

Commodification motives and degrees: the CBD objectives may benefit from using price signals as incentives but not from pricing ecosystem services or financialisation

Authors: Thomas Hahn, Claudia Ituarte-Lima, Constance McDermott and others
Corresponding author: thomas.hahn@su.se

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Introduction

Valuation of ecosystem services and economic incentive schemes are increasingly becoming part of the international discussions on scaling-up biodiversity financing. The Convention of Biological Diversity (CBD states that “biodiversity values” should be integrated in development strategies, planning processes, national accounts, and reporting systems (Aichi Biodiversity Target 2) and calls for the elimination of harmful subsidies and instead developing “positive incentives for the conservation and sustainable use of biodiversity” (Target 3).¹

The focus on biodiversity values and “innovative financial mechanisms” (IFM) has for some actors become controversial within the CBD process.² Without appropriate institutional arrangements that safeguards (ensures) biodiversity and equity there is a risk that economic incentive schemes will not contribute towards the three CBD objectives (Ituarte-Lima, et al. 2013) which are i) conservation of biological diversity, ii) the sustainable use of its components, and iii) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. CBD calls for a broader approach to valuation and financing: the institutional arrangements must safeguard that incentive schemes “do not undermine achievement of the Convention’s three objectives”.³ In other words, incentive schemes should be understood as complementary, not alternative, to regulation.

The risks of using economic incentive schemes (here used as synonymous to market-based instruments) for financing biodiversity and ecosystem services range from philosophical arguments, e.g. transforming human-nature relations and crowding-out moral obligations as motives for nature protection (Luck, et al. 2012) pp. 1023-24), to economic and equity concerns regarding the processes and outcomes of such schemes (Corbera, et al. 2007).

¹ <http://www.cbd.int/sp/targets/>

² E.g. the CBD COP-10 meeting in Nagoya, Japan, October 2010, failed to agree on innovative financial mechanism which motivated a special Dialogue Seminar in March 2012 to resolve these issues, see Farooqui and Schultz (2012).

³ See point 8(c) of CBD COP10 Decision X/3, www.cbd.int/decision/cop/default.shtml?id=12269 accessed 10 December 2013.

The aim of this paper is to clarify the role of “market” and “commodification” in various economic incentive schemes for biodiversity and ecosystem services. Based on this we make a tentative assessment of a few particular schemes in relation to an elaboration of the CBD objectives. Both in the scientific and grey literature the issue of financing biodiversity is discussed under an umbrella of more or less value-laden concepts – ecosystem services, monetary valuation, commodification, innovative financial mechanisms, and financialisation. Sometimes the normative framing is an obstacle to addressing the empirical question of how different economic incentive schemes actually perform (Gómez-Baggethun and Ruiz-Pérez 2011) p. 622). The purpose of this paper is to analytically distinguish between different types (motives) and degrees of commodification and move the focus to the detailed institutional design of economic incentive schemes.

In the first part we suggest a framework for valuation of ecosystem services by de-constructing the concepts commodification, valuation, and market. We use this to analyse the foundations for payments for ecosystem services (PES) and biodiversity offsets. Based on this theoretical framework we choose a few empirical examples of economic incentive schemes, and the financialisation of these, and assess them in relation to an elaboration of the CBD objectives.

Theoretical framework

Six degrees of commodification

Commodification of biodiversity and ecosystem services means the expansion of market trade to previously non-marketed areas of the environment (Luck et al. 2012). The degree of commodification is the extent to which the compensation received by an environmental service provider has become a tradable commodity (Muradian, et al. 2010), p. 1206).

Commodification involves at least four main degrees⁴ (modified from (Gómez-Baggethun and Ruiz-Pérez 2011): a) economic utilitarian framing, b) monetary valuation, c) appropriating the value of ecosystem services by economic incentive schemes, and d) commercialization through cap-and-trade systems. To get a more comprehensive framework we find it useful to add three more degrees; a zero degree, a middle degree of non-monetary policy integration and an “ultimate” degree of complete commodification, which we call financialisation.

0. “No commodification” (zero degree) should also be considered as a policy option in order to highlighting the dilemmas on describing the values of nature. This includes appreciation of ecosystems, in which the rationale for protecting nature is nature itself (intrinsic value), e.g. by recognising the rights of nature.⁵ Some examples are the Global Alliance for the Rights of Nature, the Community Environmental Legal Defense Fund as well as the recent Constitutional recognition of the rights of nature (Daly 2012).

⁴ Gómez-Baggethun and Ruiz-Pérez (2011:620) use the word “stages” but acknowledge that the four stages need not be consecutive, hence we prefer “degrees.”

⁵ Bolivia and Ecuador...(refs)

1. The first degree of commodification is the utilitarian framing. The separation of humans and nature and hence an instrumental view of nature can be found already in the works of Francis Bacon (1561-1626) (ref). The expansion of this anthropocentric and utilitarian framing to include ecosystem processes was popularised by Gretchen Daily (1997) who defined ecosystem services as "...the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. They maintain biodiversity and the production of ecosystem goods, such as seafood, forage, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products and their precursors" (p. 3). In this "original" meaning ecosystem services are the conditions and processes which are distinguished from the resulting or "final" ecosystem goods. The emphasis of invisible processes made ecosystem services an eye-opening metaphor (Norgaard 2010). Since the Millennium Ecosystem Assessment (MA 2005) ecosystem goods have become "provisioning services" and ecosystem services have become defined as "the benefits people obtain from ecosystems" (MA 2005, Preface).

