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Case Study:

Payments for Biodiversity Conservation in the Context of Weak Institutions: Comparison of Three Programs from Cambodia

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Payments for Biodiversity Conservation in the Context of Weak Institutions: Comparison of Three Programs from Cambodia

Report prepared for WCS TransLinks Program

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Table of Contents

Abstract 4

Introduction 4

Description of the PES Programs 6

- Background 6
- Community-Based Ecotourism 8
- Agri-Environment Payments: Wildlife-Friendly Products 9
- Direct Contracts for Bird Nest Protection 10

Outcomes of the PES Programs 11

- Community-Based Ecotourism 11
- Agri-Environment Payments 12
- Bird Nest Protection Program 13

Comparison of the Different PES Programs 17

- Institutional Arrangements 18
- Distribution of Costs and Benefits 20
- Observed Conservation Results 21

Conclusion 22

Acknowledgements 25

References 26

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Abstract

Implementing any conservation intervention, including Payments for Environmental Services (PES), in the context of weak institutions is challenging. The majority of PES programs have been implemented in situations where the institutional framework and property rights are strong and target the behaviors of private landowners. By contrast, this paper compares three PES programs from a forest landscape in Cambodia, where land and resource rights are poorly defined, governance is poor, species populations are low and threats are high. The programs vary in the extent to which payments are made directly to individuals or to villages and the degree of involvement of local management institutions. The programs were evaluated against three criteria: the institutional arrangements, distribution of costs and benefits, and the conservation results observed. The program with the most direct individual contracts had the simplest institutional arrangements and the lowest administrative costs, disbursed significant payments to individual villagers, making a substantial contribution to local livelihoods, and rapidly protected globally significant species. However, this program also failed to build local management organizations or understanding of conservation goals. By contrast, the programs that were managed by local organizations were slower to become established but, crucially, were widely understood and supported by local people and, as a result, were more institutionally effective. PES programs may therefore be more sustainable when they act to empower local institutions and reinforce intrinsic motivations.

Introduction

Although the global benefits of conservation and ecosystem services are well recognized (Balmford et al. 2002, Daily 1997, Stern 2006), these benefits are often valued differently at the local level (Kremen et al. 2000) and there may be local costs associated with conservation. Payments for environmental services (PES) have been proposed as an improved mechanism for delivering conservation outcomes that correct for these externalities at the local level (Ferraro 2001, Ferraro & Kiss 2002, Wunder 2007). PES have been described as voluntary transactions where a well-defined environmental service is bought by a buyer (i.e. someone who is willing to pay for it) if, and only if, the provider secures the provision of such service (Wunder 2005). This view of PES is based in Coasean economics, where transaction costs are assumed to be low and property rights clearly defined. The largest PES programs are government programs in developed countries, such as conservation easements in the USA or the Common Agricultural Policy in Europe (Ferraro & Kiss 2002). These programs conform to the Coasean view: land ownership or resource tenure is clearly defined; these rights are protected by law; enforcement agencies are well-funded; and there are credible external monitoring systems. Within the past 10-15 years a number of government-financed PES programs have been established in developing countries with similarly well-defined

institutional frameworks (Engel et al. 2008), including the Costa Rican payments for environmental services program (Pagiola 2008, Zbinden & Lee 2004) and Mexico's payments for hydrological environmental services program (Muñoz-Piña et al. 2008). In addition, there are a growing number of user-financed programs, such as payments for watershed services between downstream users and upstream forest owners in Ecuador (Wunder & Albán 2008) and Bolivia (Asquith et al. 2008), and contracts brokered between organizations and private landowners, communities or governments (Milne & Niesten 2009). In the vast majority of cases, but not all, these PES programs have been established in situations where property rights are clearly defined, although other aspects of the institutional framework may be weaker.

Wunder (2007) suggested that effective implementation of PES may be considerably more difficult where institutions are weak. In many countries, land ownership and resource tenure are unclear, with land and resources technically still owned and managed by the state (Agrawal et al. 2008); natural resources generate high rents, thereby attracting resource grabs and corruption; powerful individuals can often act with impunity; and government agencies have poor capacity and may receive little political support. These are also the conditions known to lead to high rates of habitat destruction and over-exploitation of natural resources (Chomitz et al. 2007, Geist & Lambin 2003). The high level of threat to species and habitats means that these areas are often of the highest urgency for conservation. Institutional failure is problematic for implementation of a PES program to protect biodiversity for a number of reasons: poorly defined property rights make it challenging to determine who to pay, contracts cannot be legally enforced, elite capture is common, and enforcement of laws (e.g., prohibiting land clearance) may be weak. However, institutional failure makes it challenging for any conservation intervention to succeed (Barrett et al. 2001), hence a critical area for research is to understand which approach is most effective given these circumstances.

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Sarus Crane

Muradian et al. (2009) have proposed a continuum of types of PES as an alternative to Wunder's and Ferraro's original descriptions, ranging from direct payments that conform to the Coase theorem, to collective action problems where property rights may be poorly defined and benefit distribution is unclear. This study compares three PES programs for biodiversity conservation that were implemented within a weak institutional setting in Cambodia, for wildlife populations and their habitats that were either under open-access or common property regimes. The three programs vary in the extent to which payments were made at the individual or collective level: direct payments to individuals for bird nest protection; a hybrid program that combines agri-environment payments to farmers with local management by a village authority; and a community-based tourism enterprise based on collective action. Figure 1 shows the three schemes mapped onto the spectrum of conservation initiatives described by Ferraro and Kiss (2002). All three were designed in response to a high level of threat where conservation opportunity costs, at least for conversion of forest lands, were also moderately high. The comparison focuses on the institutional effectiveness of the programs: the institutional arrangements, the distribution of costs and benefits, and the conservation results observed. A full evaluation of program impacts on wildlife or habitats (c.f. Ferraro & Pattanayak 2006) is beyond the scope of this study; the programs were initiated only recently and, as yet, insufficient data exist for comparison of implementation sites with controls.

