

'Ecosystem service opportunities': A practice-oriented framework for identifying economic instruments to enhance biodiversity and human livelihoods



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ABSTRACT

Economic instruments that promise “win-win” solutions for both biodiversity conservation and human livelihoods have become increasingly popular over recent years. There however remains a gap in terms of practical and policy-relevant guidance about appropriate approaches that take into account the local needs and the specific cultural, legal, and ecological context in which such instruments are being developed and applied. This paper presents a step-by-step framework that helps conservation and development planners and practitioners to identify economic instruments that can promote pro-conservation behaviour in a specific setting. The concept of ‘ecosystem service opportunities’ builds on, and brings together, general economic principles and an ecosystem services perspective. The framework was designed to also address a number of concerns regarding economic approaches in order to help practitioners recognise the potentials and limits of economic approaches to nature conservation. The framework is illustrated by its application within the realm of a biodiversity conservation project in Thailand.

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1. Introduction

The last decades have witnessed the increasing integration of economic tools and approaches into nature conservation efforts (De Groot, Alkemade, Braat, Hein, & Willemen, 2010; Mace, 2014). At the level of international policy, this development can be traced back to an explicit concern about economic incentives and financing mechanisms within the UN Conference on Environment and Development of 1992, and the “Rio Conventions” that came out of it (see e.g. OECD, 1996). More recently, via 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 & IEEP, 2012). The demand from international policy together with publications showcasing successful implementation of economic instruments (e.g., TEEB, 2010, 2011) have created high expectations that economic concepts and policy instruments can help improve the status of biodiversity and ecosystems and combine positive

conservation outcomes with enhanced economic and social prosperity (Balmford et al., 2002).

A large amount of academic research has been carried out on economic instruments for nature conservation. Taxes or subsidies to steer behaviour and reduce negative external effects have a long history in environmental policy research (Pigou, 1920). Many other economic instruments to create economic incentives and pricing mechanisms that stimulate the protection of biodiversity and enhance the provision of ecosystem services have been studied (e.g., conservation easements, resource use fees, tradable permits, offsetting schemes) (Pirard, 2012; Schröter-Schlaack & Ring, 2011). An important impetus for economic approaches to nature conservation was achieved via the “ecosystem services-human wellbeing” nexus (Boyd & Banzhaf, 2007; De Groot, Wilson, & Boumans, 2002; Fisher et al., 2008) that was made popular by the Millennium Ecosystem Assessment (MA, 2005). The TEEB (2010) initiative showcased and promoted a broad range of economic instruments for ‘capturing’ the value of biodiversity and ecosystem services. Payments for ecosystem services (PES) are a particularly prominent instrument for protecting biodiversity and ecosystem services (Schomers & Matzdorf, 2013; Wunder, Engel, & Pagiola, 2008).

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And yet, at practical policy and management levels, the call for more economic instruments for the conservation of ecosystems and biodiversity has resulted in some confusion. Conservation and development planners often struggle to understand whether and how such instruments can be used to tackle environmental degradation and to improve the effectiveness, equity and sustainability of conservation efforts, and the terminology surrounding them is frequently misunderstood. One particular common example from our experience is the way in which the process of economic valuation and the use of economic policy instruments are often conflated. Concerning instruments, an increasing body of reviews (e.g., Pattanayak, Wunder, & Ferraro, 2010; Samii, Lisiecki, Kulkarni, Paler, & Chavis, 2014) and guidance documents (e.g., Greiber, 2009; Morrison & Aubrey, 2010) have emerged for the design of PES schemes. Yet, although PES schemes can take many forms (Jack, Kousky, & Sims, 2008), they do not cover the full range of economic instruments and are not always feasible or the most appropriate approach. Broader categorizations of instruments are available in academic contributions, but they are less frequently targeted at practitioners. In addition, practitioners lack guidance for taking account of the concerns and limitations discussed in the academic debate. Academic scholars have argued against an overconfidence in “win-win” solutions and PES as panacea (Muradian et al., 2013). Some raise concerns due to the multiple and complex conditions for economic instruments to actually work in specific socio-cultural and legal contexts (Lockie, 2013; Vatn, 2010; Van Hecken, Bastiaensen, & Huybrechs, 2015), others even doubt their general (long-term) effectiveness for nature conservation (Büscher, 2012; McCauley, 2006; Redford & Adams, 2009; Spash, 2008). Yet the academic debates often use framings that are too general, formats too complex, and language too academic, all of which render the resulting advice inaccessible to practitioners working on implementation efforts “on the ground”. These reasons may partly explain why the integration of ecosystem service values into real-world decision making has not so far lived up to expectations (Daily et al., 2009; Rodríguez-Labajos & Martínez-Alier, 2012).

This paper addresses the need for more practical guidance for practitioners who seek to tap into the potential of economic instruments to enhance biodiversity and ecosystem services, at the same time as improving human livelihoods. It presents a step-by-step assessment framework with which to identify how (and which) economic instruments can be useful for enhancing conservation and development goals in a specific context. The framework starts the screening for opportunities rather broadly, in particular not initially restricting the instrument selection to payments for ecosystem services (PES).

‘Ecosystem service opportunities’ (ESO) build on an ecosystem service perspective and general economic principles for recognising how economic instruments can influence incentives and motivate actors to safeguard ecosystems. The opportunities are based on filling gaps and equalising imbalances between the groups which pay for the provision of ecosystem services and those which benefit from them, and on capturing untapped business opportunities based on ecosystem services. ESO are the entry points for choosing suitable economic instruments that modify people’s incentives and motivate them to act more sustainably and to safeguard ecosystems. This paper illustrates the application of the assessment framework with an example drawn from a conservation project in Thailand. The framework was designed to address a number of concerns regarding economic approaches. The discussion section of this paper highlights these and other key aspects that have been articulated in the academic debate and need to be conveyed to practitioners.

The paper accompanies a comprehensive guideline document for practitioners (Rode & Wittmer, 2015). While the guidelines are written in language accessible to practitioners and provide illus-

trative examples as well as templates to support application, the current paper is targeted at the academic community. It seeks to clarify the theoretical basis of the framework, and place it in the context of the current academic debate. It also aims to raise interest of conservation practitioners to apply the framework in the field.

