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Department of Environmental Politics,
Department of Economics

3/2015

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March 2015

Publisher:
Helmholtz-Zentrum für Umweltforschung GmbH - UFZ
Permoserstr. 15
04318 Leipzig

ISSN 1436-140X

Capturing *ecosystem service opportunities*: a practice-oriented framework for selecting economic instruments in order to enhance biodiversity and human livelihoods

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Abstract: Practitioners in the fields of sustainable development, land management, and biodiversity conservation are increasingly interested in using economic instruments that promise "win-win" solutions for conservation and human livelihoods. However, practitioners often lack guidance for selecting and implementing suitable economic approaches that take the specific local needs and the cultural, legal, and ecological context into account. This paper extracts from the academic debate a series of key aspects to be considered by practitioners who wish to accomplish change of behaviour via economic approaches. The paper then presents a practice-oriented framework for identifying the "ecosystem service opportunities" to conserve biodiversity and improve livelihoods in a specific local setting, and for pre-selecting suitable economic instruments. The framework is illustrated by describing its application in two pilot sites of the ECO-BEST project in Thailand, as part of which it was developed and road-tested.

Keywords:

- Conservation management
- ecosystem services
- economic instruments
- assessment framework

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1. Introduction

The last two decades have witnessed an increasing integration of economics into biodiversity conservation efforts (UNEP 2004, De Groot el al 2010, Mace 2014). It is widely recognised that the application of economic concepts and instruments can help in achieving a substantial improvement in the status of biodiversity and ecosystems combined with enhanced economic and social prosperity (Balmford et al 2002). Taxes or subsidies have a long history in environmental policy and are introduced to steer behaviour and reduce negative external effects (Pigou 1920). Many other economic instruments have emerged to create economic incentives and pricing mechanisms that stimulate the protection of biodiversity and enhance the provision of ecosystem services (e.g., conservation easements, resource use fees, tradable permits, offsetting schemes) (Schröter-Schlaack and Ring 2011, Pirard 2012). Payments for ecosystem services (PES) are seen as a particularly prominent instrument for protecting biodiversity and ecosystem services, for instance via improving watershed management, supporting wildlife conservation, or reducing natural resource extraction (Wunder et al 2008, Schomers and Matzdorf 2013).

Over recent years, there has been an increasing number of efforts to show-case, mainstream and promote the implementation of economic instruments to safeguard ecosystems (e.g., WRI 2008, UNEP 2009, TEEB 2010). However, it has been pointed out by some scholars that the degree of integration of ecosystem service values into on-the-ground decision making has not so far lived up to expectations (Daily et al 2009, Rodríguez-Labajos and Martínez-Alier 2012) and a number of critical comments are heard. Doubts are voiced due to the multiple and complex conditions for economic instruments to actually work in specific socio-cultural and legal contexts (Vatn 2010, Lockie 2013), some authors caution against an over-reliance on “win-win” solutions and PES schemes as panacea (Muradian et al 2013), and some even doubt the general (long-term) effectiveness of economic instruments and an economic discourse for nature conservation altogether (O’Neill 1997, McCauley 2006, Spash 2008, Redford and Adams 2009, Monbiot 2014, Adams 2014). This paper addresses some of these concerns by trying to move them out of the academic realm and including them in the proposed assessment framework.

The sometimes lengthy discourse on the use of economic instruments for ecosystems and biodiversity has also resulted in some confusion at the practical policy and management level. Conservation and development planners and decision-makers are often left struggling to understand whether and how economic instruments can actually be used to tackle environmental degradation and to improve the effectiveness, equity and sustainability of

conservation actions. Practitioners lack guidance to identify and tap into the potential of economic instruments to enhance biodiversity and ecosystem services, while at the same time taking proper account of the concerns and limitations voiced in the academic debate, as well as the idiosyncrasies of a specific cultural, legal and political context. This paper addresses this need for practical guidance. Section 3 highlights a number of key aspects that have been articulated in the academic debate and need to be conveyed to practitioners who aim at triggering change in a specific setting by using economic instruments. Section 4 presents a framework with a sequence of steps to guide practitioners towards identifying the "ecosystem service opportunities", and to then pre-select suitable instruments to capture these opportunities. Section 5 illustrates the application of the assessment framework by describing its application in two pilot sites of the ECO-BEST project in Thailand.

2. Background and method

An explicit concern about economic incentives and financing mechanisms emerged from the "Rio Conventions" which came out of the 1992 Earth Summit, especially the emphasis on biodiversity conservation, sustainable use and equitable benefit sharing (OECD 1996, UNEP 2004). During the 1990s and 2000s much research was carried out and many publications accumulated which aimed at better articulating the monetary value of environmental goods and services, initially via the operationalization of a "total economic value" framework (Pearce et al 1989, Costanza et al 1997) and later via the "ecosystem services-human wellbeing" nexus (De Groot et al 2002, Boyd and Banzhaf 2007, Fisher et al 2008, Spangenberg et al 2014) that was made popular by the Millennium Ecosystem Assessment (MA 2005). 'The Economics of Ecosystems and Biodiversity' initiative (TEEB 2010) subsequently made efforts to synthesize earlier approaches and communicate them to audiences beyond the conservation community. Most recently, within the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets, international conservation policy has formally requested national governments to apply economic instruments (UNEP-WCMC and IEEP 2012).

While working at the science-practice-interface the authors of this paper have been confronted with a strong need for practical guidance on how to apply economics for conservation. Confusion is particularly high concerning the relationship between valuation, economic incentives and economic (or other) policy instruments and on how to identify feasible approaches in specific contexts. A meta-study by Laurans et al. (2013) revealed that only a minimal percentage of the peer-reviewed literature on economic valuation of biodiversity and

ecosystem services includes a reference to practical implementation. Moreover, academic debates, even though addressing many relevant points, often use framings (too general), formats (too complex) and language (too academic) that render them inaccessible to practitioners working on implementation efforts "on the ground". In many cases the practical applications of the economics of biodiversity and ecosystems are not incorporating the most recent methodological and theoretical advances and good practices. Two of the authors of this paper found a similar gap from the opposite perspective when collecting and synthesizing lessons from case studies for TEEB (2011): in most cases policy processes were using straightforward and pragmatic methods without accounting for or at least mentioning the latest academic developments. Thus it can be stated that the gap between science and practice reveals itself in two ways: most academic work does not address practical needs and many practical implementations do not take academic research adequately into account. Concerning 'instruments', the discourse in policy practice typically relies on payments for ecosystem service (PES) schemes, which, although they can take many different forms (Jack et al 2008, Schomers and Matzdorf 2013), do not cover the full range of economic policy options. An increasing body of reviews and analyses (e.g., Pattanayak et al 2010, Samii 2014) as well as design guidance (e.g., Greiber 2009, Morrison and Aubrey 2010) has emerged for PES schemes, thus closing the above mentioned gap to some degree, but such guidance is rare for selection and design of other economic instruments.