Description of the PES Programs

Background

Cambodia lies within the Indo-Burma hotspot (Myers et al. 2000) and contains four of the Global 200 Ecoregions (Olson & Dinerstein 1998). The country is of global conservation importance because it contains the largest remaining examples of habitats that previously spread across much of Indochina and Thailand which still contain nearly intact species assemblages, albeit at much reduced densities (Loucks et al. 2009). These include the deciduous dipterocarp forests that once supported the greatest aggregation of large mammals and waterbirds

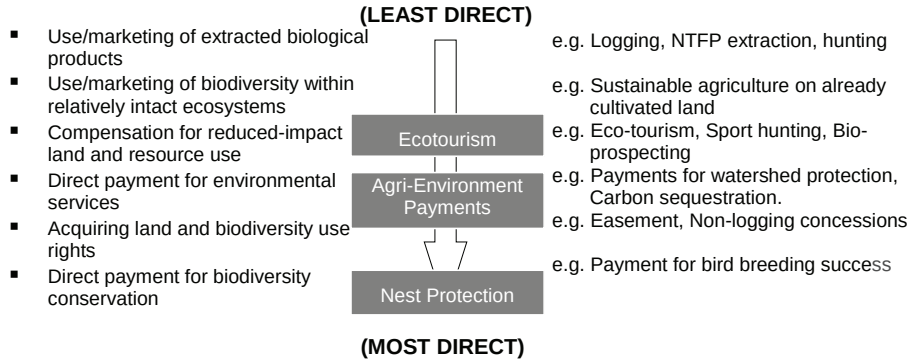

Figure 1. Spectrum of conservation initiatives (from Ferraro and Kiss 2002).

outside the African savannas (Wharton 1966). Many of these species are listed on the IUCN (International Union for Conservation of Nature) Red List (WCS 2009), including 45 mammals (7 Critically Endangered or Endangered), 46 birds (12 Critically Endangered or Endangered, including the Giant and White-shouldered Ibises, *Pseudibis gigantea* and *P. davisonii*) and 17 reptiles (9 Critically Endangered or Endangered). Conservation strategies in Cambodia are therefore frequently focused on remnant populations of highly threatened species where there is little room for error. Hunting, habitat destruction and human disturbance – both by residents and in-migrants – are the major and immediate threats to biodiversity conservation. The national annual rate of deforestation was 0.7% between 1973 and 1997 (DFW 1998) and 0.5% from 2002 to 2006 (Forestry Administration 2008), despite the fact that since 2002 most forest clearance has been illegal. Based on these statistics, Cambodia has one of the highest rates of land-use change globally. Deforestation is driven by a variety of processes, including large-scale development projects such as agro-industrial concessions, improved road access, population growth, and smallholder encroachment, both by landless in-migrants and established communities (Forestry Administration 2009). Encroachment is attractive to local people because land is an easily available, secure form of wealth which is viewed as an open-access resource, and enforcement of national laws is rare. Many plots are claimed but not cleared, forcing new farmers to move further into the forest (An 2008).

Initial conservation strategies in Cambodia focused on protected area (PA) management. The PAs have been established since 1993 and have a small number of poorly paid staff with limited capacity or infrastructure, i.e. they are 'paper parks' (Wilkie et al. 2001). PAs usually contain existing human settlements with unclear property rights, as is often observed in other countries (Bruner et al. 2001). Creation of the Cambodian PA system was based on relatively little information and, consequently, excludes many areas of importance for biodiversity conservation, again not an uncommon situation (Brooks et al. 2004). Failure of PAs alone to meet their conservation objectives highlights the importance of adopting a landscape-level approach to conservation, working both inside and outside protected areas.

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The Ministry of Environment and Ministry of Agriculture, Forestry and Fisheries, with the support of the Wildlife Conservation Society (WCS), an international Non-Governmental Organization (NGO), instituted a series of pilot PES programs as a complement to protected area management in 2002. This study compares three different programs which were initiated in the same villages within two PAs in the Northern Plains landscape; the 4,025km^2 Kulen Promtep Wildlife Sanctuary, which was established in 1993 and is managed by the Ministry of Environment, and the 1,900km^2 Preah Vihear Protected Forest, declared in 2002 and managed by the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries. Both PAs contain, or are used by, long-established communities that practice lowland rain-fed paddy rice cultivation or upland shifting cultivation for rice and other crops, collection of forest products and fishing (McKenney & Prom 2002, McKenney et al. 2004). Forest resources are a crucial livelihood safety net and provide cash income, particularly from the sale of liquid resins from dipterocarp trees, which is used to buy food when agricultural production fails to meet a family's needs (McKenney & Prom 2002, McKenney et al. 2004).

For the two village-managed programs, payments were initiated following an initial two-year participatory land-use planning process, which established forest management zones and clarified ownership over land and natural resources (Rock 2001). Each land-use plan was approved by the relevant Government authorities and is managed by an elected village committee of nine people. It specifically sets out which areas can be used for agriculture and residential land, including expansion areas that are currently forest. The village organizations and approved land-use plans provided the necessary institutional foundation for subsequent initiation of the PES programs.

Community-Based Ecotourism

The community-based ecotourism program was started in 2004 in the village of Tmatboey in Kulen Promtep Wildlife Sanctuary, following initial awareness-raising in 2002-3, and has since been replicated in other villages in the landscape. We focus here on Tmatboey, although the program operates in a similar manner at the other village sites. Tmatboey is a small village of 236 families, located in a large mosaic of deciduous dipterocarp forest, seasonally flooded grasslands and wetlands. The total village area is about 25,780 hectares, of which only a small proportion (620 hectares) is currently used for agriculture. The site fulfills many of the criteria for a successful ecotourism location (Wilkie & Carpenter 1999): it contains rare species that are high profile targets for international birdwatchers (e.g. the Giant Ibis); sightings are reliable year-round; access is relatively easy from the major tourism centre at Siem Reap, which receives more than 2 million visitors annually and has an international airport; accommodation standards have improved as village capacity has increased; and prices are moderately inexpensive. The ecotourism program aims to conserve globally threatened wildlife by establishing local village-level tourism

enterprises that directly link revenue received to long-term species conservation (Figure 2). This link is provided by the agreement between the PA authorities, WCS and the village, which stipulates that tourism revenue is subject to the villagers agreeing to stop hunting key species and abiding by the land-use plan. The value to local families of conserving wildlife is further reinforced by the fact that each tourist pays $30 to the village if all key species are seen and only $15 if just a subset is. A detailed description is given in Clements et al. (2008).

