

# Payments for ecosystem services in Indonesia

HELEN SUICH, MEGA LUGINA, MUHAMMAD Zahrul MUTTAQIN  
IIS ALVIYA and GALIH KARTIKA SARI

**Abstract** Payments for ecosystem services schemes are viewed as having the potential to achieve positive biodiversity and ecosystem service outcomes and social outcomes, and they have been widely studied since their development in the 1990s. We describe the state of payments for ecosystem services in Indonesia, where nine schemes were identified, four involving water and five involving carbon. We also assess the perceptions of stakeholders (donors, government, and non-government agencies) regarding the status of such schemes in Indonesia, and their views on what factors support or constrain their development. The main factors perceived to support payments for ecosystem services schemes were easily identifiable ecosystem services and service users, and the long-term support provided by individuals or institutions that facilitate the schemes, building on existing relationships between communities and these facilitating agencies. Stakeholders identified problems relating to regulation: the lack of regulation specifically in relation to payments for ecosystem services, but also overlap and uncertainties regarding regulations. Other constraining factors identified were the lack of recognition of environmental problems amongst potential buyers, and issues of rights and tenure for local communities. With so few operational programmes to date, covering a relatively small land area, and such constraints to further development, payments for ecosystem services schemes appear to have limited scope to supply ecosystem services successfully and sustainably at scale.

**Keywords** Forest conservation, Indonesia, payments for ecosystem services, perceptions, stakeholder assessment

## Introduction

Indonesia has the third largest expanse of tropical forest, with globally important biodiversity and carbon stores and locally important ecosystem service delivery. The country has experienced high rates of deforestation since the 1990s (Hansen et al., 2009), with c. 6.02 million ha of

primary forest lost during 2000–2012 (Margono et al., 2014), and is the third largest emitter of greenhouse gases (Sloan et al., 2012). Several activities have been implemented to reduce deforestation rates, with considerable attention being given to the potential for REDD+ (Reduced Emissions from Deforestation and forest Degradation) activities (Maryani et al., 2012; WWF, 2013; Luttrell et al., 2014; Moeliono et al., 2014; Sills et al., 2014), and a moratorium on new agriculture and logging licences and concessions was announced by the President in 2011 (Murdiyarso et al., 2011; Sloan, 2014).

The central principle of payments for ecosystem services schemes is that the providers of ecosystem services should be compensated for their efforts, and those who benefit from those services should pay for their provision (Pagiola & Platais, 2002), as is the case with most non-environmental goods and services. Such schemes have been identified as having the potential to contribute to the supply of ecosystem services, including carbon and other services, and globally in 2013 205 active payments for ecosystem services programmes were identified just for watershed services, with a further 76 projects in development (Bennett et al., 2013).

Available literature suggests that payments for ecosystem services schemes have been operating in Indonesia for more than a decade (Landell-Mills & Porras, 2002), where they are reported to have spread relatively quickly (Suyanto et al., 2005) and be relatively widely accepted (Fauzi & Anna, 2013). Most of this literature (both published and grey) analyses aspects of project design or implementation (Suyanto et al., 2007; Wunder et al., 2008; Leimona et al., 2010; Pirard & Billé, 2010; Ajayi et al., 2012), or some aspect of institutional arrangements (Arifin, 2005; Collins et al., 2011; Fauzi & Anna, 2013).

Two gaps in the available analyses are apparent. The first is that a majority of the analyses of Indonesian payments for ecosystem services schemes have focused on a few pilot projects, and therefore it is not clear how widely such schemes have been implemented across the country. The second is the rarity of cross-project analysis; such synthesis is a useful means of drawing lessons from experience, as has been occurring elsewhere in South-east Asia (Pham et al., 2013; Milne & Chervier, 2014; Nabangchang, 2014; VFPDF, 2014) and in the design of similar or more recent incentive-based programmes such as REDD+ (Wunder, 2009; Tacconi et al., 2010a; Caplow et al., 2011; Corbera, 2012; Mahanty et al., 2013; Karsenty et al., 2014; Loft et al., 2014).

We attempted to address both of these gaps by investigating current and historical schemes involving payments (either in cash or in kind) to ecosystem service suppliers in

HELEN SUICH (Corresponding author) Australian National University, Crawford School of Public Policy, Canberra, Australian Capital Territory, Australia  
E-mail [helen.suich@anu.edu.au](mailto:helen.suich@anu.edu.au)

MEGA LUGINA, MUHAMMAD Zahrul MUTTAQIN, IIS ALVIYA and GALIH KARTIKA SARI  
Forestry Research, Development and Innovation Agency, Ministry of Forestry, Bogor, Indonesia

Received 4 December 2015. Revision requested 19 January 2016.  
Accepted 19 February 2016. First published online 20 June 2016.

Indonesia, where the payments are conditional on the creation or maintenance of those ecosystem services. We also aimed to assess the experience of payments for ecosystem services in Indonesia with respect to how differences in the design of benefit-sharing mechanisms affect the incentives for community participation in ecosystem service supply schemes, and the impacts of such schemes on the livelihoods of participants. Finally, we examined stakeholders' views of the factors that support or constrain the development of payments for ecosystem services schemes in Indonesia.

## Methods

The first step in assessing the experience of payments for ecosystem services schemes in Indonesia was to compile a comprehensive list of all projects and programmes with a direct payments approach to the provision of ecosystem services, whether individually or bundled (i.e. in combination). This was achieved by searching both published and grey literature for projects described as being (or having the potential to be) linked to an ecosystem service market. To reduce the chance of excluding relevant projects in the first instance, the search and construction of a long-list was designed to be as inclusive as possible and incorporate a wide range of projects, including those described specifically as payments for ecosystem services, as well as others (e.g. those described as REDD+, clean development mechanism or voluntary carbon standard projects).