An opportunity to address this need for guidance arose in the context of the EU funded project "ECO-BEST – Enhancing the Economics of Biodiversity and Ecosystem Services in Thailand/South East Asia". ECO-BEST has the objective to plan and implement economic instruments in and around three protected areas in Thailand: Bu Phram subdistrict (Prachin Buri province), Thadee sub-river basin (Nakhon Si Thammarat province), and Pang Ma-o village in the upper Ping watershed (Chang Mai province). One of the project tasks was to develop a systematic framework for the selection and implementation of economic instruments at a local level and to apply it in the pilot sites. The final product is step-wise guidelines (Rode and Wittmer 2014) that support the assessment process all the way from defining objectives and selecting team members to a feasibility check of chosen instruments, agreements with stakeholders and implementation planning. The guidelines were tested and adapted based on the experience in the three ECO-BEST pilot sites. The framework presented in this paper (section 4) covers the part of the assessment process dealing with a) identifying opportunities to apply economic approaches for conservation and livelihood objectives (henceforth labeled as "ecosystem service opportunities") in a specific local context, and b)

pre-selecting adequate policy instruments for capturing these opportunities. We constructed this framework by distilling lessons from practical experience as technical advisors who provide guidance regarding the use of economics for conservation and development policy and management, and by extracting the essence of the often abstract and quite complex academic debates. A crucial step in the effort to develop such a framework was to determine the critical aspects which should be conveyed to practitioners regarding the use of economic instruments (described in section 3).

3. Key aspects to be considered when implementing economic instruments in practice

Efforts to implement economic approaches in land and resource management practice face considerable risks of failing, either because the measures chosen are not adopted by the stakeholders in the first place or because they do not have the expected positive effect, that is, to actually promote the desired nature conservation and development objectives. This section highlights a number of key aspects that are critical for improving the likelihood of successful implementation. They are addressed in the academic literature, but not always accessible to practitioners. We recommend that practitioners and those who advise practitioners consider these aspects in their work. We also aimed to incorporate them in the framework proposed in section 4.

3.1. Understanding motivations and incentive structures is key for changing behaviour

The main message conveyed by this framework is that in order to change behaviour, practitioners considering to utilise economic approaches should think less about calculating ecosystem service values but rather about identifying "ecosystem service opportunities", that is, the extent to which motivations and incentive structures can be modified in order to change behaviour. A wide array of methods exists to demonstrate ecosystem service value (e.g., Costanza et al 1997, 2014, Fisher and Turner 2008, Liu et al 2010, Christie et al 2012) and many conservation practitioners hope that economic valuation studies can help them "make the case" for nature conservation and will initiate positive change. But usually this will only work if the study can show that the actor who has to change behaviour will be better off by doing so. This is seldom the case (though it may work for instance when an ecosystem service analysis makes farmers or enterprises aware that they are degrading their own land or productive potential). In most circumstances, the benefits and costs of changes accrue to different parties so that the revelation of ecosystem service values, in particular when presented in an aggregate format of economic gains for society, does not in itself change the behaviour of individuals, corporations or communities (Turner et al 2003, Fisher et al 2008,

Daily et al 2009, Honey-Rosés and Pendleton 2013). Economic valuation studies may be able to raise public awareness and they can inform environmentally relevant policy for different objectives (Pearce and Seccombe-Hett 2000), but ultimately motivations and incentive structures have to be modified so that actors involved have an interest in changing their behaviour.

3.2. Conservation interventions and instruments must make economic sense to those concerned

Conservation actions that involve changing behaviour usually need to be economically attractive for the actors who are expected to adopt them: as a standalone activity and relative to alternative (unsustainable) land uses, technologies and management practices (Emerton 2014). Environmental planning has all too often underplayed or omitted altogether the issue of ensuring that policy interventions are attractive and feasible from the perspective of those actors whose behaviour should be altered (Tisdell 1996). For example, there is a long history of unsuccessful interventions designed to encourage (or even demand) the adoption of sustainable land management practices by farm households, mainly based on coercive regulatory approaches (Jones 2009). Many of these actions failed either to improve the farmers' livelihood or to reverse land degradation problems, because their design and selection did not take account of the need to be financially viable at the farm level (Barungi and Maonga 2011; Lovo 2013; Mangisoni 2009; Nakhumwa and Hassan 2012), or did not sufficiently consider the costs to farmers of undertaking sustainable land management (Iiyama et al 2010).

An analysis of economic viability (and, by implication, likelihood of adoption) of conservation instruments does not stop at comparing the cash income and expenditures associated with different land management options. While a positive monetary return is often a necessary condition for an actor to be willing − and able – to take up a particular practice or technology, by itself it is rarely sufficient. Economic viability depends upon a wide variety of additional factors: for example the timing, stability and certainty of earnings, the risk involved, the input requirements of the enterprise and their availability and affordability, the alternative earnings and opportunities that are diminished or foregone, the type of product or output that is generated, and the actors' own tastes and aspirations (Emerton 2014). Moreover, attention needs to be paid to understanding the broader bio-physical, policy and institutional landscape, and to addressing the underlying structural conditions and factors that determine decisions in the first place (Barbier 1997, Gebremedhin 2004, Giordano 2003).

3.3. Involving stakeholders increases the likelihood of identifying "real" opportunities

The long list of factors that may influence the adoption of management practices (see previous sub-section) illustrates that effective stakeholder engagement is essential to ensure that all relevant issues are included and addressed. Stakeholder involvement makes it possible to understand the different parties' motivations for current (unsustainable) behaviour and possible barriers to change, reveals existing conflicts and collaborations, and also exposes related issues stakeholders are struggling with. Examples are: the recognition of property rights as an important incentive in PES schemes (Lockie 2013) or specific social conceptions, for instance when clearing land is per se considered as progress (Van Hecken and Bastiaensen 2010). Alleviating or at least addressing these issues can significantly increase the acceptance of the proposed policy. Similarly, piloting with particularly motivated stakeholders early on in order to test what "does not fly" - and for what reasons - can help fine-tuning the instrument design and avoid painful learning experiences or failure with a larger group. In addition, involving stakeholders from the outset increases the legitimacy of the process, and stakeholder collaboration will also be essential for the actual implementation of the economic instruments and management tools.

