Notes on a Negotiation Support System for Upper Water Catchment Environmental Services

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CONTENTS

1. Introduction
1.1 Why a Negotiation Support System?
1.2 What are environmental services?
1.3 Theoretical basis for paying for environmental services
1.4 Poverty and environmental services

2. Upper water catchment environmental services
2.1 What are the problems?
2.2 To bundle or not to bundle?
2.3 Economic valuation
2.4 Compensation mechanisms

3. Negotiating environmental services
3.1 Integrative and distributive approaches
3.2 Heterogeneity and opportunism
3.3 Poverty, equity and rights

4. Land use change
4.1 Choosing land use scenarios
4.2 Stated choice methods
4.3 Scale effects

5. Institutional arrangements and policy responses
5.1 Institutional arrangements
5.2 To regulate or reward?
5.3 Prioritising interventions

6. Next steps
6.1 Which arrangements work best where, when, how and for whom?
6.2 Designing and testing a NSS

1. Introduction

1.1 Why a Negotiation Support System?

Land use change in upland water catchment alters biophysical responses leading to impacts for nature and society. The opportunity for market-based or incentive-based approaches to improve impacts and outcomes from optimal upland management practices has created interest in Markets for Environmental Services (MES) or Payments for Environmental Services (PES) (Landell-Mills and Porras, 2002). These approaches have been influenced by international policy on climate change (Clean Development Mechanism), biodiversity (Convention on Biological Diversity) and poverty (Millennium Development Goals). In particular, the relationship between forests, and changing forest cover trends around the world, and environmental services associated with forest cover has been central to much of the thinking, funding and promotion of MES. What is less certain are the socio-economic opportunities and outcomes from promoting such arrangements. If incentive-based mechanisms are to achieve both environmental and social improvements, greater understanding of negotiating sustainable environmental arrangements will benefit from new tools and approaches in at least three areas:

1. More rigorous evaluation of environmental decision-making processes between (often) competing resource users over differing land use scenarios;
2. Simplified but robust resource economic valuation techniques to value environmental services;
3. Critical institutional analysis of environmental service arrangements.

These three components will contribute to the development of a Negotiation Support System (NSS) that will build-on existing evidence, lessons and experiences from a cluster of upper water catchment research projects in Costa Rica, India and South Africa[1]. Active collaboration from wider international research experiences with PES will be sought to produce a NSS manual that will promote new or improved methods and approaches for developing incentive-based mechanisms for sustainable outcomes for nature and society.

This paper offers a short review of the theory, practice and challenges of incentive-based mechanisms with particular reference to upper water catchment environmental services in developing countries. It is not exhaustive but aims to illustrate some of the uncertainties or obstacles identified in the literature for wider application of PES approaches in developing countries facing increasing water resource constraints and competition.

[1] DFID Forestry Research Programme FLOWS (ZF0176), details at: ww.cluwrr.ncl.ac.uk

1.2 What are environmental services?

An environmental service (ES) may be an improvement or the maintenance of ecological characteristics of a catchment[2] system that results from changing land or water use practices. For example, reducing chemical fertiliser application, zero-tillage, non-riparian disturbance or sustainable forest management. ES are often classified under four broad headings:

1. Watershed services, e.g. quantity, quality and regulation of water flows from upper catchment areas to downstream users; erosion control; flood mitigation.
2. Biodiversity conservation, e.g. protecting habitat loss and species conservation.
3. Carbon fixation, e.g. forests provide stores or sinks for carbon dioxide emissions;
4. Landscape beauty, e.g. existence value from non-extractive uses (e.g. eco-tourism).

This paper focuses specifically on watershed services and, in particular, ES associated with upper water catchments in developing countries.

1.3 Theoretical basis for paying for environmental services

Environmental problems may occur because market incentives which influence people's land use decisions fail to include the full social cost (or benefits) of their choices (Chomitz et al., 1999). While policy distortions and market imperfections contribute to social costs due to government mistakes, such as bad policies or corruption, and incomplete factor markets, e.g. uncertain land tenure and credit/banking services, respectively, it is market failures that has generated increased attention as an area that can be mitigated for poverty reduction and environmental sustainability. MES and PES approaches have evolved in response to this thinking.

Three factors contribute to market failure:

- Externalities occur where no market price exists. Externalities can be positive and/or negative and may occur across a range of scales for both nature and society. Improving/deteriorating quality and quantity of water flows are examples of positive/negative ES externalities.
- 'Public goods' characteristics of ES such that: a) use by one person does not prevent benefits being captured by others, and, b) it is often difficult to exclude users, thus it may be costly to charge different users.

[2] Catchment and watershed terms are both used interchangeably and refer to a common geographical drainage unit.

- High transaction costs may occur in attempting to trade ES as distorted or missing market ‘signals’ can result in unreliable or incorrect information regarding ES values.

