



Reducing forest emissions in Southeast Asia

A review of drivers of land-use change and
how payments for environmental services (PES)
schemes can affect them

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Acronyms and abbreviations

5MHRP	5 Million Hectare Reforestation Programme (5MHP)
CIFOR	Center for International Forestry Research (Indonesia)
ICRAF	World Agroforestry Centre (formerly the International Centre for Research in Agroforestry)
FAO	Food and Agriculture Organization
FFI	Flora and Fauna International
FWI/GFW	Forest Watch Indonesia/Global Forest Watch
IPCC	Intergovernmental Panel on Climate Change
MPOC	Malaysian Palm Oil Council
PES	Payments for environmental services
PNG	Papua New Guinea
REDD	Reducing emissions from deforestation and forest degradation
RUPES	The Rewarding Upland Poor for Environmental Services programme
UNFCCC	United Nations Framework Convention on Climate Change
WRI	World Resources Institute

Executive summary

Southeast Asia witnesses high rates of deforestation and forest degradation. Large-scale deforestation for agriculture (notably oil palm) is driven by international market demand. Small-scale deforestation is partly driven by: market opportunities for typical smallholder crops like rubber; land races to gain or secure property rights; and – in marginalised, remote areas of the countries – also by poverty and population growth. Forest degradation is primarily a consequence of logging activities – especially illegal logging – driven by high international demand for timber. Logging activities are concentrated in Papua New Guinea, but also occur in Indonesia, Malaysia, Myanmar and Cambodia.

Four case studies, one in Vietnam and three in Indonesia, were reviewed to derive lessons from regional PES experiences. Compared to other parts of the tropics, PES is still in its early stages in Southeast Asia, although the interest is growing. Most schemes are small pilot efforts, often still in the planning state and with few contracts yet in place. Part of the reason why PES remains nascent relates to the challenges encountered in the region: incomplete property rights, poverty considerations, weak governance structures, and high costs of PES implementation.

These regional circumstances suggest a dual strategy for REDD investments, where improvements in forest governance and in securing local land rights must go hand in hand with the development of performance-based incentive schemes. Specifically, this paper identifies the following messages:

Importance of performance-based incentive schemes with a focus on ‘pro-poor’ aspects

PES/REDD schemes in Southeast Asia need to account for poverty considerations and shortcomings associated with poverty (budget and capacity constraints). Experience with pro-poor PES is growing rapidly and preliminary evidence suggests that the poor generally benefit from PES if their transaction costs are reduced and inappropriate access barriers are removed. There is thus scope for the Asian PES/REDD model to benefit from these experiences and to focus on ‘pro-poor REDD’ as one element of the regional REDD strategy. In addition, capacity investments seem particularly important for PES start-up in the region. Most of the reviewed PES case studies lacked the background research needed to render schemes cost-effective (including baseline setting, opportunity cost assessments, and leakage control). While PES schemes can in principle emerge without these studies, international REDD transactions will most likely require these studies to ensure that emission reductions actually occur. To anticipate these conditions, investments in capacity or tools allowing quick assessments, similar to the ‘rapid hydrological appraisals’ or ‘rapid agro-biodiversity appraisals’ (as developed by RUPES), could be useful avenues.

Need for governance investments with a focus on land rights and law enforcement

Southeast Asia’s land tenure system is characterised by at least two limitations: the absence of rights or ignorance of traditional land rights, and highly restricted rights. The idea of ‘conditional land tenure’ (allocation of land rights as a form of payment) coined by RUPES is one solution to overcoming missing land rights, and an example of how PES (and REDD) can actually help improve forest governance. As only governments can allocate land rights, the use of ‘conditional land tenure’ requires government participation in the PES scheme. When land rights are highly restricted – the aforementioned second limitation to land tenure in Southeast Asia – the scope for PES is limited. It only leaves scope to use PES as a means to enforce current land- or forest-use plans (e.g., pay to comply, or enhance requirements of the ‘protection forests’).

In addition, forest governance in Southeast Asia is challenged by lenient law enforcement. Illegal land-use activities, especially illegal logging, constitute a key concern in Southeast Asia and in the REDD debate because they are generally associated with uncontrolled deforestation and forest degradation. Local governments in particular are often not in the position, or willing, to actually enforce the laws – particularly in remote areas. To achieve improved forest law and policy enforcement for the purpose of REDD, substantial investments in governance structures, including long-term incentives (or credible threats of severe sanctions), are needed for government institutions to basically ‘do their job’ – especially during the implementation phase, but also later to ensure proper functioning. However, it may be counterproductive to insist on effective law enforcement if the laws themselves are flawed, as this can imply undesired effects in terms of effectiveness (less emission reductions) and equity (less poverty reduction). A clear ex ante assessment of the laws to be enforced to control deforestation and degradation seems necessary.

1. Introduction

Each year during the 1990s, tropical deforestation and forest degradation released 2.2 (+/-0.6) billion tons of carbon into the atmosphere, of which about 49.5 per cent came from tropical Asia (Houghton 2003). The United Nation's Food and Agriculture Organization, FAO, (2005) reports a total of 43.6 million hectares deforested in the main forest countries of Southeast Asia between 1990 and 2005, corresponding to a release of about 3.45 million tons of carbon (Table 1). Emissions can double during El Niño periods, when severe drought affects large areas of Southeast Asian forests and augments burning of forests and tropical peatlands (Page et al. 2002).

Indonesia is a key contributor to forest-related emissions in Southeast Asia, emitting more carbon than all the other countries combined. Deforestation, peatland degradation, and forest fires have made Indonesia one of the three largest greenhouse gas emitters in the world: 34 per cent of global emissions from the land-use change forestry sector arise in Indonesia (PEACE 2007).