3.4. Applying economic instruments presupposes or implicitly defines rights and obligations

Many ecosystem services are provided "for free". This is not usually considered an issue by anyone as long as they are abundant. The situation changes as ecosystem services become scarce, either because of an increase in overall demand or due to the need to consider trade-offs between different services (e.g., high agricultural return vs. water quality). The central question then arises whether it is the right of the beneficiary to have free access to ecosystem services (e.g., to clean water), or whether it is the right of the land owner to freely choose his actions (e.g., to intensify agriculture in a way that reduces groundwater quality). The distribution of (property-, access-, or use-) rights and obligations defines the reference point for determining which economic principles and instruments are adequate. For instance, practitioners who intend to apply economic thinking often propose that farmers who pollute the water by using pesticides or degrade biodiversity on their land could be compensated for refraining from the harmful activity. This is the logic behind many PES schemes where a beneficiary of ecosystem services is asked to pay and money is transferred to the providers of ecosystem services. Proposing an economic instrument in line with this thinking, however, implies the acceptance of a right to act freely on private land, including its negative effects on other members of society. In contrast, if a right of society to clean air or water was generally

accepted, the land owner could be implicitly bound by a “duty to care and provide” and could be held liable for harm inflicted by pollution or be obliged to stop or reduce it (“polluter-pays” principle). Defining such rights and obligations is essentially a political and legal decision (Jack et al 2008, Lockie 2013), reflecting societal justice perceptions in the socio-cultural context (Muradian et al 2013). If rights and obligations have already been defined, either formally in legal terms or informally within culturally accepted norms (e.g., entailing a “duty to care” or a “right to water”), then proposals for new instruments that do not consider this distribution are likely to face resistance and fail. If rights and obligations are undefined, on the other hand, then choosing economic principles and instruments implicitly defines them. Thereby, the new instrument sets a precedent and may face resistance from affected groups that benefit from a current lack of regulation.

3.5. Effective instrument design needs to consider ecosystem service interdependencies

Ecosystems provide multiple services simultaneously that interrelate in complex dynamic ways (e.g. Rodriguez et al. 2006, Bennett et al. 2009, Nelson et al. 2009). Competition between different services occurs when the provision of one service is enhanced at the cost of reducing the provision of another service. Synergies arise when different services are enhanced simultaneously (Raudsepp-Hearne et al 2010, Howe et al 2014). For example, efforts in land management to optimize a single ecosystem service (e.g. provision services such as food, timber and fibre) often result in a decline of in regulating and cultural services, such as ‘water quality and quantity’ or ‘landscape aesthetic’, or in a decrease of biodiversity (Chan et al 2012, Adams 2014).

It is a key challenge for efficient policy design to identify what type of land management positively influences ecosystem functioning and the sustained provision of all relevant ecosystem services. Otherwise, economic instruments run the risk of focusing on benefits for specific groups while not sufficiently taking into account detrimental effects on others. The prominent example of the possible additionality, leakages and externalities associated with international payments for reducing emissions from deforestation and forest degradation (REDD) can serve as an illustration. REDD has emerged as a key international strategy to halt land-use change in developing countries and involve them in climate change mitigation efforts (Angelsen 2009). REDD’s approach to reducing carbon emissions, however, has been criticized for permitting the planting of commercial forests provided that the actors involved verify that any new forest contains at least equal amounts of carbon as its predecessor. Although planting commercial forests may balance carbon emissions, native forests offer

various ecosystem services beyond carbon sequestration that are important to different stakeholders (Hicks et al 2014). Focussing on single ecosystem services or benefits to single groups in society may hence also lead to (well-founded) resistance against the proposed policies or instruments.

3.6. Viable solutions usually involve a mix of economic with other instruments

'Economic instruments' are often distinguished from 'direct regulation' (also referred to as 'command and control') and 'informational measures'. These distinct types of policy instruments are characterized by different strengths and weaknesses and may thus be able to respond to different challenges of ecosystem service management (Schröter-Schlaack and Ring 2011). Whereas direct regulations such as protected areas, public land purchase, or prescription of land management standards play a crucial role in safeguarding a minimum level of biodiversity (e.g., to avoid the extinction of an endangered species or crossing critical thresholds of ecosystem functioning), economic instruments merit particular consideration for managing ecosystem services within safe margins that do not endanger critical levels (Schröter-Schlaack and Blumentrath 2011, Hansjürgens et al. 2011). Economic instruments can also improve the performance of 'direct regulation' by incentivizing actors to provide conservation and management action beyond minimum requirements. For instance, they may link to regulation or planning (e.g., protected areas), or provide bonuses in buffer zones or other areas targeted by special conservation efforts (e.g. Drechsler 2010). Moreover, educational and informational measures aimed at learning and connecting with nature and raising awareness about biodiversity and ecosystem service degradation are often important complements to enhance the acceptance of policies, or increase participation in voluntary conservation and management measures.

Most of the time, there are several sustainability challenges within the same area, which are more likely to be successfully addressed with a mix of instruments rather than a single one (Barton et al. 2013, Wätzold and Drechsler 2005). Existing policies and instruments that are relevant for conservation will not always originate only from environmental policies, but might stem from different sectorial policies, e.g. agriculture and forestry, energy, transport or trade policy. The compatibility and synergies with existing policy measures need to be considered already when pre-selecting economic instruments (and of course again at the later stage of a detailed feasibility analysis). Taking stock of existing policies may also point to shortcomings, trade-offs and blind spots that have been overlooked in the design of the current instruments. Moreover, combining instruments can constitute an insurance against

knowledge gaps, policy and implementation failures (Ring and Schröter-Schlaack 2011, OECD 2007, Doremus 2003, Gunningham and Young 1997).

3.7. Selecting economic opportunities and instruments is also about ethics

Practitioners often underestimate the extent to which the application of economics to nature conservation involves ethical dimensions. To begin with, the most common economic principles are fundamentally rooted in considerations of distributive justice. For instance, the "polluter pays" principle aims at preventing anybody from reaping benefits at the expense of - or even despite considerable harm to – other members of society. In a similar way, having beneficiaries compensate providers for costs involved in natural resource management (according to the "beneficiary pays" and the "provider gets/steward earns" principles) is in some cases essentially a dictate of fairness. For instance, this can be the case when rich urban populations or profit-making industrial enterprises benefit for free from ecosystem services that are provided or managed at the cost of poor local landholders or a cash-strapped environmental ministry. By tackling imbalances in 'who benefits from nature's services' and 'who bears the costs to maintain or enhance them', economic instruments are essentially a means to re-allocate resources and lead to a more just distribution. Highlighting this justice argument can be helpful when communicating the merits of economic instruments to stakeholders.