Institutionally, the program relies on four parties, each of whom plays a key role:

- Elected village committees: site management of tourism services, management of income received and fund disbursements, local enforcement of no-hunting agreements and land-use plans, reporting serious violations to PA authorities;
- PA authorities: legally approve tourism agreements and local land rights, law enforcement;
- Sam Veasna Center: a local civil society partner based in Siem Reap that is responsible for marketing, site promotions, tourism bookings management and monitoring on behalf of the village-level enterprises; and
- Private Sector: tourist bookings to provide revenue.

WCS plays a general support role to all parties, and monitors the agreements.

Agri-Environment Payments: Wildlife-Friendly Products

Tourism has limited potential for replication because all villages support a similar species mix, and the international birdwatching market is of restricted size. The agri-environmental payment program was started in 2007 as an alternative community-based payment program that could be replicated widely. Under the program, farmers that comply with the land-use plan and no-hunting rules are allowed to sell their rice, through the village committee responsible for management of the

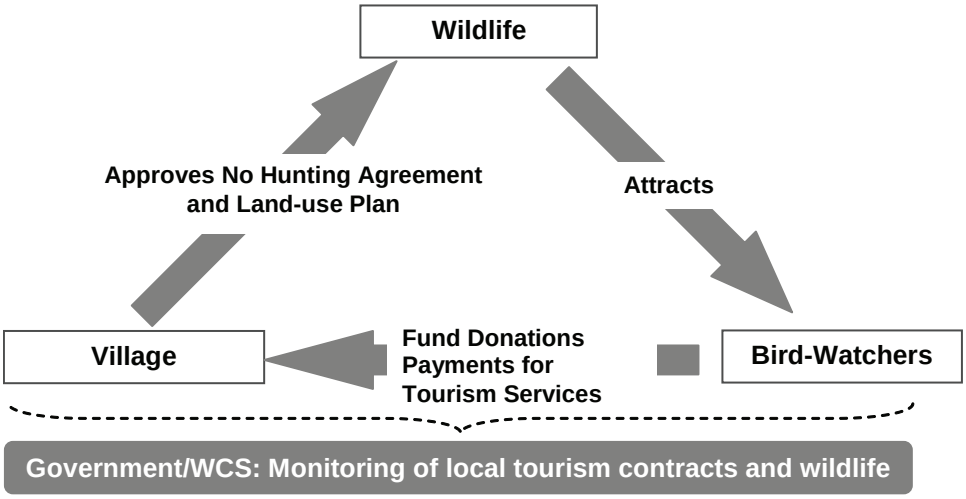

Figure 2. Design of the Community-based Ecotourism program.

land-use plan, to a marketing association (Figure 3). The association is able to offer higher prices to the farmers by: a) selling directly to national market centers, bypassing middlemen who previously monopolized village trade; and b) selling to tourist hotels under the 'Wildlife-Friendly' certification system, a new global brand. The association also provides start-up capital and training in new agricultural techniques. All profits from the sales are shared between the farmers and the village organizations, after deducting the operating costs of the association. Payments to individual farmers are conditional on their compliance with the land-use plan and no-hunting rules, which is verified by the village committee and the marketing association. The payment value was set based on the market premium available for the products, rather than on an assessment of the opportunity costs to farmers of further encroachment. For farmers with sufficient labor or access to machinery these opportunity costs are likely to be high, since alternative forms of employment are limited and the value of agricultural land is high. The committee also receives a share of the profits, which provides added motivation (and income) for their work.

Direct Contracts for Bird Nest Protection

The globally threatened large birds found in the Northern Plains are heavily threatened by human disturbance and, particularly, collection of eggs and chicks, some of which can fetch prices greater than US$100 in the national and international wildlife markets. Collection is mostly done by local communities, who sell the eggs and chicks to middlemen. The Bird Nest Protection program was started in 2002 to locate, monitor and protect the remaining nesting sites of the 10 rarest bird species. Under the program, local people are offered a reward of up to US$5 for reporting nests, and are then employed to monitor and protect the birds until the chicks successfully fledge. Protectors received $1 per day for their work and a bonus $1 per day worked, upon completion, if the chicks successfully fledged. The total payment of $2 per day was judged an acceptable daily wage based on initial village consultations. From 2008 on, this was increased to $2.50 per day ($1.25 per day up front and an extra $1.25 per day if fledging is successful), due to rising food prices. The protection teams are visited every 1-2 weeks by village rangers employed by WCS and by WCS monitoring staff to check on the status of the nests and for the purposes of research and data collection. If it can be verified that nests failed due to natural causes,

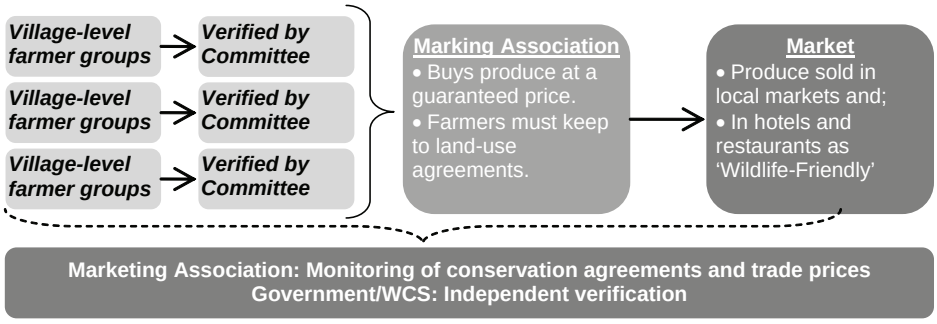

Figure 3. Design of the Agri-Environment program.

such as predation, the full payment is made. The program operates year-round, as some species nest in the dry season and others during the wet season. It started in four pilot villages in 2002 in Kulen Promtep Wildlife Sanctuary and was extended to Preah Vihear Protected Forest in 2004. By 2007 it was operating in over 15 villages. Unlike the previous two examples, the bird nest protection program works entirely through individual contracts; it is not community-based (Figure 4).