2. Method

2.1. Origin and scope of the assessment framework

The assessment framework was developed within the EU funded project ‘Enhancing the Economics of Biodiversity and Ecosystem Services in Thailand’ (ECO-BEST). It was constructed by distilling lessons from our experience as academic partners and advisors who provide guidance regarding the use of economics for conservation and development policy and management, and by extracting the essence of the academic debates. A crucial step in the effort to develop such a framework was to determine critical aspects which should be conveyed to practitioners regarding the use of economic instruments. These aspects are described in the discussion section of the paper.

The framework can be applied either when there is a clear intention to implement economic instruments (as in the ECO-BEST project), or as a scoping exercise for understanding the extent to which (additional) economic instruments could be useful in a particular setting. In this case the results may serve as basis for a funding proposal to enable a design and implementation process. In other instances, practitioners may already have a specific instrument in mind. In that case it might be useful to confirm or complement the initial ideas with the help of this assessment framework. Although the framework guides users through the assessment process along a sequence of tasks, the complexity involved in real-world settings will require a certain degree of interpretation and synthesizing. Ideally, the questions raised in the different tasks are answered together with stakeholders as part of an inclusive process for identifying opportunities to use economic instruments at local level. The accompanying guidelines for practitioners (Rode & Wittmer, 2015) provide more detailed explanation and support tools for working through the framework and for addressing practical challenges such as communication and stakeholder engagement.

2.2. The assessment framework

The assessment framework consists of a sequence of tasks that provide the structure for identifying the ‘ecosystem service opportunities’ in a specific local context (tasks 1–5) and for screening adequate economic instruments that can motivate actors to engage in more sustainable practices and nature conservation (task 6). Fig. 1 summarizes the six tasks and contains the questions to be addressed within each task. The following subsections explain the content of the tasks and provide general examples. The results section presents an example of application. It also shows how the results of the different tasks can be structured within a single template (Table 2).

2.2.1. Task 1: analysing how ecosystem services relate to the management issues

The first task is to clarify which issues or questions are of primary concern to stakeholders and to understand how they are linked to ecosystem services. Conservation managers (and stakeholders) could be interested, for instance, in decreasing or halting over-exploitation of resources (fish, timber, non-timber forest products (NTFP), etc.), mitigating current problems with water regulation and provision (floods or droughts), decreasing habitat loss or improving habitat connectivity, supporting sustainable agricultural

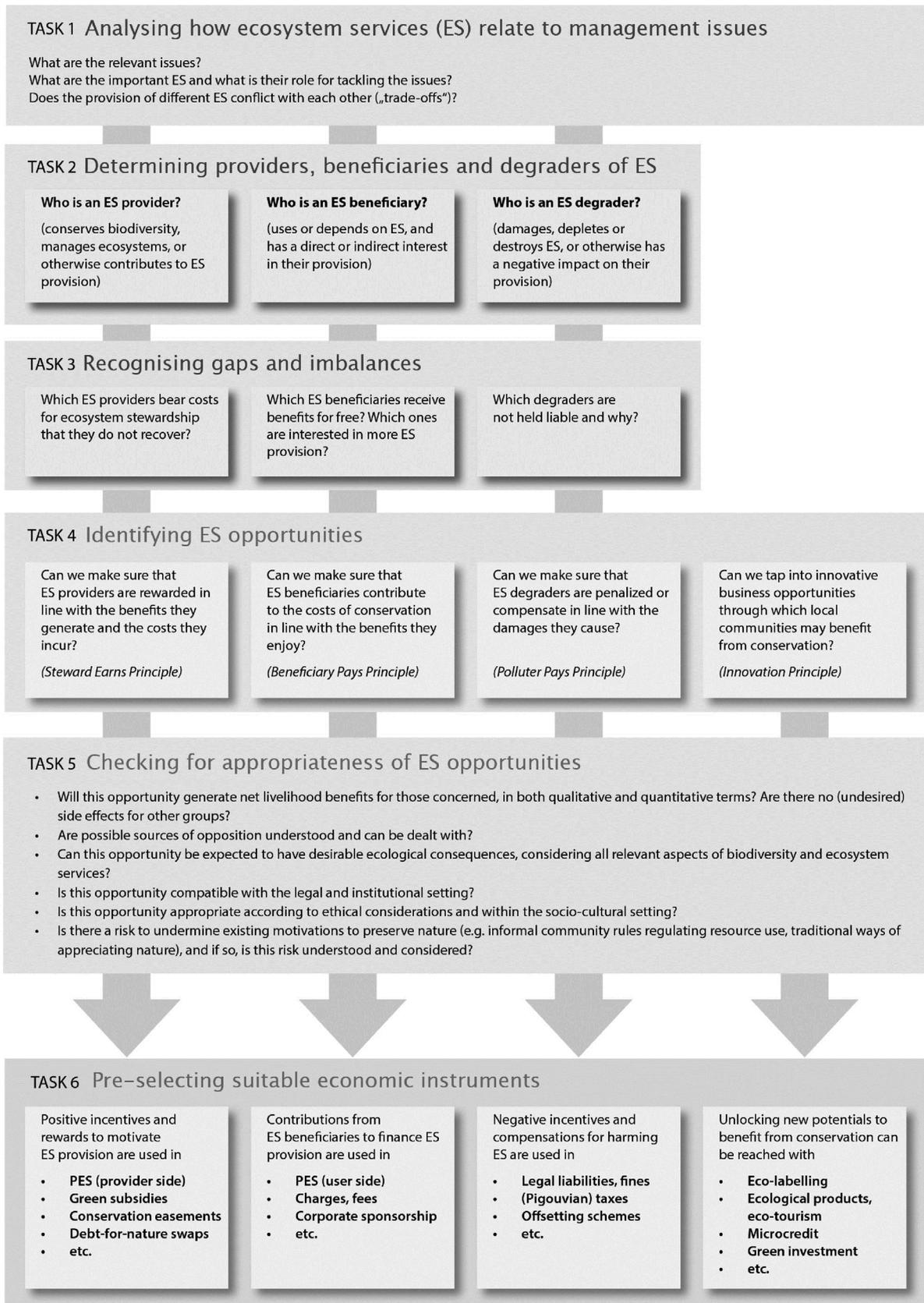


Fig. 1. The framework for identifying opportunities to use economic instruments.