Information was then sought about partners (individuals or organizations) involved in the design, implementation or funding of the scheme, whether they were government or non-government, Indonesian or international. To determine if the long-listed projects could be categorized as payments for ecosystem services schemes, one or more partners representing each scheme were contacted by telephone or email and questioned about the projects to determine whether they matched the specified criteria for such a scheme.

The definition of payments for ecosystem services is widely discussed in the literature (e.g. Wunder, 2005; Tacconi, 2012; Derissen & Latacz-Lohmann, 2013; Sattler & Matzdorf, 2013; Wunder, 2015). For the purposes of this research, schemes were included in the analysis if the purpose of the scheme was to create or sustain the provision of ecosystem services by sellers who participated voluntarily; buyers paid for either (1) activities considered to generate ecosystem services provision (i.e. payments for inputs, where payments were based on some biological or ecological understanding of the connection between the activity being paid for and the provision of ecosystem services), or (2) direct provision of ecosystem services (i.e. payments for outputs); payments were made only if agreed criteria to provide ecosystem services were met (i.e. there was conditionality);

and the scheme had made or was currently making payments for provision of ecosystem services at one or more sites in Indonesia.

Project contacts for long-listed projects were interviewed to determine whether the projects met these criteria. They were also questioned about their knowledge of other projects (i.e. snowball sampling) to ensure our coverage of actual and potential projects was as complete as possible. Information derived from this fact-checking was used to confirm the existence of projects; to add, supplement or amend information about projects; or to remove projects that did not meet the criteria from the long-list.

We consulted a variety of stakeholders to elicit their perspectives about the reasons for the success of payments for ecosystem services schemes, and constraints to the expansion of such schemes in Indonesia. In the first instance we interviewed stakeholders involved in projects that met the selection criteria. We also interviewed a number of other stakeholders who could reasonably be interpreted as playing (or potentially playing) a role in supporting, designing or implementing local-level payments for ecosystem services schemes. A total of 39 interviews were conducted, with national government officials (7), representatives of national and international conservation NGOs (15), representatives of international donor agencies (8), stakeholders (including in the private sector) who were actively involved in existing or developing payments for ecosystem services or REDD+ activities (6), and payments for ecosystem services researchers in Indonesia (3). The interviews took place during March, August and October 2014.

Our aim is to improve the understanding of factors that facilitate and constrain the development of payments for ecosystem services schemes in Indonesia, not to judge the merits, or otherwise, of the projects being implemented. Determining the spread of such schemes is important in assessing whether the proponents have been successful in creating sustainable mechanisms for ecosystem services provision over time, and whether the schemes have achieved their potential as a sustainable means of paying for conservation (Pagiola, 2007). We also sought to understand the factors supporting or constraining the spread of payments for ecosystem services activities, because of the direct implications for REDD+ schemes planning to work with local communities to provide carbon sequestration services.

Notes from all 39 interviews (46 interviewees) were transcribed and then analysed using *NVivo v. 10* (QSR International, Melbourne, Australia). All interviews were coded for a number of themes. One thematic group related to the motivation for project design, including views on the types of payments to communities or individuals typical of payments for ecosystem services schemes. Another group related to the reasons for the lack of spread of such schemes across Indonesia, and elements that may facilitate such spread in the future. Interviews in which an active or

defunct scheme was discussed were also coded for elements of the design of the scheme. Our results are drawn from these interviews unless otherwise indicated. Discussions about payments for ecosystem services schemes in this paper include local-level REDD+ schemes that make payments for carbon sequestration activities, but where the REDD+ is referenced specifically this is made clear in the quoted material.

A number of interviewees represented organizations that were initially identified as supporting payments for ecosystem services schemes but which further investigation revealed not to be the case. The views of these interviewees are not considered in relation to the development of existing schemes (see Perceptions of payments for ecosystem services) but they are included in the presentation of stakeholders' views, and in the Discussion, as they facilitate understanding of the development of payments for ecosystem services in Indonesia.

## Results

### Payments for ecosystem services projects in Indonesia

Once projects were identified (and duplicates removed), the long-list featured 87 projects. We contacted key institutions about each of these projects and removed those that did not meet the above-mentioned criteria, leaving nine projects that had been or were actively making conditional payments for the provision of ecosystem services. In the interim, one of these, the Kalimantan Forests and Climate Partnership project, has ceased operations (Howes, 2013).

Projects were excluded from further consideration for a number of reasons; for example, if a project description had been found in the literature but no project was actually developed and implemented. In a number of cases the projects described failed to incorporate payments and conditionality as part of their implementation strategies. Several projects that were in the design or implementation phase were not included in the analysis because they were yet to make any conditional payments for ecosystem services provision.

The key features of the schemes that met all of the selection criteria are described in Table 1. The schemes include communities in several districts across Indonesia and involve a range of community and private sector sellers of ecosystem services, non-governmental and private sector intermediary organizations, and both private and public funders (purchasers of ecosystem services). Schemes were identified for water and carbon services only, and all schemes involved similar activities, primarily forest conservation and tree planting. None of these schemes bundled ecosystem services.