Moreover, ethical aspects may call for caution with the application of economics, in particular when "market-based" instruments such as 'emission trading' or 'habitat offsetting' are introduced (see e.g., Gómez-Baggethun and Ruiz-Pérez 2011, Luck et al 2012). From a 'distributive-justice-perspective', a main concern is that markets allocate goods and services via prices, so that access to (natural) resources is determined by purchasing power, as opposed to an allocation securing equality in access or access in accordance with needs (Martínez-Alier 2002, Corbera et al 2007, CBD 2011, Sandel 2012). Moreover, people may intuitively reject economic terminology and the use of prices and markets for components and characteristics of nature (beauty, wilderness, sacredness, etc.), as they do for other aspects of life that are regarded as being outside of the economic domain such as friendship, donor organs, or adoption (Sandel 2012). A conservation discourse that relies on the ecosystem services concept has been criticised for promoting an anthropocentric and instrumental view i.e., a thinking in terms of "how nature benefits people", which does not capture the full range of human-nature relationships and environmental values (including notions such as respect, duty, rights of nature, sacredness, identity, and other intrinsic values) (O'Neill and Spash

2000, O'Neill et al 2008, Jax et al 2013, Doak et al 2014). Taking ethical consideration seriously can therefore help to integrate a broader set of values for nature and ease such reservations, but it can also be useful to understand and anticipate possible opposition to economic approaches, and to select suitable and effective instruments for a specific socio-cultural context.

3.8. Economic and non-economic motivations to protect biodiversity have to be understood

People may already protect nature and natural resources for non-economic reasons that in the academic debate are labelled "intrinsic motivations". Such motivations can reflect the abovementioned facets of environmental values and relationships to nature, but are also often related to existing (informal) community norms that govern a sustainable use of natural resources (Ostrom 1990). There is evidence that depending on the context and the design of policy instruments, economic framing and monetary incentives run the risk of eroding people's intrinsic motivations, for instance since economic motives become more salient in people's mind, or since informal community rules do no longer work in the presence of external regulation (Frey 2002, Rode et al 2014, Neuteleers and Engelen 2014). In other instances intrinsic motivations can be enhanced, for instance when economic incentives show that conservation is appreciated from outside (Van Hecken and Bastiaensen 2010). In order to select and design effective economic instruments it is therefore essential to understand existing motives to safeguard nature and ecosystem services, and to carefully assess how economic instruments are likely to affect them.

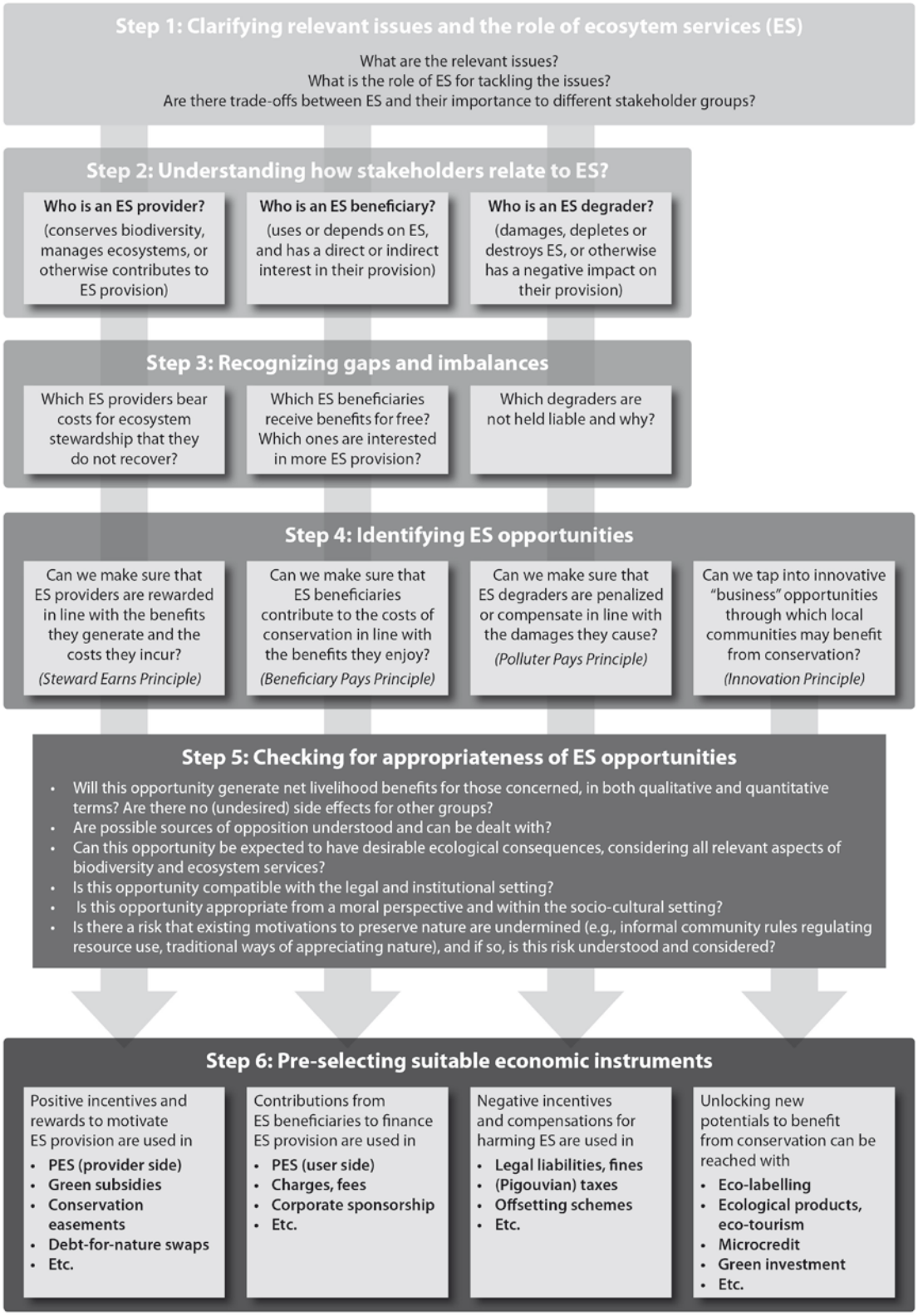
4. A framework for identifying ecosystem services opportunities and pre-selecting instruments

The intention of the framework is to provide a set of clear, practical and iterative steps (a rapid assessment tool) that can be applied by conservation and development planners, managers and stakeholders at the local level. It structures the search for "ecosystem service opportunities" (ESO), that is, the needs, niches, and potential for stimulating change of behaviour, and leads to a pre-selection of potentially suitable economic instruments. Figure 1 summarizes the six steps of the framework.[1] It should be noted that, although the framework guides through the assessment process, the complexity involved in real-world settings will

[1] The framework represents Steps 3 and 4 of the 7-Step ECO-BEST assessment guidelines (Rode and Wittmer 2014). The guidelines also present more detailed descriptions, illustrative examples, and useful tools and links.

require a certain degree of interpretation and synthesizing. The structure of the framework incorporates the key aspects mentioned in section 3.