Reducing emissions from tropical deforestation and degradation (REDD) is discussed as an additional mitigation strategy in the post-2012 climate regime. Information on the drivers of deforestation and land-

Figure 1: Map of Southeast Asia



use change presents important elements to improve the design of national REDD strategies. Lessons from payments for environmental services (PES) schemes also provide important insights for REDD design.

This paper is organised as follows: Section 2 describes the drivers of land-use change and deforestation; Section 3 reviews selected PES experiences from Southeast Asia; and Section 4 comprises concluding remarks.

Table 1: Deforestation in Southeast Asian countries, 1990-2005 (Sources: FAO 2005; FAO 2007; IPCC 2006, as cited in Gibbs et al. 2007).

Country	Forest cover 2005 [1000 ha]	Average annual change in forest area 1990 – 2005 absolute [1000 ha]	Average annual change in forest area 1990- 2005 relative [%]	Forest carbon stock above-ground [MtC]	Forest carbon stock (above- & below-ground) [MtC]	Average annual carbon emissions 1990-2005 [MtC]	Carbon density (tC/ha)
Cambodia	10,447	-1,66.6	-1.59	1,266	1,222	-20.16	121
Indonesia	88,495	-1,871.5	-2.11	5,897	25,397	-125.39	67
Lao PDR	16,142	-78.1	-0.48	1,874	1,388	-3.83	49
Malaysia	20,890	-99.1	-0.47	3,510	4,821	-16.64	168
Myanmar	32,222	-466.5	-1.45	3,168	4,867	-45.71	98
Papua New Guinea	29,437	-139.1	-0.47	n/a	7,075	n/a	n/a
Philippines	7,162	-277.5	-3.18	971	2,503	-30.94	36
Thailand	14,520	-96.3	-0.66	716	2,215	-4.72	49
Vietnam	12,931	237.9	1.84	1,174	1,546	21.65	91
Total	232,246	-2,906.7	-1.25	18, 576	51, 034	-225.74	

2. Drivers of land-use change and deforestation

Basically, deforestation occurs because non-forest uses are more profitable than forest uses. Agricultural expansion and logging – especially illegal logging – are among the key drivers of deforestation in Southeast Asia, while public policies, international market demand, and governance weaknesses are reported as important underlying causes of deforestation (see Table 2).

2.1 Large-scale agriculture

Oil palm cultivation is one of the main drivers of large-scale agricultural expansion and deforestation in Southeast Asia. Other cash crops such as rubber, sugarcane and coffee also contribute to forest loss in

the region, but to a far lesser extent. Most of this cash crop production is driven by international market demand. Oil palm expansion in the region is largely the result of an increased global demand for food and cosmetics, and also for renewable energy sources. Its cultivation is concentrated in Malaysia and Indonesia: the two countries together produce more than 80 per cent of global palm oil (Ardiansyah 2007), and oil palm plantations are growing rapidly (Figure 2). In Indonesia, the majority of existing plantations are located in Sumatra, but expansion is proceeding rapidly in Kalimantan and further development is expected in Sulawesi and Papua province (formerly Irian Jaya) (FWI/GFW 2002). 30 per cent of Malaysia's oil palm production is located in Sabah.

Table 2: Drivers of land-use change and deforestation in Southeast Asian forest countries 1990-2008 (Sources: FWI/GFW 2002; Leimgruber et al. 2005; Butler 2006; WRI 2002; Yamane and Chanthirath 2000; World Bank 2007; Bottomley 2000)

Country	Key drivers	Underlying causes
Cambodia	<ul style="list-style-type: none"> • Shifting cultivation. • Wood extraction (illegal logging, fuelwood, timber production). 	<ul style="list-style-type: none"> • Demographic factors (population pressure and poverty). • Institutional factors (weak governance and corruption).
Indonesia	<ul style="list-style-type: none"> • Wood extraction (illegal logging, industrial timber plantation). • Agricultural expansion (oil palm cultivation, small-scale rubber plantations). 	<ul style="list-style-type: none"> • Public policy and institutional factors (weak institutions, corruption). • International demand for palm oil, other cash crops and timber. • Poverty.
Laos	<ul style="list-style-type: none"> • Wood extraction (logging, shifting cultivation). 	<ul style="list-style-type: none"> • Economic factors. • Demographic factors (population pressure and urban expansion).
Malaysia	<ul style="list-style-type: none"> • Agricultural expansion (oil palm and other cash crops, shifting cultivation). • Logging. • Infrastructure extension (settlements). 	<ul style="list-style-type: none"> • Institutional factors (weak governance). • International demand for palm oil and other cash crops.
Myanmar	<ul style="list-style-type: none"> • Agricultural expansion (oil palm). • Wood extraction: fuel wood, logging. 	<ul style="list-style-type: none"> • Demographic factors (population pressure and distribution). • International demand for timber.
Papua New Guinea	<ul style="list-style-type: none"> • Agricultural expansion. • Logging. • Infrastructure development (logging roads). • Mining industry (copper). 	<ul style="list-style-type: none"> • Institutional factors (corruption for logging concessions). • Demographic factors. • Poverty. • International demand for timber.
Philippines	<ul style="list-style-type: none"> • Logging. • Illegal mining. 	<ul style="list-style-type: none"> • Population pressure. • Economic factors (national development).
Thailand	<ul style="list-style-type: none"> • Illegal logging. • Infrastructure extension (private company, settlement). 	<ul style="list-style-type: none"> • Economic factors.
Vietnam	<ul style="list-style-type: none"> • Agricultural expansion. • Subsistence farming. • Mining and shifting cultivation. 	<ul style="list-style-type: none"> • Economic factors. • Poverty.