practices, or reducing pollution and its health impacts. At the same time, important ecosystem services provided by nature in the area should be assessed and related to the issues at stake. The common categorization (see e.g., CICES, 2015; MA, 2005; TEEB, 2011) as provisioning (such as food, water and raw materials), regulating (such as maintaining the quality of air and soil, stabilising the climate, providing flood and disease control, or pollinating crops), cultural (from recreation to spiritual inspiration and mental health), and supporting services (such as providing habitat) can be useful. In discussion with stakeholders, however, we recommend starting with the broad question of why local nature and ecosystems are important and to whom, and then to narrow down and prioritise the aspects that seem particularly relevant, using culturally meaningful terms. To understand the relevance of different ecosystem services in the local context, it is important to understand trade-offs in the provision of different services, as well as synergies. A typical trade-off occurs when an increase in food provision through intensive agriculture means a decrease in biodiversity and the provision of other services (e.g. pollination or soil protection). The process of defining the relevant issues and the role of ecosystem services can serve as a forum for stakeholders to learn about, discuss and negotiate the socio-economic and biophysical conditions within which they operate, and which they seek to change.

2.2.2. Task 2: determining providers, beneficiaries and degraders of ecosystem services at stake

This task seeks to understand, map, and describe the relationships between people and ecosystem services. It aims to assess how stakeholders relate to or interact with the relevant ecosystem services, according to three types of role. *ES providers* are actors who manage ecosystems or otherwise contribute to ES provision, e.g. farmers, foresters, or wetland managers. Although clearly nature is the primary provider of ecosystem services, the ability of an ecosystem to generate important services depends to a large extent on how that ecosystem is managed, and whether it is actively protected from degradation. In some cases, it is not only important to identify current ES providers, but one should also consider possible future providers, including those who have been providers in the past and could take this role again. *ES beneficiaries* are those who benefit from ecosystem services in some way and therefore have a direct or indirect interest in their provision, or even crucially depend on them for their livelihoods. Benefits can occur locally, for instance when the local population benefits from clean water, NTFPs, erosion prevention, or the view of a beautiful landscape. They can also occur further away (e.g. a downstream municipality benefiting from flood prevention, or a company benefiting from clean and stable water flow) and may be felt on a national or global scale (e.g. natural heritage, carbon sequestration) or by future generations. *ES degraders* damage ecosystem services or otherwise have a negative impact on their provision. ES degradation can be caused by chemical pollution or extractive activities such as mining, but also by overuse of resources such as fish or timber.

Although in many cases ES providers, – beneficiaries and – degraders are different (groups of) people, the same actor can simultaneously be a provider and a beneficiary or even a degrader of ecosystem services. For example, consider a farmer in a watershed area who depends on insect pollination and pest control services (and so is a beneficiary), conserves the natural forest on part of his land and grows crops (and so is a provider) while clearing primary forest on another piece of land and allowing agrochemical runoff to drain untreated into a nearby river (and so is a degrader). Similarly, the same management practice might be seen as degrading in one context and providing in another. For example, rewetting drained peat land could be seen positively as preventing carbon release or negatively as reducing soil fertility. The classification of an actor as

beneficiary, provider or degrader determines the reference based on which the distribution of rights and obligations can be discussed.

2.2.3. Task 3: assessing gaps in ecosystem service provision and imbalances in costs and benefits

This task uncovers gaps in ecosystem service provision and imbalances in costs and benefits of ecosystem service provision. By a gap in ecosystem services we mean that demand for an ecosystem service exceeds its current supply, i.e. at least one beneficiary is interested in greater provision than at present. Imbalances occur when one actor (or a group) pays for the provision of ecosystem services and others benefit from them without making any contribution. An imbalance can also occur when an actor degrades the ecosystem and others suffer as a result.

The framework first analyses *which ES providers bear the costs of ecosystem stewardship* by expending money or effort without any recompense. An obvious example is the financial cost of managing conservation areas such as national parks, but costs also occur outside formally protected areas. Local communities or individuals may pay for ecosystem management or maintenance (e.g. fire prevention measures for community forests, monitoring of sustainable fisheries, etc.). In addition, ecosystem conservation frequently requires people not to use a piece of land for profit and to forego benefits (in economic terms: 'opportunity costs'). Examples of profitable activities include timber felling, cattle grazing, mono-crop farming or resource extraction such as mining. In order to protect biodiversity and maintain ecosystem service provision, local landholders need to refrain from these or at least restrict them, for instance by having fewer livestock, using sustainable farming practices instead of mono-cropping. Such opportunity costs are equivalent to real costs for the local land user, because they mean the loss of potential income.

With respect to ES beneficiaries, the relevant questions are: *Which ES beneficiaries receive benefits for free, and which beneficiaries are interested in more ES provision?* For instance, a large and profitable brewery may obtain a stable flow of clean water for free, which in turn depends on sound farming practices or other aspects of good watershed management upstream. A famous hotel reaps large profits as a high-end tourist destination partly due to the scenic beauty of a national park area, but does not contribute towards the costs of park management. A pharmaceutical company engages in profitable bio-prospecting activities in a large tropical forest area (i.e. the discovery and commercialisation of new products based in biological resources), but does not participate in conservation efforts. Or, consider divers and snorkelers who enjoy the coral reefs of a coastal protected area, but do not pay for their management. All these examples are characterized by imbalances in the sense that beneficiaries receive benefits for free while providers bear the costs. A gap in the current provision of ecosystem services may arise, for instance, when a hydropower company wishes to reduce the sedimentation rate in the river, or farmers or residents near a river may wish to stabilise the water flow to reduce the risk of flood and drought. In these cases the ES beneficiaries may be interested in supporting efforts to increase their provision.

Finally: *Which ES degraders are not held liable for the harm they are causing and why?* Some impact on ecosystem services (in economic terms: 'negative externality') may already be regulated, such as the effect on water quality of pollution or pesticide use. Yet the degradation of many ecosystem services is still disregarded in law or in economic policies. Negative externalities which are ignored may include coastal erosion (e.g. by cutting down mangrove forests); river bank erosion; downstream sedimentation; changes in water regulation or micro-climate (e.g. when replacing agroforestry systems with monocultures); or a decrease in carbon sequestration (typically by deforestation). The harm to aesthetic or spiritual values (i.e. cultural ecosystem services) is equally often neglected. The

task is to understand and outline which negative impacts on ecosystem services are currently not formally or informally regulated. On that basis one can decide whether it is appropriate and feasible to hold ES degraders liable for the harm they are causing.