Outcomes of the PES Programs

Community-Based Ecotourism

Table 1 shows the growth of the ecotourism program in Tmatboey. At the village scale, the ecotourism program has helped to educate local people about the importance of the bird species and their non-consumptive value. Villages have developed, and locally enforce, their own rules about which species are protected and have agreements about the conservation of nesting and feeding sites (A. John, pers. obs.). Substantial increases in wildlife numbers have been seen at the first village site, Tmatboey. For example, the population of White-shouldered Ibis, one of the rarest birds in the world (Hirschfeld 2009), had increased from one nest and a single pair in 2002 to at least six nests and 23 individuals by August 2008 (Figure 5). In addition, local people have begun

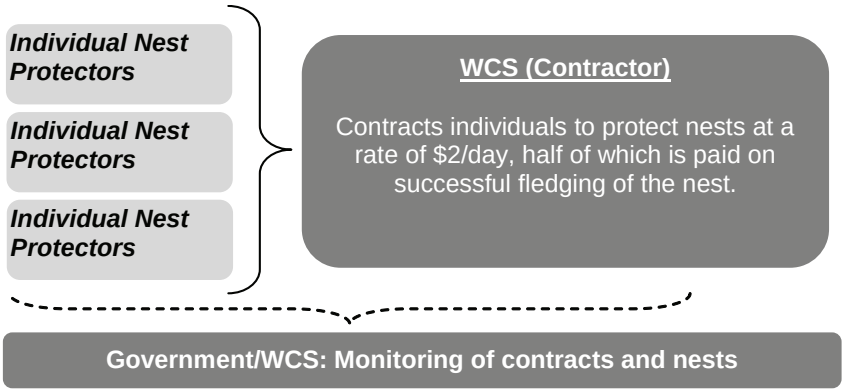

Figure 4. Design of Bird Nest Payments.

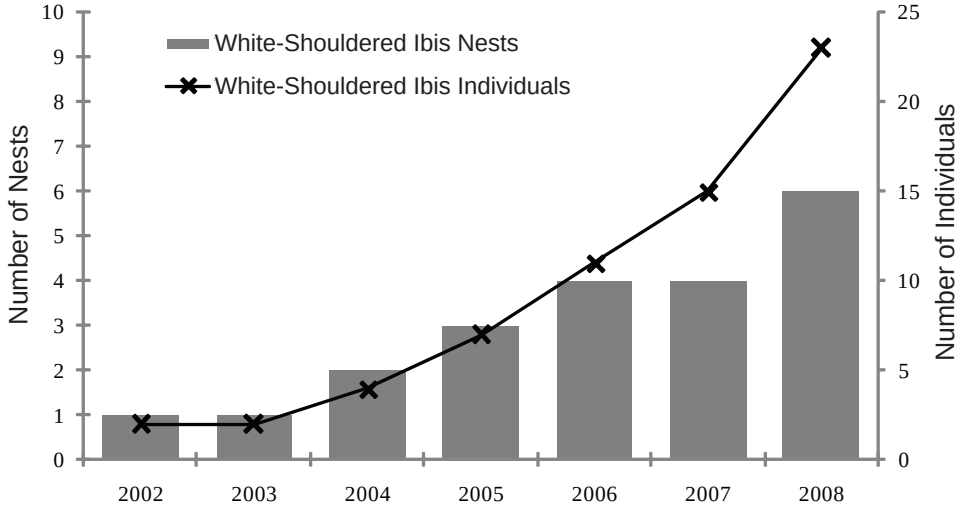

Figure 5. White-shouldered Ibis populations at Tmatboey, 2002-2008.

to enforce the land-use plan regulations; for example, by refusing to accept in-migrants and controlling where new forest is cleared (A. John, unpublished data). Tmatboey, for example, rejected 69 in-migrant families that tried to settle in 2007 alone. Self-enforcement is usually based on local verbal or written contracts between individuals and the committee to stop illegal activities or relocate agricultural plots to comply with land-use plans, rather than levying stronger punishments such as fines. Significant challenges remain, particularly as escalating national land prices have increased incentives for land-grabbing both by villagers and in-migrants.

Tourism numbers at Tmatboey have increased by an average of 36% annually since 2005 (Table 1). Revenue, however, increased by an average of 100% per annum over the same period, as the villagers have improved service quality, allowing them to raise prices, and diversified the range of services provided so that they capture a greater proportion of overall tourist spending. As a consequence, the average per tourist payment for services increased from $10 in 2004 to $67 in 2008 and the percentage of tourism spending that occurs locally has risen from 11% to 24%. Spending not captured by the village includes transportation, hotel bookings before and after the visit and employment of English-speaking tour leaders. By the 2007-8 season the village was receiving more than $12,000 in revenue, of which over $3500 was contributions made to the village fund from wildlife sighting payments and nearly $8500 was generated by tourism services supplied by villagers. Not all service payments are retained locally, as the villagers have to import goods not available in the village. In 2007-8, 25 individuals (from 236 families) were employed on a permanent part-time basis as guides, cooks and guesthouse managers, receiving an average of $20-40/month each during the tourism season (averaging $160/year, to a maximum of $400/year). These sums are significant for families that depend on subsistence agriculture and forest products, where average cash incomes per family are $350-$500/year (WCS, unpublished data). A further 65 individuals benefited in some manner through temporary employment (e.g. occasional guides, guesthouse maintenance, carrying water), or through local trade within the village, mainly for food. In total, therefore, around 40% of families were involved to some extent in the program. Tourist donations to the village fund have been used to help pay for a new school, build a road and fish ponds, repair water pumps and dig new wells. Some of the profits were used by the committee to pay villagers to conduct law enforcement patrols and guard nesting birds.

Agri-Environment Payments

Table 2 shows the results from 2008, the first full year of the agri-environment payment program. Farmers were offered a price of $0.25/kg of rice plus a bonus share of the association profits, representing an initial premium of 200% over the price offered by middlemen. In response to the competition, middlemen raised their price to $0.22/kg and offered

to use the village's scales – the middlemen's was widely believed to underestimate weights. Despite this, the villagers still preferred to sell through the village committee. Farmer interviews indicated that they preferred to sell to 'their own people' rather than outside middlemen, because they trusted the village committee, were treated with respect, the process was transparent, they had control over their own future and they liked the idea that profits would come back to the village in the future (A. John, unpublished data). There was considerable income variation between farmers, as some had more rice of trade quality than others; the median payment was $160, with one farmer earning $908. In total, the villages captured about 55-65% of the end consumer purchase price, with the remainder covering transport, processing, marketing and certification costs. A very large number of families expressed interest in joining the program, but only 38 had rice of the appropriate quality to sell through the program; this is expected to increase rapidly in future years as farmers adopt better agricultural practices.