1.4 Poverty and environmental services

In the absence of alternatives, the poor often have a disproportionate dependency on access to and use of natural resources compared to the non-poor. However, the poor often fail to have effective or secure rights and claims to natural resources, including ES. This presents a significant challenge to the stated objectives of many MES initiatives seeking to both improve livelihoods and reduce poverty while conserving the environment (Rojas and Aylward, 2003). The success of PES mechanisms in developed countries, e.g. sulphur dioxide trading in the USA, is not uniform as illustrated by the failure of a similar mechanism in Europe (Swanson, 2002). Nevertheless, the theoretical basis of developed country experiences with PES is being transferred to developing countries with sometimes weaker institutions (e.g. governance, rule of law, enforcement) and data problems (e.g. quality, coverage, time-frame). Evidence of synergies between poverty reduction and environmental conservation in developing countries is also weak (Wunder, 2001).

2. Upper water catchment environmental services

2.1 What are the problems?

Soil and water conservation (SWC) measures in upper water catchments around the world are often associated with concerns for conservation of existing stands of natural forests and the rich diversity of biodiversity supported by such forests, and reforestation (often exotic, fast-growing species) in order to mitigate a combination of:

- Soil erosion losses *on-site* and declines in land/agricultural productivity;
- Water supply changes *off-site* that will affect annual water yield, seasonal flows and groundwater recharge or depletion;
- Water quality changes *off-site* that may silt storage infrastructure and cause environmental damage and have human and economic impacts from runoff of pesticides, fertilisers or other waste (Tomich et al., 2004a).

Soil erosion can be beneficial or detrimental to farmers depending on spatial and temporal flows within a landscape. Measurement of soil erosion is often controversial and is historically-located in the present. For example, the great floodplains of Asia are formed by ancient soil deposition and currently support millions of people with food and livelihood benefits from annual movements of soil and water. Does this mean the problem should be framed spatially (upstream/downstream) or temporally (season, year), and is science robust enough to produce meaningful measurements? Would halting all soil erosion be a good thing, and for whom? Studies suggest growing water demand is a more pressing problem in the developing world, though location-specific factors can make soil erosion a significant local concern (ibid).

Water supply and quality changes *off-site* create opportunities and threats for society and nature. Concepts such as the ‘environmental reserve’ and ‘human reserve’ are symptomatic of a growing understanding of the limits of supply-based solutions to the growing and competing water demands of agriculture, industry, domestic water and ecological requirements (Calder, in press). Watershed development responses to managing water resource systems often reveal a political economy of vested interests and misguided narratives that run counter to the best available science. For example, research has questioned the scientific basis for perceived forest, water and flood relationships that has guided millions of dollars worth of ‘watershed development’ projects (ibid). Improved understanding of land and water relationships is critical to establish a baseline on which to negotiate water allocations among competing users. Water negotiations have historically been influenced more by public perceptions, power relations and value systems than science; whether and how this will change is uncertain. A key challenge in future water resource management has been identified as managing the people depending upon, and making decisions about, water in combination with existing understanding of the hydrological dynamics in a catchment system (Falkenmark, 2002). People and power and land and water interactions embed both the problem and the solution to sustainable land and water management practices.

2.2 To bundle or not to bundle?

The four ES groups mentioned are often ‘bundled’ together. This has pros and cons. In Costa Rica, where a PES mechanism was first introduced, it is theoretically possible for a farmer to sell her biodiversity, carbon, beauty and watershed services separately. This would lead to a distribution of incentives and benefits across land managers across the country. Opportunity costs for good arable land in Costa Rica are high, considerably higher than most incentive payments, and most farmers would lose money by opting for a conservation strategy. However, restrictive land use legislation prevents alteration of existing forested lands and leads to an artificial incentive to encourage farmers to participate (Porras and Hope, 2005).