More than half of the new oil palm plantations between 1990 and 2005 in Malaysia and Indonesia were established on forestlands (Lian Pin Koh and Wilcove 2008). One reason is the higher economic profitability of converting standing forests as compared with investing into agricultural or degraded lands for oil palm production, in part because the returns from timber sales are used to finance plantation establishment (FWI/GFW 2002). Hence, improving the incentives to invest in already converted or degraded lands (replace former plantation areas, improve management) rather than forestlands constitutes a key element to reduce pressure on natural forests.

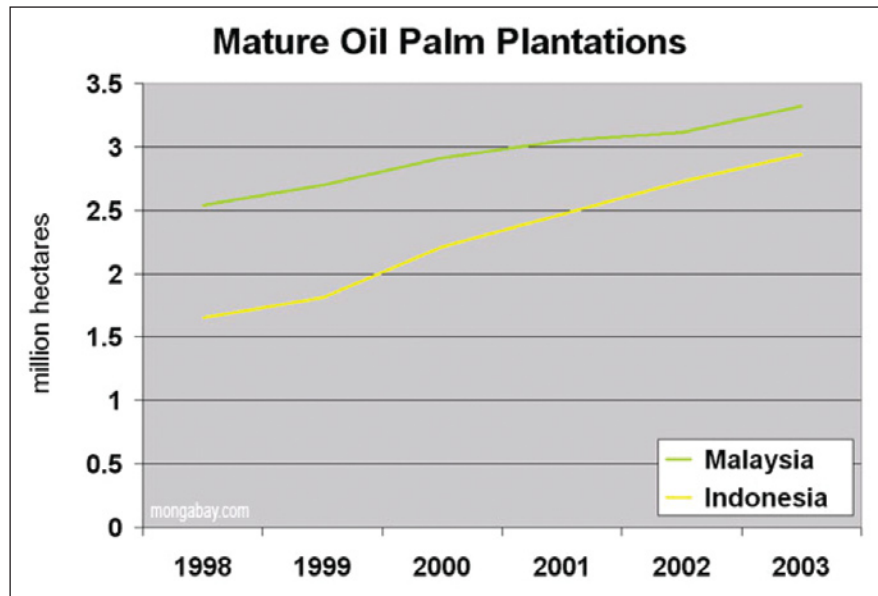
Using fire to open up new plantation areas constitutes another major problem in Southeast Asia, particularly in Indonesia. In dry El Niño years particularly, fires often get out of control (e.g., the recent 2005-2006 fires). Highly inflammable peatlands covering large areas in Indonesia further facilitate the rapid expansion of fires, once out of control. This leads to massive forest destruction and CO₂ associated emissions: it is estimated that the 1997 fires released between 0.81 and 2.57 billion tons of carbon into the atmosphere, which is equivalent to 13-40 per cent of the mean annual global carbon emissions from fossil fuels (Page et al. 2002).

2.2 Small-scale agriculture

Small-scale agriculture is present throughout Southeast Asia. Small-scale deforestation, at least in Indonesia, is largely driven by commercial motives such as the high profitability of rubber (Angelsen 1995). Although poverty may be among the characteristics of these agents, small-scale deforestation is not always poverty-driven.

Subsistence agriculture and fuel wood consumption also affect deforestation and land degradation in Southeast Asia, although to a lesser extent than commercial agricultural conversion or timber harvesting. Underlying drivers include poverty, population pressures and urban expansion, as well as agricultural profitability. In Vietnam, for example, slash and burn techniques – despite their prohibition in many areas in the country – are used not only for subsistence farming, but also to expand the cultivation of the maize cash crop (Castella et al. 2006). In part, small-scale deforestation also occurs to secure land – either where land is yet to be allocated as in Vietnam, or where traditional land rights have been overruled

Figure 2: Growth of palm oil production in Malaysia and Indonesia (Source: Butler 2006a)



by official land-use permits (e.g., logging concessions, authorisations for plantation development).

2.3 Logging activities

Logging – especially illegally logging – is another important driver of land degradation in Southeast Asia, notably in Papua New Guinea (PNG), but also in Indonesia and Malaysia, and formerly in the Philippines. Although rarely leading directly to deforestation, logging contributes indirectly by making it easier for forests to catch fire and for farmers to move into forested areas (Kaimowitz et al. 2004). 50,000 to 60,000 hectares of forest are felled in PNG each year: 50 per cent for agriculture, 20 to 50 per cent for industrial logging, and the rest for infrastructure development (Butler 2006). International demand for timber is a key driver of logging in Southeast Asia. Logging in Papua New Guinea, for example, is conducted mainly by Malaysian logging firms (WRI 2002).

Although logging in many areas of the region is by law required to comply with sustainability criteria and certification requirements (e.g., a forest management plan), only a small number of logging companies comply with these legal requirements (Bun and Scheyvens 2007). Weak forest governance and forest law enforcement – and associated room for corruption – make such regulations, especially in remote areas, largely ineffective. Many large logging operators have strong ties with the political elite, and use bribes to receive more logging licenses than officially permitted (Butler 2006). Improved forest governance through better law enforcement is needed as first step to control illegal logging and associated forest degradation.

2.4 Public policies

Government policies are an important underlying cause of deforestation. Agricultural expansion continues to be promoted as an important pillar of national development. This has experienced a further push with the rising demand for cash crops, including those used as renewable energy sources (such as oil palm, sugar cane, rubber and tapioca). Such agricultural development strategies – expressed for example through granting authorisation for plantation development on forestlands – are found throughout Southeast Asia, including Indonesia, Malaysia and Myanmar. In Malaysia, the cultivation of oil palm increased rapidly in the 1960s – first under the government’s agricultural diversification programme intended to reduce the

country’s economic dependence on rubber and tin, and later under the government’s land settlement scheme for planting oil palm as means to eradicate rural poverty (MPOC 2008). Land resettlement programmes were also conducted in Indonesia and Vietnam.