2.2.4. Task 4: identifying ecosystem service opportunities

This task identifies the opportunities to influence incentives and motivate actors to safeguard ecosystems. It distinguishes four broad types of opportunities, three of which directly link a specific stakeholder role (ES provider, ES beneficiary, ES degrader) to general economic principles, namely the principles of 'Steward Earns', 'Beneficiary Pays', and 'Polluter Pays'. A fourth type concerns 'Innovation', i.e., business opportunities based on ecosystem services, through which local communities may benefit from conservation.

The *Steward Earns principle* involves rewarding ES providers or compensating them for the costs they incur in providing ecosystem services. For example, landholders in the buffer zone of a protected area might refrain from certain land-use practices in order to maintain the natural habitat for endangered species, or assist in tree planting, patrolling and fire management activities. Financing or rewarding such conservation actions (whether direct management costs or opportunity costs) can motivate providers to maintain or even enhance ES provision.

In the *Beneficiary Pays principle*, actors who benefit or profit from ecosystem services are asked to contribute to the costs of conservation. Coming back to the previous examples, the beer or water bottling company may accept (or be obliged) to support watershed management efforts in order to maintain or improve a stable flow of clean water. Some form of payment (financial or other) for the benefits they derive from ecosystem services may be asked from users of coastal infrastructure and settlements that are protected from storm damage by coral reefs and mangrove forests, or from hikers and mountaineers who enjoy the facilities of a scenic national park. Moreover, beneficiaries may be willing to support an increased provision of ecosystem services useful to them.

In the *Polluter Pays principle*, ES degraders are held liable and asked to compensate for the damage ('negative externalities') that they cause, or to stop their harmful activities. Examples include penalising the pollution of a river that others use for fishing or for drinking water, or creating liability schemes for a sand-mining company that causes erosion and downstream siltation. This is an opportunity to generate funds to remedy or mitigate such damage, and to discourage actors from causing it in the first place. Many regional or national compensation requirements and liability regulations already apply this principle, mainly to corporate activities. But in the case of damage to ecosystem services there are still opportunities for new and better economic instruments.

The last category of ecosystem service opportunity is based on what we call the *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 new ways to enhance benefits to people while at the same time preserving biodiversity. Various types of green markets and green products are raising their profile throughout the world to add 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. Innovation can also focus on enhancing the efficiency and scope of existing eco-markets and business opportunities, or participation in them. Examples include: developing REDD+ as a form of carbon financing that explicitly benefits local communities and protected areas; providing necessary credit or training 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. Such business opportunities tend to need significant financial investment or capacity

support. This is a challenge when entrepreneurs are local communities without financial resources or business expertise, and economic and financial instruments can clearly play an important role.

2.2.5. Task 5: checking for appropriateness of ES opportunities

This task involves critical reflection on the appropriateness of the opportunities, also considering factors outside the domain of economics. Not every theoretical opportunity identified from an economic perspective will be appropriate in practice or achievable under existing conditions and endowments. The socio-cultural context, including what is considered an appropriate distribution of rights and obligations with respect to natural resources are critical at this point, but also ethical aspects need to be considered. The discussion section of this paper will come back to these aspects in more detail. The framework reminds practitioners that for different reasons it may not be appropriate to reward ES provision, to ask ES beneficiaries to contribute or ES degraders to compensate for damage. Similarly, not all innovative business opportunities are appropriate to pursue. Our experience in applying the framework has shown that inappropriate or unfeasible opportunities (such as asking people to pay for clean air, rewarding farmers for obeying the law, selling access to sacred places, etc.) will not be considered as opportunities in tasks 3 and 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:

- Will this opportunity generate net livelihood benefits for those concerned? Are there (undesired) side effects for other groups?
- Are possible sources of opposition understood and can they be dealt with?
- Is this opportunity likely to have desirable ecological consequences, considering all relevant aspects of biodiversity and ecosystem services?
- Is this opportunity compatible with the legal and institutional context?
- Is this opportunity appropriate according to ethical considerations and within the socio-cultural setting?
- Is there a risk of undermining existing conservation measures, e.g. informal community rules regulating resource use?

We recommend that these questions be discussed among a broader team, including through consultation with key stakeholders. Ultimately a decision needs to be made whether or not a particular opportunity is appropriate and worth pursuing.

2.2.6. Task 6: coming up with ideas for economic instruments

At this point, suitable economic instruments can be selected. Fig. 1 indicates congruence between the principles and potentially suitable instruments. Table 1 gives an overview of widely-used economic instruments that have been applied in biodiversity conservation and which stimulate local community involvement and benefit. The reference to the underlying principles helps to link instruments to the opportunities that were identified in task 4. It shows that economic instruments often combine several of the economic principles. For instance, PES schemes usually combine contributions from beneficiaries with an incentive mechanism for providers of ecosystem services, and there is often a fund to channel and redistribute the money. Developing and promoting an ecological product often requires securing of start-up financing.

It is important to keep in mind that new economic instruments are typically most effective in combination with existing ones and also with non-economic measures. Most of the time, there are several sustainability challenges within the same area, and a combination of instruments are more likely to address them successfully

Table 1
Classification of common policy instruments along economic principles.