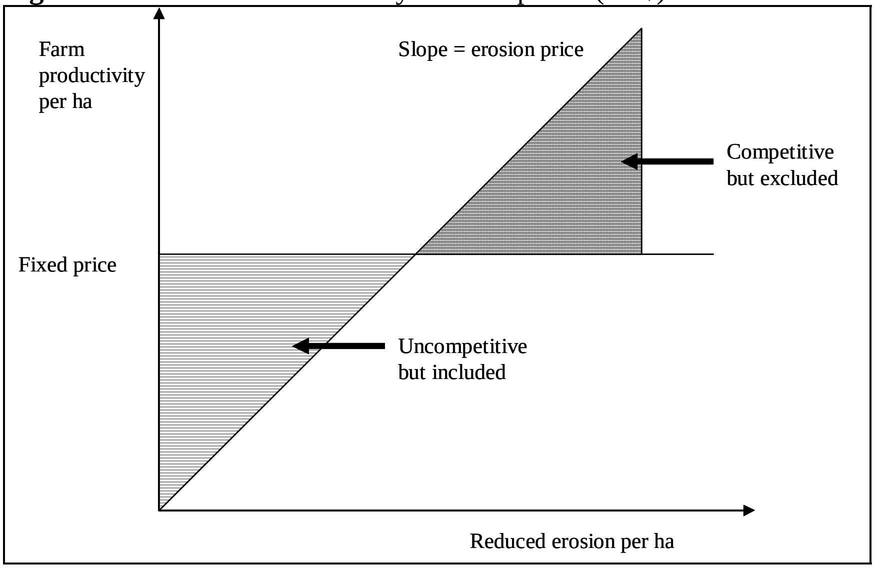
In reality, the PES programme operates under a monopsonistic arrangement as the government is often the only buyer in town. This situation is likely to occur in many catchments as there are unlikely to be more than one hydro-electric power (HEP) or water utility company competing for the same (water supply/quality) services. At the national level, a monopsony has administrative advantages in centralised monitoring, reporting and, for carbon offset markets, facilitates a baseline definition. The strategic advantage of bundling services for government is that it can cross-subsidise less popular services which are considered of national importance and for which no alternative market may exist, i.e. biodiversity (Chomitz et al., 1999). Accordingly, evidence of bundling ES arrangements has centred on private water supply and water quality transactions at the local level.

2.3 Economic valuation

Economic valuation of upper water catchment ES is complex. At least two problems challenge rigorous valuation. An identification problem in allocating value to services not revealed by market behaviour; and a referencing problem in determining a baseline condition from which agreed changes are evaluated. The identification problem includes how you attribute and isolate the quantity or quality of *incremental* change in water received by a lowland village from a mosaic of land use practices many kilometres upstream? For example, if the forestry department plants a new stand of eucalypts next to an upstream farmer's field, will changes in streamflow be attributable to the farmer's land management on one hectare or the forested 100 hectares, and how will the downstream village apportion the relative impacts? The referencing problem tackles the temporal variability common to tropical countries in terms of intra- and inter-annual climate fluctuations and the requirement to have some baseline condition from which to monitor agreements. While studies have valued ES from watershed services in the tropics (Aylward and Echevarria, 2001; Pattanayak and Kramer, 2001) , the cost, time and, often, non-replicability of the research results promote the need for simplified but rigorous economic valuation approaches for non-technical practioneers in the field.

Valuation of ES through a monopsony or private transactions also requires a pricing strategy. Prices can be fixed or vary. In Costa Rica, a fixed price was determined for different land management options. Such an approach is transparent, easy to administer and appears equitable. Adopting a fixed price may be fiscally and socially inefficient. In a simplified example, ES provided by reduced soil erosion per hectare is plotted against the value of produce per hectare (Fig. 1). Our interest would be in the soil erosion impact per farm. If the slope of the diagonal represents the current price (damage) from soil erosion downstream (say in a HEP), then any farm below the line can supply an ES competitively. With a fixed price, farms in the horizontally shaded are included even though the value of their service is less than the fixed price. Such cases may arise for land on low fertile and fragile soils where agricultural returns are low. Alternatively, land in the hashed area are excluded even though their service is greater than the fixed price; this may occur in riparian areas with deep, fertile soils where the opportunity cost of annual agriculture is high. This theoretical inefficiency is quite likely to occur as the value of a property's ES will be associated with its location in the catchment area. Similar arguments could be made for carbon services for forestry from different soil profiles in locations with varying levels of accessibility and associated opportunity costs of alternative land uses (Chomitz et al., 1999). In addition, bundled services may not be compatible. For example, a denuded, steep slope in a high rainfall area is likely to provide increased water flow and sediment load than if the area were forested, which may result in an inverted proportion of water and sediment services/impacts.

Figure 1. Distributional efficiency of fixed prices (US$)



Adapted from Chomitz et al. (1999)