The failure of public policies to take into account traditional land rights presents a further source of deforestation and forest degradation in the region. To claim land from logging or oil palm companies who previously overrode traditional land tenure rights, fire is used as a ‘weapon’ in the land conflicts, and this affects a far larger area of forest than previously thought (FWI/GFW 2002; WRI 2002; World Bank 2007). In turn, land tenure clarification, with special consideration of traditional rights, is an important element to improved forest governance in the region.

3. Experience with payments for environmental services (PES) schemes

Payments for environmental services (PES) are still nascent in Southeast Asia, but the interest in PES is growing rapidly. The region counts fewer and less advanced PES schemes than Latin America, and these are located mainly in Indonesia and the Philippines (Huang et al. 2008). Most of these schemes are still in the process of being implemented, which makes an assessment of their effectiveness difficult. In addition, most correspond more to ‘PES-like’ schemes, where not all criteria of ‘real PES’ schemes – as defined by Wunder (2005) – are implemented.¹ Still, four schemes in Southeast Asia were selected for an assessment of their efficiency, effectiveness, and equity outcomes, and potential lessons for regional REDD design. These include two small-scale schemes focusing on watershed protection in Indonesia, and two larger-scale schemes – one in Aceh, Indonesia and a national-level scheme in Vietnam (see subsection 3.1). All schemes involve payments for forest environmental services, including for avoided deforestation and carbon sequestration.

¹ Wunder (2005, p.3) uses a five-criteria definition for PES, where PES are described as i) voluntary transactions where ii) a well-defined environmental service or land use likely to secure the environmental service is iii) being bought by at least one service buyer from iv) at least one service provider v) if, and only if, the service provider secures service provision (conditionality).

Reasons for the selection of these four schemes are given in Table 4.

3.1 Four PES case studies

Sumberjaya RUPES planned scheme, Indonesia

(Sources: RUPES 2008; Huang and Upadhyaya 2007.)

Sumberjaya is a sub-district in Western Sumatra, Indonesia. It is located in the Way Besay upper watershed, which supplies drinking water to downstream residents and water to a downstream hydroelectricity plant. The total area of Sumberjaya is about 55,000 ha, of which 40 per cent is classified as ‘protection forest’. About 10 per cent of the total area within the protection forest is covered by the RUPES scheme. The scheme is still in its early stages of implementation and intends to reward water quality, reduced sedimentation, and carbon sequestration services. Beneficiaries and potential buyers of services provided by the watershed include hydroelectricity companies, downstream residents and the forest department. One key issue of this scheme is to combine environmental service provision with poverty alleviation because many of the farmers in the watershed are poor. Two payment mechanisms exist, implemented in different communities:

Table 4: Selected case studies in Southeast Asia and reasons for their selection

PES scheme	Justification as case study
1. RUPES*, Sumberjaya, Indonesia.	Strong livelihood considerations (= relevant as in many Southeast Asia forest areas, forest stewards are smallholders). Application of ‘conditional land tenure’ rewards (= relevant as appropriate region-specific incentive payments). Co-benefit consideration (= relevant experience for bundled PES schemes, e.g., REDD and water services).
2. RUPES, Singkarak, Indonesia.	Strong livelihood considerations (= relevant as in many tropical forest areas, REDD strategies need to account for poor forest stewards). Co-benefit consideration (= relevant experience for bundled PES schemes, e.g. REDD and water services).
3. The 5 Million Hectare Reforestation Programme (5MHP), Vietnam.	National-level scheme paying for afforestation (= relevant as REDD schemes contain a national implementation level). Individual and collective landowners as service providers (= relevant as in many tropical forest areas, traditional communal landownership remains important). Poverty considerations (= relevant as in many tropical forest areas, REDD strategies need to account for poor forest stewards).
4. Ulu Masen, Indonesia.	Sale of ‘avoided deforestation’ (= relevant pilot experience for REDD-type schemes in Indonesia). Recognition of traditional land tenure rights (= relevant as one cause of deforestation is ignorance of traditional rights). Special considerations of co-benefits (communities, biodiversity).

* RUPES = the ‘Rewarding Upland Poor for Environmental Services’ programme

1. In the first mechanism, sellers can receive 'payments' in the form of land tenure under the Hutan Kamasyrakatan (HKM) (social forestry) programme implemented in 2000. Specifically, land tenure will be given to coffee growers in protection forests if they agree to follow recommended cultivation practices and conserve remaining patches of natural forests. If the proposal to request land tenure is accepted, the group of growers will be granted tenure for 5 years, which can be extended for another 25 years if the owners comply with stated conditions.
2. In the second payment mechanism, sellers can receive payments through RiverCare, a group composed of people living around a hydropower reservoir, tasked with reducing sediment loads to the hydropower plants through activities (e.g., the construction and the control of dams). Payments to RiverCare are conditional on contract compliance and performance, and depend on the degree of reduced sediment loads. RiverCare will receive US\$ 1,000 for a reduction of 30 per cent or more, US\$ 700 for a 20 to 30 per cent reduction, US\$ 500 for a 10 to 20 per cent reduction, and US\$ 250 for a less than 10 per cent reduction. In-kind payments were added in 2008 (Beria Leimona, pers. communication).

It is too early for an assessment of the effectiveness of these two mechanisms as they are still being implemented.

RUPES scheme at Singkarak Lake, Indonesia

(Sources: Leimona et al. 2006; RUPES 2007.)