The common MA definition is more ambiguous which in turn has impelled researchers to distinguish between direct and indirect services (ref) or intermediate and final services (refs). Sometimes the purpose of assessing ecosystem services has been to integrate it with national accounts (according to Aichi Target 2) which has led some authors to focus on monetary valuation of final ecosystem goods and services (e.g. (Boyd and Banzhaf 2007)). It should be noted that two of the three CBD objectives have a utilitarian framing at least to some ecosystem services.

2. The second degree is a separate academic issue of putting price tags to nature and it is not a necessary stage (or step) of a commodification process. Indeed valuation can mean anything between two extreme approaches; i) a qualitative understanding and appreciation of the importance of the underlying ecological processes (like the Daily citation above) and ii) a monetary expression of the "final" benefits of these ecological processes (ref to UK Assessment and (Boyd and Banzhaf 2007)). The first approach is central for ecological economics and emphasises multi-functionality and the role of biodiversity (in genes, species, and ecosystems) to support and sustain livelihoods especially in turbulent times. Such valuation is mainly expressed in non-monetary terms, focusing on understanding and a willingness to protect nature as a producer of benefits. It belongs to the first degree of commodification but becomes the second degree if a price tag is put on the "work of nature," usually by employing pragmatic methods such as Replacement cost and Avoided cost which focus on consequences rather than preferences. According to TEEB Foundation, these are the most common methods for valuing regulating services (Pascual, et al. 2010):206.

The second approach stems from the old neoclassical environmental economics and is a monetary expression of consumer preferences of the final commodity (goods and services), often by using contingent valuation or other market-simulating methods as advocated by other TEEB Reports (e.g. White et al. 2009). However, market prices reflect the present institutions (Bromley 1990). Findings 4 of the Millennium Ecosystem Assessment is that the present ecosystem challenges can be met but this requires "significant changes in policies, institutions

and practices, that are not currently under way.”⁶ Such significant changes would alter all relative prices in the economy, hence it is illogical to use the present market prices for fibre, food, water etc. for valuation when the externalities of these goods are generally not internalised. Besides, asking people for their willingness to pay (WTP) does not address the key issue of uncertainty. Hence the second approach reflects consumer taste and failing institutional arrangements. This tension of focus, between understanding and appreciating the SUPPLY of natural processes by nature (ecological economics), and estimating the DEMAND through understanding human preferences (environmental economics), has been the source of much controversy. Turner et al. (1994) have suggested that the emergence of “ecological economics can be viewed as a reaction to, and a rejection or modification of, certain of the assumptions that tend to characterize environmental economics” (p. 3).

3. The third degree of commodification occurs when policy makers change property rights and liabilities (e.g. implementing Polluter-Pays Principle), make quantitative restrictions (sometimes called “command-and-control”), make land-use plans or pass other regulations to enhance ecosystem values. The policy is targeted at changing institutions, not using price signal, although it often results in relative price changes.

4. In the fourth degree taxes and subsidies are employed to enhance ecosystem values. These monetary incentives employ the price signal to evoke behavioural change but do not imply markets since the government is the sole “buyer/seller”. Environmental subsidies to farmers have existed in Europe since long but it was the MacSharry reform of the EU Common Agricultural Policy (CAP) in 1992 that mainstreamed payments for ecosystem services (PES) to become a significant part of the CAP (Plieninger, et al. 2012). This institutionalisation of PES has been celebrated by environmental groups who want more of the CAP budget to be directed to agri-environmental schemes (ref FoE). The support for this commodification should however be understood in light of the perceived negative environmental effects of the other payment schemes within the CAP (Einarsson 2012).

5. The fifth degree, Markets for Ecosystem Services (MES), involves a higher degree of commodification in that pollution permits or conservation credits are issued by authorities and can be re-sold on the market (i.e. several buyers and sellers). However, such cap-and-trade systems are still under strong government regulation since the government controls the design by determining the number of permits or credits (the cap), distributing these permits or credits, and commands the demand for these.

In environmental and ecological economics distinctions are usually made between taxes, subsidies and cap-and-trade; these are considered as three separate economic incentive schemes (Table 1). Biodiversity offsets involving banking and/or conservation credits therefore deserve to be treated as cap-and-trade systems, i.e. Markets for Ecosystem Services (MES). MES and PES represent two versions of economic incentive schemes (Gómez-Baggethun, et al. 2010). Economic incentive schemes are based in legislation but not referred

⁶ <http://www.maweb.org/documents/document.356.aspx.pdf>

to as “regulation” because they focus on the price signal. Economic incentive schemes are in turn distinguished from both the “real” regulations as well as policy instruments based on information or moral suasion (Common and Stagl 2005) p. 409). Case-by-case biodiversity offsets are sometimes non-traded legal liabilities with no clear price signals and therefore belong to regulations (Table 1); we will soon return to this.

Table 1. Policy instruments for ecosystem services

Degree of commodif.	Main category	Examples
1+2	Information and moral suasion	Eco-labelling
3	Regulations	Quantitative (“Command-and-control”) Land-use plans Property rights clarifications/modifications Case-by case biodiversity offsets
4	Economic incentive schemes	Taxes Subsidies/PES
5	Economic incentive schemes	Cap-and-trade and other MES, e.g. biodiversity offsets through trading conservation credits

6. Financialisation is the sixth degree of “complete commodification” and describes how the traded commodity is re-packaged and re-sold as a financial product. The financial flows of PES or MES schemes are the basis for this. Hence financialisation builds on, but is not in itself, a policy instrument and therefore goes beyond Tables 1 and 2. Financialisation uses the ecosystems, which are commodified by PES and MES schemes as collateral for investments. Based on Sullivan (2012) we define financialisation as a process in which financial actors invest in units of conserved nature and turn these investments into financial instruments which are sold to create additional value.