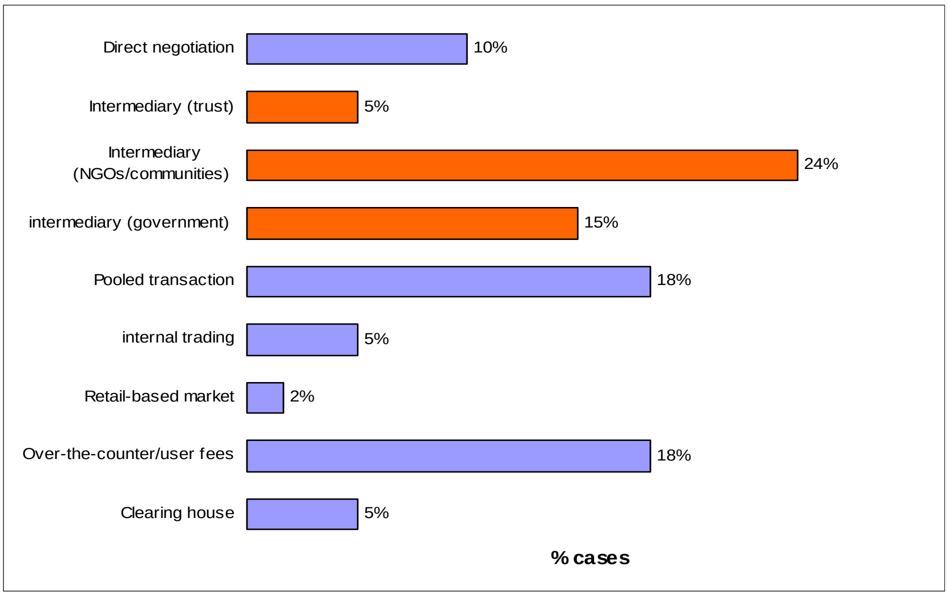
Variable or differentiated pricing has the advantage of social efficiency in assigning values on a property (or land zone) basis for the ES provided. However, assigning prices at the plot level may be complex and contentious. Further, such an approach would incur high transaction costs and may be difficult to finance. A more flexible pricing strategy may be to hold 'reverse auctions' where a budget is announced for an area and land managers submit bids to place their land in the scheme. A limitation is that transaction costs will still be high, participant expectations may be unrealistic, perverse land incentives may occur and administrative capacity may be stretched for extensive areas with thousands of potential participants.

Current evidence of pricing strategies for PES suggest that environmental science and economic theory contribute little to setting an incentive level, rather fixed prices are set by central, often government, agencies or ES prices are negotiated locally with agreements based on cash or in-kind payments.

2.4 Compensation mechanisms

Various compensation mechanisms are used for ES transactions. Mechanisms are often multiple with varying levels of sophistication. A particular initiative might combine several mechanisms, for example, a pooled transaction with a trust-fund intermediary. In a global review, simpler mechanisms were found to be more common (Landell-Mills and Porras, 2002). Intermediary-based mechanisms occur in over four out of ten cases with a combination of direct negotiation, pooled transactions and user fees representing a similar proportion of cases (Fig. 2).

Figure 2. Compensation mechanisms for Environmental Services



Source: Landell-Mills and Porras (2002)

Direct negotiations involve detailed contracts outlining best management practices, land purchase agreements and conservation easements. Direct negotiations are mostly used when the number of buyers and sellers is relatively small. Intermediaries are used to control transaction costs and risks. They are frequently set up and run by non-government organisations (NGOs), community-based organisations (CBOs) and government agencies. In some cases independent trust funds are created. They can be used with other mechanisms, such as pooled transactions. These control transaction costs by spreading risks amongst several buyers. They are also used to share the costs of a large transaction, where minimum threshold is required or when investors are interested in different commodities.

Retail-based trade is based on a consumer's willingness to pay (WTP). In the case of catchment water ES, payments are associated with existing consumer preferences, e.g. Salmon Safe agricultural produce. It is also used in biodiversity and carbon sequestration. Normally associated with certification and labelling schemes that generate consumer recognition and WTP.

More sophisticated techniques are emerging although most of these are based in developed countries. In over-the-counter transactions the service is "pre-packaged" for sale (water quality credits, park entrance fees and carbon offsets). ES are frequently offered at a fixed price for different beneficiaries through user fees. This rate is normally non-negotiable and the same for all beneficiaries/users. Clearing-house transactions offer a central trading platform for buyers and sellers. It presents a transparent system for price discovery, but depends on the existence of a standardised pre-package commodity (e.g. salinity credit, water quality offset). As noted, auctions attempt more competitive arrangements. Auctions are proposed for determining the supply of ES as well as for allocating obligations to pay. Finally, internal-trading are transactions within an organisation, or within different parts of the government, which may establish a price threshold or WTP before external trading.

3. Negotiating environmental services

3.1 Integrative and distributive negotiations

Success in negotiating improved ES arrangements may be predictably poor because of the nature of the problem (regulation of open access resources) and the nature of the process of resolving the problem (multi-party contracting) (Swanson, 2002). As noted, this may lead to high transaction costs, which prevent the gains from joint management being achieved. Three potential obstacles contribute to high transactional costs of negotiating ES improvements. First, if the resource is a 'public good' or an open access resource, all existing and potential resources users are required to <u>cooperate</u>. Second, the contractual nature of the agreement requires that each participant (individual, household, community) finds the proposed agreement in her <u>own interest</u> before (meaningful) acceptance is likely to occur. Third, the multi-functional nature of many environmental arrangements results in the possibility of <u>sequential acceptance</u> as opposed to simultaneous commitment, which may generate (perverse) incentives contrary to the negotiated agreement (Leeuwis, 2002).