The scheme at Singkarak Lake in West Sumatra, Indonesia covers 27,000 ha. The project is aimed at forest rehabilitation of the slopes around Singkarak Lake to secure a basket of environmental services, i.e., water quality and quantity, flood and landslide control, and carbon sequestration. The project is supposed to participate in both local and international markets for environmental services. For the international carbon market (A/R CDM), the destined carbon sequestration services originate from 15,000 ha of afforestation/ reforestation in Solak district surrounding the lake. Watershed conservation services are directed to local service demanders, i.e., the state-owned hydropower company PLTA Singkarak. However, the prime buyers of water services are provincial/local governments, using funds raised from a local water tax, since Indonesian Law requires the state-owned company to distribute royalties to both national and local government. The 35 per cent of total royalties that must go to local areas are channelled to the districts via the provinces. Service providers are local communities in Tanah Datar district, surrounding Singkarak Lake.

One major challenge in the implementation of the scheme consisted in capacity development of stakeholders participating in the PES mechanism. First payments started in 2005 in Nagari Paninggahan, which is one of the villages near the lake and which received close to US\$40,000 as its first allocation of hydropower royalties of about \$1 per person per year.

The 5 Million Hectare Reforestation Programme (5MHRP), Vietnam

(Sources: Wunder et al. 2005; de Jong et al. 2006.)

The 5MHRP was initiated in 1996 and its implementation guided by Program 661 (since 1998), a follow-up programme of a similar earlier programme (Program 327). The objectives to be reached by 2010 are:

1. To plant 5 million hectares of forests, as well as to protect the existing forest, in order to increase forest coverage to 43 per cent of the country's land area.
2. To make efficient use of 'wild lands' and bare hills; to create more rural jobs (contributing to poverty reduction) and human settlements; to increase the income of upland inhabitants; and to improve socio-political stability, national defence and security, especially near national borders.
3. To provide wood as material for paper production and plywood, and to meet the needs for timber and other forestry products for domestic consumption and production for exports, as well as to develop the forestry processing industry in order to increase the economic importance of the forest sector, contributing to socio-economic development in mountain areas.

Funding originates from the state budget, which contributes to about 63.5 per cent of the total budget; the rest comes from credit loans, overseas funds and self-financing. The 5MHRP allocates forestlands to economic organisations, households or individuals. The validity of the allocation or lease of land to these participants is 50 years. If the users have been using the land for correct purposes, the allocation or lease will be prolonged. At the national scale, substantial progress has been achieved in forest protection and development: forest cover increased from 9.3 million hectares in 1995 to 11.31 million ha in 2005, increasing on average 0.3 million hectares per year (Vietnam Prime Minister's Decision Approving the Vietnam Forestry Development Strategy 2006-2010, 5 February 2007). However, most of these increases occurred in protection and special use forests, while forest increase in production forests still has not reached the target. In addition, the quality of the forests (including biodiversity) has been continuously reduced. Weaknesses of the programme include the limited degree of voluntary participation

(at least initially), the small amount of payments made (far lower than opportunity costs), poor conditionality, dependence on the government, missing clarity over who receive the benefits from forests, and obstacles for rural (often ethnic) communities to participate.

Ulu Masen REDD planned project, Indonesia

(Sources: FFI 2008; The Provincial Government of Nanggroe Aceh Darussalam (Aceh) 2007.)

The Ulu Masen project in Indonesia is one of the first projects in Southeast Asia seeking to secure financial compensations for reducing emissions from deforestation and degradation. It is located within a connected forest ecosystem and nearby forests of 750,000 ha covering the five northeast districts of Aceh Province: Aceh Besar, Aceh Jaya, Aceh Barat, Pidie and Pidie Jaya. Specifically, the project aims at supporting local communities to use their forests sustainably and thereby provide REDD services of 100 million tCO₂ over the next 30 years, to be sold on the international voluntary carbon market. Biodiversity conservation is another co-benefit of avoided deforestation. To date, the American investment bank Merrill Lynch has expressed interest in buying resulting REDD credits. Payments will be performance-based and progress will be monitored both with ground surveys by forest wardens and with remote sensing technology. Payments

are projected to reach \$26 million over the first five years. The NGO Flora and Fauna International will act as intermediary in the Ulu Masen forest area, with a budget of \$7.72 million. The project is certified by the Climate, Community and Biodiversity Alliance (CCBA) and its first phase is to be implemented over a period of 4.5 years between 2008 and 2010.

3.2 Characteristics of case study schemes

The case studies are grouped into user-financed and government-finance schemes to express the nature of the actual service buyer: the end user, or a third party (typically the government) acting on behalf of end users.² Among the four selected case studies, there is only one purely user-financed scheme – the planned Ulu Masen REDD project in Indonesia. Another scheme in Indonesia, the Sumberjaya scheme, is partly user-financed (payments from a hydroelectricity company) and partly government-financed (land tenure rewards). The others are government-financed schemes (see Table 5).

² User-financed schemes are fully voluntary for both service buyers and sellers, and focus only on one environmental service (e.g., water, carbon); government-financed schemes are often only voluntary on the supplier side and often cover more than one environmental service (Wunder et al. 2008).

Table 5: Characteristics of PES case studies (adapted from Wunder et al. 2008)

PES scheme	Environmental service	Who buys?	Who sells?	Start year	Spatial scale	Obstacles
User-financed						
Ulu Masen, Indonesia	REDD	Carbon investors (Merrill Lynch*).	Government of Aceh.	2008	750,000 ha in Ulu Masen forest ecosystem.	Illegal logging due to increased wood demand since the 2004 tsunami.
Government-financed						
RUPES - Sumberjaya, Indonesia	HKm: Forest conservation & reforestation.	Government .	Coffee growers in protection forest.	2000	55,000 ha in Way Besay upper watershed.	Illegal encroachment of protected areas and conflicts with local communities.
	RiverCare: reduced sedimentation.	Hydroelectric company.	Local land users in river buffer zone.	2004		n/a
RUPES - Singkarak, Indonesia	Water quality + quantity via forest restoration, carbon sequestration.	Local governments.	Local community around the lake.	2002	2,700 ha in total around Singkarak Lake (540 ha of critical land each year for 5 years).	Low capacity, complex and multi-layered local governance.
5MHP, Vietnam	Water services via forest conservation + reforestation.	Central government.	Individuals, households, economic organisation.	1996	Nationwide (11.3 million hectares in 2005).	Low payments (although they were doubled in 2007), high transaction costs for land users to get contract, unclear transparency in the contracting process.

