Supplementary Material B

Table S11.1 Synopses of PES review articles

Publication	Review Type Traditional (T), Narrative (N), Systematic (S), Hybrid (H)	National (N), Regional (R), or Global (G) focused Review	Brief Summary		
			Context	**Theoretical application**	**Principle conclusions and/or recommendations**
Landen-Mills, N. & Porras, T.I. 2002. Silver bullet or fools' gold? A global review of markets for forest environmental services and their impact on the poor. Investments for Sustainable Private Sector Forestry Series. Institute for Environment and Development. London.	H (shares characteristics of a traditional and systematic review)	G	The document presents a global review of carbon (75), watershed (61), biodiversity (72), landscape beauty (51) and bundled services (28). Identifying a total of 287 market-oriented case-studies (proposed, active and inactive). These case-studies are those recognised and identified with, generically, forest environmental services. The report seeks to uncover if these market-oriented mechanisms deliver both poverty reduction whilst concomitantly achieving environmental protection.	Environmental services targeted in this review are understood within the typology of the MA framework. The review takes a broad-based approach as to what constitutes market-oriented approaches, going beyond what would be traditionally recognised as PES, though its perspective is within the environmental economics paradigm: market form, market evolution, constraints on market development, and impacts of market development on human welfare and the poor. The paper develops a conceptual framework (for guiding research) which it then applies to the review.	The report describes 12 proxies or commodities that are used to capture values associated with services in emerging markets, namely: business shares, credits/offsets, products, easements, debt-for-nature swops, development rights, land lease/conservation concession, land acquisition, management contract, protected areas and research permits. 8 payment mechanisms are identified: direct negotiation, intermediary-based transaction, pooled transactions, joint-venture/venture-capital, over-the-counter trade, clearing-house transaction, retail-based trade and exchange –based trade Overall, the report indicates that markets are multi-stakeholder affairs involving the public and private sector, government, NGOs, communities at local, national and international scales. Immaturity still predominates – most markets are nascent, with the private sector tending to dominate. Governance arrangements are critical for market development, and development is typically still demand-side driven. Primary obstacles to market development are transaction costs, opportunity costs, regulatory frameworks, capacity building and property-rights issues. With regards to impacts, the report highlights that few adequate assessments have been made of the costs and benefits of

					markets on increasing human-welfare, of positive influences on poverty reduction and environmental protection. Most assessments are ad hoc, general and biased towards benefits. Main recommendations are: formalisation of property rights, clearly identify services and define commodities, improvements are required in the development of cost-effective payment mechanisms, increase institutional strength and capacity building.
Mayrand, K. & Paquin, M. 2004. Payments for Environmental Services: A survey and assessment of current schemes. Unisféra International Centre.	T (supplemented with some expert opinion)	G	The purpose of the review document is to assess underlying differences and similarities as well as associated strengths and weaknesses of PES models, by evaluating schemes operating in the Western Hemisphere. The report focuses on 25 schemes operating in 15 countries. The majority of schemes (23) and countries (13) are located across Central and South America. Seven schemes are noted as being either at the proposal,	The concept of PES and the approach taken to understand the case studies upon which the report is constructed remains within the traditional environmental economics approach. The report takes a flexible view of what constitutes a definitional understanding of PES allowing a broader flexibility in the report's critical appraisal.	The report emphasises the importance of context (in the broadest sense) in the determination of whether PES is a 'cost-optimal' strategy. The authors identify an inherent tension and therefore trade-off underlying the central philosophy of PES which is the dual maximisation of effectiveness and efficiency both of which have polar effects on transaction costs. Alongside which PES requires to deliver fairness and equity. In this regard the report also highlights the need to increase the participation levels of poorer sectors of society to ensure that PES schemes work effectively and several factors, including security and land tenure are identified as areas requiring attention in this context. The authors place special emphasis on getting the design of PES schemes right. Nevertheless, they acknowledge that multiple models exist, related to specific operating conditions, and there is no single one size fits all PES design. However, they do suggest that defining ESs, identifying land-use ES linkages, providing flexible contractual agreements, diverse payment flows and ensuring compliance are necessary factors

			development or pilot stage, with one indicated as completed. Twelve are currently on-going or in-progress and two are identified as having had single transactions. The report focuses on the type of environmental services amenable to PES and a conceptual analysis of PES, which is then related to the various underlying components crucial to the successful functioning and application of the concept. Conditions required for successful PES outcomes are discussed as are optimal policy instruments.		that require being central in the design process. As a consequence they also highlight these areas as those in which PES schemes currently face difficulties and limitations.
Kumar, P. 2005. Markets for ecosystem services. International Institute for Sustainable Development	H (Characteristics of a Traditional and Narrative review)	G	General over-view of Markets for ES's literature (including considerations of PES schemes).Brief discussions of the theory, arguments, roles	MA typology of ES's. Environmental Economics perspective – favours ES market internalisation.	The report emphasises that valuation is necessary for effective management of ES's. Moreover, the author asserts that governments, as primary buyers of ES's, have a key role to play in market-based interventions and developments. Technical information and exchange of experience is a prerequisite for decision-makers to make informed choices regarding the optimum types and designs of market instruments for ES

			and challenges of ES valuation. The present status of ES markets using a limited range (9 examples) of global watershed cases – principally N. American and Latin American is outlined. Information on market-based instruments to promote ESs and biodiversity payments is mentioned.		delivery. In addition, the importance of producer, market and transaction cost data for establishing and operating functioning and effective market mechanisms is highlighted. Finally, capacity building is required to develop greater expertise in market development and implementation.
Bond, I. 2007. Payments for watershed services: opportunities and realities. International Institute for Environment and Development. London.	H (Characteristics of a Traditional and Narrative Review)	G	The paper presents a brief review of payments for watershed services, focusing on conceptions, present and emerging issues and the linkages between PES and climate.	The article proceeds from an environmental economic perspective, with a focus on mechanisms and implementation.	The paper argues that the key requisites for PES/PWS are the clear definition of an environmental service/services and conditionality of payments. However, most PES do not fit the standard definition (Wunder, 2005, 2007) many in respect of conditionality or a defined ES. A significant number of PWS programmes are now being underpinned by both public and private sources, with local initiatives also increasing. Key constraints to PES development and implementation include transaction costs, opportunity costs (need for payments to adequately compensate for alternative land-uses), institutional arrangements (contractual agreements and land-tenure – stability is important – uncertainty is prohibitive), the linking of management practices to the specific change in and delivery of defined ESs (also related to the optimum targeting of payments – most PWS are not spatially targeted to maximise

					outcomes). Overall the paper argues that, advancing the implementation and operationalisation of PES and its capacity to deliver positive outcomes requires: proper hydrological modelling (linking service to management practice), improved institutional infrastructure (governance) and better monitoring and evaluation protocols.
Dillaha, T. *et al.* 2007. Payments for Watershed Services Regional Syntheses. USAID PES Brief 7.	T	G	The report by USAID provides a regional synthesis of on-going payments for watershed services (PWS) in Africa, Asia and Latin America, derived from three separate reports funded by USAID/EGAT/NRM. The report focuses on PWS trends, factors affecting PWS – context and regional influences, programme design and challenges.	The review adopts Wunder's (2005, 2007) definition of what constitutes a PES/PWS scheme and therefore takes an environmental economics frame of analysis. Market interventionism is therefore assumed to be overall positive for environmental protection purposes.	The report shows that across Latin America, Africa and Asia most PWS schemes do not meet Wunder's 5-point criteria for defining a PES scheme. Of the reviewed programmes Latin America/Central America has the highest number of PWS schemes, with Ecuador (e.g. PROFAFOR, Pimimpiro) and Colombia (e.g. PROCUENCA and RISEMP) in South America being the most progressive compared to Bolivia, Peru and Venezuela. Brazil recently instituted the Proambiente programme. In Central America the main programmes are Mexico's PSA-H programme and Costa Rica's PSA programme. Overall, the main impediments to PES expansion are identified to be high costs and uncertain benefits. In addition, many programmes have non-conditional payments and rely too heavily on external donors for contributions. With regards to Asia the report highlights that most programmes are in their infancy, with many projects being donor-driven scoping assessments to determine where best to target PES schemes – these are occurring in Indonesia, the Philippines, India, Nepal, Vietnam and China. Population densities, leading to small land-holdings, and state-controlled forest/agricultural land are significant influencers of PWS

					development. Water utilities, national and local administrations and hydroelectric facilities are the main buyers of services, and there seems limited demand for environmental services buyers, due to lack of awareness, and so there are few successfully implemented programmes. In some cases payments are not always adequate, but may be of benefit if they are complementary to in-kind gifts, though the social/poverty benefits have yet to properly materialise. The report indicates that it is difficult to talk of PWS/PES in an African context, few schemes exist, outside of theoretical or proposed projects – only two reviewed are currently paying – both in South Africa, Working for Water programme and the Working for Wetland programme. Most African initiatives appear to be funded through external donors i.e. Overseas Development Assistance, international conservation organisations or government agencies, with little private sector action. The report also identifies numerous constraints curtailing the development of PES programmes in Africa, most of which concern the lack of institutional, legal and technical capacity.
Porras, I.; Grieg-Gran, M. & Neves, N. 2008. All that glitters: A review of payments for watershed services in developing countries.	H (Shares characteristics with a Traditional and Systematic review)	G	The review concerns the status of PWS schemes in developing countries around the world, with the four-fold purpose to: (i) examine trends regarding implementation since	The authors adopted a modified (expanded) version of Wunder's PES criteria, which necessitates that schemes must (a) address an environmental externality through payment (b) be voluntary in principal on the supply-side and (c) have	The review indicated that few of the 41 proposed and on-going PWS schemes identified in the 2002 report were still in operation 6 years later, with many early proposals failing to materialise. Great variation in PWS scheme scale and focus exists from 5 families and 13 ha (case in Nicaragua) to 27000 villagers and 32 million ha (SLCP in China).