Conditions for successfully negotiating ES include a divergence of interests, mutual (resource) inter-dependence and the ability to communicate (ibid). Divergence of interests may be addressed in a distributive or integrative negotiation process. A distributive negotiation accepts the status quo and simply tries to redistributive the 'cake'; it is therefore unlikely to be sustainable as conflicts are largely left in-tact. Alternatively, an integrative negotiation acknowledges wider constraints and opportunities beyond ES and attempts to identify new and wider problem (consensus) through collective learning experiences. For example, research in Costa Rica illustrated that upstream land managers were unlikely to participate in a PES programme on a 'dollars per hectare' basis alone but were interested if benefits included road improvements or access to land titles (Porras and Hope, 2005). Integrative negotiation processes may identify secondary interventions to catalyse agreements. For example, externally-funded SWC structures were built at Sukhomajri, India, to compensate pastoralists (and the wider community) for not over-grazing upland areas that negatively impacted downstream water users whilst compensating existing upland livelihood practices by creating new opportunities through rainfall harvesting structures for irrigation (Kerr, 2002).

3.2 Heterogeneity and opportunism

In a negotiation process, particularly for spatially distributed ES, there are likely to be varying impacts across heterogeneous social groups. A uniform approach will have differential impacts. This will result in different incentives for cooperation based on the entitlements and endowments of different social groups. Social and spatial heterogeneity introduce the problem of discriminating between substantive and valid differences and opportunistic rent-seeking (Swanson, 2002). Estimating appropriate reward, compensation or payment levels is far from obvious, particularly when biophysical evidence may be uncertain, disputed or absent. Identifying the appropriate point on a spectrum between justified compensation/reward and opportunistic rents is challenged by determining an objective and consensual method for determining appropriate incentives.

Given that a negotiation may, at best, only achieve a partial agreement, this may remove the incentive for all parties to quickly cooperate. The incentives for rent-seeking can then dominate as actors may consider the best alternative is the pursuit of self-interest rather than cooperation. This creates a perverse incentive in sequential arrangements to choose to cooperate as the opportunity cost of 'signing-up' for those not cooperating becomes more costly and therefore more unlikely. This is not to say that non-cooperation is always strategic behaviour as the agreement may actually make some people worse-off and it is irrational for net losers to choose to cooperate. Further, non-cooperation may be a function of 'hidden information' with *a priori* investigation of land use change scenarios able to better understand and predict land management behaviour (see below).

3.3 Poverty, equity and rights

Negotiation is a conflictual process. Even when all relevant stakeholders are identified and agree to attend a common platform (no mean feat in itself), it is unrealistic to make everyone set aside their conflicting personal and/or institutional interests in social learning or scenario building processes before any negotiation can meaningfully develop. Assuming that individuals could abstract temporarily from their relative strategic or power positions, they are likely to have differential access to knowledge, kinship groups, land, labour, finance, etc., which can be used to debate or determine claims on truth, validity and legitimacy. As such, even if the opportunity to 'speak out' is equal, the possibilities to make claims, criticize and influence are not (Leeuwis, 2002). In this context, expectations for pro-poor and equitable outcomes have to be set.

Reducing poverty in upper water catchments through water-based ES will be influenced by the legal plurality of land claims. Upland poor people often have no or insecure land rights, even though they may be *de facto* land managers due to absentee landlords or share-cropping arrangements. Water-based ES opportunities will depend on enforceable claims on upland areas to legitimise payments from downstream water users. National water legislation may consider water resources an indivisible national asset, de-linking land ownership and rights from water resource rights. Legislation may also provide a minimum threshold of water to all citizens though the mechanism by which this is provided may be separate from land ownership. The monitoring, enforcement and interpretation of these various and over-lapping water rights further complicates how ES arrangements may benefit the upland poor in a manner consistent with legislation at the national level. Ignoring this complexity is likely to undermine sustainable arrangements.

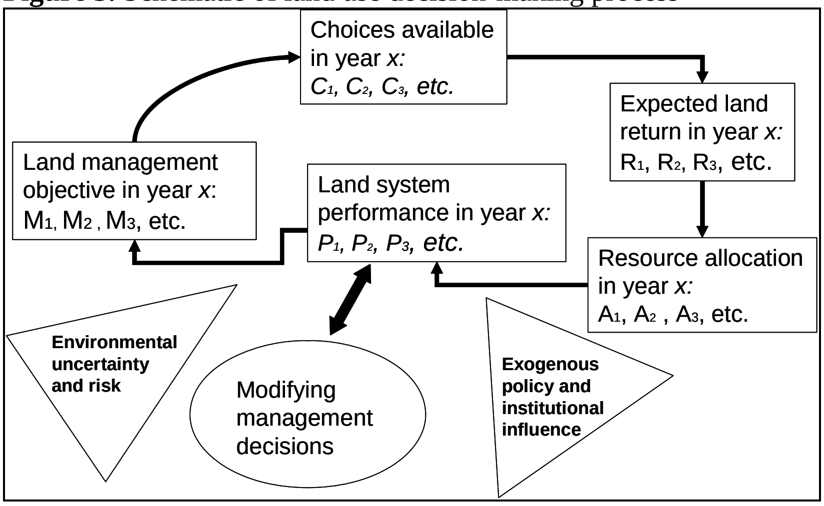
Public works programmes offer a labour-focussed approach to improve land management, water conservation and reduce poverty (Hope, 2005). The Working for Water programme in South Africa highlights a potential model for an incentive-based (rather than market-based) approach that links the upland poor with downstream water demand. How equitable, sustainable and pro-poor such mechanisms are is debatable, though in water-scarce countries the potential for programmes that improve land management whilst conserving water resources seems high. Whether a regulatory or reward approach is more applicable may depend on ecological, economic or social priorities and objectives (see below). Inclusion of rights-based and equity objectives into poverty reduction and environmental conservation interventions is desirable though experiences promote a pragmatic approach for achievable and measurable goals. Greater understanding of the decision-making priorities of resource managers is likely to improve the design and adoption of PES initiatives.