Economic instrument	Steward Earns	Beneficiary Pays	Polluter Pays	Innovation	How it works
User fees & surcharges	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Imposes fees or charges for the use or consumption of goods, services or activities associated with the natural environment. These may be used to generate revenue, recover costs and/or manage demand. If the aim is to generate income, all or some of the fees are retained and reinvested in conservation (or channelled to fund the people who manage the land, resources or facilities for which charges are being made). Common examples of user fees include protected area entry fees; parking, waste disposal and sanitation fees, timber royalties; fishing, hunting and trophy fees; other resource-harvesting fees (firewood, medicinal herbs, wild plants, etc.); bioprospecting fees, charges for the use of tourist facilities (climbing, hiking, camping, etc.), restaurant, hotel and land concessions and rental fees.
Payments for Ecosystem Services (PES)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Landholders or resource managers are rewarded or compensated for managing land and resources in a way that generates specified ecosystem services. Payments are made by the beneficiaries of ecosystem services, and may be provided in cash or in kind (e.g. via monetary payments, contributions of infrastructure, technical training, access to loans, etc.). PES are most frequently made to regulating services such as water quality and supply, landscape enhancement, biodiversity conservation and disaster risk reduction.
Carbon payments	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		A special form of PES which involves the sale of certified emissions reductions (carbon credits), generated by undertaking land and resource uses which sequester carbon, or which avoid or reduce carbon emissions. Carbon payments are particularly relevant for implementation of the UN programme towards 'Reducing Emissions from Deforestation and Forest Degradation' (REDD+).
Direct payment (e.g. conservation concessions & contracts, compensation etc.)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			People are provided with performance-based payments for undertaking agreed conservation actions. These payments can occur within PES schemes, but they are often made by international agencies, governments, companies or NGOs and not necessarily by the beneficiaries of the ecosystem services. They typically focus on compensating the opportunity costs of foregoing a particular land or resource use in order to secure conservation goals.
Insurance schemes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Insurance schemes compensate local people for cost or damages related to conservation (e.g., crops or livestock eaten by wildlife).
Voluntary donations and corporate sponsorship	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Individuals or companies interested in conservation, or who benefit from ecosystem services, or accept that they play a role in the degradation of ecosystems, voluntarily sponsor activities that enhance biodiversity or channel funds to local communities.
Taxes		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Activities that use ecosystem services or run the risk of harming biodiversity and ecosystem services are subject to 'ecological' tax or to relatively higher tax rates.
Tax reliefs, subsidies	<input checked="" type="checkbox"/>				The government supports products, technologies, investments and practices that minimise or prevent environmental degradation, or contribute towards conservation goals by relatively lower tax rates, tax exemptions, or payments.
Ecological fiscal transfers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Redistribute public revenue according to certain criteria, including conservation measures. Payments compensate for the costs of conservation measures (including opportunity costs) and reward the provision of public benefits.
Benefit/revenue-sharing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			A flat fee or percentage of public revenues or private income streams generated from conservation products and services are shared with local residents. The intention is to recognise that local people play a key role in conserving the environment and enabling the revenue streams that are generated by it, and to provide them with positive incentives and tangible benefits to continue to do so.
Prizes, awards & other recognition	<input checked="" type="checkbox"/>				Prizes, awards or other honours are used as a way of recognising and rewarding individuals, groups or villages/towns which display particularly good environmental practices.
Fines, penalties & legal liabilities		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		People who overuse, harm, or pollute the environment are legally obliged to pay for the damage they cause. The aim is to motivate individuals and companies to avoid or minimise environmental impacts or, if damage is already done, to oblige the responsible party legally and financially to compensate for it.

Table 1 (Continued)

Economic instrument	Steward Earns	Beneficiary Pays	Polluter Pays	Innovation	How it works
Tradeable quotas, rights & permits	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Sets overall or individual limits on the use, conversion or pollution of the environment. Resource users, land developers or polluters who wish to exceed their quota or right must buy permits from others. The sellers of these permits are those who are not using their own allocation, or who have gained credits from conserving the resource or ecosystem service elsewhere.
Auctions & tenders	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Auctions are a mechanism to decide which landowners receive a contract that pays them to change land use and carry out landscape conservation measures on their land. So several landowners make competing propositions or bids for the price they ask to implement conservation measures and a buyer (government or private) will decide which one to accept (usually lowest price for comparable measures).
Biodiversity offsets, habitat/mitigation banking	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		Companies whose activities damage biodiversity or destroy natural habitats (e.g. agriculture, forestry, oil and gas, mining, transport or construction) invest in biodiversity conservation elsewhere in order to balance or compensate for damage. Biodiversity offsets are usually pursued as a final step after on-site environmental harm has been reduced and alleviated as much as possible. When a conservation bank (or 'mitigation banking') is established, a landowner who acts to conserve the natural habitat is seen as making a deposit in the bank and receives credits. Another landowner who wants to develop the habitat or otherwise impact on it must purchase a credit from the bank.
Debt-for-nature swaps	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		A portion of debt is forgiven in exchange for environmental conservation measures.
Deposits & performance bonds			<input checked="" type="checkbox"/>		Individuals or companies undertaking activities which threaten the environment or require some form of mitigation, remediation or management plan are required to make a (usually refundable) deposit of funds against the expenditure involved.
Green products & markets (alternative income & employment sources)	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	Income streams are developed from products based on the sustainable use of land and natural resources, which use environmentally-friendly production processes, or which replace environmentally-damaging sources of income and employment. This may involve reforming existing products and markets or establishing new ones. Common examples include wild nature-based products (e.g. honey, fruits, natural cosmetics, handicrafts), domestication of wild species (e.g. flowers, medicinal plants, commercial species, or eco-tourism).
Certification & eco-labelling	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	Eco-labelling and certification are voluntary trademarks awarded to products or services deemed to be environmentally sustainable. The idea is to enable them to charge a price premium and reach new markets – thus providing an incentive for businesses to operate in a way compatible with biodiversity conservation. Common examples include fisheries, timber, eco-tourism, and organic agriculture.
Credit & loans	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	Credit and loans or preferential terms and conditions are explicitly granted to green products and enterprises, or may stipulate certain environmental requirements in their terms of agreement.
Green investment facilities (conservation bonds, green investment funds, etc.)	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	These are larger-scale sources of credit and investment for green or biodiversity-based enterprises. While most of these facilities operate on a commercial basis, some provide funding on preferential or concessional terms. Bonds for instance are tradable capital market instruments issued by sovereign governments, states, municipalities or corporate entities to raise upfront funds, backed up by the promise to repay the investor the value of the bond plus periodic interest payments.
Land/resource management & usage rights	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	The allocation of clear, secure and enforceable use and/or management rights is often a prerequisite for the implementation of economic instruments.
Environmental training & education programmes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Training and education is often a prerequisite for the implementation of economic instruments. For example, may enable entrepreneurs and producers to take up new practices or technologies, trigger behavioural change, or increase consumers' awareness of the range of options open to them and the positive benefits of green products and practices.