Framework for valuation and policy integration

Valuation is often assumed to be in monetary terms, a price tag. Here we define valuation as decision support expressed in qualitative, quantitative, and/or monetary terms (Table 2). In a broader economic sense valuation is about expressing a willingness to make sacrifices to protect something.

Table 2 suggests that regardless how the biodiversity values of a forest are described (from intrinsic qualities to monetary terms), this can motivate and justify a nature reserve or liability regulations. Similarly for a PES, which can be justified by qualitative information on biodiversity and ecosystem services focusing on understanding risks, resilience and insurance values, or by quantitative information on some measurable environmental objective, or finally by monetary information within an economic efficiency framework. Since the (stated) purpose and rationality is different in each of the columns, these different motives for policy integration represent differences in kind, not degrees, of commodification.

Table 2. Framework for ecosystem services valuation and policy integration

Information in:	Qualitative terms	Quantitative terms	Monetary terms
Rationality (concerns, motives)	Concern for non-measurable objectives like equity, precautionary principle and safeguarding the insurance value of biodiversity.	Concern for reaching quantitative targets in cost-effective ways without expressing targets in monetary terms.	Concern for economic efficiency by internalising externalities.
Methods for describing values. Decision-support. Commodification degrees 1+2	SWOT analysis, Identification, Historical assessment, Narratives, Stakeholder consultation, Delphi methods, Multicriteria Analysis.	Technical/scientific mapping and assessment of trends e.g. water flows and species abundance. Multicriteria Analysis.	Estimating values of e.g. water flows in monetary terms. Travel-cost method, Contingent valuation. Cost-benefit analysis.
Policy integration by regulation. Commodification degree 3	Land use planning, protected areas, defining property rights and liability for ecological compensation.	Land use planning, protected areas, defining property rights and liability for ecological compensation.	Land use planning, protected areas, defining property rights and liability for ecological compensation.
Policy integration by economic incentives. Commodification degrees 4+5	PES directed to certain communities and MES or tax reforms to change drivers and improve conditions in multiple dimensions.	PES, MES and tax reforms to change incentives of market actors and reach quantitative goals in a cost-effective way.	PES, MES and tax reforms to account for externalities with the aim to increase economic efficiency. Level of tax or PES is informed by the calculated value of the targeted ecosystem service.
	Level of tax or PES is not a valuation of the ecosystem service but reflects the opportunity cost of conservation.		

Hence, even if the degree of commodification is the same, the rationale and motive could differ. Qualitative information is common in business thinking on resilience (Hamel and Vlikangas 2003) and it has many similarities to SWOT (Strength, Weakness, Opportunity, Threat) analysis in business (Hanson, et al. 2008). The right column represents the ideal in neoclassical economics, that all values are expressed in monetary terms which enables efficiency calculations. Monetary valuation based on neoclassical economics (e.g. contingent valuation) is also the ideal in some of the TEEB Reports (e.g. White et al. 2009) although these pay attention to all three ways to analyse nature.

Legal requirements for ecological compensation are regarded as property rights-regulation in Table 2 in accordance to present legislation in the EU for Nature 2000 and other protected areas (Conway, et al. 2013), pp. ii-iii). As we shall see, it is a matter of institutional design whether biodiversity offsets can be characterised as an ecological compensation (degree 3) or as a cap-and-trade system (degree 5). How much market do we want to rely on for reaching political targets on biodiversity and ecosystem services?

Market-based is a confusing term

In economic text-books (e.g. Pearce & Turner 1990) market-based instruments include taxes, subsidies and various cap-and-trade systems. Unlike the latter, taxes and subsidies do not involve the price mechanism (market mechanism) which is the autonomous (free) market adjustments between supply and demand resulting in an equilibrium price. To avoid confusion with monopoly markets and other quasi-markets, we define “market” as trade based on the price mechanism (requiring many sellers and buyers). For taxes (or subsidies), the government determines the price and is the sole “seller” (or buyer); hence these market-based instruments do not depend on the market! We therefore replace the confusing term “market-based instruments” with the term *economic incentive schemes* (Table 1). Economic incentive schemes are broad policy instruments generally assumed to result in cost-effective changes because they rely on the price signal (rather than a “command” i.e. regulation) to create incentives for a desired change among market actors, but they need not rely on the price mechanism.

Cap-and-trade systems involves the fifth degree because the price is the result of the price mechanism and trade is allowed. Hence, the price signal is determined by the government in the 4th degree but by the market in the 5th and 6th degrees. Markets for Ecosystem Services (MES) indeed require more, not less, regulations than the previous degrees if MES are to contribute to environmental benefits (Glicksman & Kaime 2013). Hence, ‘markets’ should not be understood ideologically as opposite to regulations even though they are often presented as such (Penca 2013; Fletcher & Breitling 2011). Moreover, the transaction costs associated with MES are often considerable compared to taxes, subsidies, and regulations, which suggests that *a priori* assumptions about cost-effectiveness should be avoided. Principles of international law and safeguards can contribute to designing and implementing MES including ensuring accountability in environmental governance (Ituarte-Lima et al. 2013; Glicksman & Kaime 2013).⁷

The foundations of economic incentive schemes

PES are mostly government subsidies

In a global survey Milder et al. (2010) found that 97-99% of all payments for biodiversity and ecosystem services (PES) are financed by governmental organisations. Such government PES cannot be characterised as “delegating the power to decide on biodiversity to the market.” It is more correct to characterise government PES as subsidies in which governments determines the price, the eligible sellers, and sometimes the maximum quantity. The remaining 1-3% (2-4% in developing countries) are private, voluntary PES including payments by conservation NGOs and business motivated by CSR. A good examples is the fund FUNBIO which has protected 33 million ha of the Amazon forest (Farooqui and Schultz

⁷ See also p. 22 in Report of the ad hoc open-ended working group on review of implementation of the CBD on the work of its fourth meeting, UNEP/CBD/COP/11/4, 21 June 2012.