4. Land use change

4.1 Choosing land use scenarios

Farmers are resource managers. They face complex agro-ecological, social, institutional and financial decision-making processes in any tropical agro-ecosystem (van Noordwijk et al., 2004). Climate variability and risk challenge optimal land use decisions at the farm level. Beyond the farm gate, farmers must evaluate market access and price fluctuations in decisions to invest in a crop surplus for sale, often in a situation of imperfect information. In addition, they must weigh up changing macro-economic, policy and political factors that influence land tenure, input prices, energy supply, seasonal labour and output markets. A simplified schematic of land use decision-making may be represented by four inter-linked stages influenced by exogenous factors, such as climate, macro-economy and institutions, within which the farmer may be able to modify some management decisions (Fig. 3).

Figure 3. Schematic of land use decision-making process



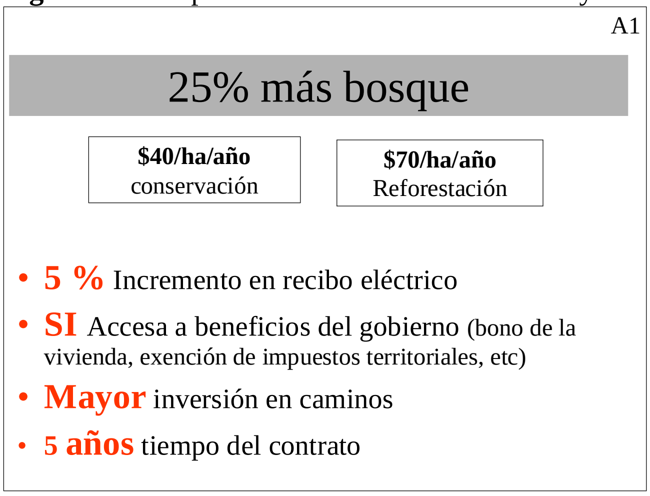
Adapted from van Noordwijk et al. (2004: 29)

Understanding how farmers choose between land use scenarios is important to the process of negotiating payments for services derived from land use change as agro-ecological system performance and farmer incentives are dynamic and location-specific. Exploring the priorities and preferences of land managers across a range of experimental scenarios can improve evaluation of the factors that influence commitment to any PES scheme over the expected life-time of the arrangement. Stated choice methods allow insights into behavioural responsiveness in such situations of uncertainty and complexity.

4.2 Stated choice methods

Stated choice methods (SCMs) offer an approach to investigate, estimate and predict the responsiveness of people to changes in goods or services in an existing or hypothetical scenario (Louviere et al., 2000). SCMs aim to provide improved theory, methods and analytical tools to explain individual and aggregate choice behaviour, and predict behavioural responses to changing opportunities. For example, a SCM experiment explored upland farmer participation in the Costa Rica PES programme (Porras and Hope, 2005). The experiment elicited preferences based on voting scores to scenarios of changing forest land cover on their properties, alternative forest land incentives, road condition, electricity bills (HEP, land, water linkages), government welfare access and contract length. An example of one of the choice cards is presented in figure 4.

Figure 4. Example of choice card from PES study



Source: Porras and Hope (2005)

Results of this experiment provided counter-intuitive insights into farmer priorities, particularly their insensitivity to payment levels compared to alternative interventions such as road improvements. The simple voting procedure allows respondents to choose their preferred scenario, which are often presented in pictorial formats for ease of understanding and participation of less well-educated respondents. Given the choice between several alternatives, people attempt to select the one that they like best (i.e. that offers them the most welfare) subject to various constraints (e.g. income, information). Econometric methods allow rigorous and flexible analysis of choice responses with parameter and model estimates allowing clear specification of scenario preferences. Successful application of different SCMs in Costa Rica (Porras and Hope, 2005) and South Africa (Hope and Garrod, 2004) to upper water catchment scenario analyses is being refined in the development of a choice experiment at the Bhoj wetland, near Bhopal, India.