Several features of these existing projects meant that further investigation of the impact of design elements on livelihoods and community and individual participation would

not yield meaningful results at this stage. Many are pilot or demonstration schemes (Pirard & Billé, 2010). This created an expectation that a variety of design mechanisms and activities would be tested by the various schemes. However, variation in design characteristics appears to be correlated with the intermediary organizations, with each using similar designs for the projects they are involved in. This similarity of design elements may mean that opportunities to learn from implementation are reduced because of the relative lack of diversity in design, although not with respect to the context of operation. However, the two most important features that made an impact analysis non-viable were the recent start date of payments in several schemes (meaning impacts would not have had sufficient time to emerge) and, in most cases, the relatively small payments being made to ecosystem services sellers.

### Perceptions of payments for ecosystem services

Interviewees held a wide range of views about the appropriateness of payments for ecosystem services schemes (and REDD+ as a subset of such schemes) in ensuring the provision of ecosystem services in Indonesia. One interviewee (interviewee 23) noted that 'people seem to be quite polarized. They either think it's the answer to everything or it's evil. Very few people sit in the middle.'

The greatest range of views on the potential, or otherwise, of payments for ecosystem services schemes to contribute to conservation was found amongst the intermediary agencies (large and small, domestic and foreign NGOs), approximately half of which were actively involved in the design and implementation of payments for ecosystem services schemes.

Of those not involved in project implementation approximately half actively opposed payments for ecosystem services and expressed a dislike of direct payments to communities. According to interviewee 14, 'it's almost a blackmail kind of thing, where people will say they'll hold the chainsaw to the tree: if you don't pay us, we'll cut it down.' Interviewee 4 suggested that front-loading payments for activities was akin to bribing the community. However, the other half of non-implementing intermediaries took a less oppositional stance, generally agreeing that 'monetary incentives are not always the answer to a lot of problems, particularly conservation problems' (interviewee 16).

Intermediaries involved in payments for ecosystem services projects supported cash payments, and particularly the agency of community members: 'We want transaction payments. Whether the money will be used for this or that, it's their [the communities'] business. . . it's up to them' (interviewee 11). However, even within an organization that actively supported payments for ecosystem services, the view was held that 'payments for ecosystem services will be exceptional. . . REDD+ is included in this. The issue is, to

TABLE 1 Key features of payments for ecosystem services (PES) schemes implemented in Indonesia.

Scheme	Province	Start of PES	Seller	Buyer	Payment	Intermediary	Activity
<b>Water</b>							
Cidanau	Banten	2001	c. 30 farmer groups	State-owned enterprise	IDR 1.2 million per ha	Stakeholder group	Tree planting, agroforestry
Mount Rinjani Payments for Watershed Services	Lombok/Nusa Tenggara Barat	2009	25 groups in 12 villages	Water association members/users	IDR 30–80 million per group	NGO	Rehabilitation, reforestation
Aceh Payments for Watershed Services	Aceh	2009	10 farmer groups	Companies	IDR 70–90 million per contract	NGO & stakeholder group	Tree planting, prevent tree cutting & pollution
Sumberjaya	Lampung	2007	3 villages	Company	IDR 1.5–1.6 million per ha	NGOs	Tree planting, river bank conservation, construction of terraces & sediment pits
<b>Carbon</b>							
Ketapang	West Kalimantan	2013*	Villages	Donors (including private foundations)	IDR 100,000,000 per village per annum	NGO	Avoiding planned deforestation
Merangin	Jambi	2013*	Villages	Donors (including private foundations)	IDR 100,000,000 per village per annum	NGO	Avoiding unplanned deforestation
Rimba Raya	Central Kalimantan	2008 (but not sales)*	Private sector (ecosystem restoration concession licence)	Private sector	Not applicable (90 million t, 30 years; 2.2 million verified carbon units)		Avoiding planned deforestation
Berau Forest Carbon Programme	East Kalimantan	2007	Villages	Donor (international)	USD 25,000 per village per annum	NGO	Reduced deforestation, forest rehabilitation
Kalimantan Forests & Climate Partnership	Central Kalimantan	2010–2014*	Villages	Donor (international)	AUD 1.8 million total	Kalimantan Forests & Climate Partnership	Tree planting, intended canal blocking

\*These schemes are paying for inputs (i.e. compensating participants for their activities) rather than paying for outputs.

do this you need a lot of money. But if there is a lot of money then there are too many power issues, and powerful people put their interests [first]' (interviewee 7).

Within government, donor and other stakeholder groups, differences in opinion were less extreme. Even where these categories of stakeholders were not actively involved in designing, implementing or funding payments for ecosystem services projects, all interviewees were broadly supportive of the principles of the use of conditional incentive payments to achieve outcomes. However, one donor (interviewee 27) made the distinction between projects for carbon and those for other ecosystem services, being generally unsupportive of project-level activities for carbon because 'they don't address the threats [at a large enough scale].'

Too few interviews were held with private-sector personnel to gain an understanding of the breadth of support for payments for ecosystem services mechanisms but there was enthusiasm for the principle amongst those interviewed. Although it was beyond the scope of this research to investigate the demand for ecosystem services amongst the private sector, future research in this area would be valuable, focusing not only on large enterprises and multinationals but also on small and medium-sized businesses.

Despite the support for payments for ecosystem services expressed by all national government representatives interviewed, the government, and specifically the Ministry of Forestry, was perceived by non-government respondents as lacking the interest or political will to actively support the implementation of projects. The awareness and understanding of payments for ecosystem services amongst provincial and district government departments and officials were also questioned.