Figure 1: The framework for identifying ecosystem service opportunities and economic instruments



4.1. Step 1: Clarifying relevant issues and the role of ecosystem services

The assessment process starts by clarifying which ecosystem-related issues or questions are of primary concern to stakeholders and need to be addressed so as to enhance conservation and development goals. Examples of issues to which the ESO framework may be applied include problems with water regulation and provision (floods or droughts), threats to ecosystems due to changing land use, over-exploitation of resources (fish, timber, NTFP, etc.), wildlife conflicts or habitat loss, pollution of ecosystems (e.g., of rivers) and related health issues, soil erosion, and poverty or indebtedness of a local population dependent on natural resources.

With respect to the relevant issues, the role of ecosystem services needs to be understood, including trade-offs between different ecosystem services as well as differences between stakeholder groups. It is worth noting that the process of defining the relevant issues and the role of ecosystem services can serve an important purpose in its own right. It provides a forum or platform for stakeholders to learn about, discuss and negotiate the socio-economic and biophysical conditions within which they operate, and which they seek to change.

4.2. Step 2: Understanding how stakeholders relate to ecosystem services

The framework envisages three basic categories of stakeholders. *"ES providers"* conserve biodiversity, manage ecosystems, or otherwise contribute to ecosystem services provision. *"ES beneficiaries"* use or depend in some way on ecosystem services, and have a direct or indirect interest in their provision. *"ES degraders"* engage in activities which damage ecosystem services or otherwise have a negative impact on their provision.

It is perhaps self-evident that, although in many cases ES providers, -beneficiaries and -degraders may be spatially and temporally separated, these categories are in no way mutually exclusive. An actor may simultaneously be a member of one, two or all of these groups. Consider for example a farmer in a watershed area who depends on insect pollination and pest control services (i.e. is a beneficiary), conserves the natural forest on part of his land and grows valuable crops (thus being a provider), and at the same time clears primary forest on another piece of his land and allows agrochemical runoff to drain untreated into a nearby river (making him a degrader). A management practice might be considered as degrading in one context and as providing in another, depending on biophysical causalities and on how the rights to use and manage natural resources are distributed in society. For example, rewetting a drained peat land can be seen as avoiding carbon release or as reducing soil fertility for agriculture.

This step of the assessment process seeks to understand, map, and describe the relationships between people and ecosystem services, and between different stakeholders. The classification of an actor as beneficiary, provider or degrader varies according to the services looked at and to the institutional, legal and cultural context. Hence, the reference points and the distribution of rights and obligations can be discussed based on the classification of actors.

4.3. Step 3: Recognizing gaps and imbalances

Imbalances between 'who bears costs of ecosystem maintenance' and 'who reaps the benefits from ecosystem services' are very often the cause of ecosystem threats. An imbalance can also occur when some actor degrades ecosystems and others suffer from the resulting loss of services. Moreover, actors can have an interest in additional provision of ecosystem services, thus opening a gap between current provision and potential demand. Within this framework, gaps and imbalances are regarded as entry points for improving the situation. Step 3 seeks to uncover gaps and imbalances, structured along the three types of relations between stakeholders and ecosystem services that were laid out in the previous step. The framework first analyses which ES providers bear costs for ecosystem stewardship that they do not recover. Examples are the bearer of the costs of protected area management, but also local communities or individuals who face costs of ecosystem management or maintenance (e.g., fire prevention measures for community forests, monitoring of sustainable fisheries, etc.), or bear opportunity costs by refraining from more profitable activity on a piece of land providing ecosystem services (e.g., timber felling, cattle grazing, mono-crop farming, or resource extraction such as mining). With respect to ES beneficiaries, the relevant questions are: who receives benefits for free, and who is interested in more ES provision. For instance, the industrial sector may be interested in a stable flow of clean water, hydropower companies benefit from sediment reduction, and tourists enjoy the beauty of the natural landscape. Finally, the framework asks whether any ES degraders are not held liable for the harm they are causing. Whereas most jurisdictions already regulate the use of pesticides or the impacts on water quality, harm to other ES is often not captured by legal obligations. Such harm could include changes to the hydrology (water provision and regulation), the micro-climate, carbon sequestration, but also to aesthetic or spiritual values of the natural environment.

4.4. Step 4: Identifying ecosystem service opportunities

This step identifies the niches or potential to stimulate behavioural change that can address the problem or management issue. The framework presents four categories of ecosystem service opportunities (ESO). Three categories are linked directly to the types of relationship

between stakeholders and ecosystem services (i.e., provider, beneficiary, degrader) and apply the general economic principles of "steward earns", "beneficiary pays", and "polluter pays". A fourth category builds on people's innovation capacity to generate additional potential for benefitting from ecosystem services.

> ***Def.:*** **Ecosystem service opportunities** arise when biodiversity can be conserved and local livelihood improved by
>
> - **addressing imbalances in the costs of and benefits from conservation**
> - rewarding those who conserve nature in line with the benefits they generate and the costs they incur,
> - asking those who benefit from nature to contribute to the costs of conservation in line with the level of benefits they enjoy,
> - making sure that those who degrade, deplete or destroy nature are held liable for the damages they cause.
> - **tapping into innovative "business" opportunities** through which local communities may benefit from the conservation and sustainable use of biodiversity and ecosystem services.

The *"Steward Earns Principle"* invokes rewarding ES providers or compensating them for the costs they incur for providing ecosystem services. For example, landholders in the buffer zone of a protected area could refrain from certain land use practices in order to maintain natural habitat for endangered species, or they could assist in tree planting, patrolling and fire management activities. Both, in case of direct management costs and opportunity costs, financing or rewarding conservation actions can motivate ES providers to maintain or even enhance ES provision.

In accordance with the *"Beneficiary Pays Principle"*, imbalances can be addressed when actors who derive benefits from ecosystem services, or even generate commercial profit, are asked to contribute to covering the costs of conservation. Examples include a beer or water bottling company that relies on a stable flow of clean water from a well-managed watershed, users of coastal infrastructure and settlements that are protected from storm damage by coral reefs and mangroves, or hikers and mountaineers who enjoy the facilities of a scenic national park. In these cases, the opportunity that can be seized is to demand some form of (monetary or non-monetary) payment for the benefits they derive from ES, or a contribution to the costs of their maintenance. Moreover, beneficiaries may be willing to pay or otherwise contribute if they have an interest in increasing the provision of certain ecosystem services beyond the status quo.