2012), p. 31). For all PES, the benefits are mainly public goods; nature conservation and poverty alleviation. Since there are no cash flows to tap, there is no monetary incentive for a market to emerge.

Hence, the real existing PES are mainly governmental economic incentive schemes that do not rely on the market (price mechanism) and should therefore not be associated to “the market” or “neoliberalism” (Fletcher and Breitling 2011). Most often they do not rely on a monetary valuation either (the second degree of commodification) although such academic valuation exercise may be part of the decision context. Instead, the level of the PES is often set pragmatically, to compensate for the opportunity costs (the forgone net benefits) of nature conservation (Table 2).

Furthermore, the characterization of the commodity is fuzzy, based on assumptions about the relationship between a certain land use and the provision of targeted but often non-explicit ecosystem services. For example, the largest economic incentive schemes within the CAP are payments to grazing land and organic farming although it is not clear exactly which species or ecosystem services benefit from such land use. As a result, it is rather one hectare of forest or agricultural land under a specific land-use that is commodified, not the desired species or ecosystem services themselves (Muradian, et al. 2010): 1206). The degree of commodification involved in governmental PES is very low and therefore we define PES as subsidy-like payments from public or private sources.

Sometimes legally mandated private payments which are required to offset environmental impacts, e.g. wetland mitigation or habitat banking, are included in the definition of PES together with the price premium for eco-certified products that reaches the producers of ecosystem services (Scherr et al. 2008). However, analytically it makes sense to de-construct PES and distinguish between economic incentive schemes that function like subsidies (government PES and voluntary private PES) from those that function like a cap-and-trade system. And although an eco-label often functions as a price premium for producers (monetary incentive), it is indeed a kind of information/moral suasion (Common and Stagl 2005) p. 409) and should for analytical purposes be treated as a policy instrument separated from PES and other economic incentive schemes (see Table 1).

Biodiversity offsets and degree of commodification

In biodiversity offsets and ecological compensation, a company that exploits (develops) land and water resources for housing, industries, infrastructure, etc. to compensate for the degradation of biodiversity and ecosystem services by investing in these values elsewhere. This could be voluntary or mandatory. Degradation should, according to the mitigation hierarchy, first be avoided by choosing a less valuable site for the development project. Once a site has been approved for exploitation, degradation (negative impacts) should be minimised. The third step of the mitigation hierarchy is that the developer takes rehabilitation or restoration measures on the ecosystems impacted and the final step consists of off-site offset measures to compensate for significant adverse residual impacts (Dickie et al. 2010).

Biodiversity offsets are controversial. Proponents emphasise that it is fair that exploiters are required to pay for restoration to offset the degradation they cause and this may also steer exploitation away from areas with high biodiversity and ecosystem services values because they are expensive to compensate for (Conway, et al. 2013), p. vii). Landowners who invest in biodiversity and ecosystem services can get paid for this by the exploiters rather than by taxpayers (e.g. through government PES schemes). The logic is the same as in emission trading systems or the bonus-malus principle, applied in some European countries to car producers, in which the “good” actors in a designed market are receiving payments from the “bad” actors in the same market design.

Critics of such schemes are afraid that they will offer incentives for exploiters and administrators to “to downplay or ignore the requirement to first avoid and reduce their impacts under the false impression that any impact can be compensated for” (Quétier and Lavorel 2011), p. 2991. The largest offset program, US Wetland mitigation, has focused too much on the compensation part and neglected the earlier stages of the mitigation hierarchy (Hough and Robertson 2009). Hence biodiversity offsets may result in less stringent regulations, delegating the responsibility to the market although there is ample of evidence that offsetting land in existing biodiversity offsets schemes have not at all compensated for the biodiversity loss (Regnery, et al. 2013) (Burgin 2008).

Most of the literature on biodiversity offsets concern habitat banking schemes or other versions of cap-and-trade systems (Table 1) based on some kind of metrics and credits. However, the dominant model for ecological compensation in the EU is the Natura 2000 regulation, where a qualitative case-by-case compensation is done with no conservation credits being traded by the market (Conway et al. 2013, p. ii). Such compensation scheme is a kind of regulation (Table 1) and may be justified and motivated by a concern for biodiversity, for equity (polluter pays principle), and for efficiency (seeking a low-cost compensation).

Hence there are at least two main legal models for biodiversity offsets, both consistent to the mitigation hierarchy. Model A is the like-for-like offset in which the same values in an exploited Natura 2000 site should be compensated for. Model B is the habitat banking scheme in e.g. the USA and Australia where exploiters are mandated to buy a certain amount of conservation credits from landowners or habitat banks. The difference corresponds to the 3rd and 5th degree of commodification in Tables 1 and 2.

The no net loss (NNL) initiative of the EU

In the EU 86,200 ha of “undeveloped” land are “developed” (exploited) every year, of which 10% concern Natura 2000 sites.⁸ The vast majority is agricultural land, followed by forests and woodland shrub, sclerophyllous vegetation and natural grasslands. (Conway pp. iv-vi). Whereas compensation for displaced habitats /species is a legal requirement of the EU Birds and Habitats Directives, and of the Environment Liability Directive in the case of damage to

⁸ The EU Natura 2000 network covers 95 million ha, meaning that 0.01% is exploited every year.