International Institute for Environment and Development. London.	the Landen-Mills & Porras report in 2002, (ii) review the main characteristics of schemes included in the report, (iii) assess the economic, social and environmental impacts and (iv) develop lessons to be learned.	payments that are conditional in principle. The starting point for PWS scheme identification and inclusion was to consider the PWS schemes outlined in the Landen-Mills & Porras report (2002) and then to cast the net wider. Using these selection criteria the review obtained sufficient information to detail 81 profiles (50 on-going, 8 advanced and 37 preliminary), 41 of which came from the Landen-Mills and Porras report. Case studies were divided into five types according to payment arrangements and sub-categorised as local, national or advanced. Overall, the analysis fits within the standard environmental economic perspective.	Many national schemes are scaled-up versions of local schemes, and whereas local schemes target 1 or 2 services at the national level a bundled services-approach is used. Land-based approaches are generally used to assess changes in environmental service provision – in most cases providers are paid on the basis of adopting particular land-management practices presumed to ensure service delivery. Although more than two-thirds of local schemes have private sector involvement, or fees paid through water users, there remains a heavy reliance on government and external donors. In many cases several organisations are involved in the payment chain, with levels generally determined administratively at the national level, and via negotiation by an intermediary at the local level. Payments are generally simple cash payments (often supplemented with in-kind gifts) with a flat-rate per hectare, there is little differential targeting of payments. Monitoring of compliance is ad-hoc, and is based on land-use inspection, which varies site to site, or through the use of satellite imagery. Communally held land associated with poorer sectors of society is under-represented in PWS schemes, although there is no clear evidence that PWS schemes are prohibitive to poorer households accessing services. Mixed evidence for sellers of watershed services benefiting from payments, in many cases, payments are sub-optimal rather

					than representing an alternative income stream. Lack of evidence to link payments and management practices with service delivery. In many cases impacts on water flow or quantity are based on extrapolation, or the views of users, rather than on-site measurements and accurate modelling. Moreover, in many cases the land area, as well as land-type, included in the PWS programme is too small and may be sub-optimal to guarantee service delivery and therefore scheme effectiveness. Overall, PWS schemes require better targeting of payments, more sophisticated payment methods and compliance and monitoring functions. Better evidence regarding the beneficial impacts of land management practices on water regulation, as well as potential trade-offs, and the ability of payments to alter landholder behaviour (this may require a substantial increase in payment level).
Wunder, S.; Engel, S. & Pagiola, S. 2008. Taking stock: A comparative analysis of payments for environmental service programs in developed and developing countries. *Ecological Economics*, 65, 834-852	T (though a systematic approach to the formal analysis of the PES programmes identified is taken)	G	The review synthesises information regarding PES case studies presented in a Special Issue of Ecological Economics built around programmes identified at a PES workshop held in Titisee, Germany in 2005. 12 PES programmes, plus 2 PES-like	The standard definition and theoretical approach employed by the authors is consistent with the description of PES presented by Wunder (2005) and the environmental economics view of natural resource use, and by extension, the utilisation of incentive-based mechanisms to achieve sustainable use.	The authors divide the PES programmes according to the financing basis of their operation i.e. user-financed or government financed. Using that primary difference as their platform the analysis proceeds to try and discern relative differences between their operations. Though the authors acknowledge that most programmes actually involve mixed-financing heritage. In this respect the main differences detected are related to scale of operation (government programmes cover a larger area), the number of ESs targeted (government programmes generally target multiple ESs), the nature of intermediaries (user-financed schemes often develop their own whereas government-financed

			programmes, six drawn from the 'developing' world and six from the 'developed' world are deconstructed to enable structural comparisons regarding design, implementation and effectiveness.		programmes utilise already existing institutions or purposefully designed agencies), economies of scale with regards to finance and government-financed programmes tend to have more side-objectives, for example poverty alleviation. The paper identifies the importance of programme monitoring and permanence for ensuring the continued production of ESs and the continued contractual compliance of participants, particularly if perverse incentivisation is likely. Moreover, the authors highlight the current lack of scientific evidence underpinning land-use service linkages. Also noted, are the trade-offs between efficiency, effectiveness and equity when trying to maximise cost-effectiveness and service output and distribution. The paper concludes with the idea that PES represents both a supply-side innovation (buying conservation, negotiating social and private benefits, acting as a quid pro quo for ES providers) as well as a demand-side innovation (targeting ES users directly for new conservation funding, providing information on what ESs are desirable as well as incentives for using funds wisely).
Southgate, D. & Wunder, S. 2009. Paying for watershed services in Latin America: A review of current initiatives. *Journal of Sustainable Forestry*, 28, 497-524	T	R	Review of Latin American payments for watershed services. Focuses on PES activities that seek to enhance hydrological services, and appraises their current state – primarily by concentrating on policy,	Employs an environmental economic framework of analysis for PES schemes using Wunder's (2005, 2006 & 2007) five point definition i.e. the criteria a PES scheme must meet to be regarded as a 'pure' PES scheme. Advocates the transformation of PES-like schemes into FULL PES	Limited implementation of 'full' PES schemes is the result of two primary factors: low returns to PES (flowing from modest environmental benefits and limited internalisation) and high costs (resulting from opportunity costs, transaction costs and government impediments). Most current PES initiatives are PES-like schemes (viewed from Wunder's prescriptive). Scientific understanding of hydrological linkages, adoption of

			institutional and governance factors. Brief over of Latin American PES cases, with specific reference to three examples: PIMAMPIRO (Ecuador), FONAG (Ecuador) and PSA-H (Mexico) – all established to tackle hydrological services; interaction between the public and private sector	schemes as the primary means of better evaluating and improving their socio-economic and environmental additionality.	innovative bidding procedures, institutional arrangements favouring reduced transaction costs, change in attitudes, building trust through civil-society and the NGO sector would encourage increased use of conservation payments. Though schemes should suit local conditions only schemes aligning to a FULL PES design would be truly effective
Ferraro, P.J. 2009. Regional review of payments for watershed services: sub-Saharan Africa. *Journal of Sustainable Forestry*, 28, 525-550	T	R	Review of African payment for watershed services programmes. The paper focuses specifically on two ongoing projects in South Africa (working for water and working for wetlands programmes) and proposed projects in South Africa, Tanzania and Kenya. Ferraro poses the question of why PES projects are not widespread in Africa	The paper uses Wunder's (2005, 2007) definition of a PES scheme, but extends it in the following way, by emphasising that payment should be variable and conditional on a well-defined environmental outcome. That the buyer should not have complete control over the outcome but that the provider should have partial or total control over the production of the outcome. This Ferraro remains with the environmental economic tradition but makes Wunder's definition somewhat	Most PWS schemes in Africa are either proposal or not currently making payments, and in many cases would not fit the standard definition of a PES scheme. Generally, PWS initiatives are funded through overseas development assistance (ODA), international conservation organisations and increasingly governmental agencies. Presently, there is little private sector involvement. Most PWS schemes are geared towards social mobilisation and poverty alleviation, environmental outcomes are secondary. The South African Working for water and Working for wetlands programmes are the only on-going PWS schemes, currently paying, and having noticeable effects on environmental and social outcomes – though because of their

			as they are in Latin America and outlines the main reasons for this occurrence.	more flexible.	funding mechanism many may not consider them to be true PES/PWS schemes. Of the constraints and limitations prohibiting the effective establishment, implementation and operationalisation of PWS in Africa the main ones are: the financial health of institutions (lack of water delivery services, hydroelectric infrastructure, and urban water systems declining), ability to pay (high levels of poverty), lack of tenure security (proliferation of customary tenure) and poor supporting institutions.
Huang, M. et al. 2009. Payments for watershed services in Asia: A review of current initiatives. *Journal of Sustainable Forestry*, 28, 551-575	T	R	The paper is a review of payments for watershed services in Asia. The article reviews 15 PWS schemes in Asia, the majority of which are in the early stages of implementation. The article considers schemes in: China (2 schemes), Indonesia (5 schemes), Philippines (3 schemes), Nepal (1 scheme) and India (2 schemes).	The paper takes as its basic premise Wunder's (2005, 2007) definition of what constitutes a PES scheme. The authors of the paper remain within the standard environmental economic framework, emphasising that conditionality is the criteria which is most important in distinguishing PES from other market-mechanisms, and thus their analysis proceeds from that perspective.	The paper highlights that in most cases there are conceptual gaps between Wunder's definition of PES and the practical application and operation of the concept. Buyers of services are predominantly national or district governments (due to state-owned nature of the land), with few private or quasi-sector buyers. Sellers vary, from upland farmers, communities and governments. In most cases intermediaries are crucial reducing transaction costs and power disparities. Payments are generally cash, in-kind or a combination of both, however, conditionality is limited which affects their underlying validity. This is also underscored by the difficulty of measuring changes in environmental services produced by a PWS programme. Some indication that particular aspects of conditionality may lead to eviction via coercion and marginalisation. In some cases Hydro-electric power plants in Indonesia, the Philippines and Nepal share a small proportion of their revenue

					with local communities. But this benefit sharing is not universal. PES could be used as a poverty alleviation tool that provides environmental services if payments are of a significant size, RUPES in the Philippines is attempting to encourage energy companies to enter into agreement above and beyond minimal payments to reward local people for providing environmental services. Evidence of PWS on poverty alleviation is tenuous, and in general impacts focus on those you participate in the programmes as sellers. Little is known about impacts on non-participants within the same community. Overall, there is very little evidence to link these programmes and the resultant land-use changes to improved provision of desired environmental services.
Praseyto, F.A.; Purwanto, S.A. & Hakim, R. 2009. Making policies work for payments for environmental services (PES): An evaluation of the experience of formulating conservation policies in districts of Indonesia. *Journal of Sustainable Forestry*,	T	N	The article focuses on PES in Indonesia. Specifically, the article relates three cases studies (i) West-Lombok – WWF Indonesia-Nusa Tenggara/KONSEPSI (ii)Sungei Wain Protection Forest (HLSW) (iii) Conservation Districts programme. The article focuses on lessons	The paper situates its analysis of PES firmly within the environmental economics approach of Wunder (2005, 2007). In addition, PES is contextualised in relation to other incentive-based mechanisms. The legal/institutional framework for PES establishment is also highlighted.	Voluntary transaction criterion was not clearly established. Lombok had both command-and-control and voluntary aspects, whilst HLSW was non-voluntary. In all the case studies water was the PES commodity; however, linkages between management and water services were less evident. Great difficulty in quantifying water services and relating that to economic value PES is represented by a mixture of private sector and public sector environmental service providers and buyers, with beneficiaries having a wide array of motivations. Securing ES provision would be best guaranteed through a mix

28, 415-433			learned from PES watershed protection implementation through a benefit transfer process in connection to state policies to enable PES to function and aid conservation.		of market-based and regulatory approaches. More appropriate funding with less complexities in fund allocation and distribution would enhance PES functioning.
Villamor, G.B. & Lasco, R.D. 2009. Rewarding upland people for forest conservation: experiences and lessons learned from case studies in the Philippines. *Journal of Sustainable Forestry*, 28, 304-321	T	N	The article concerns an assessment (context, design and funding mechanism) of four: Bakun, Kalahan, Sibuyan and Baticulan RUPES-pilot or associated PES schemes in the Philippines. All projects are in the early stages of development.	The presented studies are located in the rewarding environmental services conceptual framework developed by van Noordwijk *et al* (2007): the framework centres on the idea of environmental service production and maintenance being pro-poor and locally adapted. Ecological economics emphasis.	Community-focused management is central – most service providers are organised communities. Implementation and operational success will depend on a platform of accommodating traditional land-use practice. Success is dependent on multi-stakeholder cooperation, with Rapid Hydrological Assessment providing a means to communicate and facilitate information. Water provision is the main ecosystem service of economic value, contrasting with carbon and biodiversity payments which are only at the proposal stage. Payment transfer to upland service providers, effective monitoring body, quantification of ES linkages to management practices and transaction costs were identified as major challenges to the operation of PES in the Philippines.
Stanton, T. *et al*. 2010. State of Watershed	H (Shares characteristics of a Traditional and	G	The report focuses on the present state of global watershed	The report uses a more flexible and generic definition of PES than Wunder (2005, 2007) and	Overall, in 2008 the report identified 216 PWS schemes operating in 24 countries of which 102 were actively engaged in transactions. Latin America (36/101), Asia (9/33), Africa