Sources: UNEP (2004), Chambers and Toth (2005) Chapter 2, UNEP (2009), CFA (2008).

Table 2
Identifying ecosystem service opportunities and suitable economic instruments in Bu Phram subdistrict (Prachin Buri province, Thailand).

Task 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 fertiliser) vs. species habitat, erosion prevention, soil degradation; infrastructure development (roads, resorts, shopping mall) vs. wildlife corridor improvement			
Task 2: Understanding how stakeholders relate to ES	Villagers: <i>ES providers</i> : those farmers who let palm trees or other trees grow on their land or practice organic (pesticide-free) cultivation; <i>ES beneficiaries</i> : all villagers using food, water, Lan palm tree, NTFP and benefiting from micro-climate and water regulation; <i>ES degraders</i> : 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: <i>ES providers</i> : wildlife and forest management Local conservation NGOs: <i>ES providers</i> : wildlife conservation Community professional organizations; <i>ES beneficiaries</i> : harvesting of palm trees, herbs, rubber Private Sector: <i>ES providers</i> : petrol company with financial contributions (CSR activities), <i>ES beneficiaries</i> : 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; <i>ES degraders</i> : waste water pollution and land conversion by resort development and cows breeders Tourists and users of highway 304: <i>ES beneficiaries</i> : wildlife watching, nature trails, scenery; <i>ES degraders</i> : road kill due to speeding, and littering along the road Govt. administration (national and provincial); <i>ES beneficiaries</i> : Irrigation, tourism National and global citizens; <i>ES beneficiaries</i> : biodiversity heritage conservation			
Task 3: Recognizing gaps and imbalances.	Unrecovered costs of ES provision or potential costs for more ES provision: <ul style="list-style-type: none"> Maintenance of biodiversity on agricultural land is higher effort (harvesting that protects trees, less pesticides), Farmers on Thap Lan side fear that leaving natural vegetation recover will increase risk that they lose land use rights Local authorities and communities may have to give up (part of) infrastructure development 	Unpaid ES benefits or interest in more ES provision: <ul style="list-style-type: none"> Tourism and shop operators benefit from scenery but do not financially support conservation; 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. 	Uncompensated ES degradation: <ul style="list-style-type: none"> Tapioca and eucalyptus farmers are not held liable for impact on biodiversity, soil, water; 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. 	
Task 4: Identifying ES opportunities	“Stewards earns” opportunities: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 could provide funds. 	“Polluter pays” opportunities: <ul style="list-style-type: none"> “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: <ul style="list-style-type: none"> Ecological product certification; new markets for sustainable Lan products Nature-based tourism (wildlife watching, bike tours, homestays, etc.) Educational activities (wildlife, Lan education center)
Task 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.
Task 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 <ul style="list-style-type: none"> 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 finances for speeding and wildlife road kills (later stage, subject to police and national park authorities) 			

than a single one. For instance, a voluntary scheme by which beneficiaries support ecological land management or conservation actions can improve on the minimum requirements already established by direct regulation (such as rules for land use within protected areas, limits to fertiliser use, legal restrictions on hunting or logging, etc.). It may provide additional bonuses for conservation activities in buffer zones or other conservation areas.

For this task, it is also crucial to understand and evaluate the functioning of existing economic instruments. In some countries, such as in Thailand during the time of the ECO-BEST project, entrance or user fees were commonly used, but PES and co-management schemes were relatively new ideas, whereas in other countries such as Costa Rica or Mexico a much broader set of instruments were already common. In parallel to generating ideas about new economic instruments, Task 6 hence also involves analysing the extent to which the identified ecosystem service opportunities can be captured by existing instruments, by improving their functioning or broadening their scope.

The assessment framework hence leads to a screening 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 (for guidance and reference to useful resources see [Rode & Wittmer, 2015](#)).

2.3. Application of the assessment framework: an example from the ECO-BEST project in Thailand

ECO-BEST was a four-year project (2011–2015) to reduce terrestrial biodiversity loss in Thailand and South-East Asia for the benefit of local communities through the application of economic approaches. The project aimed to establish economic instruments in three pilot sites in Thailand: Thadee Sub-River Basin (Nakhon Si Thammarat province); Pang-Ma-O community in the upper Ping Watershed (Chiang Mai province); and Bu Phram sub-district (Na Dee district, Prachin Buri province) located within Dong-Phayayen-Khao-Yai (DPKY) Forest Complex. In Bu Phram, the main objective was to ensure connectivity of the DPKY Forest Complex (UNESCO Natural World Heritage Site). This would be achieved by improving the ecological condition of the land along Highway 304, which separates Khao Yai and Thap Lan National Parks (see map in [Fig. 2](#)).

[Table 2](#) presents the results of the application of the assessment framework in Bu Phram. Due to the unclear land tenure situation and the lack of trust and collaboration between park management and local communities, the project identified the need for a co-

management agreement, within which more specific instruments and benefit-sharing schemes could be developed. These include the promotion of wildlife watching and eco-tourism activities; markets for handicrafts made from native Lan palm leaves; certification schemes for organic agricultural products; financial and other support for farmers who restore grassland and let native tree species grow back; and corporate sponsorship schemes from downstream industries.

By early-2016, the instruments were still in a design and early implementation phase. Thap Lan National Park (NP) and Bu Phram Sub-district Administration Organization (SAO) had signed a co-management agreement based on the 19th Article of the National Park Act of 1961 with the goal to develop the Bu Phram region as a community-based wildlife tourism destination. The Thap Lan NP Park Advisory Committee (PAC) had officially endorsed the establishment of a Conservation and Ecosystem Restoration Fund, and the Department for National Parks (DNP) and the DPKY World Heritage Advisory Committee had agreed that in order to increase recognition, the scope of the Fund should cover the whole DPKY World Heritage, with Bu Phram as first target area. The constitution of a new DPKY-WH Association (DoKWHA) as official administrative body for the DPKY-WH Fund was drafted and submitted to the DPKY-WH Advisory Committee. It is envisioned that funds would be used to compensate land holders for individual commitments to stop tapioca cultivation and return the land to natural vegetation, restore or improve ecological conditions, under individual agreements with DoKWHA, and that the DPKY-WH Advisory Committee would function as monitoring body. Income for the Fund was agreed to come from several sources, including Thai and international wildlife initiatives, Lan palm handicrafts enterprises, and service providers who benefit from eco-tourism in Bu Phram (buses, restaurants, hotels, shops, etc.). Contributors would receive wildlife conservation stickers and annual certificates. Participating farmers would receive annual compensation during a 5 year period, after which conditions are renegotiated.