Natura 2000 sites, there is no requirement for compensation outside these protected areas. Action 7 under target 2 of the EU Biodiversity Strategy to 2020 seeks to “ensure no net loss of biodiversity and ecosystem services”.⁹

The idea is that loss of biodiversity and ecosystem services also in non-protected “ordinary” landscapes, resulting from exploitation of land and water, for housing, industries, infrastructure, etc., should be compensated. Considering the vast area (86,200 ha/year) that needs to be compensated, this would entail enormous administrative (transaction) costs why new institutions are needed to ensure economies of scale as well as confirming the principle that the exploiter should pay. In the EU, the supply of grassland and wetland habitats for restoration or enhancement is least constrained. Coastal, freshwater, forest, sclerophyllous and heathland habitats are more limited while dune and rocky habitats are most limited (Conway et al. 2013:vii).

Three possible options, which are not necessarily mutually exclusive, have been discussed to achieve NNL: i) a clear decision-making framework, to ensure degradation is avoided wherever possible before compensation is envisaged; ii) an overall non-binding framework at EU level providing guidance and exchanges of best practices for Member States who have adopted voluntary or mandatory biodiversity offset policies; and iii) an EU level legal framework for no net loss of ecosystems, which could make some of the above elements mandatory. (European Commission 2011). The first option is Model A and the third option Model B. Note that there are no decisions on how to design biodiversity offsetting schemes or whether habitat banking should be used. Still, the consultants who have been commissioned to explore these options (Dickie, et al. 2010), (Conway, et al. 2013) strongly argue for habitat banking.

For example, the Final Report on Habitat Banking in the EU, submitted to DG Environment (Conway et al. 2013), concludes that existing ecological compensation schemes are not designed along any metrics to ensure no net loss of biodiversity (p. i), and that habitat banking has the potential to offset biodiversity losses “in an ecologically- and cost-effective way” (p. xiv). Habitat banking is assumed to be cost-effective due to the smaller transaction costs compared to if compensation is determined case-by-case. However, the report emphasises that regulators are very important by ensuring fair and transparent monitoring and enforcement, defining standards and performance indicators and that “without a strong regulator, offsets and habitat banking are likely to be unsuccessful, or limited to isolated ‘hotspots’ of voluntary action” (p. xiii).

Ideally, like-for-like compensation should be done in the sense that the same species and ecosystem services that are degraded are also compensated. Recreation services must of course be compensated for nearby to be meaningful for people, whereas biodiversity may be compensated according to ecological principles (Conway, p. viii). The report also discusses

⁹ http://ec.europa.eu/environment/nature/biodiversity/nnl/index_en.htm

like-for-unlike compensation where the same values cannot be compensated for locally; if so there should be a “trading-up” to achieve a like-for-better compensation (Conway p. vii).

Normative analysis and empirical examples

So far the analysis has been descriptive. For normative analysis some kind of norm is needed and we use an elaboration of the CBD objectives as norms. The questions we asked were: a) Are there any signs in the literature that the scheme benefits biodiversity conservation? Has the scheme promoted b) sustainable use and c) equity in benefit sharing? The criteria for sustainable use are based on the Addis Ababa principles “to ensure that their use of the components of biodiversity will not lead to the long-term decline of biological diversity”¹⁰ and Principle 10 of the Ecosystem Approach which calls for co-existence of conservation and use, avoiding the dichotomy of either protected or non-protected.¹¹

Equity concerns procedural and substantive outcomes in terms of benefit sharing for indigenous and local communities, based on Article 5 of the Nagoya Protocol.¹² The benefit-sharing includes not only genetic resources but also the functions (ecosystem services) provided by biodiversity at the ecosystem level.¹³

We chose eight existing or proposed schemes of PES and biodiversity offsets, as well as the financialisation of these instruments, which have been evaluated or at least discussed in scientific papers or reports. We interpreted and synthesised the evaluations in Table 3. A comprehensive description or analysis of these schemes is beyond the scope of this paper; the examples were chosen to reflect a variety of degrees and motives of commodification. Our synthesis should be regarded as a tentative evaluation in relation to the elaborated CBD objectives. Moreover, these examples of commodification were chosen to clarify the controversies concerning the role of the market and to emphasise the importance of institutions to safeguard desired outcomes and reduce risks.

Three PES schemes were selected; EU CAP PES, Costa Rica PES, and Ecuador PES. Two existing biodiversity offsets schemes (US conservation banks and the German compensation pools) were selected together with the proposed EU habitat banking. Finally, two proposed schemes for financialisation were selected, one based on biodiversity offsets (SpeciesBanking.com) and one based on REDD+ (Forest Bonds).

Analysis (This whole section needs to be developed!)

¹⁰ <https://www.cbd.int/sustainable/addis.shtml>

¹¹ COP5 Decision V/6, see the Rationale of Principle 10. <https://www.cbd.int/decision/cop/?id=7148>

¹² <https://www.cbd.int/abs/text/default.shtml>

¹³ COP5 Decision V/6. See C. Operational guidance for application of the ecosystem approach, point 9. “Benefits that flow from the array of functions provided by biological diversity at the ecosystem level provide the basis of human environmental security and sustainability. The ecosystem approach seeks that the benefits derived from these functions are maintained or restored. In particular, these functions should benefit the stakeholders responsible for their production and management. This requires, inter alia: capacity-building, especially at the level of local communities managing biological diversity in ecosystems.”
<https://www.cbd.int/decision/cop/?id=7148>

Table 3. Synthesis of evaluation (very tentative!)