Payments: An emerging market place. Forest Trends/Ecosystem Marketplace.	Systematic review)		payments (PWS and water quality trading), focusing specifically on PES scope, establishment of baselines to track changes following PES implementation and opportunities and challenges based on present levels of transactions and programmes operating. Focuses general on financial arrangements more so that underlying effectiveness of PWS programmes.	so many of the programmes included may be open to questioning, particularly as conditionality is absent. The operational definition used to describe a PWS is: private or government-driven payments, where the paying are aiming to protect or improve watershed services and those receiving payments are engaged in activities to ensure continued provision.	(10/20) and China (47/47). The paper identified that the institutional make-up of the schemes consisted 55% government managed, 9% privately/NGO managed and 36% and mix of public and private sector management. Latin America (2008) a total of us$31 million to watershed conservation measures impacting 2.3 million hectares. China (2008) estimated transaction value of US$8.7 billion, impacting some 290 million hectares. Asia (2008) US$1.8 million impacting nearly 110,000 hectares Africa (2008) US$62 million impacting nearly 200,000 hectares
Morrison, A. & Aubrey, W. 2010. Payments for ecosystem services literature review: A review of lessons learned and a framework for assessing PES feasibility. WWF/Federal Ministry for Economic	T	G	The report produced discusses the what, why and how of PES. Specifically, with regards to rationale, key characteristics, design and implementation attributes and a framework for assessing PES feasibility. The framework is used as a means to analyse current PES projects.	The article employs an Institutional-type analysis framework to critique the present state of PES – by assessing factors such as; actors and funding mechanisms, quantification of ecosystem services, key institutional requirements and social, legal and political barriers. The article assumes Wunder's (2005, 2007) definition of what	The report identifies that most PES schemes are publically funded (i.e. significant government involvement), although carbon-based services have a high degree of private involvement. The report acknowledges that there is a great lack of knowledge regarding how to quantify ecosystem services and also in defining the underlying linkages between paid for management practices and service delivery. An assumption that payment + management = ES. Intermediaries are key to most PES schemes, particularly where multiple stakeholders are involved – being important in

Cooperation and Development /BioClimate Research and Development				constitutes a PES programme and so works with the environmental economics perspective.	reducing transaction costs. Stakeholder involvement and defined property rights are key to the successful design, implementation and operation of PES schemes Conditionality is key i.e. payments should be performance-based and linked to regular monitoring. Payments must be fair, equitable, targeted (to delivery maximum benefits) and should be sufficient to alter behaviour and provide an alternative revenue stream.
Yamasaki, S.; Guillon, B. *et al.* 2010. Market-based payments for ecosystem services: current status, challenges and the way forward. *CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resource*, 5, 1-13	H (Shares characteristics of a Traditional and Systematic review)	Review of PES as a market-mechanism (not a global or regional review of case studies per se)	The review concerns technical and socio-political barriers to the implementation of PES markets.	Definitions of PES are discussed, although the paper itself does not advocate one type of definition to adopt. Alternatives to PES schemes are discussed, i.e. the benefits or appropriateness of other market-mechanisms in specific contexts e.g. regulations and penalties and grants and subsidies.	The article identifies a number of challenges to PES establishment, adoption and operationalisation: Scientific and technical: establishing linkages between ES and management practices, and the quantification of resultant services, particularly with regards to scale and land-use type. Socio-political: property rights (the necessity of stable land tenure), the establishment of demand (market compliance), the determination of market values for ESs and social equity. Barriers to investment: the uncertainty of demand and regulatory uncertainty and lack of capacity building.

Pattanayak, S.K.; Wunder, S. & Ferraro, P.J. 2010. Show me the money: do payments supply environmental services in developing countries? *Review of Environmental Economics and Policy*, 4, 254-274	T	G/R	The paper presents a review of PES. Six case studies are discussed drawn from Wunder et al 2008 specifically: China's (SLCP), Mexico's (PSA-H), Costa Rica's (PSA), Ecuador's (PROFAFOR and Pimampiro) and Bolivia's(Los Negros), but with additional material since 2008. Also discussed are recent econometric PES studies, predominantly drawn from Latin America. Collectively, these cases are employed to answer the question of whether PES adequately delivers environmental services within developing countries.	The article employs an environmental economics framework for the analysis of the 6 case studies by dissecting the question of effectiveness by focusing on enrolment (participation), conditionality (compliance), additionality (benefits attained only through PES) and land-use ES linkages. Wunder's (2005, 2007) definition is used to define the criteria required for a programme to be considered a PES market mechanism.	Enrolment: a high level of participation was identified. Conditionality: technically many schemes operate performance-based payments but in reality fewer function in this manner. Levels of monitoring were quite variable. Main sanction for non-compliance is temporary (possibly permanent) loss of payment. Additionality: levels of additionality were programme specific, some high (e.g. Pimampiro, Ecuador) and some low (e.g. Los Negros, Bolivia) Land-use ES linkage: In most instances the linkages were assumed although some programmes had or were starting to initiate proper hydrological service assessments to link changes to land management practices. Poverty alleviation: poor service providers appear to be able to access programmes and thus sell services. However, formal land title requirements can prohibit participation, particularly in government-driven programmes. In Costa Rica and Bolivia PES contracts appeared to increase property rights' security.
Daniels, A.E. *et al.* 2010. Understanding the impacts of Costa Rica's PES: Are we asking the right	T/S (Traditional review supplemented with a qualitative meta-analysis)	N	The review focuses purely on Costa Rica's PES experience; specifically, documenting PES	The review synthesises - via a qualitative meta-analytic approach – and critiques a number of national and sub-national PES impact studies. The	National and sub-national studies tell two different stories: at the national level PES is described as not affecting the deforestation rate, yet other evidence (forest cover analyses and farmer interviews) demonstrates that PES has had a level of additionality in terms of reducing deforestation.

questions*? Ecological Economics*, 69, 2116-2126			impact studies: Morse et al (2009); Pfaff et al (2008); Sanchez-Azofeifa et al (2007) and Sierra & Russman (2006) and locating these studies and their findings within the broader development of PES evolution. Legal statutes enabling PES modalities are highlighted. Studies focusing on PES related to forest cover and land-use are reviewed and critiqued.	critique takes a methodological deconstruction approach to assess the validity of each study and their associated conclusions. Spatial, sampling and path dependency considerations are employed as the tools of analysis.	Differences in findings are based on the frame of analysis; sub-national studies considered a greater array of factors: farm level, changes in forest cover, differences in vegetation types and pre-PES incentives. Whereas national studies considered only deforestation. Reforestation and regeneration are identified as two significant factors responsible for slowing the deforestation rate. The function of PES in national forest expansion is poorly understood: the report suggests that the major impact of PES has been realised through forest expansion by natural regeneration and plantation development. Spatial targeting is of major significance and requires proper evaluation.
Nonga, F.N. 2011. Are payments for environmental services (PES) an opportunity for relieving countries of the Congo Basin from poverty? *Journal of Sustainable Development in Africa*, 13, 40-58	T	R	The article focuses on evaluating the capacity of PES to be effective in functioning as a conservation tool (for managing ecosystem services) and also a livelihoods tool (for alleviating poverty) in the context of the Congo Basin, although Cameroon is used as an exemplar of the region.	The construction of ES markets and their ability to mobilise service providers and service beneficiaries is the prism of analysis. Environmental economic perspective is taken, focusing of conceptual underpinnings, design and implementation and payment mechanisms set within contextual constraints.	The Congo Basin has numerous environmental services (e.g. carbon, biodiversity and hydrological) these need to be valued and protected. High levels of poor who lead subsistence life-styles and therefore depend on functioning services. Principle constraints on PES implementation include: transaction costs, opportunity costs, levels of additionality, identification of beneficiaries capable of paying for conservation measures, land tenure arrangements (cultural land ownership), and capacity building development. Some pilot projects occurring: WWF-CARPO for Lake Barombi-Mbo (Cameroon) and WCS for River Mbe (Gabon) –

					markets for the conservation of side basins.
Brouwer, R.; Tesfaye, A. & Pauw, P. 2011. Meta-analysis of institutional-economic factors explaining the environmental performance of payments for watershed services. *Environmental conservation*, 38, 380-392	T/S (meta-analysis) – primary and secondary data supplemented with a mail survey of PWS managers	G	The purpose of the paper is to investigate the connection between the institutional arrangement of PWS schemes and the effectiveness of environmental outcomes. Specifically, the institutional-economic factors that explain environmental performance. For this the paper takes a meta-analytic approach, using a combination of primary and secondary data sources on 47 global PWS schemes (for which appropriate data exists) supplemented by the views and opinions vis-à-vis scheme performance of PWS managers.	The paper extends the Coasean definition of PES to a broader construct that acknowledges the significance of institutional factors and social interactions in explaining the performance of PWS schemes. The paper uses a simply binary variable of effectiveness to demonstrate whether a scheme has been successful in meeting its environmental objectives or not, as only 47% of schemes quantified their objectives.	Significant outcomes resulting from this analysis are: Overall, 58% of schemes were judged to have been 'effective' in realising their environmental objectives, whilst 42% were judged not to have been effective in this regard. In 70% of schemes land covered by forest was a important indicator of environmental performance The institutional factors identified as significantly influencing PWS environmental performance were: the number of intermediaries involved, the voluntary nature of participation and the criteria on which ES providers were selected. All these factors negatively influenced scheme performance. Thus for 'better' or more 'effective' scheme performance fewer intermediaries appears to be better, as does not allowing voluntary participation and widening selection criteria.