Stakeholders' views on why payments for ecosystem services approaches had not spread more widely in Indonesia were categorized into macro- and micro-level concerns. The former related to the policy and regulatory environment in which payments for ecosystem services schemes would be introduced, and the latter to the operationalization of payment schemes. A number of macro-level constraints were identified, and despite the stated support of government for payments for ecosystem services schemes, many of the macro-level constraints centred on government actions and the regulatory context in which projects were implemented, as well as issues of trust.

The first constraint to be overcome was how to get buyers and sellers to recognize the problems of land and forest degradation, and the increasing scarcity of certain ecosystem services, as some in the private sector retained the belief that 'ecosystem services are free' (interviewee 7). Even where demand for ecosystem services had been exhibited, the commitment of the private sector to purchasing ecosystem services as a routine business operation was questioned because payments are often made from corporate social responsibility (CSR) funds rather than being treated as

operating costs. According to interviewee 3, 'it is still philanthropic in many ways, and companies are trying to be good corporate citizens. The majority of it is CSR-related.'

Just under 50% of respondents felt there was potential for increasing demand for ecosystem services, with 41% of those identifying the private sector as a potential buyer of ecosystem services (surprisingly positive views, given that few firms are currently involved in active payments for ecosystem services projects in Indonesia), although approximately half of these indicated that they would only be willing to purchase ecosystem services if regulations required them to do so. One respondent stated that the private sector would have no interest in financing payments for ecosystem services schemes. The remaining respondents identified the Indonesian government and foreign donors as potential financiers of such schemes.

The respondents who suggested that the private sector would potentially be interested in paying for ecosystem services believed that private sector participation was currently constrained by uncertainty about the future. In the early days of REDD+ there was considerable interest but most projects were dropped because of the global financial crisis, the delays in negotiating project design and implementation amongst the partners, and the uncertainty around rights and benefit-sharing mechanisms.

The second constraint identified was the questionable level of government commitment to payments for ecosystem services, as demonstrated by the persistence of overlapping and conflicting regulations and the apparently ineffective regulatory development processes. More than 90% of interviewees drew attention to the issue of conflicting and overlapping regulations and the shifting policy regime, exacerbated by the various levels at which regulations can be enacted (district, provincial and national) and the multiple ways in which they can be interpreted. This results in uncertainty.

The uncertainty of the regulatory environment in Indonesia was contrasted with regulation of payments for ecosystem services in other locations, including Costa Rica, where 'there is a clear law and a very strong certainty related to the law, so people are willing to pay because there is certainty and clarity' (interviewee 11). In fact, the Costa Rican scheme is largely funded by government through the collection of taxes, primarily on fuel but more recently also on water (Porrás et al., 2013).

The regulatory development process within government also contributes to this uncertainty. Although regulation related to payments for ecosystem services schemes has been ready for 2 years, 'some bureaucrats are not there to take risks' (interviewee 20), and it has not been put forward for official approval. Furthermore, 'there needs to be clear guidance, but I don't know whether the government is quite serious to consider this' (interviewee 2).

One quarter of respondents felt that a lack of regulation was a stumbling block to the spread of payments for



ecosystem services schemes in Indonesia. However, when asked about the type of regulations that were lacking they could rarely identify specific issues that, if resolved, could support the establishment of such schemes. The lack of available mechanisms to deliver payments legally at the community level was identified repeatedly. However, schemes currently in operation are already making payments using a variety of mechanisms, and therefore this constraint appears to relate more to a lack of knowledge than to a need for additional regulation.

A further constraint associated with the regulatory environment was the lack of ‘synchronization and coordination’ between ministries. This may be partially overcome by the merger between two ministries into the Ministry of Environment and Forestry, which began in late 2014, but it will depend on the leadership and operations within the new ministry. Coordination with the finance ministry will remain critical because it holds the responsibility for developing regulations regarding benefit sharing.

The lack of clarity over property rights is perceived as a critical constraint to the spread of payments for ecosystem services schemes but is recognized as a factor affecting rural development generally, and not only payments for ecosystem services projects. ‘Without well-defined rights it is very difficult to develop a mechanism and to address who is going to benefit’ (interviewee 9), and to determine who the ecosystem service sellers are. It will be necessary to ‘support communities to have their tenure rights clarified. Once you’ve done that, then you can layer a project on top of that, but unless you’ve solved that you’ve got too much uncertainty’ (interviewee 19).

Interviewees from all stakeholder groups noted that the length of time required to operationalize a project was a factor reducing the incentive to participate. Some delays were attributable to the uncertain regulatory environment and also to the need to build trust between the parties, in most cases between ecosystem services sellers (communities) and intermediaries: ‘in our experience, it is a long process to ensure that we don’t just come to the village and spend money, but that they understand. This needs a long run process, not an instant process’ (interviewee 29). This process had taken more than 3 years in at least two of the operating projects.

Government processes can also delay aspects of projects. Although the Rimba Raya project started in 2008 and generated carbon credits from that time, the credits could not be sold until after the project was granted a full restoration licence in 2013. For another project, in the Cidanau watershed, it took 4 years to finalize negotiations with the buyer. Three intermediaries involved in payments for ecosystem services projects stated that projects had been abandoned by buyers because of the length of time it took to reach agreements between all parties, particularly for carbon services.