3. Discussion: key aspects to be considered when implementing economic instruments

Practical efforts to implement economic instruments in conservation and sustainable development planning 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 sec-

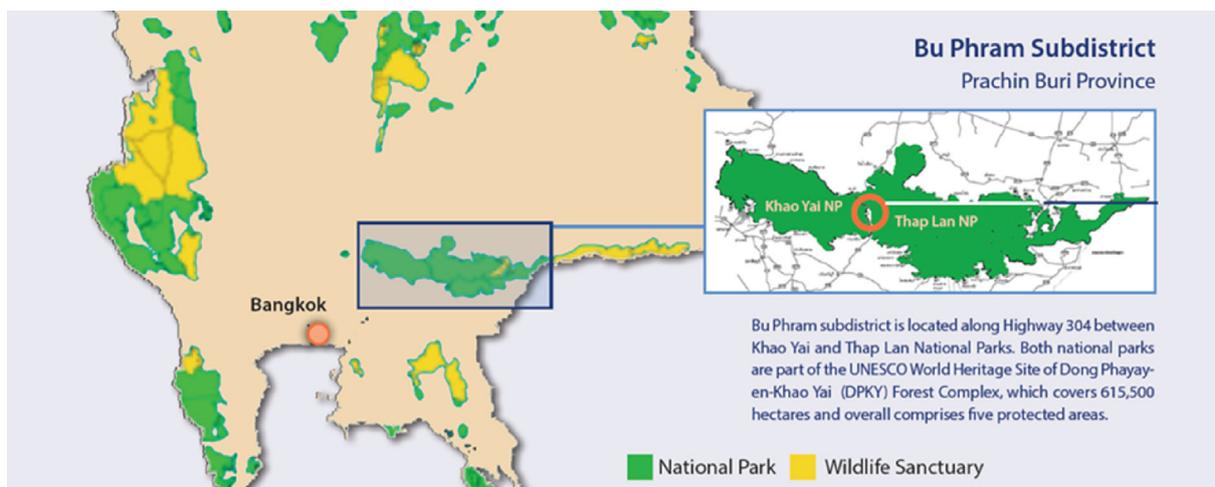


Fig. 2. Location of Bu Phram sub-district in Thailand.

tion highlights eight 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. The proposed assessment framework aims to address and incorporate these aspects.

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

A main message conveyed by this assessment framework is that in order to change behaviour, practitioners considering to utilise economic approaches should think less about calculating precise 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 articulate the monetary value of environmental goods and services (e.g., Christie, Fazey, Cooper, Hyde, & Kenter, 2012; Costanza et al., 2014; Pearce, Markandya, & Barbier, 1989). There are many situations in which economic valuation is important in influencing policy processes (Bateman, Mace, Fezzi, Atkinson, & Turner, 2011; Bateman et al., 2013; Pearce & Seccombe-Hett, 2000) or raising public awareness and support for environmental protection. However, generating information about ecosystem service values, alone, rarely changes the behaviour of individuals, corporations or communities (Daily et al., 2009; Fisher et al., 2008; Honey-Rosés & Pendleton, 2013; Turner et al., 2003). In most circumstances, the benefits and costs of changes accrue to different parties in very different ways, and 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 (Barbier, 1997; Emerton, 2014). Environmental planning has 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 & Maonga, 2011; Nakhumwa & 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 of conservation instruments does not stop at comparing the cash income and expenditures associated with different land management options. Economic viability of a particular practice or technology depends not only on positive monetary returns, but also upon other factors such as 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, preferences regarding the type of product or output that is generated, and the actors' own tastes and aspirations (Emerton, 2014).

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

Stakeholder involvement makes it possible to understand people's motivations for current (unsustainable) behaviour and resistance to change, reveals existing conflicts and collaborations, and exposes related issues they are struggling with. Many stakeholders are the providers, beneficiaries, or degraders of ecosystem services that will be directly affected by the development of any new economic instrument. Other stakeholders could provide critical support for implementation, for instance as intermediaries or as representatives of government agencies or other institutions. In addition, it may be as critical to the overall success to procure at least passive consent or acceptance from those who may initially oppose the initiative. A good understanding of stakeholders' positions, interests and constraints is therefore essential for selecting and designing a workable new instrument. Stakeholders are much more likely to accept a proposed policy if it alleviates or at least addresses their constraints. 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 & Bastiaensen, 2010). Similarly, early piloting with particularly motivated stakeholders to find out what works or not – and for what reasons – can help to fine-tune the instrument and avoid painful learning experiences or failure with a larger group. In addition, involving stakeholders from the outset increases the legitimacy of the process.

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

A central question for an appropriate use of economic instruments is whether the beneficiary of an ecosystem service has the right to have free access (e.g., to clean water) and stable provision, or whether it is the right of the land owner to freely choose his actions, including to degrade an ecosystem service (e.g., to intensify agriculture in a way that reduces groundwater quality). The distribution of rights and obligations (of property, access, or use) is the reference point for determining which economic principles to use. For instance, adherents of economic thinking often propose paying farmers to stop polluting water with pesticides or degrading biodiversity on their land. This is the logic behind many PES schemes: a beneficiary of ecosystem services is asked to pay and money is transferred to the providers. However, proposing such an economic instrument supports the view that land owners may act freely on their own property, even if it negatively affects other members of society. Conversely, if the right of all people to clean air or water was the priority, the land owner could be implicitly bound by a 'duty to care'. Under the Polluter Pays principle he could be obliged to stop or reduce pollution or else be held liable for it. Defining such rights and obligations is essentially a political and legal decision (Jack et al., 2008; Lockie, 2013), reflecting perceptions of justice in the socio-cultural context (Muradian et al., 2013; Ostrom, 1990). If rights and obligations are already defined (whether formally in legal terms or informally within culturally accepted norms), then proposals for new instruments that disregard them are likely to face resistance and fail. On the other hand, if rights and obligations are undefined, the choice of economic principles and instruments essentially defines them. In this case, groups that benefit from the current lack of regulation may oppose the new instrument or there may be concerns of setting a precedent in an as yet unregulated field.