Engagement in the agri-environmental scheme appears to be an incentive for local enforcement of land-use plan regulations. In the four villages, the percentage of families that have been recorded breaking land-use plans in each village is less than 8%, and three of the four villages have refused to accept in-migrants (the fourth is remote and no in-migrants tried to settle there). The effect of the agri-environment program in protecting individual species is unclear, although the program has only been in operation since late 2007 and it may be too early to draw conclusions. As with the ecotourism program, local self-enforcement is based on verbal or written contracts between farmers and the committee to stop illegal activities or relocate rice fields within land-use plans, rather than stronger punishments such as fines or imprisonment. At least eight families in two of the villages have relocated their agricultural plots based on the agri-environment program contracts.

Bird Nest Protection Program

Since 2002, the bird nest program has been extremely successful at protecting nesting sites (Table 3), safeguarding over 1,550 nests of globally threatened or near-threatened species. Very few protected

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Threshing Rice

Table 1. Tourism revenue in Tmatboey, 2003-2008.

Year	Visitors	Total	Fund*	Services	Payments to Villagers	% of Overall Revenue Captured by the Village	Average Service Payment/Tourist	Regular Employees	Total Beneficiaries
2003-4	13	$498	$370	$128	$128	11.40%	$10	n/a	n/a
2004-5	51	$2,588	$1,530	$1,058	$820	14.10%	$21	n/a	n/a
2005-6	72	$3,553	$2,100	$1,453	$1,158	14.10%	$21	12	35
2006-7	78	$5,521	$2,220	$3,301	$1,997	19.90%	$42	13	51
2007-8	125	$12,807	$4,295	$8,512	$5,846	23.90%	$68	25	90

** Tmatboey also received the United Nations Development Programme Equator Prize in 2008, which contributed a further $5,000 to the fund.*

Table 2. Payments from Agri-Environment scheme 2008.

	Villages	Rice Bought	Total Rice Payments	Profit Sharing	Total Payments to Village	% Revenue Captured by Village	Families Involved	Average (Median) Family Payment
Total	4	35,534 kg	$8,740	$1,890	$10,631	55-69%	38	$255 ($160)
Village Average	1	8,884 kg	$2,185	$473	$2,658	-	-	-

Table 3. Bird Nest Protection Program: Nests Protected, 2002-2008. In some cases nests were protected but there is no data available. '-' indicates species that were probably present, but were not protected in that year. Initially the program started at one site and operated in two sites from 2004. Numbers found have grown by 36% per year since 2004.

Species	2002 -03 (1 site) Nests (Colonies)	2003 -04 (1 site) Nests (Colonies)	2004 -05 (2 sites) Nests (Colonies)	2005 -06 (2 sites) Nests (Colonies)	2006 -07 (2 sites) Nests (Colonies)	2007 -08 (2 sites) Nests (Colonies)	2008 -09 (2 sites) Nests (Colonies)
White-shouldered Ibis *Pseudibis davisoni*	1	1	2	3	4	5	5
Giant Ibis *Pseudibis gigantea*	-	5	27	28	28	30	17 (*c*)
Sarus Crane *Grus antigone*	-	6	19	29	37	54	57
White-rumped Vulture *Gyps bengalensis*	-	-	-	3	4	4	3
Red-headed Vulture *Sarcogyps calvus*	-	-	1	1	1	1	2
Black-necked Stork *Ephippiorhynchus asiaticus*	-	-	-	2	3	2	2
Oriental Darter *Anhinga melanogaster*	13 (1)	-	-	-	26 (1)	84(1) (*b*)	9 (1)
Greater Adjutant *Leptoptilus dubius*	-	(*a*)	21 (2)	17 (2)	18 (2)	10 (2)	6 (3)
Lesser Adjutant *Leptoptilus javanicus*	-	34 (5)	97 (16)	134 (15)	221 (22)	277 (27)	261 (27)
Totals, both sites	**14**	**46+**	**166**	**217**	**342**	**416**	**360**

(*a*) *present*; (*b*) *some or all nests destroyed by crows*; (*c*) *incomplete surveys*

nests have been collected by hunters, although it is not uncommon to find unprotected nests that have been collected. The numbers of nests monitored and protected has increased by an average of 36% each year between 2004-5 and 2007-8. Most of this increase is due to greater numbers of Sarus Crane (*Grus antigone*), Vultures (*Sarcogyps calvus* and *Gyps bengalensis*), Oriental Darter (*Anhinga melanogaster*) and Lesser Adjutant (*Leptoptilus javanicus*) nests being found, suggesting that persecution and nest collection were the main factors limiting populations of these species. By contrast, Giant Ibis numbers have remained constant despite a high rate of breeding success (Keo et al. 2009), supporting the findings of other studies (e.g., An 2008, Keo 2008) that other factors such as conversion of feeding habitats to agriculture and human disturbance are the primary threats to this species. The bird nest program does not directly target habitat protection, and interviews suggest that bird nest protectors are not able to protect breeding sites or feeding areas from other villagers or outsiders (A. John, pers. obs.). Villages participating only in bird nest payments, but not ecotourism or agri-environment payments, regularly accept in-migrants who contribute to deforestation and habitat loss. In 2008, the nesting trees used by Greater Adjutant (*Leptoptilus dubius*) were felled by in-migrants near the village of Antil, although the bird subsequently re-nested elsewhere. This is one of only two colonies recorded in Southeast Asia for this species.

A detailed breakdown of the bird nest payments made in the 2005-6, 2006-7, 2007-8 and 2008-9 seasons is given in Table 4. The total cost to WCS of the program is around $25,000 to $30,000 per year, with an average cost of $65-$120 per nest protected. The average cost has declined as the number of nests has increased, partly because monitoring costs can be shared between adjacent sites and also due to the greater number of nests at colonies. Between 71 and 78% of the spending went directly to local people, either protectors or village rangers, with the rest covering monitoring costs incurred by WCS.

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Darter nests

Table 4. Bird Nest Protection Program: Costs, 2005-2009.