## Discussion

The majority of the stakeholders interviewed were supportive of the principle of using incentive-based mechanisms, such as payments for ecosystem services schemes, although only approximately half were directly involved in the design, implementation or funding of such schemes in Indonesia. Three intermediary institutions expressed dissatisfaction with the idea of paying communities for the provision of ecosystem services. The identified constraints to the spread of payments for ecosystem services projects in Indonesia can be categorized broadly as a lack of recognition that degradation and scarcity of ecosystem services is a problem, and the constraints imposed by the conflicting and uncertain regulatory environment.

The lack of recognition amongst buyers and sellers of the problems associated with environmental degradation is not unique to Indonesia (GCP et al., 2014). Although the number of projects scoped, especially carbon-related projects, suggests that initial interest was relatively strong, the subsequent lack of implementation suggests that the transaction costs associated with the transition from design to implementation were too high, particularly for potential buyers.

The dearth of programmes being driven by the private sector, and the use of corporate social responsibility funds to purchase ecosystem services seem to support the suggestion that the private sector does not yet recognize the scarcity of ecosystem services as a threat to continued operations, or that environmental degradation may be an externality that they are (partially) responsible for. Additionally, it has not been clear whether, or where, the benefits of ecosystem service delivery exceed the costs, although recent studies go some way towards addressing the lack of information regarding values and the distribution of benefits from ecosystem services (Prasetyo et al., 2009; Yamamoto & Takeuchi, 2012; Sumarga et al., 2015; Suwarno et al., 2015).

A lack of information about the operation of payments for ecosystem services schemes is likely to have a negative impact on the understanding and awareness of such schemes, particularly amongst provincial and district governments, which have a critical role in natural resource management. Without such information, governments are unlikely to shift their focus from productive utilization, where ‘policy is driven by a timber mindset’ (interviewee 20).

The remaining constraints contributed to the uncertainty facing both potential purchasers and suppliers of ecosystem services, apparently adding significantly to the transaction costs of a scheme (i.e. the costs of defining the service to be traded, finding trading partners, and negotiating and closing contracts; Niehans, 1971, cited in Coggan et al., 2015).

The constraints affecting payments for ecosystem services in Indonesia overlap significantly with the reasons identified for the poor spread of payment schemes for watershed services in sub-Saharan Africa (Ferraro, 2009) and with constraints to other such schemes elsewhere (Vatn, 2010; Alix-Garcia & Wolff, 2014). They also align, in reverse, with the economic, institutional and cultural preconditions for payments for ecosystem services as identified by Wunder (2013). Economic preconditions are that the benefits exceed the costs of any intervention (as discussed above), cultural preconditions describe the necessity for both users and providers to have a motive for action, whereas the institutional preconditions relate to trust, transaction costs and tenure (Wunder, 2013).

Schemes operating in Indonesia have demonstrated that buyers can be organized to make payments for ecosystem services but only in circumstances where intermediaries initiate activities. This may be because intermediaries cut transaction costs by developing a formula for project design and implementation (Banerjee et al., 2013); in Indonesia each intermediary involved in multiple active projects made similar choices about mechanism design (Table 1).

Although factors supporting the establishment and continuation of the projects identified were not discussed explicitly during the interviews, schemes that have been implemented successfully have evidently been built on trust (Wunder, 2013). In all active schemes, intermediary agencies had been working with community providers of ecosystem services in each location prior to the introduction of payment schemes. The trust fostered during this time seems to have been a factor in reducing transaction costs, thus improving the viability of project implementation (Sunderlin & Sills, 2012). This kind of trust-building has been described as a contributor to the success of the Cidanau watershed scheme (Leimona et al., 2010), and other schemes (Tacconi et al., 2010b; Mahanty et al., 2013; Namaalwa & Nabanoga, 2013).

Clarity and security of tenure are institutional preconditions for payments for ecosystem services schemes, and are generally problematic in Indonesia. Almost all stakeholders identified the lack of clarity and security of tenure as a constraint to payments for ecosystem services schemes, and issues related to land tenure have been studied extensively in Indonesia (Collins et al., 2011; Indrarto et al., 2012; Murdiyarto et al., 2012; Resosudarmo et al., 2014; Sunderlin et al., 2014).

Ecosystem services have been identified as a way of 'escaping the control of public authorities' (Pirard, 2012, p. 25), as the absence of regulation facilitates more adaptive management of projects. However, in Indonesia there is demand amongst stakeholders for government guidance and regulation to reduce the uncertainty regarding payments for ecosystem services. Furthermore, government guidelines and regulation may raise the profile of payments for

ecosystem services, and thus encourage buyers to participate. However, this would not be successful if any new regulation simply added to the existing conflictual and overlapping regulatory regime. It is our opinion that improving the clarity of the regulatory environment would be of greater benefit.

The necessity of government involvement is more straightforward in some cases; for example, in the Cidanau watershed scheme, government regulation was necessary to facilitate implementation (Pirard et al., 2014). Government agencies that are not primarily concerned with environmental outcomes could be important in driving wider implementation of payments for ecosystem services schemes (e.g. to achieve poverty alleviation outcomes; Rosa da Conceição et al., 2015). The merger between the ministries of forestry and the environment is a cause for optimism that the development of payments for ecosystem services may accelerate.

These findings confirm the conclusions of other researchers: although many potential schemes have been identified and projects announced, there is little information available about them (Landell-Mills & Porrás, 2002; Heyde et al., 2012). There has also been a lack of learning from activities and a lack of analysis of experiences, which continues to be the case in Indonesia. Some projects have been underway for more than a decade and have hosted numerous study visits, yet many of the issues identified in this study as reasons for the lack of spread of payments for ecosystem services schemes in Indonesia have been at least partially addressed by existing projects.