Noordwijk, M. van *et al*. 2012. Payments for environmental services: evolution towards efficient and fair incentives for multifunctional landscapes. *Annual Review of Environment and Resources*, 37, 389-420	T	Review of PES development from a landscape scale perspective – not focused on 'reviewing' national to global PES case studies	The fundamental concepts and historical development of PES is discussed. Its specific use as a policy tool is deliberated in relation to landscape multi-functionality, where the report develops its own theoretical application of PES to aid land sparing or land sharing developments in relation to ES production. The report then presents a series of PES critiques and then provides future challenges and a way of framing future applications.	PES is situated within a broadly behavioural economic context where scales of economic activity are linked to 'brain systems' – which define and determine agent behavioural processes – for the purpose of better understanding the incentive effect on decision-making, but also for broadening the analysis at which the operationalization of PES can be understood.	The authors make the following pronouncements: Scheme conditionality, voluntary engagement and ES targeting are on a continuum rather than binary phenomena thus allowing a plurality of PES paradigms to operate. Rights and reward-based approaches need to be aligned with planning, economic and governance structures at the same scale. Need to be aware that intrinsic motivations for exploiting the natural environment sustainably may be expunged through individual financial incentives. Co-investment may provide an alternative to requiring land tenure as a pre-requisite to PES scheme participation. PES implementation and impacts need to be viewed from multiple economic scales not simply at the micro- and meso-scale. Cross-scale connections between ES production and efficiency and fairness of distribution need to be related to rights and performance measures Decision-making behaviour in response to different economic scales needs and can be incorporated into PES praxis.
Lin, H. & Nakamura, M. 2012. Payments for Watershed services:	T	G	This study collates information from 163 PWS schemes across 34 developing countries.	The paper – which articulates a new governance approach to PWS – situates itself in a 'broad' or 'interactive' governance	The principal outcome resulting from this study is the paper's articulation of a new integrated framework for PWS, based on a reappraisal of the institutional dynamics of the traditional PWS set-up articulated through a New Institutional Economic

directing incentives for improving lake basin governance. *Lakes & Reservoirs: Research and Management*, 17, 191-206	Using these schemes, and in particular assessing their structural and institutional arrangements, the authors introduce the concept of an integrated ecosystem management approach to PWS, with particular reference to lake basin governance. In this respect, the paper uses the role of intermediary institutions, within a New Institutional Economic framework, to create a three-part PWS design attuned to lake basin governance: using a Costa Rican PWS scheme to articulate that design. Ultimately, through this process the paper hopes to better communicate the 'scientific and socioeconomic frontiers for developing locally suitable and integrated watershed governance structures'.	tradition. Moreover, through its support for integrated PWS management that acknowledges the key role played by intermediary institutions, which it uses as a device to construct an integrated PWS framework, the paper contextualises itself within New Institutional Economic thinking. Additionally, in its overall consideration of a PWS scheme the paper does not depart from the standard environmental economic model.	analysis of the intermediary (institutional) agents participating in lake basin governance. The author's framework proposes a three part PWS governance structure, based on inclusivity, organised in the following way: (i) capturing stakeholder incentives; (ii) incorporating stakeholder incentives and (iii) assessing feedback based on those incorporated incentives. Each of those three strands is then broken down into 5 steps to make up a 15 step process: Capturing stakeholder incentives concerns publicising data, working out transaction costs, facilitate negotiations, accrue private information and specify suitable transaction cost options. Incorporating stakeholder incentives concerns assessing institutional arrangements, drawing up contractual proposal, identifying counter proposals, identifying contractual options and then selection feasible and acceptable contractual options. Detecting feedback from stakeholder incentives relates to the monitoring of outcomes, pairing-down contractual proposals, assessing altered incentives in the participant community, repeating this process for non-participants, and identifying governance options. Importantly, the authors argue that this framework is also 'enriched' by relating its governance regime to management, resources, markets and operations, and at its core being designed around the three main institutional structures of (i)

					incentive, (ii) contract and (iii) intermediary. These are then linked to the standard environmental economic model in terms of price, value, property rights and transaction costs.
Bennett, G.; Carroll, N. & Hamilton, K. 2013. Charting a new course: state of watershed payments 2012. Forest Trends/Ecosystem Marketplace.	T/S (the report uses programme data, interviews as well as published material)	G	The report represents a snap shot of current global watershed payment schemes (in the broadest sense). Further, it provides project and design information relevant for decision-making across all sectors and scales. In total the report identifies 205 active programmes, with a further 76 programmes currently in development, collectively spanning 29 countries.	The scope of payment mechanisms is purposefully broad: a clear buyer and seller are involved, payments for service provision are received and hydrological services are the main motivating factor. In this case PWS is far broader than the standard PES definition (e.g. Wunder 2005/2006) – according to this definition PWS includes PES schemes, water quality trading schemes and other water compensation programmes. However programmes are still presented within the standard environmental economic frame of reference.	Of 205 active programmes worldwide 61 occur in China and 67 in the USA. China, through its eco-compensation fund represents the main funder of such schemes. The total transaction value of schemes in 2011 was US$8.17 billion, with 117 million hectares managed for watershed services. Focusing on non-Western geographic regions, Africa has 6 active programmes with 10 in development, Asia has 83 active programmes with 36 in development and Latin America has 28 active programmes with 8 currently in development. Most transactions are made by programmes operating bilateral regulatory agreements (82%). Only 8% of transactions are due to bilateral voluntary schemes. Excluding China 66% programmes are based on public good payers, 31% on beneficiary payers and only 3% on polluter payers. Water funds with heterogeneous funding streams are the most rapidly growing model in Latin America. Increasingly, there is a growing interest in stacking and bundling payments for multiple ESs. In fact, two thirds of programmes involve bundling or stacking to some extent with biodiversity or carbon management as the principal co-benefit. Increasingly programmes are of a trans-boundary nature and are focusing on climate adaptation and mitigation. However, management interventions differ widely according to geographic region.

					Programmes are gradually driving towards socio-economic objectives particularly poverty alleviation (48%) and community economic development (14%) and resource management (13%). Overall, investment demand emanates from government or government-related sources (63%), followed by private (25%) and then civil/NGO (11%) sources. On the supply side however government or government-related institutions account for 31% of investment whereas private landholders make up 47% of investment supply. There is little involvement of the private sector in tackling water-related risks and since 2008 there has been a noticeable decline in a number of programmes that were then new or being developed – mainly as a consequence of financial instability.
Schomers, S. & Matzdorf, B. (2013) Payments for ecosystem services: A review and comparison of developing and industrialised countries. *Ecosystem Services, 6,16-30*	T/S	G	The paper focuses on addressing four areas: (1) the economic conceptualisations of PES, (2) Priority research foci for PES identified in the literature, (3) comparison of developed and developing nation applications of PES and (4) potential	The paper reviews 457 articles obtained through a structured literature search. The authors sorted articles by geographic region and then according to the content of the papers, based on whether they described a case study, PES theory or concerned PES implementation from a research perspective. Papers that described case studies were further categorised according to their economic conception of	Geographically speaking, most PES publications concern studies conducted in Latin America, Asia and then Africa. 15% of publications come from industrialized nations, but these generally refer to agri-scheme variants. Although when discussed PES theory is normal considered from a Coasean perspective, in fact few case studies demonstrate a purely Coasean approach, with most schemes exhibiting a Pigouvian character as a consequence of the level of government involvement in payment programmes. The paper indicates that a principal difference between developed and developing country PES programmes is the

			transference of best practice between developed and developing nations	PES into Coasean, Pigouvian or a mixture of both. The authors then describe in more detail some of the specific schemes that exemplify each of these economic conceptualisations.	focus on ecosystem services. Reforestation and forest management are the main foci of developing countries, whereas ES produced on agricultural lands are the primary focus of developed nations. The authors identify key research priorities as institutional governance, effectiveness and efficiency concerns articulated through the lens of work on spatial targeting, cost-benefit distributions and the development of performance-based payments and reverse auctions. Furthermore, they demonstrate that equity issues are particularly prevalent, with research emphasising the linkages between poverty alleviation, biodiversity and environmental degradation and PES's role in ameliorating these connections. The authors argue that the knowledge of payment programmes accumulated in developed nations, through a tradition of such schemes, should be used as a form of best practice and transferred to developing nations' programmes to ensure more optimally designed programmes are fostered.
Martin-Ortega, J.; Ojea, E. & Roux, C. 2013. Payments for water ecosystem services in Latin America: a literature review and conceptual model. *Ecosystem Services*, 6, 122-132	T/S	R	The paper presents a (systematic) literature review, of both peer-reviewed and grey publications, concerning PWS programmes operating in Latin America. In this respect the authors assess 310 transactions from 40	The authors collected 310 observations derived from 40 PWS schemes taken from a literature search spanning 1984 to 2011. The PWS programmes described are located in 10 Latin American countries: Costa Rica, Ecuador, Bolivia, Brazil, Colombia, Mexico, El Salvador, Nicaragua, Guatemala and	Principal outcomes from this study are: The majority of PWS schemes (73.3%) operate at the local scale, with their introduction predominantly driven by deforestation and land cover changes (77.3%). Most PWS schemes focus on producing ES bundles (72.9%), with almost half (48.7%) focused on ESs additional to water-related services. The modalities for which transactions pay for are mainly forest conservation (60%), reforestation (54.3%) and

	PWS programmes. The paper then sets out three objectives on this basis of this collected evidence: (i) evaluate and describe key PWS characteristics, (ii) Identify where the knowledge gaps lie and (iii) contrast their evidence with standard PES theory	Honduras. Study descriptions were obtained, context data (e.g. drivers of PES), and PES variables (e.g. institutional arrangements, ecosystem service types) – altogether 120 coded variables. As one of the paper's main objectives is to contribute to the debate regarding current PES theory they straddle the fence on their environmental economic or ecological economic credentials.	forest management (25.7%) Most service buyers are water firms (28.1%) or water utilities (27.4%), with most schemes having a high level of intermediary activity (81.6%) – particularly from the NGO sector (23.3%). Many intermediaries also function as programme initiators or promoters (67%), which in many cases is a combination between various national and local NGOs (57.9%). Price differentiation is observed in 48.5% of transactions, particularly in relation to management practices and land features. In the main cash is the primary form of payment, common to 76.5% of schemes. There is also much variation in observed payments, with sellers' receipts significantly higher than buyers. From this evidence base the authors create a composite conceptual model of PWS programmes based on present operations. The model they develop is based on three core aspects: stakeholders, service delivery and contracts – which relates to the central idea of payments. This model accounts for spatial scale interactions and the drivers (threats) and promoters of PES schemes. Overall the authors conclude there is a disconnection between PES (as currently practiced in the form of PWS) and theory – particularly in relation to scheme conditionalities, payments and definitions. These mismatches related to specific knowledge gaps that require filling, namely: PES terminology, environmental threats as drivers, definitions of ESs, seller identification, baseline information, payment information and

	contract related details. However, have reached these conclusions the authors are reticent to change the status quo vis-à-vis PES theory, although they would be valid in doing so, but they argue we need to know more – particularly with regards to managing the scientific priorities and the practicalities.