4.3 Scale effects

Land use scenarios also have spatial considerations, which have varying impacts on biophysical and social systems. Scaling-up plot level or local level interventions may be appealing politically but may not be appropriate for a number of reasons. A textbook example is the small soil erosion plot experiment that is naively extrapolated up to the regional, national or continental level overlooking the inherent diminishing proportional contribution from one scale (plot, field, village) to another (catchment, basin); and that, at the global scale, sediment loss is zero (van Noordwijk et al., 2004). In India, growing evidence of competitive groundwater extraction for irrigation has led to rapidly falling aquifer levels contributing to reduced dry season domestic water availability and extreme hardship for many farmers, including linkages to farmer suicides (Calder, in press). Promotion of 'Watershed Development' as a 'one size fits all' solution for rural development challenges across highly variable agro-ecological has also significant scale effects that may not be realised at the implementation level of a village of micro-watershed (circa. 500 hectares). Linking a vast jigsaw of watershed interventions at larger hydrological planning and modelling units may reveal perverse and unintended outcomes for nature and society, which may create a different and new set of problems (ibid).

The scientific justification that supports a PES mechanism may often be complex with varying spatial impacts. For example, forestry is strongly associated with positive ES though global hydrological studies indicate that while water quality services may be justified increased or regulated water quantity flows are likely to reduce with increased forest cover (Calder, in press). This takes us back to the 'bundling services' discussion, as forestry may contribute to carbon fixation services in immature stands but, dependent on tree species, will not contribute to biodiversity (i.e. non-indigenous species) or downstream water flows. These impacts will vary across scales from global climate change benefits (here, forestry is good) to distributed catchment level impacts where forestry may be bad for downstream water users but good for upstream forestry users. 'Internalising the externalities' sounds good on paper but often depends on who you are and, critically, where you are.

5. Institutional arrangements and policy responses

5.1 Institutional arrangements

Institutional arrangements (IA) for ES can be broadly described under regulatory or reward frameworks. An example of a regulatory framework is illustrated by the Costa Rica PES programme, which aims to promote socially optimal forest cover by compensating land managers for the external benefits from ES derived from their forested land. A reward approach underpins the Rewarding Upland Poor for Environmental Services (RUPES) programme that is exploring market-based mechanisms that improve incentives for non- or under-valued ES to livelihood groups in Asia (van Noordwijk et al., 2004). In practice, the level of formalization of the institutional environment (IE), largely determined by a country's development, will influence the performance of IA at the local level. For example, in India, it is argued that low level interaction between the IE of the water sector, as explained by the effective reach of legal and regulatory mechanisms, on IA at the local level, which are characterised by self-provisioning water institutions, illustrate an informal water sector that may be better influenced by 'indirect instruments' for performance enhancement (Shah, 2005). Alternatively, in more mature economies of northern Europe, America, Canada, Japan and Australia, the IE of the water sector is more formalized with provision dominated by service provides applying technical approaches for cost recovery, resource allocation and resource management.

The distinction identified between the IE and IA is the difference between the 'rules of the game' and the 'rules in use' (North, 1990). Usefully, it highlights t potential gains from different interventions. For example, in upland rural catchments of developing countries ES arrangements are likely to be forged under customary or traditional influences distant from national resource policy, laws or administration. Analysis of the rules in use from *in situ* IA that moderate ES transactions in upland water catchments have received little or uncritical attention in the nascent PES literature.

While IA for collective action have evolved in many situations of resource scarcity or heightened competition, the premise of a PES approach is based on incremental benefits in improving or conserving resource provision and therefore are located in an uncertain domain. How do local IA evolve in this context? There is weak understanding of how PES arrangements co-exist with historical resource allocation modalities and how they effect the distribution of ES benefits across stakeholder groups. How do different actors identify themselves and develop an initial dialogue? Are IA driven by necessity, opportunity or entirely dependent on external interventions? What are the conditions that will make one IA likely to be sustainable over time and another fail? Do PES institutions replace, replicate or create new clusters of actors in their arrangements? If there are new participants, who are they and what is their motivation for investing in the IA? A better analytical understanding of such questions is required to better inform the development of a NSS for sustainable PES arrangements.

5.2 To regulate or reward?

When and how should policy makers respond to social and environmental problems? Is it more important to respond to the negative (and visible) impacts of land use change or better understand the drivers of land use change? And when is the right time to respond – early with a 'precautionary principle' approach or only when government may lose votes, money or both? As discussed, policy responses may be considered to be either regulatory or reward-based. The former comprises traditional administrative, centrally-managed and often threshold-bound targets or limits, such as air or water quality standards. The latter consists of 'carrot-based' approaches through incentives, subsidies or payments for good behaviour or 'stick-based' disincentives through taxes or fines for bad behaviour (Tomich et al., 2004b).