High transaction costs appear to be the most significant constraint to the scaling-up of payments for ecosystem services schemes. It would thus be useful to understand the role, if any, of such costs in schemes that are already in operation, and to identify opportunities to reduce the transaction costs of these schemes and payments for ecosystem services schemes more generally.

Despite the low rate of expansion of payments for ecosystem services in Indonesia after more than a decade of activity, it may be premature to be disillusioned with such schemes as a means of achieving conservation and social goals (Redford & Adams, 2009) given the relatively limited experience of their implementation and application in the country.

## Acknowledgements

This research was funded by the Australian Centre for International Agricultural Research, project FST/2012/040. We thank Mary Milne, Gabriela Scheufele and Luca Tacconi for their insightful comments. The perceptive comments of two anonymous reviewers were also appreciated. Any remaining errors are the responsibility of the authors.

## References

- AJAYI, O.C., JACK, B.K. & LEIMONA, B. (2012) Auction design for the private provision of public goods in developing countries: lessons from payments for environmental services in Malawi and Indonesia. *World Development*, 40, 1213–1223.
- ALIX-GARCIA, J. & WOLFF, H. (2014) Payment for ecosystem services from forests. *Annual Review of Resource Economics*, 6, 361–380.
- ARIFIN, B. (2005) *Institutional Constraints and Opportunities in Developing Environmental Service Markets: Lessons from Institutional Studies on RUPES in Indonesia*. RUPES Working Paper No.2005/1. World Agroforestry Centre, Bogor, Indonesia.
- BANERJEE, S., SECCHI, S., FARGIONE, J., POLASKY, S. & KRAFT, S. (2013) How to sell ecosystem services: a guide for designing new markets. *Frontiers in Ecology and the Environment*, 11, 297–304.
- BENNETT, G., CARROLL, N. & HAMILTON, K. (2013) *Charting New Waters. State of Watershed Payments 2012*. Forest Trends, Washington, DC, USA.
- CAPLOW, S., JAGGER, P., LAWLOR, K. & SILLS, E. (2011) Evaluating land use and livelihood impacts of early forest carbon projects: lessons for learning about REDD+. *Environmental Science & Policy*, 14, 152–167.
- COGGAN, A., VAN GRIEKEN, M., BOULLIER, A. & JARDI, X. (2015) Private transaction costs of participation in water quality improvement programs for Australia's Great Barrier Reef: extent, causes and policy implications. *Australian Journal of Agricultural and Resource Economics*, 59, 499–517.
- COLLINS, M., MACDONALD, E.A., CLAYTON, L., DUNGGIO, I., MACDONALD, D.W. & MILNER-GULLAND, E.J. (2011) Wildlife conservation and reduced emissions from deforestation in a case study of Nantu Wildlife Reserve, Sulawesi: 2. An institutional framework for REDD implementation. *Environmental Science & Policy*, 14, 709–718.
- CORBERA, E. (2012) Problematizing REDD+ as an experiment in payments for ecosystem services. *Current Opinion in Environmental Sustainability*, 4, 612–619.
- DERISSEN, S. & LATA CZ-LOHMANN, U. (2013) What are PES? A review of definitions and an extension. *Ecosystem Services*, 6, 12–15.
- FAUZI, A. & ANNA, Z. (2013) The complexity of the institution of payment for environmental services: a case study of two Indonesian PES schemes. *Ecosystem Services*, 6, 54–63.
- FERRARO, P.J. (2009) Regional review of payments for watershed services: sub-Saharan Africa. *Journal of Sustainable Forestry*, 28, 525–550.
- GCP, IPAM, FFI & UNEP FI (2014) *Stimulating Interim Demand for REDD+ Emission Reductions: The Need for a Strategic Intervention from 2015 to 2020*. Global Canopy Programme, Oxford, UK; the Amazon Environmental Research Institute, Brasilia, Brazil; Fauna & Flora International, Cambridge, UK; and UNEP Finance Initiative, Geneva, Switzerland.
- HANSEN, M.C., STEHMAN, S.V., POTAPOV, P.V., ARUNARWATI, B., STOLLE, F. & PITTMAN, K. (2009) Quantifying changes in the rates of forest clearing in Indonesia from 1990 to 2005 using remotely sensed data sets. *Environmental Research Letters*, 4, 034001.