Table S11.2 Database Search Strategy

Database	Search Strategy	Search Terms	Total References (after duplicates)	Duplicate/Record Ratio
Web of Knowledge	***Databases***: All Sources ***Searched in***: TOPIC (=Title, abstract, keywords) ***Dates***: 1995 – Present	payments for ecosystem services, OR pay* for ecosystem service*, OR payments for environmental services, OR pay* for environmental service*, OR payments for watershed services, OR pay* for watershed service*, OR market* for environment* service*, OR market* for ecosystem service*, singly and/or linked with the follow other search terms: conservation, biodiversity, forest*, carbon, farm*, social, participation, benefit*, livelihood*, private, public, govern*, additionality, equity, property, buyer, seller, poverty, agricultur*	5834	0.56
Sciencedirect (Sciverse)	***Databases***: All sources ***Subjects included***: All Subjects ***Searched in***: Title, abstracts and keywords ***Dates***: 1995 – Present		1352	0.33
Scirus	***Databases (content sources):*** All journals, all preferred web sources. ***Subject areas***: All subjects ***Information types***: All types (abstracts, articles, reviews etc.) ***File format***: Any format ***Searched in***: Title (no option to select Topic or abstract, keywords) ***Dates***: 1995 – 2012		665	0.62
OvidSP	***Databases (resources selected):*** Journals at Ovid – Full text, Your Journals at Ovid: Econlitt (1961-2011), Embase (1974-2011), Inspec (1987-week 38 2011), Ovid Medline(R) (1948-2011), Social Science & Practice. ***Searched in***: Abstract, Original Title, Title, Key words and Heading words. ***Dates***: 1995 - current		168	0.43

Table S11.3 Internet Search Strategy

Search Strategy	Search Date	Total Hits	Documents in the first 50 hits	Duplicates across All Searches	Duplicate Record Ratio	Duplicates with Database search	Included Studies after Screening
"paying for ecosystem services".pdf	03/10/2011	1440	41	42	0.17	6	6
"payments for ecosystem services".pdf	03/10/2011	70700	42				
"paying for environmental services".pdf	03/10/2011	5290	41				
"payments for environmental services".pdf	03/10/2011	86300	44				
"paying for watershed services".pdf	03/10/2011	312	37				
"payments for watershed services".pdf	03/10/2011	8330	37				
Total			**242**				

Table S11.4 Coding protocol for the preliminary screening process based on article title and abstract relevance

Title Relevance	Abstract Relevance
Contains: Payments for ecosystem services, OR pay* for ecosystem service*, OR payments for environmental services, OR pay* for environmental service*, OR payments for watershed services, OR pay* for watershed service*, OR market* for environment* service*, OR market* for ecosystem service* OR ecosystem service* or environmental service*	(1) Theoretical or general discourse (2) Empirical evidence based on case study (3) Combination of 1 and 2 (4) Modelling approach based on computed data

Table S11.5 Coding protocol for secondary screening process based on the theoretical and empirical aspects of the articles

Document Analysis		
Article Type	**Theoretical Information**	**Empirical Evidence**
Journal (J), Conference/Meeting Abstract (CA/MA), Conference Paper (CP), Thesis (T), Book (B), Book Chapter (BC), University Paper Series (UPS), Private Organization – NGO (PO), International Body (IB), University (U), Government Source (GS), Website Source (WS)	(1) conceptual analysis of PES schemes, (2) Issues regarding intervention implementation, operation and enrolment (3) arguments for and against PES (4) review of previous research (5) analysis of PES scheme (6) PES and Poverty alleviation (7) Other	(0) No empirical knowledge (1) Qualitative evaluation (2) Quantitative evaluation (3) Combination of 1 and 2 (4) Observation evidence (5) Using previous research data (6) Model-simulated data

Table S11.6 Coding protocol for CAF outcomes

Capital Asset Outcomes	Coding Information
Human & Social Capital	
Social Outcomes	(0) Not assessed (1) Assessed
Extent of Social Outcomes	(1) Little impact (2) Medium impact (3) High impact
Aspects of Social Outcomes Measured and Improved	(1) Food security (2) Reduction in poverty (3) Living standards (4) Resilience to Environmental change (5) Better access to services (* Social, ** Environmental) (6) Other (specify)
Social Capital character of PES and non-PES participants	1) Differences in education levels (a) PES participants are more educated (b) non-participants are more educated (c) small differences in education levels between income groups (d) large differences in education levels between income groups (2) Landownership (a) PES participants have larger land-holdings (b) Non-participants have larger land-holdings (c) small differences in land-holding area between income groups (d) large differences in land-holder area between income groups (3) Labour character (a) more intensive in PES farms (b) more intensive in non-PES farms (c) no differences in labour intensity between income groups (4) Other (Specify)
Level of Poorer household participation	(1) Low (2) Medium (3) High
Natural Capital	
Natural Capital Outcomes	(0) Not assessed (1) Assessed
Area of Forest/Watershed/Agricultural land successfully under payment scheme (Ha)	(1) < 100 (2) 100 – 999 (3) 1000 – 4999 (4) 5000 – 9999 (5) 10000 – 19999 (6) ≥ 20000 (specify)
Management Type	(0) Unknown (1) Reforestation (2) Protection/conservation (3) Basic management (4) Agro-forestry (5) Other (Specify) AND degree *= low levels, **= medium levels, ***= high levels
Landscape Change	(1) Increase in forest size or protected area (specify e.g. X hectares or % increase or ha/yr) or a decrease in deforestation (2) Decrease in forest size or protected area (specify e.g. X hectares due to deforestation/logging or % decrease or ha/yr lost) or an increase in deforestation (3) change in agricultural intensity (specify e.g. hectares left fallow) (4) Change in agricultural practices (specify e.g. changes in pastoral/arable activities) (5) (a) PES is an ineffective/inefficient as a mechanism to produce land-use change (b) PES is an effective/efficient mechanism to produce land-use change (6) PES activities undertaken in areas of good environmental condition (7) PES activities undertaken in areas of poor environmental condition (8) Change in biodiversity levels and status (Specify e.g. positive increase in overall biodiversity or specific species)
Ecosystem service type and preservation	(1) Ecosystem services identified (specify) (2) Ecosystem service delivery not assessed (3) Ecosystem service delivery assessed (4) link between management and ecosystem service assumed (5) link between management and ecosystem service known

	(6) ecosystem service preserved (7) ecosystem service not preserved
Financial Capital	
Financial Capital Outcomes	(0) Not assessed (1) Assessed
Number of participants receiving payments	(0) No payments made (awaiting payment) (1) < 10 (2) 10 – 49 (3) 50 – 99 (4) 100 – 250 (5) 250 – 999 (6) ≥ 1000 (specify)
Payment Distribution	(1) Small landholders receiving payment (2) Medium landholders receiving payment (3) Large landholders receiving payment (4) Other (specify)
Household and Community	(1) Increase in household income (specify $/household since PES payments) (2) Diversification of household economic activities (specify e.g. Artisanal activities) (3) improved distribution of material wealth e.g. average community household income is increased (4) Other (specify)
Payment Equity	(1) payments favour wealthier landowners (2) payments favour poorer landowners (3) Other (specify)
Income Stream	(1) PES participants are more reliant on payments for household finances (2) PES participants' income is mainly off-farm (3) PES participants have more diverse incomes streams than non-participants (4) PES payments contribute 50% or more to household income (5) PES payments contribute less than 50% to household income (6) Payments are (a) sufficient or (b) insufficient to meet household needs or provide a suitable alternative income stream (7) Other (Specify)
Financial Contribution	(1) Contribution of private sector to PES scheme (Specify, US$) (2) Contribution of Public sector to PES scheme (Specify, US$) (3) Other (Specify)
Institutional Capital	
Institutional Outcomes	(0) Not assessed (1) Assessed
Institutional Arrangements	(1) Community control over natural resource-use (2) Decentralised administration control over fund disbursement and contract awards (3) Centralised administration control over fund disbursement and contract awards (4) Expansion in the number of institutions and companies (5) Predominantly a State intervention (6) Predominantly a private intervention (7) Greater involvement of local institutions (8) Improved institutional relationships and cooperation (9) Other (Specify)
Institutional Accountability	(0) Not assessed (1) Assessed (2) Increased accountability and transparency (3) Decreased accountability and transparency (4) Funding chain more transparent (5) Providers more accountable to beneficiaries (6) legal and regulatory mechanisms in place to ensure proper resource use (7) Other (specify)

Table S11.7 Coding protocol for challenges and opportunities to PES

Conclusions and Recommendations	Coding Information
Barriers to Participation and PES Effectiveness	(1) Transaction costs (2) Opportunity costs (3) Payments too low to encourage programme uptake and contract renewal (4) Accessibility of scheme information (e.g. to non-PES receivers) (5) Farm or forest size if set aside required (6) land-use restrictions /management practice restrictions (7) Household wealth – entry more difficult for poorer households (8) property rights (9) financial viability (10) Other (Specify)
Opportunities for Progress	(1) Intermediaries ensure that PES participants are fully aware of the scheme process, practicalities and legalities (2) greater institutional coordination to enhance capacity building and technical assistance (3) enhance poorer household uptake of PES scheme (4) improved payment amount to provide a realistic alternative income stream (5) improved legislation regarding contract requirements (6) more flexibility concerning on-property management and property transfer (7) enhanced spatial targeting of payment schemes (8) Increase project permanency (9) Improve funding arrangements at local to national levels (e.g. encourage international donors) (10) Encourage efforts to incorporate the private sector to enter into voluntary agreements to pay for ESs (11) Improve monitoring of ESs and their outcomes (12) Improve governance, accountability and transparency (13) Other (Specify)

Table S11.8 Coding protocol for programme arrangements: operation and implementation

Programme Operational and Implementation Arrangements	Coding Information
Country & Programme	Specify
Environmental Conditions	(1) Lowland (2) Upland /Highlands (3) Agricultural (Specify, if known) (4) Tropical Rainforest (and dry forest) (5) Cloud Forest (6) Temperate Forest (7) Boreal (8) Grassland (9) Rural (10) Peri-urban (11) Other (Specify)
Ecosystem Services Considered	(1) Hydrological/Watershed Services (2) Carbon/forest (3) Biodiversity (4) Food and Fibre (5) Climate regulation (6) Flood mitigation (7) Other (specify)
PES Modality	(1) Changes in Agricultural practices (2) Protection of forest/biodiversity (e.g. Forest Protection) (3) resources regeneration (reforestation)/afforestation (4) Reduction in logging/timber extraction (5) Other (Specify)
PES Modality Criteria	Specify particular criterion required for each modality
Land-use ES Link	(0) No research, assumed (1) Some Research, several assumptions (2) Good Research, explicit
Environmental Legislation	Specify any legislation that was enacted to establish PES scheme
Programme Activity	0) Project currently active (1) Project inactive/concluded
Programme Permanence	Project active for 1 year or less (1) Project active for 1 - 3yrs (2) Project active for 4 - 6yrs (3) Project active 6+ yrs (4) Project inactive for 1 year or less (5) Project inactive for 1 - 3yrs (6) Project inactive for 4 - 6yrs (7) Project inactive 6+ yrs (8)
Spatial Extent (Ha)	Specify

Table S11.9 Coding protocol for programme arrangements: design and institutional character

Programme Design and Institutional Arrangements	Coding Information
Buyer	(1) Private firm (2) NGO (local/national) (3) NGO (International) (4) Municipality/local Government agency (5) Central Government (6) Other (specify)
Seller	(1) Individual Landholder/farmer (2) Communal landholders (3) Private (corporation) landholder (specify) (4) Indigenous community (5) Government (local) (6) Other (Specify)
Intermediaries	(1) Local/National NGO (2) Community cooperative (3) local municipal administration (4) National government (organisation/agency) (5) Other (Specify)
Project Initiator	(1) Buyer (2) NGO (local/national) (3) NGO (International) (4) Government (National) (5) Other (specify)
Seller Selection	(1) Village focus (2) Biophysical condition (3) Price (4) Minimum size/plot size (5) land topography (6) Priority areas (e.g. Biodiversity) (7) Strategic service site
Conditionality	(1) Low (2) Medium (3) High (4) Variable (5) Not Known/documented
Monitoring	(0) No monitoring (1) Annual monitoring (2) Multiple Inspections per year (3) variable monitoring by different parties (4) Local monitoring (5) Government monitoring (6) Other monitoring modes (Specify) (7) Not known/documented
Sanctions	(0) No Sanctions (1) Temporary PES exclusion (2) Permanent PES exclusion (3) Loss of Future payments (4) PES payback (5) Other (Specify) (6) Don't know/not documented
Contract Length	(1) less than or equal to 2yrs (2) Greater than 2yrs but less than 4yrs (3) 4 - 6yrs (4) 6+ yrs (5) Initially X now Y (Specify) (6) Variable depending upon activity (Specify) (7) Renewable after X years (Specify)