* Merrill Lynch has committed to buy REDD credits worth US\$9 million (www.ml.com/index.asp?id=7695_7696_8149_88278_95339_96307).

Most PES schemes in Southeast Asia are small, donor-driven pilot efforts with a strong focus on social co-benefits (pro-poor PES), and are generally still in the planning stages, with few contracts already in place (Huang et al. 2008).

The selected schemes are characterised by having an intermediary between service sellers and buyers; rather weak components as regards seller selection, monitoring, and enforcement of sanctions; although conditionality is generally announced high (see Table 6). Intermediaries play an important role and are often the main drivers or facilitators of PES schemes. Intermediaries tend to be government agencies, such as in the case of Vietnam and in two of the selected Indonesian schemes, and this is a typical feature of the Asian PES model (Huang et al. 2008). This can partly be explained by the political history of the region

3.3 Payment design

Payments are ultimately the main incentive to comply with PES contracts. They are typically made in cash, but sometimes combined with technical assistance or in-kind compensation (as in the case of Ulu Masen and the 5MHRP). In the case of the Sumberjaya scheme, where service providers are smallholders and often poor, granting land tenure ('conditional land tenure') has become another promising variant of payment. Receiving land tenure in exchange for environmental service provision has been piloted by RUPES and yielded promising results in a context where insecure land ownership remains a frequent barrier to effective land management.

The level of payment ultimately shapes the incentive for land users to shift to more sustainable land uses. To constitute a strong incentive, these

Table 6: Design features of PES case studies (adapted from Wunder et al. 2008)

PES scheme	Intermediary	Seller selection	Monitoring	Sanction	Conditionality
User-financed					
Ulu Masen, Indonesia.	International NGO (FFI).	Local land users living in and around the project area.	Forest wardens and satellite images.	Illegal activity is reported to authorities for prosecution.	High (private investors will pay only upon service delivery).
Government-financed					
RUPES - Sumberjaya, Indonesia.	HKm: State agencies.	Coffee growers living upstream.	Field visit.	Penalties (but without further specification).	High.
	RiverCare: Local association.	Land users living in erosion hotspots along river.	Participatory monitoring.		Announced high
RUPES - Singkarak, Indonesia.	Unclear (ICRAF-RUPES team).	Local land users affecting water quality/quantity.	Field visits, and satellite images analysis at project start.	N/A	Announced high (amount paid depends on degree of decreased sediment load).
5MHP, Vietnam.	State agencies.	Guidelines exist, but ad hoc in reality.	Field visits, but undermined by low frequency and local-level corruption.	In principle no contract renewal, but this is hardly enforcement.	N/A

with highly centralised government-controlled forest governance. Non-state actors (e.g., NGOs), who are important intermediaries of PES schemes in other parts of the world, are emerging as new players, such as in the user-financed Ulu Masen scheme.

Seller selection through spatial targeting can improve the cost-effectiveness of PES by targeting areas of high risk of deforestation or forest degradation. In most of the studied PES schemes, spatial targeting is applied to locate eligible service sellers by, for example, targeting residents of a specific watershed (Tables 5 and 6). However, no differentiation is made among those residents, i.e., no further sub-categories are made between areas of high versus low risk of deforestation, with the exception of RiverCare where payments are directed to land users residing in erosion hotspots.

payment need to cover at least the opportunity costs (forgone agricultural rent) and transaction costs. However, little information was available on actual payment levels – partly because the schemes were not yet fully implemented. The Vietnamese 5MHRP is characterised by rather low payment levels, which can hardly compete with more profitable cash crops such as maize (Liss 2008), although payments have doubled in 2007 (Pham Thu Thuy, pers. communication). Non-competitive payment levels can in part be the result of administratively set payment levels, i.e., payment levels are largely the result of government decisions rather than direct negotiations or opportunity cost analyses. In a context of high rural poverty, as in most parts of Southeast Asia, the level and kind of payment are all the more important since land users will base their decision

Table 7: Payment design features of PES case studies (adapted from Wunder et al. 2008, Porras et al. 2008)

PES scheme	Mode of payment	Amount	Determination of payment level	Timing of payment	Differentiation	Contract duration
User-financed						
Ulu Masen, Indonesia.	Cash and/or in-kind.	N/A	N/A	Ex post.	N/A	N/A, project for 30 years.
Government-financed						
RUPES - Sumberjaya, Indonesia.	HKm: land tenure,	Land tenure.	N/A	Ex post.	N/A	5 years, renewable 25 years.
	RiverCare: cash & in-kind (since 2008).	500-1,000 US\$ / year depending on level of reduced sedimentation.				1 year.
RUPES - Singkarak, Indonesia.	Unclear.	Unclear.	Administrative.	N/A, probably ex post.	N/A	5 years.
5MHP, Vietnam.	Cash.	3 – 6.5 US\$/ha/year	Administrative.	Annual.	Higher for afforestation/ reforestation.	1-5 years, renewal possible.

on how to secure their livelihoods on a comparison of the different returns they can receive from competing land uses.

Contract duration among the selected schemes varies between 5 and 30 years. A 30-year duration is an option in the Ulu Masen project. Although in principle longer term arrangements allow for improved land-use planning, shorter term contracts – such as apply in Singkarak and in the 5MHRP – are more feasible in practice since conditions and preferences change over time, rendering contract renewal more efficient.