- HEYDE, J., LUKAS, M.C. & FLITNER, M. (2012) Payments for Environmental Services in Indonesia: A Review of Watershed-related Schemes. artec Forschungszentrum Nachhaltigkeit, Universität Bremen, Bremen, Germany.
- HOWES, S. (2013) KFCP: begun with a bang, ending with a whimper. <http://devpolicy.org/in-brief/kfcp-begun-with-a-bang-ending-with-a-whimper-20130701-2/> [accessed 10 July 2013].
- INDRARTO, G.B., MURHARJANTI, P., KHATARINA, J., PULUNGAN, I., IVALERINA, F., RAHMAN, J. et al. (2012) The context of REDD+ in Indonesia. Drivers, agents and institutions. CIFOR Working Paper No.92. CIFOR, Bogor, Indonesia.
- KARSENTY, A., VOGEL, A. & CASTELL, F. (2014) 'Carbon rights', REDD+ and payments for environmental services. *Environmental Science and Policy*, 35, 20–29.
- LANDELL-MILLS, N. & PORRAS, I. (2002) *Silver Bullet or Fools' Gold? A Global Review of Markets for Forest Environmental Services and their Impact on the Poor*. IIED, London, UK.
- LEIMONA, B., PASHA, R. & RAHADIAN, N.P. (2010) The livelihood impacts of incentive payments for watershed management in Cidanau watershed, West Java, Indonesia. In *Payments for Environmental Services, Forest Conservation and Climate Change. Livelihoods in the REDD?* (eds L. Tacconi, S. Mahanty & H. Suich). Edward Elgar, London, UK.
- LOFT, L., PHAM, T.T. & LUTTRELL, C. (2014) *Lessons from Payments for Ecosystem Services for REDD+ Benefit-Sharing Mechanisms*. CIFOR, Bogor, Indonesia.
- LUTTRELL, C., RESOSUDARMO, I.A.P., MUHARROM, E., BROCKHAUS, M. & SEYMOUR, F. (2014) The political context of REDD+ in Indonesia: constituencies for change. *Environmental Science and Policy*, 35, 67–75.
- MAHANTY, S., SUICH, H. & TACCONI, L. (2013) Access and benefits in payments for environmental services and implications for REDD+: lessons from seven PES schemes. *Land Use Policy*, 31, 38–47.
- MARGONO, B.A., POTAPOV, P.V., TURUBANOVA, S., STOLLE, F. & HANSEN, A.M.C. (2014) Primary forest cover loss in Indonesia over 2000–2012. *Nature Climate Change*, 4, 730–735.
- MARYANI, R., AGUNG, P. & SUYANTO (2012) REDD+ in Indonesia: a historical perspective. Working Paper No.154. ICRAF, Bogor, Indonesia.
- MILNE, S. & CHERVIER, C. (2014) *A Review of Payments for Environmental Services (PES) Experiences in Cambodia*. CIFOR, Bogor, Indonesia.
- MOELIONO, M., GALLEGRE, C., SANTOSO, L., BROCKHAUS, M. & DI GREGORIO, M. (2014) Information networks and power: confronting the 'wicked problem' of REDD+ in Indonesia. *Ecology and Society*, 19.
- MURDIYARSO, D., BROCKHAUS, M., SUNDERLIN, W.D. & VERCHOT, L. (2012) Some lessons learned from the first generation of REDD+ activities. *Current Opinion in Environmental Sustainability*, 4, 678–685.
- MURDIYARSO, D., DEWI, S., LAWRENCE, D. & SEYMOUR, F. (2011) *Indonesia's Forest Moratorium: A Stepping Stone to Better Forest Governance?* CIFOR, Bogor, Indonesia.
- NABANGCHANG, O. (2014) *A Review of the Legal and Policy Framework for Payments for Ecosystem Services (PES) in Thailand*. CIFOR, Bogor, Indonesia.
- NAMAALWA, J. & NABANO, G.N. (2013) *Assessing Local Preferences for Payment Formats in REDD+ Interventions. A Case Study of the Ongo Community Forest*. REDD+ Country Report. IIED, London, UK.
- PAGIOLA, S. (2007) *Guidelines for 'Pro-poor' Payments for Environmental Services*. World Bank, Washington, DC, USA.
- PAGIOLA, S. & PLATAIS, G. (2002) Payments for environmental services. *Environment Strategy Notes*, 3, 1–23.
- PHAM, T.T., BENNETT, K., VU, T.P., BRUNNER, J., LE, N.D. & NGUYEN, D.T. (2013) *Payments for Forest Environmental Services in Vietnam: from Policy to Practice*. CIFOR Brief No.22. CIFOR, Bogor, Indonesia.
- PIRARD, R. (2012) Market-based instruments for biodiversity and ecosystem services: a lexicon. *Environmental Science and Policy*, 19–20, 59–68.
- PIRARD, R. & BILLE, R. (2010) *Payments for Environmental Services (PES): A Reality Check (Stories from Indonesia)*. IDDRI Analyses No.3/10 June 2010. IDDRI, Paris, France.