Table S11.10 Coding protocol for programme arrangements: finances and funding

Programme Financial and Funding Arrangements	Coding Information
Payment Mode	(1) In-Kind (2) Cash (3) Technical Assistance (4) Provisions
Payment Amount (US$/ha/yr)	Specify
Payment Heterogeneity	(0) Does not vary according to Landscape attribute (1) Marginal variation in payment according to landscape attribute (2) Significant variation in payment according to landscape attribute (specify e.g. Increased payment for cloud forest) (3) Other (Specify) (4) Unknown/not documented
Payment Frequency	(1) Monthly, post monitoring (2) Annual, ex ante (3) Annual, ex post (4) Other payment frequency (Specify) (5) Not Known/documented
External Donor Support	(0) No (1) Yes (Specify)
Programme Cost	(1) Borne by the programme (2) Borne by participants (3) Borne by the programme and participants (4) Not known/documented
Total Level of Investment (US$)	Specify

Table S11.11 Coding protocol for report characteristics

Study Report Characteristics	Coding Information
Report ID	Specify (A, B, C etc.)
Author Names	Specify
Number of Authors	Specify
Year of Publication	Specify
Type of Report	(1) Journal report (letter, article review) (2) Book or Book Chapter (3) Dissertation (Masters or PhD) (4) Private Report/Independent Institute (5) Government Report (Stated, Fed, District) (6) Conference Paper (7) Other (specify) 8 (can't tell)
Source of Publication	Specify
Peer-review Status	(0) Not peer reviewed (1) Peer reviewed (2) Can't tell
Organisation producing the report	(1) University (2) Government entity (National to local) (3) Intergovernmental organisation (4) Contract research firm (5) NGO, Independent Institute (6) Other (specify) (7) can't tell
Funding Status	(0) not funded (1) Funded (2) can't tell
Funder Identity	(1) Government funder (specify) (2) Private foundation (specify) (3) National/International Agency/NGO (specify) (4) Other (specify)
Study Rationale	***Theoretical Approach***: (1) Social (2) Environmental (3) Economic ***Outcome Measures***: (4) Impacts/Additionality (5) Participation (6) Accessibility (7) Livelihood Sustainability (8) Equity (9) Poverty Alleviation (10) Institutional governance (11) Other (Specify)
Study Context	**Coding Information**
Study location, General	Continent + Country: South America (SA), Central America (CA), North America (NA), Africa (A), Europe (EU), Asia (As), Oceania (O)
Study Location, Country	specify
Study Location, Within country site	specify
Contextual background to PES discussed	(1) historical development (2) Institutional/political landscape (3) Legislative aspects (4) Environmental-conservation discourse
Drivers responsible for PES introduction	(1) Climate mitigation (2) Flood mitigation (3) Drought Prevention (4) Water protection (5) Land-use and cover change (6) Pollution (7) Energy Consumption (8) Government (political economy) (9) Poverty Alleviation (10) Other (specify)
Context Investigated	(1) Economic (2) Social (3) Political/Governance (4) Environmental/Ecological (5) Other (Specify)

Table S11.12 Coding protocol for study investigative modes and constraints

Study Mode	Coding Information
Study design	(1) Comparative Analysis (e.g. Participant vs. Non-participant) (2) Non-comparative (e.g. Participants only) (3) Qualitative (4) Quantitative (5) Semi-quantitative (6) Research synthesis
Study Method	(1) Observational (2) Quasi-experimental (3) Survey-related (e.g. questionnaire/interviews) (4) Matched Sample approach (5) spatial mapping (6) Other (Specify)
Stakeholder composition	(1) PES Participants (Farmers, landholders, community groups) (2) PES non-participants (farmers, landholders, community groups) (3) Private businesses (4) NGOs (5) Government (6) Indigenous groups (7) Professionals (e.g. foresters) (8) Other (Specify)
Sample size	specify e.g. Total number/Number of each stakeholder group
Statistical Analysis	(1) Descriptive (2) Linear regression (e.g. OLS) (3) Multivariate statistics (4) Econometric model (5) Other (specify)
Method Constraints	**Coding Information**
Sample	(1) Size (2) Composition (specify e.g. gender or age bias) (3) distribution (specify e.g. highly localised) (4) Selection strategy unclear or poor
Method	(1) Difficulties in method(s) not addressed (2) Alternative methods not considered
Statistical Analysis	(1) Lack of statistical rigour (2) Alternative statistics not considered (3) Other (specify)

Table S11.13 Study Sample: Reviewed Articles

Country	PES studies used in the Review
Bolivia	Aquith, N.M.; Vargas, M.V. & Wunder, S. 2008. Selling two environmental services: in-kind payments for bird habitat and watershed protection in Los Negros, Bolivia. Ecological Economics 65, 675-684
Cambodia	Clements, T.; John, A.; Nielsen, K.; An, D.; Tam, S. & Milner-Gulland, E.J. 2010. Payments for biodiversity conservation in the context of weak institutions: comparison of three programs from Cambodia. Ecological Economics 69, 1283-1291
China	Bennett, M.T. 2008. China's sloping land conversion program: institutional innovations or business as usual? Ecological Economics 65, 699-711 Liu, J.; Li, S.; Quyang, Z.; Tam, C. & Chen, X. 2008. Ecological and socioeconomic effects of China's policies for ecosystem services. PNAS 105, 9477-9482 Zhang, L.; Tu, Q. & Mol, A.P.J. 2008. Payments for environmental services: the sloping land conversion program in Ningxia Autonomous Region of China. China & World Economy 16, 66-81 Li, J.; Feldman, M.W.; Li, S. & Daily, G.C. 2009. Rural household income and inequality and the sloping land conversion program in western China. PNAS 108, 7721-7726 Uchida, E.; Rozelle, S. & Xu, J. 2009. Conservation payments, liquidity constraints, and off-farm labor: impact of the grain-for-green program on rural households in China. American Journal of Agricultural Economics 91, 70-86
Columbia	Pagiola, S.; Rios, A.R. & Arcenas. 2010. Poor household participation in payments for environmental services: lessons from the silvopastoral project in Quindíos Columbia. Environmental Resource Economics 47, 371-394
Costa Rica	Miranda, M; Porras, I.T. & Moreno, M.L. 2003. The social impact of payments for environmental services in Costa Rica: a quantitative field survey and analysis of the Virilla watershed. International institute for Environment and Development, London. Hope, R.A.; Porras, I.T. & Miranda, M. 2005. Can payments for environmental services contribute to poverty reduction? A livelihoods analysis from Arenal, Costa Rica. Department of International Development (DfID) Zbinden, S. & Lee, D.R. 2005. Paying for

environmental services: an analysis of participation in Costa Rica's PSA program. World Development 33, 255-272

Sierra, R. & Russman, E. 2006. On the efficiency of environmental service payments: a forest conservation assessment in the Osa Peninsula, Costa Rica. Ecological Economics 59, 131-141

Sánchez-Azofeifa, G.A.; Pfaff, A.; Robalino, J.A. & Boomhower, J.P. 2007. Costa Rica's payment for environmental services program: intention, implementation, and impact. Conservation Biology 21, 1165-1173

The World Bank. 2007. Implementation and completion report: ecomarkets project. Report No. ICR0000433

Arriagada, R.A. 2008. Private provision of public goods: applying matching methods to evaluate payments for ecosystem services in Costa Rica. Dissertation submitted to North Carolina State University, USA.

Locatelli, B.; Rojas, V. & Salinas, Z. 2008. Impacts of payments for environmental services on local development in northern Costa Rica: a fuzzy multi-criteria analysis. Forest Policy and Economics 10, 275-285

Pfaff, A.; Robalino, J.A. & Sanchez-Azofeifa, G.A. 2008. Payments for environmental services: empirical analysis for Costa Rica. Working Paper Series SAN08-05 Terry Sanford Institute of Public Policy, Duke University.

Pagiola, S. 2008. Payments for environmental services in Costa Rica. Ecological Economics 65, 712-724

Sills E., Arriagada R. A., Ferraro P. J., Pattanayak S. K., Carrasco L. E., Ortiz E., Cordero S., Caldwell K., Andam K.. 2008. Private provision of public goods: Evaluating payments for ecosystem services in Costa Rica. Working Paper, North Carolina State University, Raleigh.

Smith, C.E. 2008. Encouraging climate change adaptation through payment for environmental services: case studies in the Pacific region of Costa Rica. Dissertation for the University of Waterloo, Canada.

Blackman, A. & Woodward, R.T. 2010. User financing in a national payments for environmental services program: Costa Rican hydropower. Ecological Economics 69, 1626-1638

Cole, R.J. 2010. Social and Environmental impacts of environmental services for agro-forestry on small-scale farms in southern Costa Rica. International Journal of

	Sustainable Development & World Ecology 17, 208-216
	Legrand, T.; Froyer, G. & Le Coq, J-F. 2010. The efficiency of the Costa Rican payment for environmental services program under discussion. 12th BIOECON Conference "From the wealth of nations to the weath of nature: rethinking economic growth", Venice, September 27th-28th 2010.
	Porras, I. 2010. Fair and green? Social impacts of payments for environmental services in Costa Rica. International Institute for Environment and Development, London.
Ecuador	Echavarria, M.; Vogel, J.; Albán, M. & Meneses, F. 2004. The impacts of payments for watershed services in Ecuador: emerging lessons from Pimampiro and Cuenca. International Institute for Environment and Development, London.
	Wunder, S. & Albán, M. 2008. Decentralized payments for environmental services: the case of Pimampiro and PROFAFOR in Ecuador. Ecological Economics 65, 685-698
	De Koning, F.; Aguiñaga, M.; Bravo, M.; Chiv, M.; Lascano, M.; Lozada, T. & Suarez, L. 2011. Bridging the gap between forest conservation and poverty alleviation: the Ecuadorian Socio Bosque program. Environmental Science & Policy 14, 531-542
	Farley, K.A.; Anderson, W.G.; Bremer, L.L. & Harden, C.P. 2011. Compensation for ecosystem services: an evaluation of efforts to achieve conservation and development in Ecuadorian páramo grassland. Environmental Conservation 38, 393-405
Kenya	The World Bank. 2010. Implementation completion and results report: western Kenya integrated ecosystem management project. Report No. ICR00001533
Madagascar	Sommerville, M.; Milner-Gulland, E.J.; Rahajaharison, M. & Jones, J.P.G. 2010. Impact of a community-based payment for environmental services intervention on forest-use in Menabe, Madagascar. Conservation Biology 24, 1488-1498
	Sommerville, M.; Jones, J.P.G.; Rahajaharison, M. & Milner-Gulland, E.J. 2010. The role of fairness and benefit distribution in a community-based payment for environmental service interventions: a case study from Menabe, Madagascar. Ecological Economics 69, 1262-1271
Mexico	Alix-Garcia, J.; de Janvry, A.; Sadoulet, E. & Torress, J.M. 2005. An assessment of Mexico's payment for environmental services program. Document prepared for the FAO.