3.5. Effective instrument design needs to consider ecosystem service interdependencies

Ecosystems provide multiple services simultaneously that interrelate in complex dynamic ways (Bennett, Peterson, & Gordon, 2009; Nelson et al., 2009; Rodríguez et al., 2006). 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 (Howe, Suich, Vira, & Mace, 2014; Raudsepp-Hearne, Peterson, & Bennett, 2010). For example, efforts in land management to optimize a single ecosystem service (e.g. provisioning services such as food, timber and fibre) often result in a decline of regulating and cultural services, such as 'water quality and quantity' or 'landscape aesthetic', or in a decrease of biodiversity (Adams, 2014; Chan, Satterfield, & Goldstein, 2012). 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. This may lead to (well-founded) resistance against policies or instruments. The prominent example of the 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).

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 may be able to respond to different challenges of ecosystem service management (Schröter-Schlaack & Ring, 2011). Most of the time, multiple sustainability challenges within the same area are more likely to be successfully addressed with a mix of instruments rather than a single one (Barton, Blumentrath, & Rusch, 2013). 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 & Blumentrath, 2011) or for improving the performance of 'direct regulation'. For instance, they may provide bonuses in buffer zones or other areas targeted by special conservation efforts (Drechsler, Wätzold, Johst, & Shogren, 2010). Educational and informational measures aimed at learning about 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. Taking stock of existing policies from different sectors that are related to conservation (e.g. agriculture and forestry, energy, transport or trade) may also point to shortcomings and blind spots in the design of the current instruments (Doremus,

2003; Gunningham & Young, 1997; OECD, 2007). The compatibility and synergies with existing policy measures need to be considered already when screening economic instruments.

In addition, acting on ecosystem service opportunities often requires arrangements of multiple instruments across different scales. For instance, REDD+ payment schemes or international 'green' investment vehicles are linking global beneficiaries to local providers via a cascade of measures and policies. Global beneficiaries' willingness to provide funds, and hence the overall viability of the scheme, depends crucially on the extent to which safeguarding procedures can alleviate potential risks that may occur at different scales. This includes monitoring and enforcement activities to ensure effective conservation at local level, credible reporting to different audiences at higher scales, and transparent procedures to rule out bribery and ineffective use of funds across scales. Local authorities interested in these instruments need to be aware of the scale-sensitivity and establish early on the link to higher level initiatives and policy levels.

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 'Steward Earns' principles) can be considered a dictate of fairness. But ethical aspects may also call for caution in the application of economics, particularly market-based instruments such as emission trading or habitat offsetting (Gómez-Baggethun & Ruiz-Pérez, 2011; Luck et al., 2012). Markets control access to goods and services by deciding how much they will cost. This means that people can only have what they can afford, as opposed to a system of equal distribution or a policy of access according to need not purchasing power (CBD, 2011; Corbera, Kosoy, & Martínez-Tuna, 2007; Martínez-Alier, 2002; Sandel, 2012). Moreover, many people intuitively reject the use of economic terminology in relation to nature, regarding beauty, wildness, sacredness, etc. as being outside the economic domain in the same way as love or friendship (Sandel, 2012). Taking ethical consideration seriously can help to construct a broader set of values around nature (Doak, Bakker, Goldstein, & Hale, 2014; Jax et al., 2013; O'Neill & Spash, 2000; O'Neill, Holland, & Light, 2008) and to ease such reservations, but it is wise to anticipate and understand possible opposition to economic approaches and to select instruments which are workable in 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 labelled as 'intrinsic motivations' in the academic debate. Such motivations can reflect the different 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 risk eroding people's intrinsic motivations. This can occur if economic motives become more salient in people's mind, or if informal community rules no longer work in the presence of external regulation (Cardenas,

Stranlund, & Willis, 2000; Frey, 1992; Rode et al., 2015). In other instances intrinsic motivations can be enhanced by introducing incentives, for instance when they are perceived as recognition and appreciation (Van Hecken & 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. Conclusions

Conservation policy and the academic debate on this topic have 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. We set out from the assumption that indeed 'win-win solutions' that can combine conservation and livelihoods benefits may not always be found, but that it is worth looking for them. One hindrance to capturing their potential may be the lack of accessible and practical guidance for practitioners to adequately transcribe the economic concepts and ideas into a specific context. This article addresses the need for practical guidance. It presents a framework that assists conservation practitioners to identify the opportunities where economic instruments can motivate actors to engage in more sustainable practices and to conserve ecosystems. A more detailed manual for applying the framework in the field can be found in Rode and Wittmer (2015).

While our guidance on an assessment of ecosystem service opportunities focuses on the local level, many measures for improving the status of ecosystems and local livelihood cannot be enacted solely at the micro scale. This can be due to the fact that revenue streams might have to come from the national or even international level, suitable policy instruments fall into the responsibility of national or provincial jurisdiction, or local-level innovations might require higher-level legal changes or institutional reforms. At the same time, socio-economic systems and ecosystem service linkages typically extend over multiple levels of scale. We see three possible ways in which the framework described in this paper can also be useful at higher policy levels. First, it can serve as an important means of linking or crossing the boundaries between different levels of scale and stakeholder groups, and fostering common action which is based on shared interests and joint solutions to conservation and development issues. Secondly, 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. Third, changing economic incentives is decisive at all levels. Identifying opportunities to close gaps between potential enhancers or providers of ecosystem services and their beneficiaries can equally be pursued at regional or national levels. Against an understanding of who benefits from ecosystem services and how incentives can be changed to enhance their provision (or at least prevent their further deterioration) instruments can better target conservation and livelihood goals. Assessments of ecosystems and their services as currently undertaken in many countries, such as for example the EU Member States, provide an important baseline for such an approach. Similarly there is scope for private enterprises to apply the approach in order to identify opportunities to help close the gaps between provision and demand for ecosystem services. This applies particularly to the development of new business opportunities, but private enterprises can also function as interme-

diaries in setting up new instruments or support policy measures via capacity building and training.

We are therefore convinced that 'ecosystem service opportunity' thinking can also help to stimulate a transformation within the broader policy debate. This may be an important 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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