	2005-6	2006-7	2007-8	2008-9
Local Payments	$20,350	$19,289	$19,508	$22,556
(%)	78%	74%	72%	71%
Nest Protection Payments	$10,425	$10,786	$10,933	$11,890
Community Rangers	$9,925	$8,503	$8,575	$10,666
WCS Monitoring	$5,603	$6,630	$7,474	$9,375
(%)	22%	26%	28%	29%
Expenses	$2,506	$3,470	$3,914	$5,195
Salaries	$3,098	$3,160	$3,560	$4,180
Total	$25,953	$25,918	$26,986	$31,930
Nests Protected	217	342	416	360
Average Cost/Nest	$120	$77	$66	$89
Villages				
Number of Villages	15	18	21	21
Average total payments/village[a]	$1,357	$1,080	$933	$1,017
Maximum total payments/village	$4,013	$3,525	$3,487	$3,267
Nest Protectors				
Number of nest protectors	88	102	105	88
Average payments/nest protector	$119	$107	$108	$135
Maximum payment/nest protector	$474	$356	$292	$343

[a] *Antil village received the greatest total payments in each year.*

Average payments per family are around $100/year, with considerable variation depending upon how long people are employed. Some individuals have become specialist protectors, switching species depending on the season and receiving continual employment for several months. The amounts paid, sometimes totaling more than $400/individual, are substantial in comparison with other cash income options. Payments per village average $1100-$1500, depending on the year, but some villages earn considerably more due to the presence of a large number of key species, or species with particularly long breeding periods. Antil village made the largest amount, totaling nearly $11,000 of payments over the three seasons, mainly due to the presence of Greater Adjutant colonies which require at least 6 months of protection each year.

Comparison of the Different PES Programs

The advantages of direct payment schemes have been suggested to include (Ferraro 2001, Ferraro and Kiss 2002):

- Institutional simplicity, since direct payments reduce the complexity of implementation, including simplified monitoring arrangements;
- Cost efficiency, including potentially improved livelihood benefits, as a consequence of a greater percentage of resources being allocated to the local level; and
- Increased conservation effectiveness, because payments are explicitly and conditionally linked to conservation actions.

Institutional Arrangements

Institutions are defined by North (1990) as: "the rules of the game in a society or, more formally, ... the humanly derived constraints that shape human interaction". Organizations are groupings of individuals that operate within the institutional framework. This framework includes property rights, monitoring, enforcement, governance and contracting arrangements (Table 5). Of the three PES programs described, the bird nests program has the simplest institutional arrangements, as it relies on a direct contract between the individual and WCS to protect biodiversity under the assumption that individuals can temporarily control human access to and use of a breeding site even if they do not own it. In this case, regular monitoring by WCS ensures compliance. Simple contracting can fail, however, if not adequately supported by the existent institutional framework. For example, though the Monarch Butterfly project in Mexico purchased logging rights from forest-dwellers to protect butterfly habitat, most illegal logging was performed by powerful outsiders, which local people were incapable of preventing (Missrie & Nelson 2005). Similarly, Cambodian bird nest protectors were unable or uninterested to stop others from felling nesting trees.

Both the ecotourism and agri-environment programs have more complex institutional arrangements. The ecotourism contract is made directly with a village organization, which has been approved by the Government to develop and enforce local land-use regulations. The agri-environment program is a hybrid program, with the village organization sub-contracting to individual farmers. The village institutions – the local rules governing natural resource management – are nested in a multi-layered framework that includes:

- An external agency (Sam Veasna Center for the ecotourism program, the marketing association for the agri-environment program) that provides rewards by connecting the villages to national and international markets, certifies compliance, and helps to mediate conflicts;
- PA authorities, who can enforce environmental and forestry laws, supporting village institutions to resolve cases they are unable to solve internally or to remove outsiders; and
- External organizations, including private sector companies and NGOs, that reinforce rules and can assist with resolving conflicts or other problems (such as talking to donors and higher Government authorities).

Monitoring of compliance (Keane et al. 2008) is conducted at all levels: local monitoring by village organizations, certification by the external agency, and enforcement of national laws by the PA.

In summary, institutional arrangements under the bird nest payment program are considerably simpler and more direct than the other two examples, but this is not necessarily an advantage. The more complex institutional arrangements are multi-layered, with redundancy

Table 5. Summary comparison of the three direct payment programs.

	Community-based Ecotourism	Agri-Environment Payments	Bird Nest Protection
Institutionality			
– Organizational arrangements	Four actors: Village: Management PA: Enforcement External agency: Certification & Marketing Private Sector: Sales	Four actors: Village: Management PA: Enforcement External agency: Certification & Marketing Private Sector: Sales	Two actors: Individuals: Protection WCS: Monitoring & making payments
– Property Rights	Forest: common property co-managed by Village and the PA	Forest: common property co-managed by Village and PA; individually owned fields	Nests: *de facto* individual control
– Contracts	Tourists -> Village Committee	Purchaser -> Village Committee -> Villagers	NGO -> Villagers
– Local Governance	Yes (Local Management)	Yes (Local Management)	No (NGO Management)
– Monitoring	External agency (certification) and PA	External agency (certification) and PA	WCS
Distribution of Costs and Benefits			
– Initial investment	High ($50,000/village)	High ($50,000/village)	Low
– Income:			
• Community Funds	$1,000/village (maximum $4,000)	>$300/village	None
• Individuals	>$1,200/village (maximum $6,000)	$2,500/village	$1,200/village (maximum $4,000)
	10% of families employed, $160/year	5-10% of families, median $160/year	5% of families employed, $120/year
	Many families receive some benefit	Potentially all farmers could benefit	
– Efficiency (% of overall cost paid locally)	24% (increasing, as capacity improves)	55-60%	71-78%
– Financial Sustainability?	Yes (both for community business & certification and marketing costs)	Yes (both for community business & certification and marketing costs)	No (WCS pays $25,000/year)
Conservation Results			
– Conservation of:			
• Key Wildlife	20-100 individuals/ village	20-100 individuals/ village	>1,000 individuals
• Habitat	10-50,000 hectares (village area)	10-50,000 hectares (village area)	0
– Targeting	Wildlife: Yes Habitat: Some	Wildlife: Some Habitat: Yes	Wildlife: Yes Habitat: No

and reinforcement provided by different organizations (for example external monitoring by WCS, the PA and marketing or tourism agencies). These arrangements build resilience and checks into the system that ultimately may make the programs more effective and sustainable (Berkes 2007).

Distribution of Costs and Benefits

The simplified institutional arrangements of the bird nest program lead to lower administrative costs: 71-78% of payments are disbursed at the local level (Table 5). This was predicted by Ferraro and Kiss (2002), who suggested that direct payment programs would have administrative costs of only 5-25%, which is far lower than indirect conservation interventions. The bird nest program was also inexpensive to establish. By contrast, the more complex ecotourism and agri-environment programs are less efficient at disbursing revenue locally, mainly due to marketing and monitoring costs incurred by the external agencies. They are also expensive to establish, requiring substantial investments over approximately two years in order to build the capacity of the village organizations.