	Kosoy, N.; Corbera, E. & Brown, K. 2008. Participation in payments for ecosystem services: case studies from the Lacandon rainforest, Mexico. Geoforum 39, 2073-2083
	Muñoz-Piña, C.; Guevara, A.; Torres, J.M. & Braña, J. 2008. Paying for the hydrological services of Mexico's forests: analysis, negotiations and results. Ecological Economics 65, 725-736
	Corbera, E.; González Soberanis, C. & Brown, K. 2009. Institutional dimensions of payments for ecosystem services: an analysis of Mexico's carbon forestry programme. Ecological Economics 68, 743-761
	García-Amado, L.R.; Pérez, M.R.; Escutia, F.R.; García, S.B. & Mejía, E.C. 2011. Efficiency of payments for environmental services: equity and additionality in a case study from a biosphere reserve in Chiapas, Mexico. Ecological Economics 70, 2361-2368
	Scullion, J.; Thomas, C.W.; Vogt, K.A.; Pérez-Maqueo, O. & Logsdon, M.A. 2011. Evaluating the environmental impact of payments for ecosystem services in Coatepec (Mexico) using remote sensing and on-site interviews. Environmental Conservation 38, 426-434
Mozambique	Hedge, R. & Bull, G.Q. 2011. Performance of an agro-forestry based payments for environmental services project in Mozambique: a household level survey. Ecological Economics 71, 122-130
Nicaragua	Pagiola, S.; Rios, A.R. & Arcenas, A. 2008. Can the poor participate in payments for environmental services? Lessons from the silvopastoral project in Nicaragua. Environment and Development Economics 13, 299-325
	Hack, J. 2010. Payment schemes for hydrological ecosystem services as a political instrument for the sustainable management of natural resources and poverty reduction – a case study from Belén, Nicaragua. Advances in Geosciences 27, 21-27
	Van Hecken, G. & Bastiaensen, J. 2010. Payments for ecosystem services in Nicaragua: do market-based approaches work? Development and Change 41, 421-444
Nicaragua, Honduras, Costa Rica	Kosoy, N.; Martinez-Tuna, M.; Muradian, R. & Martínez-Alier, J. 2007. Payments for environmental services in watershed: insights from a comparative study of three cases in Central America. Ecological Economics 61, 446-455
Brazil, Bolivia	Pereira, S.N.C. 2010. Payments for environmental services in the Amazon forest: how can conservation and development be

reconciled? The Journal of Environment & Development 19, 171-190

Table S11.14 Capital Asset Analysis of PES programmes under review

PES Scheme	Capital Asset Measured* (%) and Effectiveness of Scheme			
	Human & Social	**Natural**	**Financial**	**Institutional**
PSA (Costa Rica)	**43.75** Low to medium social impact, with some improvements in food security, living standards, resilience to environmental change and access to social and environmental services. Need more emphasis on assessing participation, particularly with respect to poorer households.	**81.25** Overall increase in forest size and reduction in deforestation within PES implemented areas. Some moves towards lower agricultural intensity, and adoption of alternative (sustainable/lower impact) agricultural practices. Mixed views regarding the effectiveness of PES in inducing the land-use changes required. Generally no assessment made of ES provision, or the links between ESs and land management practices. More research regarding the programme's ability to deliver ESs is required.	**37.5** Larger and wealthier land holders are more likely to participate in the programme and receive the lion's share of payments. More information needed on payment distributions to poorer sectors and payment contributions to household and community finances. Some suggestion that the programme positively contributes to household income and diversification of income streams. Payment equity favours wealthier landowners. More evidence for the way payments diversify household incomes in poorer areas is needed.	**43.75** A general trend in institutional expansion, with a greater involvement of local actors and cooperation between institutions. Some improvements in accountability between ES providers and ES beneficiaries, with legal mechanisms in place to ensure proper resource use. However, there is a need for far more research regarding institutional outcomes, particularly in respect of transparency and accountability within the system.
PSAH (Mexico)	**60** Low to medium social impact. Some evidence to suggest improvements in living standards and access to social and environmental services. Further substantial research investigating social outcomes is required. No information regarding participant characteristics or participation of poorer households, both of which need immediate analysis	**100** Mixed outcomes regarding forest expansion and cessation of deforestation. Similarly, evidence supporting significant changes in agricultural intensity and practices induced by the programme is unclear. More evidence is required in this regard, and also with respect to programmes measuring ES provision, of which there is no clear evidence. General assumption of land practices generating required ESs.	**80** Payment distribution is focused on infrastructural developments, construction activities, social developments and business enterprises, with distribution to households/communities based on status and property rights. Exclusion of the highly marginalised. More information regarding payment equity and contributions to household finance and income stream diversification is much needed.	**80** Suggestions of increased community ownership over natural resources and decentralisation of administration processes, alongside institutional expansion. Mixed information regarding the programmes operation with regards to transparency and accountability. Much more detailed work regarding institutional arrangements and relationships is needed.
PSA-CABSA (Mexico)	**50** Medium level social impact, particularly in relation to living	**100** Mixed evidence as to whether the programme has improved forest cover	**100** Limited information regarding payment distribution and payment contributions to	**100** Evidence to support the contention that the programme has led to more

	standards and access to social and environmental services. Based on limited data. No information regarding participant social characteristics and poorer household participation rates. Much more work required on the human and social capital effects of the scheme.	and reduced deforestation rates. No evidence regarding the programmes influence on changing agricultural practices and intensity. Furthermore, ES land-use linkages are assumed, and no evidence is provided to show programmes are providing core ESs. More research regarding land-use change and ES supply and delivery is needed.	household and community incomes. Suggestions that the programme does (and has) made positive contributions to incomes, diversification of household economic activities and wealth distribution. Lack of information regarding payment equity and income stream financial arrangements.	community ownership over natural resource use, decentralisation of administration processes, local institutional expansion and improvements in institutional relationships. Very limited information on programme institutional arrangements with regards to transparency and accountability.
Fidecoagua (Mexico)	**100** Little social impact. No real evidence presented concerning social outcomes, participant social characteristics or the participation of poorer households	**100** Mixed evidence with regards to whether the programme has improved forest cover and been effective in inducing the necessary land-use changes stipulated. No information concerning changes in agricultural activities or practices. Moreover, ESs not identified, and no assessment made as to whether the programme has provided ESs. No assessment of ES-land use linkages.	**100** Lacking general information regarding the programme's payment distribution and equity effects, as well as evidence regarding its contribution to household economic activities and income streams. Some evidence to suggest the programme does contribute to household income, but significantly below 50%.	**0** No institutional information regarding the programmes performance, level of decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency.
Pimampiro (Ecuador)	**0** No information regarding the programme's impact on human and social capital vis-à-vis social outcomes, participant social characteristics and participation of poorer households.	**50** Evidence to suggest the scheme has increased forest cover, reduced the levels of agricultural intensity and that in this respect the programme has been viewed as effective in delivering necessary land-use changes. Although ESs have been identified there is no evidence that the programme is effective in providing these ESs. Moreover, the linkages between land management practices and ES provision are assumed.	**100** Small, medium and large landowners all receive payments, with payments distributed equally. Further there is evidence to suggest that payments have improved household incomes in some circumstances and have also contributed to diversification of household economic activities. No information regarding the programme's effect on income stream financial arrangements.	**0** No institutional information regarding the programmes performance, level of decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency

PROFAFOR (Ecuador)	**0** No information regarding the programme's impact on human and social capital vis-à-vis social outcomes, participant social characteristics and participation of poorer households.	**100** Evidence to suggest that forest cover has increased, and agricultural intensity has been reduced, with a perception that the scheme has been effective in inducing changes in land-uses. Although ESs have been identified there is no evidence that the programme is effective in providing these ESs. Moreover, the linkages between land management practices and ES provision are assumed.	**100** Payments distributed to mainly small and medium-sized landowners, with evidence that participant household incomes have increased. Based on limited evidence. No information regarding the programme's effect on income stream financial arrangements.	**0** No institutional information regarding the programmes performance, level of decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency
Socio Bosque (Ecuador)	**0** No information regarding the programme's impact on human and social capital vis-à-vis social outcomes, participant social characteristics and participation of poorer households.	**100** Some evidence to suggest there has been increased forest cover. No information regarding changes in agricultural intensity or practices. However, there's a perception that the scheme has been effective in inducing changes in land-uses. Although ESs have been identified there is no evidence that the programme is effective in providing these ESs. Moreover, the linkages between land management practices and ES provision are assumed.	**100** Payments distributed to mainly small and medium-sized landowners. Payment disparity between what families and communities receive compared to individual landowners. No information regarding household economic activity, income and income stream impacts of the programme.	**100** Evidence to support the contention that the programme has led to more community ownership over natural resource use, decentralisation of administration processes, and local institutional expansion. Although is based on limited information, and in some circumstances decentralisation has not always been observed. Very limited information on programme institutional arrangements with regards to transparency and accountability, but suggestions that funding transparency has increased. Further research on institutionally interactions, administration processes and accountability is required.
PPSA-H (Nicaragua)	**100** Low impact. Little information on social outcomes, participant	**100** Some evidence to suggest forest cover has increased and there has been a	**100** Little financial information, mainly relating to payment levels and their insufficiency in meet	**100** Predominantly a private sector initiated project. Evidence to indicate that there

	characteristics or participation of poorer households.	reduction in agricultural intensity. Mixed evidence to whether the scheme has been effective in inducing required land-use changes. Although ESs have been identified there is no evidence that the programme is effective in providing these ESs. Moreover, the linkages between land management practices and ES provision are assumed.	household needs. Need for more information on payment distribution, equity, contribution to household economic activities and income stream diversification.	has been an expansion in local institutional participation and overall institutional cooperation. No information on institutional accountability or transparency.
San Pedro Del Norte – PASOLAC (Nicaragua)	**0** No information regarding the programme's impact on human and social capital vis-à-vis social outcomes, and participant social characteristics. However, the evidence suggests the programme has a high rate of poorer household participation.	**100** No information regarding changes in forest cover, but the evidence suggests that there has been a reduction in agricultural intensity and changes in agricultural practices. Although ESs have been identified there is no evidence that the programme is effective in providing these ESs. Moreover, the linkages between land management practices and ES provision are assumed.	**100** In relation to payment equity, payments favour poorer landholders, but the evidence suggests that payments contribute to less than 50% household income and are insufficient to meet household needs. Limited evidence base. More information on payment distribution, income stream financial arrangements, and contribution to household economic activities is needed.	**0** No institutional information regarding the programmes performance, level of decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency
RISEMP (Nicaragua)	**50** Medium social impact, particularly in relation to access to social and environmental services. More information needed on the full range of social outcomes the programme may influence. Medium level of poorer household participation. No information on participant social characteristics.	**100** Evidence to suggest that the programme has increased forest cover, reduced agricultural intensity and altered agricultural management practices. Mixed evidence to suggest how effective the programme has been in altering land-uses, but overall leaning towards being effective. Core ESs have been identified and in some cases they have been assessed, where land-use ES connections	**100** Payments mainly distributed to small and medium-sized landholders, but payment amounts, proportionally (some evidence suggests) favours wealthier landowners. Overall, payments contribute to less than 50% household income and are considered insufficient to meet household needs. Further information regarding income stream diversification and financial arrangements is needed – and the way in which payments	**0** No institutional information regarding the programmes performance, level of decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency

		are robust, and shown to be preserved. In some cases land-use ES linkages are still assumed.	contribute to poorer household economic activities.	
Los Negros (Bolivia)	**0** No information regarding the programme's impact on human and social capital vis-à-vis social outcomes, and participant social characteristics. Evidence suggests the programme has a low rate of poorer household participation	**100** Evidence indicates that forest cover has increased, but the perception has been that the scheme has been overall ineffective in inducing land-use changes required. Although ESs have been identified there is no evidence that the programme is effective in providing these ESs. Moreover, the linkages between land management practices and ES provision are assumed. Limited evidence base.	**100** Payments mainly distributed to small and medium-sized landholders, with some suggestion that there has been a diversification of household economic activities (although this is based on limited evidence). Further evidence regarding payment equity and income stream financial arrangements is needed.	**100** Some indications that there is increased community control of natural resource use and decentralisation of administration processes, with greater involvement of local institutions. However, there is some evidence suggesting that the programme's institutional arrangements are less accountable and transparent. Further investigations need to focus on institutional accountability.
NKMCAP (Bolivia)	**100** Small to medium social impact, in relation to poverty reduction, living standards and access to social and environmental services. Evidence indicates that the programme has encouraged a medium level participation of poorer households. No information on the social characteristics of participants.	**100** Evidence suggests forest cover has increased and there have been changes in agricultural practices. However, there's a perception that the programme has not been as effective as it could be in achieving land-use changes (limited evidence base). Nevertheless, core ESs have been identified, and these have been preserved in cases where assessment has taken place and the evidence linking ES and land-use change is robust.	**0** No significant analysis of financial capital with regards to payment distribution, contribution of payments to household and community household economic activities or income stream financial arrangements. However, some information showing payments favour medium-sized landowners, and in this context contribute to more than 50% income.	**100** Overall, evidence suggests a centralisation of administration processes. However, there has also been an expansion in institutional organisation. The programme is a mixed private and state enterprise, but which has active local institutional involvement and has seen increased institutional cooperation. Unfortunately, programme institutional accountability is mixed, and needs further investigation.
RISEMP (Columbia)	**100** Medium social impact, specifically in relation to accessing social and	**100** Evidence for an increase in forest cover and a reduction in agricultural intensity.	**0** No significant analysis of financial capital with regards to household and community economic	**0** No institutional information regarding the programmes performance, level of

	environmental services. Evidence suggests that programme has a medium level rate of poorer household participation. Little information regarding other human and social capital outcomes and no information concerning participant social characteristics.	In this regard the scheme is regarded as effective in producing land-use change. ESs have been identified, and where assessed (because of robust evidence linking land management practices and ES provision) they have been shown to be preserved by programme activities.	activities, diversification of income streams and income stream financial arrangements. However, information suggests that payments are distributed across small, medium and large-sized landholders and may represent sufficient amounts to meet household needs.	decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency
Jesus de Otoro – PASOLAC (Honduras)	**0** No information regarding the programme's impact on human and social capital vis-à-vis social outcomes, and participant social characteristics. Evidence suggests the programme has a medium to high rate of poorer household participation.	**100** The evidence presented indicates that the programme has reduced agricultural intensity and altered agricultural practices, although the extent to which it has been effective in achieving this is not evidenced. Core ESs have been identified, but their provision has not been assessed and the evidence connection land management practices with ES provision is assumed.	**100** Payments favour poorer landholders. However, payments contribute to significantly less than 50% household income and are deemed insufficient to meet household needs.	**0** No institutional information regarding the programmes performance, level of decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency
Bolsa Floresta (Brazil)	**100** Medium social impact, particularly in relation to food security, poverty reduction, living standards and access to social and environmental services. Evidence to suggest the programme has a high rate of poorer household participation.	**100** Indications that the programmes has increased forest cover and altered agricultural practices in a manner perceived as particularly effective. Core ESs have been identified, and where assessed, due to strong linkages between management practices and ES provision, ESs have been preserved by scheme activities.	**100** Some evidence indicates that programme payments have led to an increase in household income and a diversification of household economic activities. Payments favour poorer landholders, but represent less than 50% of household income. However, there is no information regarding whether these payment levels are seen as sufficient to meet household needs. More information concerning payment distribution and income stream financial arrangements, alongside payment contributions at the household level is needed.	**100** Overall, evidence suggests a centralisation of administration processes. However, there has also been an expansion in institutional organisation. The programme is a mixed private and state enterprise, but which has active local institutional involvement and has seen increased institutional cooperation. Unfortunately, programme institutional accountability is mixed, and needs further investigation.

Durrell Conservation Trust Scheme (Madagascar)	**100** Medium social impact, specifically in relation to accessing social and environmental services. No information regarding participant social characteristics or the level of involvement of poorer sectors.	**50** Evidence to suggest that the programme has resulted in changes to agricultural practices and in producing stipulated land-use changes the programme has been judged effective. Core ESs have been identified but not the delivery of ESs has not been assessed although the links between management practices and ES provision are known.	**50** Payments directed towards local capacity building and social developments. Little information regarding household and community income affects of the scheme i.e. impacts on the diversification of household economic activities. No information regarding income stream financial arrangements.	**100** The evidence indicates that the programme has led to a decentralisation of administration processes and a greater control of natural resource use in local ownership. The programme also seems to have resulted in an expansion in the number of institutions and involvement of local institutions, as well as increased institutional cooperation. The evidence is mixed regarding programme accountability and transparency, but there are legal mechanisms in place to regulate natural resource use.
WKIEMP (Kenya)	**100** Medium social impact in regards to food security, poverty reduction, living standards and access to social and environmental services. Evidence to indicate that the programme has a medium level of poorer households participating.	**100** The evidence supports the idea that the programme has increased forest cover and reduced agricultural intensity. Further, in achieving stipulated land-use changes that programme is seen as effective. Moreover, the scheme has promoted improvements in biodiversity. Core ESs have been identified, with the links between management practices and ES provision known. Mixed evidence for whether the programme has delivered ES provision.	**100** Some evidence suggests that the programme has led to an increase in household incomes and diversification of household economic activities for participants. Indeed, compared to non-participants, participants have more diverse income streams. However, overall, little information is provided regarding income distribution, payment equity and broader income stream financial arrangements.	**100** The evidence indicates that there has been an increase in local community ownership over natural resource use. Furthermore, that the programme has led to an expansion in the number of institutions involved, particular local institutions and that institutional cooperation has been improved. However, there is no information regarding decentralisation, or institutional accountability or transparency.
Carbon Livelihoods Project	**0** No information regarding the programme's impact on human and	**0** No specific analysis of natural capital has been undertaken, but there is some	**100** The evidence suggests that payments are distributed across small, medium and large	**0** No institutional information regarding the programmes performance, level of

(Mozambique)	social capital vis-à-vis social outcomes, or evidence of poorer household participation. However, it does appear that participants in the scheme are better educated and have larger land holdings than non-participants.	suggestion that the programme has caused a reduction in agricultural intensity and altered agricultural practices, but information is limited. No information regarding whether the programme has enabled a supply of ESs.	landholders, and that payments have resulted in increased household incomes and a diversification of household economic activities. Payments contribute less than 50% of household income, although there is no evidence to indicate whether participants find this sufficient or insufficient to meet household needs. Further information of income stream arrangements is necessary.	decentralisation, stakeholder engagement, institutional cooperation, accountability or transparency
Cambodian PES (outcomes similar across all programmes)	**0** No information regarding the programme's impact on human and social capital vis-à-vis social outcomes, participant social characteristics and participation of poorer households.	**100** Some evidence to suggest that schemes altered agricultural practices and improved less of biodiversity and with respect to land-use changes programmes we seen as generally effective in their delivery. ESs identified, some evidence linking ES provision and programme modalities, mixed outcomes regarding ES provision when assessed.	**100** Distribution of payments to the community through capacity building and technical assistance. Evidence for diversification of household and community economic activities. In some cases payments favour wealthier participants. Payments contribute less than 50% household income, although there are no details of whether this is sufficient to meet household requirements.	**100** Evidence indicates that these programmes have enabled community ownership over natural resource use, but to some extent there has been increased centralisation of the administration process. Nevertheless, it seems there has been a general expansion in the number of institutions, particularly involving local stakeholders alongside improvements in institutional cooperation. However, there is no information regarding institutional accountability or transparency.
SLCP (China)	**60** Generally low to medium level social impact, although in some circumstances the scheme has had a high social impact, particularly with regards to food security, poverty reduction and living standards and to lesser extents in relation to resilience	**60** The evidence indicates that the programme has significantly increased forest cover and reduced agricultural intensity – in this respect the scheme has been highly effective in inducing land-use change. The programme has also had positive effects on biodiversity in some	**100** Payments favour predominantly small and medium-sized landholders, with notable increases in household income and diversification of household economic activities along with increased distributive wealth. Overall payments favour poorer landholders. In general participants are more reliant on payments for	**20** Highly centralised administration processes, as the scheme is predominantly a state intervention measure. Little information regarding other institutional arrangements or regarding institutional accountability and transparency.

	to environmental change and access to social and environmental services. The programme, due to its targeting criteria, has a high level of participation from the poorest households. There are small differences between participant and non-participants.	regions. ES are identified by the scheme, and where they have been assessed there have been strong links between management practices and ES provision, and in the main the scheme has been effective at providing the core ESs it has stipulated.	income, and have more diverse incomes than non-participants, in some cases, as a result of off-farm work. More information on income stream financial arrangements is needed.	
NFCP (China)	**100** Low to medium social impact, mainly in relation to poverty reduction, living standards and resilience to environmental change. Indications that the programme has encouraged a low to medium level of poorer households to participate. More information regarding the details of social outcomes and the characteristics of participants is needed.	**100** Evidence suggests that the programme has significantly increased forest cover and in many areas altered agricultural practices, though the evidence is mixed with regards to whether the programme has been as effective and efficient as it could have been in inducing land-use change. There is some evidence to suggest the programme has positively affected biodiversity levels, but that in many areas the scheme has been employed in regions of good environmental conditions, which questions its additionality. Core ESs have been identified and where assessed, due to robust links between management practices and ES provision, then the ESs have been shown to be preserved by programme activities.	**100** Payments are distributed mainly to small and medium-sized landholders. Payments have been shown to increase household income. However, information regarding payment contributions to household income, specifically whether they represent a sufficient income stream that allows a diversification of household economic activities is lacking. Although it seems that payments have led to an increase in material wealth distribution.	**0** No specific analysis of the institutional dynamics of the scheme or its effects, particularly in relation to institutional accountability and transparency – rather an indication that it is a top-down centralised state-run scheme.