According to the *"Polluter Pays Principle"*, ES degraders should be held liable and asked to compensate for the harm ("negative externalities") that they are causing, or to stop their harmful activities. Examples include penalizing the pollution of a river that others use for fishing or extracting drinking water, or creating liability schemes for a sand mining company that causes erosion and downstream siltation. The opportunity that can be seized is usually linked both to ensuring that sufficient funds are generated to remediate or mitigate the effects of such damage and to discouraging actors from causing negative impacts in the first place.

The last category of ecosystem service opportunities is based on what we label *"Innovation Principle"*. It comprises untapped business opportunities based on ecosystem services, and possibilities to access or create new markets and value-adding possibilities. The aim is to find novel and innovative ways to enhance the benefits for people while at the same time preserving biodiversity. Various types of green markets and green products are gaining importance and are being used across the world as a means of adding monetary value to conservation efforts, ranging from more "traditional" products such as ecotourism or organic foodstuffs to non-traditional markets in forest carbon, biodiversity offsets or forest bonds. The innovation principle can also focus on enhancing the efficiency, scope, or participation of existing eco-markets and business opportunities – for example developing REDD as a form of carbon financing that explicitly benefits local communities and protected areas, providing the credit or training that is required to enable protected area residents to invest in developing ecotourism facilities and services, or negotiating premium prices and purchasers for products that are sustainably produced.

4.5. Step 5: Checking the appropriateness to pursue an ecosystem service opportunity

In this step the framework undertakes to critically reflect on the appropriateness of the identified ESOs according to contextual considerations that often lie outside the domain of economics. Obviously not every opportunity that can be identified theoretically from a purely economic perspective will be desirable and appropriate in practice and can be operationalised under existing conditions and endowments. Our experience in applying the framework has shown that inappropriate or infeasible opportunities (e.g., asking to pay for clean air, rewarding for obeying the law, selling access to sacred places, etc.) will not be considered as opportunities in Step 3 and Step 4 in the first place. Nevertheless, the following questions

serve as an additional safeguard, and they can also help to identify additional conditions or areas of support that are required for a successful implementation of an opportunity.[2]

- Will this opportunity generate net livelihood benefits for those concerned, in both qualitative and quantitative terms? Are there no (undesired) side effects for other groups? (see Sections 3.1, 3.2, 3.3, 3.5)
- Are possible sources of opposition understood and can they be dealt with? (see 3.3, 3.4, 3.5, 3.7)
- Can this opportunity be expected to have desirable ecological consequences, considering all relevant aspects of biodiversity and ecosystem services? (see 3.5, 3.6)
- Is this opportunity compatible with the legal and institutional setting? (see 3.4, 3.6)
- Is this opportunity appropriate according to ethical considerations and within the socio-cultural setting? (see 3.3, 3.4, 3.7)
- Is there a risk to undermine existing motivations to preserve nature (e.g., informal community rules regulating resource use, traditional ways of appreciating nature), and if so, is this risk understood and considered? (see 3.8)

4.6. Step 6: Pre-selecting suitable economic instruments

Finally, this step of the assessment process within the framework guides the pre-selection of instrument options. Policy instruments can be classified along various dimensions (see e.g., Schröter-Schlaack and Ring 2011, Collins and Scoccimarro 2008, UNEP 2009, Chambers and Toth 2005, Klenke et al 2011, Pirard 2012). Here, we systemise them according to their congruence with the four economic principles discussed above, thereby providing a direct correspondence between ecosystem service opportunities and potentially suitable instruments (see Table 1). In practice, policies will often combine several components, frequently from more than one category. For instance, PES schemes usually involve the channelling of contributions from beneficiaries (e.g., within a fund) and a payment scheme for providers of ecosystem services.

We note again that the assessment framework merely leads to a pre-selection of potentially suitable instruments. Proposing a specific design and conducting a fine grain feasibility analysis will be subsequent steps on the way towards actual implementation of an instrument (see also Rode and Wittmer 2014).

[2] This step does of course not replace a more detailed feasibility analysis once a specific policy or management instrument has been selected.

Table 1: Classification of common policy instruments along economic principles

Steward earns / Provider gets	Beneficiary pays	Polluter pays	Innovation
Payments for Ecosystem Services (PES) (provider side)	PES (beneficiary side)	Legal liabilities, fines	Certification, eco-labelling
Tax reliefs, green subsidies	Conservation Funds	(Pigouvian) taxes, fees	Ecological products
Stewardship payments, conservation easements	Charges, fees	Performance bonds	Bio-prospecting agreements
REDD+, carbon sequestration payments	Taxes	Voluntary environmental agreements	Eco-tourism activities
Insurance schemes	Corporate sponsorship	Offsetting schemes, habitat banking	Green credits/ loans
Debt-for-nature-swaps		Tradable permits (markets); auctions	Green microcredits
Ecological fiscal transfers			Green investments

4.7. Examples of applications of the framework

We present as examples the assessments in two of the three pilot sites of the ECO-BEST project in Thailand. The table in the Annex summarizes the respective outcomes of the six steps.

In Bu Phram subdistrict (Prachin Buri province) the main objective was to improve the ecological condition of the wildlife corridor along Highway 304 that separates Khao Yai and Thap Lan National Parks in order to ensure connectivity of the Dong Phayayen-Khao Yai Forest Complex (UNESCO Natural World Heritage Site). Due to the unclear land tenure situation and the lack of trust and collaboration between park management and local communities, the assessment identified the need for a co-management and development plan. This would serve as an umbrella agreement and legal basis, within which more specific instruments and benefit sharing schemes could be developed, including new markets and certification schemes for local and organic products (e.g. based on native Lan palm leaves handicraft), financial and other support for farmers who restore grassland and let native tree species grow back, and corporate sponsorship schemes from downstream industry.

In Pang Ma-o village in the upper Ping watershed (Chang Mai province), intact highland forest ecosystems are threatened, mainly by conversion from traditional agro-forestry tea production to monocultures, constructions of resorts and private mansions, and the difficulties to continue effective community forest management. Indebtedness of villagers due to past investments in wrong seeds increases economic pressures and thereby the tendency to convert or sell forest land. The assessment identified a “debt-for-nature swap”-scheme as promising, in which the agricultural bank would relieve the debt or otherwise support agro-forestry or

conservation measures. Beyond that, certification of agro-forestry tea and coffee could create additional benefits based on ecosystem maintenance, and ecosystem services beneficiaries (downstream agriculture and industry, rich owners of newly-built residential houses) could support community forest management.