Economic incentive schemes	Degree of commodif.	Impact on the elaborated CBD objectives (Positive, Promising, Neutral, Negative)		
		1	2	3
1. EU CAP PES	3	Neutral	Neutral	Positive
2. Costa Rica PES	3	Positive	Positive	Positive
3. Ecuador PES	3	Promising	Promising	Promising
4. US conservation banks	5	Negative	Neutral	Negative
5. German comp. pools	3	Promising	?	?
6. EU Habitat banking	5	?	?	?
7. Speciesbanking.com	6	Negative	?	?
8. Forest Bonds	6	Negative	Negative	Negative

1. EU CAP PES

The agri-environmental schemes within the Common Agricultural Policy (CAP) is probably the largest PES scheme. For the coming years, Pillar 2 (Rural Development) of the CAP will cost €12 bn/year for the EU budget¹⁴ and member states often need to put in an equal budget. Depending on priorities of member states, a large proportion of this total sum is used for PES schemes. Still, agri-environmental schemes are often overlooked in the PES literature because they are mainly motivated as non-trade-distorting income-support schemes (ref).

Many countries use CAP PES to support land-use associated with multiple ecosystem services like semi-natural pastures and organic farming (Einarsson 2012). The payments are considerable and have therefore a positive effect on biodiversity and contribute to integrating production and conservation, i.e. sustainable use. However, the cost-effectiveness of these PES schemes is a re-current debate (Kleijn and Sutherland 2003), (Plieninger, et al. 2012) why the evaluation should be “neutral” and not “positive”. Since many farms with marginal land would close down without these agri-environment schemes, they definitely contribute to equity for rural communities of small-scale farmers.

2. Costa Rica PES

Pago por Servicios Ambientales (PSA) in Costa Rica is one of the most well-known examples of national PES program. At the introduction in 1996 the government presented it as a neoliberal market-based conservation mechanism although Fletcher and Breitling (2011) argue that it has been successful because it's NOT neoliberal: PSA was enabled by a new Forest Law (1996) that banned land-use change but not sustainable use; it is largely financed through a carbon tax (+ water tariffs); the government is the only buyer (hence it's not a market) and it has targeted high poverty areas and “biological corridors” (Matulis 2013):256. Indigenous communities have increased their share of budget allocation from 3% in 1997 to 26% in 2012, which is an indication of equity (Porrás, et al. 2013). Forest cover, which is regarded as a proxy for biodiversity conservation, has recovered from about 30% in 1996 to over 50% in 2010 (Porrás, et al. 2013).

¹⁴ EUR 84.936 billion/7 years. http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf

3. Ecuador PES/compensation

The general aims of *Programa Socio Bosque* (PSB) in Ecuador are articulated along the lines of the three CBD objectives. In 2008, the PSB was established by the Ecuadorian government which aims to combine ecosystem conservation with poverty alleviation by providing direct benefits to the participants and focusing on areas with high conservation and socioeconomic relevance.¹⁵ Unlike Costa Rica the Ecuadorian government regarded PSB as a subsidy. In a four-year period of implementation, 1,780 agreements were signed covering around one million hectares of native forests and moorland, involving approximately 121,400 citizens.¹⁶ Hence, it has a promising effect in the conservation of biological diversity. Yet, there are also challenges in PSB. For instance, certain provisions in PSB's contracts as well as the scheme's implementation process may inhibit, in some cases, the achievement of the CBD objectives e.g. PSB does not provide guarantees that the government will comply with its commitments (Reed 2011).¹⁷

In terms of equitable distribution of benefits, a requirement for qualifying for the PSB is to own land with statutory land title, individually or collectively. For community and collective partners, the Investment Plan as well as accountability must be developed in a participatory manner and approved by the assembly in accordance with their own statutes, which has the potential of strengthening collective action.¹⁸ The sustainable use of biological diversity may be positively affected by the strengthening such collective action. Yet, it be negatively affected by other circumstances e.g. by too restrictive provisions in PSB contracts that forbid practices such as logging because such prohibitions may limit people from conducting sustainable use and management of the forest. Likewise, the requirement to own land with statutory land title requirement may increase local inequity because people without land titles, such as many communities with disputed land tenure, who are already in a relative disadvantaged position, cannot participate.¹⁹ Still, the number of local and indigenous communities is large and for some of these, the PSB has had a positive effect on well-being²⁰ justifying a promising equity effect.

The commodification of PES in Ecuador is made up of a web of relationships in which land and forest communities' formal and informal tenure rights play an important role in determining who has the ability to benefit from PES schemes.²¹ Consequently, in order to be in line with the three CBD objectives, the general aims of the PSB need to be synchronized with operational policies and PSB contracts related to tenure rights. By recognising the rights of Nature (*Madre Tierra*) as well as people's rights to a good way of living (*buen vivir*), the

¹⁵ De Koning, F. & Al., 2011. Bridging the gap between forest conservation and poverty alleviation: the Ecuadorian Socio Bosque program. *Environmental Science and Policy*, 14: 531-542.

¹⁶ Folleto de sistematización de Socio Bosque, 2012, Ministerio del Ambiente, <http://sociobosque.ambiente.gob.ec/?q=node/595>, accessed 2 March 2014.

¹⁷ Reed, P. (2011). REDD+ and the indigenous question: a case study from Ecuador. *Forests*, 2(2): 525-549.

¹⁸ See Experiencias exitosas de Socio Bosque, 2012, Ministerio del Ambiente, <http://sociobosque.ambiente.gob.ec/?q=node/595>, accessed 2 March 2014.

¹⁹ Krause, T., Collen, W., & Nicholas, K. A. 2013. Evaluating Safeguards in a Conservation Incentive Program: Participation, Consent, and Benefit Sharing in Indigenous Communities of the Ecuadorian Amazon. *Ecology and Society*, 18(4), 1.

²⁰ Folleto de sistematización de Socio Bosque, 2012, Ministerio del Ambiente, <http://sociobosque.ambiente.gob.ec/?q=node/595>, accessed 2 March 2014.