All three programs deliver approximately the same levels of individual income to villagers (Table 5): around $120-$160 per family participating, and an average of $1200 (to a maximum of $4000-$6000) per village. Significant payments are made only to a minority of families under each program: the number of possible nest protectors or tourism employees is necessarily limited, and agri-environment payments are approximately proportional to the size of land holdings, meaning that politically powerful or wealthy individuals with larger fields will benefit the most (as suggested by Börner et al. 2009). In the village-managed programs, decisions over who benefits are made locally rather than by an external NGO, and community development funds, managed by the village organizations, provide benefits to the entire village. These funds are extremely important because they are the only source of development assistance to the village that is entirely under local control.

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Transporting rice harvest

Most other assistance is provided by NGOs or government authorities from outside the village, and is therefore driven by external priorities. All three programs are inequitable to some extent (i.e. not all villagers benefit equally). The direct payments for bird nest protection benefits the least number of people and does not incorporate mechanisms for wider benefit-sharing. A study in Madagascar found that the majority of participants perceived a village-managed program to be fair, despite apparent inequalities, and ranked communal benefits highly (Sommerville et al. 2009). The same was found in the ecotourism and agri-environment payment examples described in this study.

Direct payment programs for biodiversity conservation have been criticized as being unsustainable because they rely on a continual stream of external funding (Swart 2003). The bird nest program is entirely dependent on $25,000 to $30,000 made annually available by WCS. By contrast, both the ecotourism and agri-environment programs, once established, have the potential to be financially self-sustaining.

Observed Conservation Results

All three programs target protection of wildlife, and the agri-environment and ecotourism programs also explicitly include habitat (Table 5). The bird nest program in particular provided very rapid protection for many species that were at risk of local extinction; increasing protection within the very first few months of operation and probably contributing to increases in these populations (Clements et al. 2009). By contrast, the village-based programs required a few years of operation to become effective and are more long-term and indirect in their conservation effect, aiming to reduce both habitat loss and over-harvesting of species. Understanding whether these programs are effective at delivering conservation will require a counterfactual comparison once they have been in operation for several years, as suggested by Ferraro and Pattanayak (2006). However, the substantial increases in species populations observed for both the bird nest and ecotourism programs are very promising, given the general ongoing decline in species abundance in Cambodia (Loucks et al. 2009). The rejection of in-migrants by villages with the ecotourism and agri-environment programs is also significant, given that in-migration is known to lead to greater deforestation (An 2008). Although rejected in-migrants might settle in other remote forest areas, thereby displacing deforestation to another site, available information suggests that they have instead chosen to settle near major population centers outside the PAs.

Despite positive results in terms of species status, direct payments to individuals may fail to build broad local support for conservation. From 2005 to 2007, villagers in Antil received $7488, much of it to protect two Greater Adjutant nesting sites, while Tmatboey received $7475 in tourism payments, of which only $3155 was used to pay individual villagers. In both cases, only a subset of the community benefited. During this period, the population of White-shouldered Ibis doubled

around Tmatboey due to a reduction in hunting pressure and improved protection of nesting and feeding areas, the village barred 69 families from settling in the area, and various other activities to curb land clearance were undertaken. In Antil, however, forest encroachment and in-migration were widespread, culminating in the felling of the Greater Adjutant nesting trees in 2008. It seems that, despite the high level of payments to individuals to protect their nests, villagers in Antil were not sufficiently motivated to protect this species. This may have been because payments were widely perceived as being unfair, because only a few individuals benefited and because no local organization existed to mediate conflicts.

The above example also illustrates the problem with highly targeted conservation interventions: a program's designer assumes the risk that the correct targets have been chosen to ensure success and that no perverse incentives will be created (Bowles 2008). Under conditions of high uncertainty over threats and potential impacts of interventions, less specific payment programs that reward a set of outcomes (habitat protection and no-hunting agreements, as in the tourism and agri-environment cases) may be much more effective than a highly targeted program such as the bird-nest protection program (Kosoy & Corbera 2009).