5. Concluding remarks

Conservation policy and the academic debate on this topic have - during the last 25 years - witnessed a paradigm shift with high hopes that applying economic instruments can enhance biodiversity conservation and local livelihood. So far however, this potential remains contested and true success stories are rare. One hindrance to capturing the potentials may be the lack of accessible and practical guidance for practitioners to transcribe the ideas into a specific context. This article addresses the need for practical guidance by outlining key aspects for practitioners to take into account when considering economic instruments, and by presenting a framework that helps them identify entry points for action and select suitable economic instruments. This perception on an "economic approach" goes beyond merely demonstrating societal benefits from ecosystem services with ecosystem service valuation, but rather identifies opportunities to change behaviour of the actors involved so as to successfully and verifiably enhance biodiversity and ecosystem service benefits.

The primary scope for an assessment of ecosystem service opportunities is at the local level. But evidently many measures for improving the status of biodiversity and local livelihood cannot be enacted solely at the micro scale, since revenue streams would have to come from the national or even international level, because suitable policy instruments fall into the responsibility of national or provincial jurisdiction, or due to the need to enable local-level innovations via higher-level legal changes or institutional reforms. We see two possible ways in which the framework can also be useful for analyses at higher policy levels. First, local assessments and successful initiatives may serve as "good practice" examples that help broaden the debate on how society wants to manage its natural resources and help provide a momentum for a wider sustainability transition. For example, if sufficient local initiatives can adequately monitor and ensure forest conservation or reforestation, institutions at the national level may apply for REDD payment schemes internationally. Secondly, similar lines of reasoning proposed by the framework presented may be applied at all levels. We are therefore convinced that 'ecosystem service opportunity thinking' can also help to stimulate a transformation within the broader policy debate. This may be a complementary strategy to the

current national focus on valuing ecosystem services for raising general awareness and including ecosystem service values into accounting systems.

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Annex: Two examples of application of the framework (at ECO-BEST pilot sites)

Example 1: Bu Phram subdistrict (Prachin Buri province, Thailand)				
Step 1: Clarifying relevant issues and the role of ES	Issues: Insufficient wildlife corridor between Khao Yai and Thap Lan National Parks due to utilized land surrounding Highway # 304 (both NPs part of UNESCO World Heritage Site); on Thap Lan NP side, communities feel insecure due to lack of official land ownership titles; general lack of cooperation between communities and NP management; illegal harvesting of endemic Lan palm leaves in the forest Ecosystem services: Provision of agricultural products, erosion prevention, forest services (CO2 sequestration, species habitat incl. protected Lan palm tree, NTFP, water regulation); water provision and fisheries Trade-offs: higher and stable income from agricultural food production (using chemical fertilizer) vs. species habitat, erosion prevention, soil degradation; infrastructure development (roads, resorts, shopping mall) vs. wildlife corridor improvement			
Step 2: Understanding how stakeholders relate to ES	Villagers: *ES providers:* those farmers who let palm trees or other trees grow on their land or practice organic (pesticide-free) cultivation; *ES beneficiaries*: all villagers using food, water, Lan palm tree, NTFP and benefiting from micro-climate and water regulation; *ES degraders*: Tapioca and eucalyptus mono crop farmers who use excessive pesticides, sellers of products based on illegal forest use (palm leaf products, tree stump carvings, sugarcane planters); illegal wildlife hunters/traders Thap Lan NP management: *ES providers:* wildlife and forest management Local conservation NGOs: *ES providers*: wildlife conservation Community professional organizations: *ES beneficiaries*: harvesting of palm trees, herbs, rubber Private Sector: *ES providers*: petrol company with financial contributions (CSR activities), *ES beneficiaries*: Tourism agencies, restaurants, resorts, hotels benefit from scenery; Lan leave handicrafts enterprises, local drinking water producers, „Kabinburi 304" industry downstream benefits from water provision and recruits labor force; *ES degraders*: waste water pollution and land conversion by resort development and cows breeders. Tourists and users of highway 304: *ES beneficiaries*: wildlife watching, nature trails, scenery; *ES degraders*: road kill due to speeding, and littering along the road. Govt. administration (national and provincial): *ES beneficiaries*: Irrigation, tourism National and global citizens: *ES beneficiaries*: biodiversity heritage conservation			
Step 3: Recognizing gaps and imbalances	Unrecovered costs of ES provision or potential costs for more ES provision: • Maintenance of biodiversity on agricultural land is higher effort (harvesting that protects	Unpaid ES benefits or interest in more ES provision: • Tourism and shop operators benefit from scenery but do not financially support conservation;	Uncompensated ES degradation: • Tapioca and eucalyptus farmers are not held liable for impact on biodiversity, soil, water;	

	trees, less pesticides), • Farmers on Thap Lan side fear that leaving natural vegetation recover will increases risk that they lose land use rights • Local authorities and communities may have to give up (part of) infrastructure development	• Community association for Lan palm handicraft does not contribute to recovering of the palm; • "Verona resort" owner has prime location between two NPs and has not contributed to costs; has an interest in solving conflicts between NP and communities; • Downstream industries do not contribute to improve the living conditions of their labor force; • Conservationists are interested in keeping UNESCO WHS status but provide little support.	• Illegal forest users and poachers are rarely caught and punished; • Verona resort is not held liable for impacts of waste water, exotic species introduction,(e.g. horticultures and cows). • Speeding on highway 304 that leads to animal road kills is monitored, but rarely punished.	
Step 4: Identifying ES opportunities	"Stewards earns" opportunities: • Farmers could be rewarded (payments, honor certificates, technical assistance, etc.) for organic and wildlife-friendly agriculture and native tree restoration; • Farmers on Thap Lan side could receive security that native vegetation recovery will not lead to loss of land use rights; • Local authorities could be supported in their efforts towards sust. dev. by provincial and national authorities; • NP management could receive additional funds for restoration via benefit-sharing scheme.	„Beneficiary pays" opportunities: • Local tourism and shopping operators could contribute to grassland and palm tree restoration; • Community organization for Lan palm production could support sustainable harvesting on productive land and enforce non-use of Lan trees in forest; • "Verona resort" owner could contribute financially, with land donation (on Khao Yai side), and promote "sustainable business" in the area; • Local drinking water producers could contribute financially. • National and international conservation organizations	"Polluter pays" opportunities: • "Verona resort" owner could be asked to reduce and/or compensate for his impacts (e.g., run-off from stables) • Speeding on highway 304 and road kills could be pursued and punished.	Innovation opportunities: • Ecological product certification; new markets for sustainable Lan products • Nature-based tourism (wildlife watching, bike tours, homestays, etc.) • Educational activities (wildlife, Lan education center)