²¹ See Corbera, E. & Brown, K., 2010. Offsetting benefits? Analyzing access to forest carbon. *Environmental and Planning*, Volumen 42, pp. 1739-1761.

Ecuadorian Constitution provides a legal basis for harmonizing different elements of public policies in order to effectively foster equitable governance of biodiversity and ecosystems, throughout the process of design and implementation of schemes such as PSB.²²

4. US Conservation banks

US Conservation banking is legally mandated biodiversity offsets, modelled after wetland banking and apply the mitigation hierarchy (McKenney and Kiesecker 2010). The US agency Fish and Wildlife Service (FSW 2003) has provided guidance for conservation banks established after 2003 and the remaining of this section is based on this guidance. One idea of habitat banking is to promote private/public partnership and bring together financial resources as well as planning and scientific expertise not practicable for smaller conservation actions. Landowners to habitat with listed species can register land and receive conservation credits from FSW according to an assessment of the biodiversity value, with the standard value being 1 credit/acre. When these credits are sold to a land exploiter, the land becomes an easement for perpetuity. The “credit price will include funding for the long-term natural resource management and protection of those values” (FWS 2003:2). All land must be managed, depending on the species which the bank is registered to conserve. This may involve restoration, enhancement, or even creation of habitats. If significant measures are needed, credits can be sold only after completion of these measures and verification of outcomes (pp. 7-8). If the habitat is suitable for several listed species it should be established how credits will be divided (p. 9).

When the first credit in a given bank is sold, the entire area of this bank becomes legally protected to eliminate future habitat fragmentation. For land exploiters, mitigation ratios are used to establish the amount of credits that will need to be purchased. Qualitative assessment should be done to determine the exploited area; if the land is low in quality the ratio may be 1:2, i.e. one bank acre for two project acres (p. 11). If the exploited area has high conservation values the ratio may be 2:1. Prices are determined by market actors according to the price mechanism.

Most evaluations of habitat banking concern wetland banks and the time period before 2003. If habitat quality is used as a measure of compensation success rather than area, Briggs et al. (2009:116) conclude that a low proportion of projects can be considered as successful. Other scientific evaluations have emphasised shortcomings in monitoring and performance, suggesting that biodiversity offsets need much stricter institutions to deliver (Hough and Robertson 2009), (Robertson and Hayden 2008). It is not clear whether the FWS guidance from 2003 has significantly improved this. The fact that the price for habitat destruction depends on supply and demand of conservation credits may result in very low cost for habitat destruction, if agencies issue too many credits or in times of recession. The EU Emission Trading System (ETS) illustrate this, where the price of carbon dropped drastically during the financial crisis of 2008 (ref).

²² Republic of Ecuador Constitution of 2008, <http://pdba.georgetown.edu/Constitutions/Ecuador/english08.html>, accessed 2 April 2014.

US conservation banks must be given a perpetual conservation easement, restricting land-use to conservation. How that relates to sustainable use is difficult to assess. As far as equity is concerned, an evaluation of habitat banking depends on whether we assume that the exploited (developed) land would be exploited anyway or not. If it would be exploited regardless of policy, the loss cannot be attributed to the banking scheme. But if habitat banking facilitates land exploitation, by the promise to compensate for the degraded values elsewhere, equity is compromised if local communities who used to benefit from the exploited land have small means to benefit from the compensated land. This is one of the main criticisms to habitat banking and it is mostly pronounced in low and middle income countries where indigenous and local communities may lose their basis for livelihoods (ref). But recreational and other cultural values may be compromised in any country if the “service area” of the bank is large enough to accept offsetting sites far away from the exploited land.

5. Biodiversity offsets in Germany by compensation pools

Germany has the most developed biodiversity offset system in Europe with “high quality standards” (Conway et al 2013:113). There are more than 1,000 compensation pools and they are governed by public or private “Compensation Agencies,” appointed by respective state nature conservation agency. Most compensation pools are municipal and they often serve only “their own compensation requirements” (Dickie et al. 2010:180). These are integrated with municipal land-use planning, i.e. the initial steps of the mitigation hierarchy.

There are two types of compensation pools: sites where land has been set aside to be ready for future enhancement (Flaschenpool) and sites where measures for enhancement of the site have already been taken (Ökokonto). Two advantages of compensation pools is that 1) agencies can act towards a more complex design of biodiversity offsets, e.g. by strategically plan for habitat connectivity, compared to case-by-case compensation; and 2) that relationships and dialogue with various landowners and stakeholders can be maintained for long periods which facilitates quality (ref). The different states of Germany decide on criteria and as a consequence practice vary between states. However, even if the compensation pools sometimes are referred to as “habitat banks“ (e.g. Conway et al. 2013:106), it is clear that there is no role for the market, neither for determining price nor quality (Conway et al. 2013:113-114). The German compensation pools belong to Model A, i.e. the 3rd degree of commodification.

6. EU Habitat banking

None of the two most comprehensive reports to the EU (Dickie et al. 2010, Conway et al. 2013) outline any detailed system for habitat banking. It is easy to agree that present case-by-case compensation for Natura 2000 sites entails excessive transaction costs to serve as a model for the enormous compensation needs in non-protected areas. It is also easy to agree that rigorous regulations are needed for any kind of offset scheme. German compensation pools are celebrated as “promising” in both these reports although these offer no room for markets.

Perhaps the concepts “compensation pools” and “habitat banking” can be used interchangeably depending on cultural-political context? Perhaps an elaboration of the German system could be described both as i) a clear decision-making framework, to ensure degradation is avoided wherever possible before compensation is envisaged; and iii) an EU level legal framework for no net loss of ecosystems, which could make some of the above elements mandatory, which were two opposite models envisioned by the European Commission (2011). The crucial issues for achieving no net loss of ecosystems are:

- Who and how to calibrate quality (the equivalence problem)?
- Who and how to determine liability (“demand”), price, ensure additionality as well as long term?