3.4 Effectiveness considerations

Effectiveness refers to whether a certain target – the delivery of environmental services – has been achieved and more importantly, whether these results were ‘additional’ compared to what would have occurred in the absence of a programme. Baselines (typically set to reflect the ‘business as usual’ scenario) are used to assess additionality. However, none of the selected schemes conducted explicit baseline analyses (Table 8), which renders a robust assessment of programme effectiveness more difficult. Other aspects of effectiveness (including leakage control, permanence, and verification of land-use/ environmental service links) also largely remained unaddressed in all of the selected case studies.

Monitoring of contract compliance and sanctioning non-compliance are also crucial to ensure effective service provision. In the selected schemes, monitoring is based on both remote sensing and field visits, with field visits being the preferred approach (Table 6). This can partly be explained by the small-scale nature of most schemes, which renders field visits still feasible and affordable. The existence of sanction measures is reported in all schemes, but the degree of enforcement

is unclear. Since most schemes are still nascent, information on how non-compliance is dealt with in practice remains scarce. Conditionality is included in most of the selected schemes, but it is too early to assess to what extent it has been implemented in practice (see also Huang et al. 2008).

3.5 Efficiency considerations

Payments levels that are determined by the actual opportunity costs tend to render schemes more efficient. However, most of the selected PES schemes didn’t conduct detailed opportunity cost studies (Table 8). Instead, as in the case of Vietnam, payment levels tend to be set administratively. Indeed, analysing opportunity costs can be costly and many schemes therefore opt not to do this. Nonetheless, the literature on PES emphasises that payments based on the costs of providing a given environmental service (or land use likely to provide them) can strongly improve the efficiency of a scheme. One way to reveal such costs for PES schemes is procurement auctions³, as already used in two PES schemes in the US and Australia (Ferraro 2008), and tested in Sumberjaya during 2006-2008, with likely implementation in 2009 (B. Leimona, pers. communication).

There is also little information on whether payment differentiation, which can render PES schemes more efficient, is implemented in the selected case studies – except for Vietnam’s 5MHRP (Table 6). Barriers to payment differentiation in Southeast Asia are perhaps equity considerations and the notion of

³ A PES contract procurement auction is a process through which a buyer of environmental services invites bids (tenders) from suppliers of environmental services for a specified contract and then buys the contracts with the lowest bids (Ferraro 2008).

Table 8: Factors affecting efficiency and effectiveness of PES case studies (adapted from Wunder et al. 2008).

PES scheme	Baselines and scenarios	Opportunity costs	Additionality	Land-use/ service link	Leakage	Permanence	Transaction costs
User-financed							
Ulu Masen, Indonesia.	Implicit, continuation of current trends.	Not studied.	Probably high.	High.	N/A	Likely not secured after programme ends.	N/A
Government-financed							
RUPES - Sumberjaya, Indonesia.	HKm: Implicit, continuation of current trends RiverCare: implicit, current sedimentation.	N/A, but procure-ment auctions tested 2006-2008	Likely high.	Probably high.	N/A	N/A	Studied.
RUPES - Singkarak, Indonesia.	Implicit, current deforestation trends.	Not studied.	Likely high.	Probably high.	N/A	N/A	N/A
5MHP, Vietnam.	Implicit, current trends of forest loss.	Not studied.	Rather low.	Mixed (some high, some low).	N/A	Unclear beyond contract period, but rather secure.	N/A

‘unfair treatment’. Little information was available on the transaction costs associated with the start-up and running of the selected schemes (Table 8).

Although many of the key elements to efficient PES design were not studied in-depth in the selected case studies, it is important to reiterate that most of them are still in the course of being fully implemented. This includes the possibilities that some of the above-discussed elements are being studied during project implementation.

3.6 Equity considerations

Most of the potential or actual service providers in the Southeast Asian context are rural smallholders, and many of them are poor. Poverty considerations are therefore an important element in regional PES design. Conditional land tenure, as used in Sumberjaya, has emerged as an appropriate measure to set an incentive

while accounting for local needs, i.e., in a context with predominantly public land ownership but an increasing interest in giving more land rights to people (Huang et al. 2008). Enforcing traditional land tenure rights, as intended in Ulu Masen, is another important element in the region where oftentimes traditional rights were overruled by government policy.

Other welfare effects on poor sellers include capacity improvements, income generation and training (Table 9). Besides social and governance improvements, biodiversity conservation – except for Ulu Masen – is only an implicit co-benefit. The experience suggest, nevertheless, that linking too many side-objectives to PES can ultimately become counterproductive as it will lose its comparative advantage over traditional integrated conservation and development projects, and its implementation will become more challenging (see Wunder 2007).

Table 9: Side-objectives and welfare effects of PES case studies (adapted from Wunder et al. 2008).

PES scheme	Side-objectives	Welfare effects on poor sellers
User-financed		
Ulu Masen, Indonesia	Poverty alleviation, biodiversity conservation.	Income generation, land tenure, capacity development.
Government-financed		
RUPES - Sumberjaya, Indonesia	Poverty alleviation.	Land tenure, capacity improvements, income generation.
RUPES - Singkarak, Indonesia	Poverty alleviation.	Governance and capacity improvements, probably higher income.
5MHP, Vietnam	Poverty alleviation, livelihood improvements in mountain areas.	Land tenure and access to credit, training.

4. Concluding remarks

Southeast Asia witnesses high rates of deforestation and forest degradation. Large-scale deforestation for agriculture (notably oil palm) is driven by international market demand. Small-scale deforestation is partly driven by: market opportunities for typical smallholder crops like rubber; land races to gain or secure property rights; and – in marginalised, remote areas of the countries – also by poverty and population growth. Forest degradation is primarily a consequence of logging activities – especially illegal logging – driven by high international demand for timber. Logging activities are concentrated in Papua New Guinea, but also occur in Indonesia, Malaysia, Myanmar and Cambodia.