		could provide funds.		
Step 5: Checking the appropriateness to pursue the ES opportunity	Unclear, but potentially YES: on Thap Lan side it is currently difficult to pay people who do not officially have ownership land title; those farmers most inclined to ecological agriculture are the "newcomers" whose land use tenure is least secured.	YES in general, but acceptability needs to be checked for each group of beneficiaries separately	NO, with legal situation little chance to hold "Verona owner" liable via the Environmental Quality Promotion Act 1992, it is more promising to win him as an ally for partnership in green tourism etc.; Punishment for speeding subject to police, (collaborations with NP authority perhaps in far future)	YES, but requires trust in authorities by the farmers (rights to use land), investment and technical support on certification or label development and operation, and wildlife based tourism management.
Step 6: Pre-selecting suitable economic instruments	Due to the overlapping land use rights situation, an umbrella agreement between NP authorities and the communities is needed. A co-management and development plan as legal basis seems feasible under the National Park law Act, Article 19. This agreement can include and facilitate • official limited right to harvest lan palm leaves on farm land • zoning and mapping of land use for conservation purposes • support for development and benefit sharing scheme • new markets for local and organic products (e.g. ,organic rice, Lan palm products), ecological tourism activities (wildlife watching, waterfall tours, biking, homestays, etc.) and educational activities; • certification scheme (eco-labelling) and selling local products in the shopping complex; • incentives for sustainable land use (according to zoning - e.g., grass land for conservation management, mixed cropping, etc.) in form of money, green credits, access to loans, agric. assistance, insurance scheme for damage from wildlife • corporate sponsorship schemes (CSR) with "Kabinburi 304" industry downstream • fines for speeding and wildlife road kills (later stage, subject to police and national park authorities)			
Example 2: Pang Ma-o village in highlands of upper Ping watershed area (Chang Mai province, Thailand)				
Step 1: Clarifying relevant issues and the role of ES	Issues: Intact highland forest ecosystems are threatened by conversion from traditional agro-forestry tea production to monocultures and new constructions; community forest needs continuous management and protection from outside intrusion; indebtedness of villagers with agro-bank due to investment in wrong seeds Ecosystem services: Agricultural production (in particular coffee, tea, and traditional chewing tea leaves), NTFP (medicinal plants, mushrooms, etc.), water-regulation (less drought), erosion prevention, micro-climate regulation, CO2 sequestration, species habitat (endangered turtles, plants), clean air, aesthetic values of natural landscape			

	Trade-offs: Higher income from agricultural production vs. other forest ES; income from tourism via hotel construction vs. forest preservation; efforts to manage community forest vs. time for economic activities			
Step 2: Understanding how stakeholders relate to ES	Villagers: *ES providers:* those farmers who maintain forest ecosystem intact with traditional agro-forestry; those villagers who contribute to community forest management (fire prevention, patrolling), *ES beneficiaries*: agricultural products, NTFP (incl. medicinal plants), clean air, water regulation, erosion prevention; *ES degraders*: those farmers who convert from agro-forestry to mono-cropping or sell land to outsiders for construction Downstream communities, tea plantations, industry: *ES beneficiaries*: water regulation, space for cultivation, micro-climate regulation Businessmen from outside: *ES beneficiaries*: aesthetic value, clean air, tourism income; *ES degraders*: construction of houses and hotels. Tourists: *ES beneficiaries*: aesthetic value, educational value, clean air; *ES degraders*: solid waste. National & global citizens: *ES beneficiaries*: species conservation, CO2 sequestration, medicinal plants Govt. departments (province, national): *ES beneficiaries*: forest department: forest preservation and management, health department: medical plants and high health status of the population Agricultural bank: *ES degraders* (indirectly): financing of conversion to mono-cropping, putting financial pressure on indebted villagers			
Step 3: Recognizing gaps and imbalances	Unrecovered costs of ES provision or potential costs for more ES provision: • Market for traditional chewing tea from agro-forestry is stable, but mono-cropping possibly more profitable for villagers (indebtedness increases economic pressure) • Community forest management is costly (time and effort)	Unpaid ES benefits or interest in more ES provision: • Downstream villagers, towns, and business (tea plantation owners, agriculturists, and food and tourism industry) do not contribute to ecosystem maintenance.	Uncompensated ES degradation: • Farmers and businessmen who change forest cover for mono-cropping or construction are not held liable; • agro-bank is not compensating for indirect pressure on ecosystems	
Step 4: Identifying ES opportunities	"Stewards earns" opportunities: • Payments or other support (e.g., debt release) to agro-forestry farmers for ecosystem maintenance and/or tree-	„Beneficiary pays" opportunities: • Downstream beneficiaries, owners of new houses and hotels could contribute to forest maintenance	"Polluter pays" opportunities: • Farmers and businessmen who construct houses could compensate for induced loss of forest;	Innovation opportunities: • Certification scheme for agro-forestry products (access to eco-markets); • Nature-based tourism

	planting • Compensation for community forest management	• Govt. agencies (e.g, Forestry Dept.) and NGOs with health or conservation mandate could contribute	• agro-bank could refrain from financing mono-cropping and reduce debt to alleviate economic pressures	• Educational activities
Step 5: Checking the appropriateness to pursue ES opportunities	• YES, but cautiously, so that payments do not undermine intrinsic motivations to protect forest ecosystem (high appreciation)	• YES in general, but acceptability needs to be checked for each group of beneficiaries separately	• NO for farmers and businessmen, since not realistic to change liabilities for activities on private land; • YES for agro-bank (voluntary)	• YES, but required technical support on certification development and operation, eco-tourism and education to the villagers.
Step 6: Pre-selecting suitable economic instruments	• Debt-for-Nature swap: the bank agrees to relieve the debt of villagers, if they commit to conservation measures (community forest management, turtle protection, agro-forestry); either as a CSR activity or (preferably) as a business model • PES scheme for hydrological services with payments from down-stream beneficiaries for community forest management. • New markets for agro-forestry products (green tea, coffee) could create additional benefits • Certification scheme, joining existing schemes or as a co-operation with other villages for contracting with a processing company • Nature-based tourism and educational activities to study turtles, medicinal plants, agro-forestry management • Conservation rewards for turtle protection or protection of medicinal plants, paid for e.g., by govt. agencies, business, or NGOs			