In a paper called “Habitat banking – how it could work in the UK,” Briggs et al. (2009) warn that “Without careful regulation, habitat banks could offer low-cost compensation as a result of cutting corners on conservation, and the market would reward poorly managed banks and thus harm conservation efforts” (p. 117). Many comparisons have been made between habitat banking and carbon markets but for the latter there is already an agreed metrics, carbon, relatively easy to measure. This is not at all the case for biodiversity or ecosystem services even though attempts have been made (Figure 1). Therefore a cap-and-trade system with conservation credits may be inappropriate for habitat banking because market actors have incentives to devalue the quality of these credits, which necessitates an agency controlling and accepting each transaction. Assessing quality is even difficult for experts – Robertson (2006) concludes, after research on ecosystem assessment technicians, that “this new round of the commodification of nature may overwhelm the capacity of science to provide stable representations of commodity value.”

Figure 4: Matrix showing how condition and distinctiveness are combined to give the number of biodiversity units per hectare⁸

		Habitat distinctiveness		
		Low (2)	Medium (4)	High (6)
Condition	Good (3)	6	12	18
	Moderate (2)	4	8	12
	Poor (1)	2	4	6

Figure 1. Modified from DEFRA (2012)

Acknowledging the inherent difficulty to calculate the commodity value of nature, a multi-stakeholder board of the compensation agency could be given this task, including “wildlife

trust or other appropriate conservation NGO” (Briggs, et al. 2009), p. 117. A multi-stakeholder board dealing with a range of offsets at the same time would ensure professional judgement and transparency, unlike a market system for conservation credits, as well as cost-effectiveness, unlike case-by-case compensation.

7. Speciesbanking.com

Speciesbanking.com is a global information clearinghouse for a segment of biodiversity markets focusing on biodiversity offsetting, compensation and banking.²³ It is a part of Ecosystemmarketplace.com (EM), a project of Forest Trends, which collates and publishes news, data and analysis focused on markets and PES. They believe that by improving the accessibility of market-relevant information, “...markets for ecosystem services will one day become a fundamental part of our economic system.... we hope not only to facilitate transactions (thereby lowering transaction costs), but also to ...spur the development of new markets and the infrastructure that supports them, and achieve effective and equitable nature conservation.”²⁴ The EM advisory committee include senior partners from the financial sector.

Speciesbanking.com is based on conservation banking in the USA but aims to take this one step further, by facilitating trade and attract new actors. In a survey of 123 species banks at SpeciesBanking.com, Pawliczek and Sullivan (2011) found that 64 posted the total number of credits awarded to the bank, 27 posted total credits awarded per species, but only seven posted their credit asking prices.

The actors behind Ecosystemmarketplace.com foresee and promote the emergence of secondary markets related to PES or MES, implying financialisation. Markets depend on transparent and reliable information and what “is true for investors on Wall Street is equally true for environmental market players trading in carbon, water quality, and biodiversity.”²⁵ There are signs of this, e.g. Mandel et al. (2010) have proposed, in a prestigious ecology journal, the creation of “biodiversity derivatives.” Derivatives are financial instruments that promise payments derived from bets on the future value of something else, known as the “underlying” (Sullivan 2011:10). The underlying asset could for example be conservation credits with the speculation that the price of credits will increase if biodiversity loss continues.

Somehow financialisation implies a contradiction; it is motivated as internalising externalities but instead make biodiversity conservation an externality of the buyers and sellers of derivatives. The aim of these homepages is to provide information on supply, demand, and prices to facilitate trade, assuming trade would benefit biodiversity conservation. The CBD

²³ http://www.speciesbanking.com/pages/about_us

²⁴ http://www.ecosystemmarketplace.com/pages/dynamic/web.page.php?page_name=overview§ion=about_us&eod=1

²⁵

http://www.ecosystemmarketplace.com/pages/dynamic/web.page.php?page_name=overview§ion=about_us&eod=1

objectives are marginalised when the focus is shifted to creating new markets based on speculation.

8. Forest Bonds

Forest bonds is an example of financialisation proposed by the WWF and Global Canopy Programme that enables forest owners, the issuer of forest bonds, “to raise large-scale finance now that will be repaid by existing and anticipated future income” (Cranford, et al. 2011) p. 6). The issuer of the bonds “will need to convince investors that the cash flows they plan to pay the bond back with are sufficiently secure and predictable” (p. 6). A reliable global carbon market (REDD) would provide such predictability but “support from the public sector through regulations or other commitments will be needed to ensure that these cash flows materialise” (p. 6).

Like any other bonds there must be collateral for the bonds. In the worst case the forest communities issuing bonds may therefore lose the rights to their forest if they are unable to pay back the bonds: “If for any reason those earmarked cash flows did not arise, the issuer would draw on other financial resources to meet its obligation. In this case, the potential investors would primarily consider the balance sheet and risk level of the issuing institutions before deciding to invest in the bond” (p. 14). However, socially responsible financiers may target social and environmental returns and “may be willing to sacrifice financial returns and potentially compromise in other areas, like secondary market liquidity” (p. 6). According to the proposal by Cranford et al. (2011) forest bonds require a lot of guarantees from the public sector including international donors and multilateral institutions to attract investors. Still forest bonds are presented as “engaging the private sector to help finance the large shift to sustainability that economies need to undertake” (p. 24). Forest bonds require very rigorous institutions to fulfil any of the three CBD objectives and it is unlikely that such institutions can be developed in countries with limited governance capacity.

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