Compared to other parts of the tropics, PES is still in its early stages in Southeast Asia, although the interest is growing. Most schemes are small pilot efforts, often still in the planning state and with few contracts yet in place. Part of the reason why PES remains nascent relates to the challenges encountered in the region: incomplete property rights (who are the service providers?), poverty considerations, weak governance structures and high costs of PES implementation. These regional circumstances suggest a dual strategy for REDD investments, where improvements in forest governance and in securing local land rights must go hand in hand with the development of performance-based incentive schemes.

4.1 Performance-based incentive schemes with a focus on ‘pro-poor’ aspects

PES/REDD schemes in Southeast Asia need to account for poverty considerations and shortcomings associated with poverty (budget and capacity constraints). About 2/3 of the world’s poor reside in Asia, and poverty is an important underlying cause of deforestation and forest degradation in many areas, including Vietnam and Laos. Experience with pro-poor PES is growing rapidly and preliminary evidence suggests that the poor generally benefit from PES if their transaction costs are reduced and inappropriate access barriers are removed (see, for example, Grieg-Gran et al. 2005; Wunder 2008).⁴ Hence, there is scope for the Asian PES/REDD model to benefit from these experiences and focus on ‘pro-poor REDD’ as one element of the regional REDD strategy.

Capacity investments seem particularly important

for PES start-up in the region. As became evident in the selected PES case studies, most lacked the background research needed to render schemes cost-effective, including baseline setting, opportunity cost assessments, and leakage control. While PES schemes can in principle emerge without these studies taking place, international REDD transactions will most likely require these studies to ensure that emission reductions actually occur. To anticipate these conditions, investments in capacity or tools allowing quick assessments, similar to the ‘rapid hydrological appraisals’ or ‘rapid agro-biodiversity appraisals’ (as developed by RUPES), could be useful avenues.

4.2 Governance investments with a focus on land rights and law enforcement

Southeast Asia’s land tenure system is characterised by at least two limitations: the absence of rights or ignorance of traditional land rights, and highly restricted rights. In some parts, traditional land rights were overruled by government policies, which left many households and communities with limited or no rights to land. The absence of full land rights renders PES arrangements more difficult as landholders have in principle only limited scope for entering PES contracts. The idea of the abovementioned ‘conditional land tenure’ (allocation of land rights as a form of payment) coined by RUPES is one solution to overcoming missing land rights, and an example of how PES (and REDD) can actually help improve forest governance. However, as only governments can allocate land rights, the use of ‘conditional land tenure’ requires some form of government participation in the PES scheme, which makes the rise of user-financed schemes more difficult – at least in the near future. Therefore, the RUPES experience with ‘conditional land tenure’ is crucial for PES/REDD in the Asian context and needs to be part of the REDD investment portfolio in Southeast Asia.

When land rights are highly restricted – the aforementioned second limitation to land tenure in Southeast Asia – the scope for PES is limited. In Vietnam, for example, land use is highly prescribed and controlled by the government. Although individuals and households could enter into PES contracts, the freedom to make land-use decisions remains limited. This only leaves scope to use PES as a means to enforce current land- or forest-use plans (e.g., pay to comply, or enhance requirements of the ‘protection forests’). However in parts of the region, the current legislation itself represents a barrier for some land-use groups to

⁴ For further information on pro-poor PES, see the recent special issue of the journal *Environment and Development Economics* published in June 2008 (Volume 13, Issue 3), which is dedicated to PES and the poor, covering key concepts and experiences.

benefit effectively from PES schemes: communities in Vietnam, for example, need to fulfil four conditions before being allowed to enter into a contract, which corresponds currently to a de facto exclusion from PES contracts (due to associated transaction costs and capacity requirements). This means that (long-term) government cooperation is crucial for the success of PES/REDD in the region – not only for implementation in the current (largely government-controlled context), but also for potential law reforms to transfer greater land tenure rights to land users.⁵

Forest governance in Southeast Asia is further challenged by widely present lenient law enforcement. Illegal land-use activities, especially illegal logging, constitute a key concern in Southeast Asia and in the REDD debate because they are generally associated with uncontrolled deforestation and forest degradation. Local governments in particular are often not in the position, or willing, to actually enforce the laws – especially in remote areas. To achieve improved forest law and policy enforcement for the purpose of REDD, substantial investments in governance

⁵ It is unlikely that the latter can occur in a short time period, but this question is nonetheless essential, i.e., whether PES/REDD is used to reinforce current centralised, top-down structures or whether it allows the rise of new structures that can be somewhere in between high centralisation and full decentralisation.

structures, including long-term incentives (or credible threats of severe sanctions), are needed for government institutions to basically ‘do their job’ – especially during the implementation phase, but also later to ensure proper functioning. However, as indicated above, it may be counterproductive to insist on effective law enforcement if the laws themselves are flawed, as this can imply undesired effects in terms of effectiveness (less emission reductions) and equity (less poverty reduction). A clear ex ante assessment of the laws to be enforced to control deforestation and degradation seems necessary.

Governance weaknesses also include perverse incentives for deforestation. In Indonesia, for example, it is currently more efficient to clear cut forestlands to establish oil palm plantations than to use already degraded or agricultural lands (see above). As for the aforementioned discussion of which laws to enforce, REDD strategies will have to account for such incentives and correct these within the scope of the start-up phase (in the REDD debate also coined as the ‘readiness’ phase). But REDD strategies will also have to account for national development objectives, strengthen opportunities for ‘sustainable’ agricultural expansion, and support leadership action, e.g., that currently being undertaken by the Governor of Aceh (the ‘Green Aceh’ programme).

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