- PIRARD, R., DE BUREN, G. & LAPEYRE, R. (2014) Do PES improve the governance of forest restoration? *Forests*, 5, 404–424.
- PORRAS, I., BARTON, D.N., CHACÓN-CASCANTE, A. & MIRANDA, M. (2013) *Learning from 20 Years of Payments for Ecosystem Services in Costa Rica*. IIED, London, UK.
- PRASETYO, F.A., SUWARNO, A., PURWANTO & HAKIM, R. (2009) Making policies work for payment for environmental services (PES): an evaluation of the experience of formulating conservation policies in districts of Indonesia. *Journal of Sustainable Forestry*, 28, 415–433.
- REDFORD, K.H. & ADAMS, W.M. (2009) Payment for ecosystem services and the challenge of saving nature. *Conservation Biology*, 23, 785–787.
- RESOSUDARMO, I.A.P., ATMADJA, S., EKAPUTRI, A.D., INTARINI, D.Y., INDRIATMOKO, Y. & ASTRI, P. (2014) Does tenure security lead to REDD+ project effectiveness? Reflections from five emerging sites in Indonesia. *World Development*, 55, 68–83.
- ROSA DA CONCEIÇÃO, H., BÖRNER, J. & WUNDER, S. (2015) Why were upscaled incentive programs for forest conservation adopted? Comparing policy choices in Brazil, Ecuador, and Peru. *Ecosystem Services*, 16, 243–252.
- SATTLER, C. & MATZDORF, B. (2013) PES in a nutshell: from definitions and origins to PES in practice—approaches, design process and innovative aspects. *Ecosystem Services*, 6, 2–11.
- SILLS, E.O., ATMADJA, S.S., SASSI, C.D., DUCHELLE, A.E., KWEKA, D.L., RESOSUDARMO, I.A.P. & SUNDERLIN, W.D. (eds) (2014) *REDD+ on the Ground. A Case Book of Subnational Initiatives Across the Globe*. CIFOR, Bogor, Indonesia.
- SLOAN, S. (2014) Indonesia's moratorium on new forest licenses: an update. *Land Use Policy*, 38, 37–40.
- SLOAN, S., EDWARDS, D.P. & LAURANCE, W.F. (2012) Does Indonesia's REDD+ moratorium on new concessions spare imminently threatened forests? *Conservation Letters*, 5, 222–231.
- SUMARGA, E., HEIN, L., EDENS, B. & SUWARNO, A. (2015) Mapping monetary values of ecosystem services in support of developing ecosystem accounts. *Ecosystem Services*, 12, 71–83.
- SUNDERLIN, W.D., LARSON, A.M., DUCHELLE, A.E., RESOSUDARMO, I.A.P., HUYNH, T.B., AWONO, A. & DOKKEN, T. (2014) How are REDD+ proponents addressing tenure problems? Evidence from Brazil, Cameroon, Tanzania, Indonesia, and Vietnam. *World Development*, 55, 37–52.
- SUNDERLIN, W.D. & SILLS, E.O. (2012) REDD+ projects as a hybrid of old and new forest conservation approaches. In *Analysing REDD+: Challenges and Choices* (eds A. Angelsen, M. Brockhaus, W. D. Sunderlin & L.V. Verchot), pp. 177–191. CIFOR, Bogor, Indonesia.
- SUWARNO, A., HEIN, L. & SUMARGA, E. (2015) Who benefits from ecosystem services? A case study for Central Kalimantan, Indonesia. *Environmental Management*, 57, 331–344.
- SUYANTO, S., KHUSUSIYAH, N. & LEIMONA, B. (2007) Poverty and environmental services: case study in Way Besai watershed, Lampung Province, Indonesia. *Ecology and Society*, 12, 13.
- SUYANTO, S., LEIMONA, B., PERMANA, R.P. & CHANDLER, F. (2005) *Review of the Development of Environmental Services Market in Indonesia*. ICRAF, RUPES, Bogor, Indonesia.
- TACCONI, L. (2012) Redefining payments for environmental services. *Ecological Economics*, 73, 29–36.
- TACCONI, L., MAHANTY, S. & SUICH, H. (eds) (2010a) *Payments for Environmental Services, Forest Conservation and Climate Change. Livelihoods in the REDD?* Edward Elgar, Cheltenham, UK.
- TACCONI, L., MAHANTY, S. & SUICH, H. (2010b) PES schemes' impacts on livelihoods and implications for REDD activities. In *Payments for Environmental Services, Forest Conservation and Climate Change. Livelihoods in the REDD?* (eds L. Tacconi, S. Mahanty & H. Suich), pp. 244–260. Edward Elgar, Cheltenham, UK.
- VATN, A. (2010) An institutional analysis of payments for environmental services. *Ecological Economics*, 69, 1245–1252.
- VFPDF (VIETNAM FOREST PROTECTION AND DEVELOPMENT FUND) (2014) *Payments for Forest Environmental Services (PFES) in Vietnam: Findings from Three Years of Implementation*. Vietnam Forest Protection and Development Fund, Hanoi, Vietnam.
- WUNDER, S. (2005) *Payments for Environmental Services: Some Nuts and Bolts*. CIFOR Occasional Paper No.42. CIFOR, Bogor, Indonesia.
- WUNDER, S. (2009) Can payments for environmental services reduce deforestation and forest degradation? In *Realising REDD+: National Strategy and Policy Options* (eds A. Angelsen, M. Brockhaus, M. Kanninen, E. Sills, W.D. Sunderlin & S. Wertz-Kanounnikoff), pp. 213–223. CIFOR, Bogor, Indonesia.
- WUNDER, S. (2013) When payments for environmental services will work for conservation. *Conservation Letters*, 6, 230–237.
- WUNDER, S. (2015) Revisiting the concept of payments for environmental services. *Ecological Economics*, 117, 234–243.
- WUNDER, S., CAMPBELL, B., FROST, P., SAYER, J., IWAN, R. & WOLLENBERG, L. (2008) When donors get cold feet: the community conservation concession in Setulang (Kalimantan, Indonesia) that never happened. *Ecology and Society*, 13, 12.
- WWF (2013) *Building REDD+ for People and Nature: From Lessons Learned Across Indonesia, Peru and the Democratic Republic of Congo to a New Vision for REDD+*. WWF International, Geneva, Switzerland.
- YAMAMOTO, Y. & TAKEUCHI, K. (2012) Estimating the break-even price for forest protection in Central Kalimantan. *Environmental Economics and Policy Studies*, 14, 289–301.

## Biographical sketches

HELEN SUICH is a development economist whose work focuses on poverty alleviation and sustainable livelihoods, and issues related to the sustainable management of ecosystem services in changing environments. She has worked across southern Africa for the last 15 years and in Indonesia for the last two. MEGA LUGINA is interested in forest economics and policy, especially the management of forest ecosystem services. MUHAMMAD ZAHRUL MUTTAQIN is interested in forest economics and policy, especially the utilization of forest ecosystem services and community-based forest management. IIS ALVIYA is interested in regional economic development, and her research has focused on forest socio-economics. GALIH KARTIKA SARI's research interests focus on public administration.