Each approach has pros and cons. Theoretically reward mechanisms should be economically more efficient and effective in implementation as they exploit high pay-off, low transaction cost arrangements. But this depends on the technical, institutional and informational context, and particularly uncertainty. For example, in a situation where there is a threshold effect, such as drinking water quality or biodiversity irreversibility, a regulatory approach is likely to more effective by reducing monitoring costs by targeting enforcement effort around the threshold line. In reality, science is less certain where such threshold lines may lie and much regulatory effort in developing countries for environmental protection has resulted in neither conservation of natural habitat or species, and often led to the forced displacement of vulnerable groups and their 'degrading' practices elsewhere (ibid). As noted, improved understanding of why people modify landscape mosaics over time is an important step in the design of any NSS whether it is structured within a regulatory or reward framework, or combines both approaches. Equally, there is a need to prioritise which interventions are most important from a public policy perspective.

5.3 Prioritising interventions

Public policy has to prioritise action across a myriad economic, social, environmental, institutional and political factors. It is naïve to think that public policy is not influenced by political or hegemonic self-interest groups, whether that is an understandable desire to be re-elected in the short-term, be seen to be 'doing the right thing' or involves complicity in, or optimal ignorance of, maintaining sanctioned discourses that little serve the public interest (Calder, in press). In the case of ES arrangements, there at least two tensions being played out at any one time. First, an environment-first approach, and, second, a people-first approach. While PES initiatives attempt to harmonise or exploit commonalities between these approaches, this is predicated on certain assumptions that may not often be found on the ground (Wunder, 2001). This paper has deliberately targeted watershed services as it is believed there lies more scientific justification for some of the ES derived from upper water catchment for developing incentive-based mechanisms than from ES derived from biodiversity, landscape beauty or carbon trading land uses. This is particularly germane where livelihood benefits are a stated aim of such arrangements. However, poor people and environmental value will not always coincide. Though aggregate arguments are plausible for arguments to support MES initiatives, social and landscape mosaics are highly variable and location-specific. If this is recognised, some of the premised reduced transaction cost benefits from reward systems may be lost. This may not matter if the ES value is high, not disputed and a financing mechanism can offset no upstream-downstream payments. How sustainable and replicable such arrangements are is questionable.

6. Next steps for a NSS

6.1 Which arrangements work best where, when, how and for whom?

A critical mass of experiences, lessons and studies into PES arrangements are beginning to emerge in the literature. International donor organisations and research institutions have been involved to varying levels in action learning research into existing and nascent incentive-based arrangements in Latin America, Africa and Asia since the late 1990s. They include: World Bank, Food and Agricultural Organisation (FAO), International Institute for Environment and Development (IIED), Department for International Development (DFID), World Agroforestry Centre (ICRAF), Worldwide Fund for Nature (WWF), the World Conservation Union (IUCN), plus national government departments and a host of universities, non-government organisations (NGOs) and community-based organisations (CBOs).

What is not clear from the literature is whether there are generic lessons which can inform a more rigorous and practical approach to negotiating incentive-based ES arrangements. For example, which ES arrangements work best, where they fail or succeed, why outcomes are different and for whom, when interventions work or not, how arrangements may be best structured, and what are the distributional impacts across social groups, particularly for the poor. These insights are key to developing, designing and evaluating the next steps in a NSS for incentive-based ES arrangements. The development of a NSS manual will seek the collaborative and critical support of government, research and civil society in its development, design and testing with a view to bridging research and policy.

6.2 Designing and testing a NSS

Designing and testing a generic NSS for upper water catchment services will be informed by the lessons and experiences detailed in the preceding review. Particular attention will be directed towards developing and testing methods and approaches for:

- More rigorous evaluation of environmental decision-making processes between (often) competing resource users over differing land use scenarios;
- Simplified but robust resource economic valuation techniques to value environmental services;
- Critical institutional analysis of environmental service arrangements.

A study site has been selected in the upper catchment area of the Bhoj wetland, near Bhopal, Madhya Pradesh, India. The wetland is a RAMSAR site threatened by deteriorating water quality and increasing siltation. While impacts from human sewage and industrial effluent are being addressed in the downstream, urban area, impacts from agricultural runoff from upland catchment communities land use practices has yet to be tackled though represents a major threat to the wetland due to increasing agricultural land use (currently 60% of catchment area) and increasing chemical usage influenced by crop choices and tillage practices. Linked to this field study will be desk-based analysis of IA for water-based catchment services in India and Costa Rica. It is hoped that institutes identified in the learning alliance will contribute their experiences and lessons to this exercise. Further, complementary resource economic valuation work by IIED, WWF and IUCN is likely to benefit from sharing approaches and methods.

Outputs from the research will include technical reports from study site, which will be linked to the IA and economic work to produce a ‘working draft’ NSS manual for the August 2005 Stockholm World Water Week symposium. Based on wider, critical review, this manual will be published as a collaborative document later the same year for targeted hard-copy distribution and global availability via the project and collaborators’ websites.

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