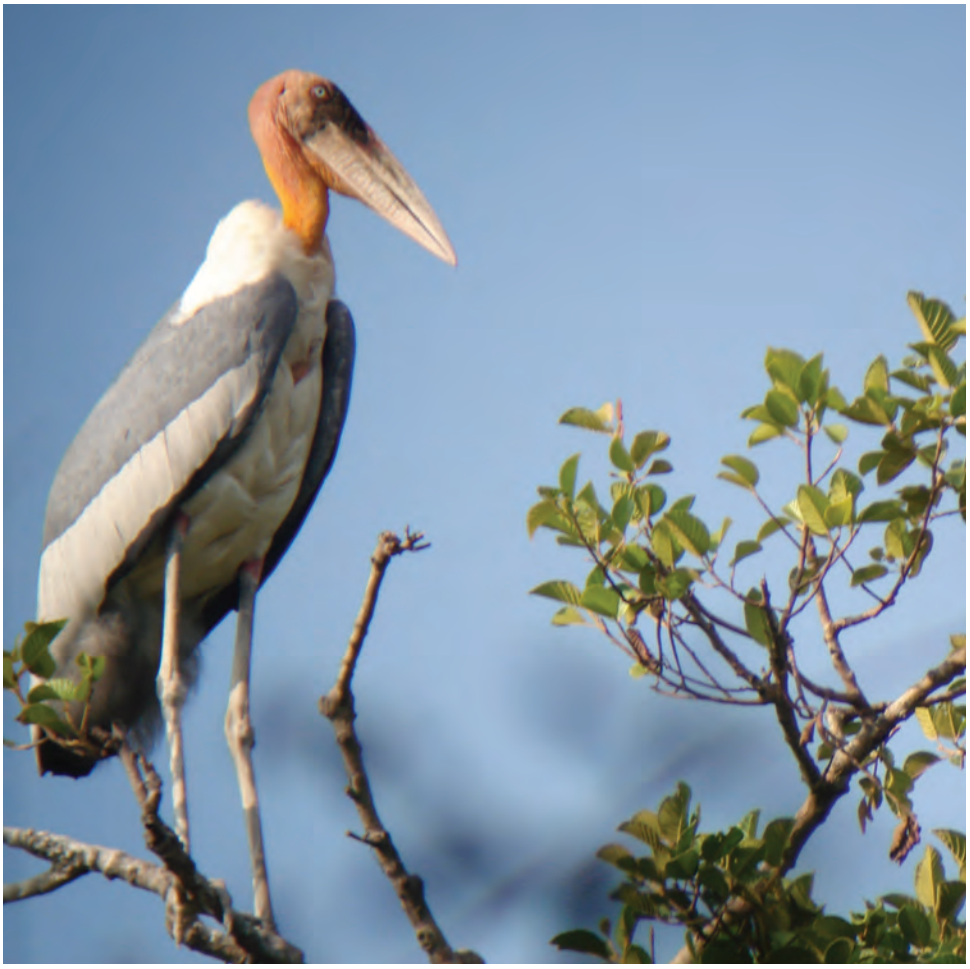
Conclusion

Institutional frameworks in tropical forest countries, many of which are undergoing a rapid rate of forest loss or erosion of biodiversity, are often weak and uncertain (Barrett et al. 2001). Designing PES programs in the context of weak institutions is challenging, particularly if property rights are not clearly defined. This comparison of three programs from Cambodia has highlighted two different approaches. The first is direct payments to individuals who can temporarily control a biodiversity resource, modeled on the approach proposed by Ferraro and Kiss (Ferraro 2001, Ferraro & Kiss 2002). The second approach is longer-term and requires investing in clarifying property rights and building local institutions for the management of wildlife and habitats in addition to the provision of incentives. The comparison suggests that the first approach can be very effective initially; the bird nest program rapidly protected several hundred pairs of globally threatened bird species, was inexpensive to implement and had low administrative costs (most of the money was disbursed locally). However, this comparison has also suggested two significant problems with the approach.

First, direct payment systems require strong institutional frameworks that support contracting, particularly enforcement of property rights (Börner et al. 2009, Muradian et al. 2009, Vatn 2009). The Cambodian bird nest protectors had weak ownership rights over breeding sites and were unable to protect them in the longer term from clearance by others. In the absence of strong existing institutional frameworks, payment programs need to invest in building the appropriate institutions

both at the village and higher levels. Increasing the diversity of institutions creates checks and improves resilience and sustainability in the system (Berkes 2007), but imposes its own costs. In the two Cambodian cases (ecotourism and agri-environment programs), the increased institutional diversity led to a more sustainable outcome even though the proportion of payments that were made to local people was reduced to provide the necessary revenue to fund the other organizations' monitoring, enforcement and supporting roles.

Second, direct payments to some individuals, but not to others, may fail to generate broad support for conservation, which is particularly necessary when the institutional framework is weak. Unlike the bird nest example, the two Cambodian village-managed programs successfully built local support for, and increased the understanding of, rules and regulations regarding protected species and land-use. These rules and regulations were developed locally and approved by the entire village. This is an example of empowerment, defined by Chambers (1983) as "the process through which people, and especially poorer people, are enabled to take more control over their own lives, and secure a better livelihood, with ownership of productive assets as one key element." The importance of intrinsic motivation in determining behavior has been recognized by psychologists since the 1980s (e.g., DeCaro & Stokes 2008, Deci & Ryan 1985). Endogenous rules which have



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Greater Adjutant

been developed by the impacted group themselves are far more likely to be respected and understood by local people (Berkes 2003, Ostrom 1990) than are externally-imposed rules (Cardenas et al. 2000). Such endogenous rules would probably be sustained for a period even if payments ceased. By contrast, bird nests are valued only because WCS chooses to pay for their protection, not through any particular recognition of the birds' importance; if payments stopped, even temporarily, collection of bird nests would probably resume. Externally-imposed rules and incentives may even 'crowd-out' locally-developed rules and social norms (Bowles 2008, Cardenas et al. 2000, Vatn 2009), or lead to perceptions that incentives are unfair (Fehr & Falk 2002), as may have occurred in the bird nest case. Payment programs that are structured to facilitate intrinsic motivations are therefore far more likely to be successful.

PES programs are best viewed as one tool in a broader process of strengthening institutions for the conservation of biodiversity (Agrawal & Gibson 1999, Barrett et al. 2001). The conditions which favor the formation of institutions for the collective management of common pool resources have been well-articulated through several decades of research (Agrawal 2001, National Research Council 2002, Ostrom 1990). However, few settings in the world are characterized by all of these conditions (Dietz et al. 2003). The challenge, therefore, is to devise institutional arrangements that help to establish such conditions or at least meet the main challenges of governance in the absence of ideal conditions (Dietz et al. 2003). PES programs can address two critical constraints: first, by providing an incentive to reform institutional arrangements (for example, clarification of property rights); and second, by increasing the financial returns from collective management through provision of additional payments under conditions where sustainable extraction alone would not be profitable. At the village level, the combination of a stronger institutional framework and payments leads to a greater local incentive for collective action; i.e., the village moves closer towards fulfilling the design principles articulated by Ostrom and others (e.g., Agrawal 2001). In the Cambodian cases the payments are critical for three main reasons. Firstly, they increase the value of the biodiversity resource to local people, both directly through individual payments and indirectly by providing funds for village development. Secondly, the payments fund the costs of management of common pool resources by village institutions, a system which is itself a public good (Ostrom's 'second-order social dilemma' (1990)). Thirdly, the payments fund monitoring and sanctioning by the village institutions (Ostrom's 'third-order social dilemma'). The structure of the payments – providing revenue at both the individual and village-level scale – ensures that these outcomes are possible.

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The program is organized around four core activities that will be implemented in overlapping phases over the life of the program. These are:

1. Knowledge building including an initial review, synthesis and dissemination of current knowledge, and applied comparative research in a number of different field locations to help fill gaps in our knowledge;
2. Identification and development of diagnostic and decision support tools that will help us better understand the positive, negative or neutral relationships among natural resource conservation, natural resource governance and alleviation of rural poverty;
3. Cross-partner skill exchange to better enable planning, implementing and adaptively managing projects and programs in ways that maximize synergies among good governance, conservation and wealth creation; and
4. Global dissemination of knowledge, tools and best practices for promoting wealth creation of the rural poor, environmental governance and resource conservation.

Over the 5-year life of the program, TransLinks aims to develop a coherent, compelling and, most importantly, useful corpus of information about the value of, and approaches to, integrating Nature, Wealth and Power. To do this, TransLinks is structuring the work around two core issues – 1) payments for ecosystem services and 2) property rights and resource tenure.

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