



# Economic valuation and the commodification of ecosystem services

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## Abstract

In the last decade a growing number of environmental scientists have advocated economic valuation of ecosystem services as a pragmatic short-term strategy to communicate the value of biodiversity in a language that reflects dominant political and economic views. This paper revisits the controversy on economic valuation of ecosystem services in the light of two aspects that are often neglected in ongoing debates. First, the particular institutional setup in which environmental policy and governance is currently embedded. Second, the broader economic and sociopolitical processes that have governed the expansion of pricing into previously non-marketed areas of the environment. Our analysis suggests that within the institutional setup and broader sociopolitical processes that have become prominent since the late 1980s economic valuation is likely to pave the way for the commodification of ecosystem services with potentially counterproductive effects for biodiversity conservation and equity of access to ecosystem services benefits.

## Keywords

commodification, ecosystem services, market instruments, valuation

## 1 Introduction

The ecosystem services concept was originally conceived as a metaphor to reflect societal dependence on ecosystems (Norgaard, 2010). However, in the last two decades environmental science and policy have made increasing efforts to value ecosystem services in monetary terms, and to articulate such values through markets in order to create economic incentives for conservation (Balmford et al., 2002; Barbier et al., 2009; Daily and Ellison, 2002; Freeman, 2003; Heal et al., 2005; Pascual et al., 2010).

The growing reliance on economic valuation (hereafter valuation) and related market-based instruments has triggered a heated debate among

environmental scientists (e.g. Child, 2009; Costanza, 2006; Fisher et al., 2009; McCauley, 2006; Redford and Adams, 2009; Skroch and López-Hoffman, 2010). Contending views in this controversy range from the support of valuation and market solutions as core strategies to solve present environmental problems (which from this perspective are framed as market

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failures) (Engel et al., 2008; Heal et al., 2005), to an outright rejection of utilitarian rationales for conservation (Child, 2009; McCauley, 2006). In between, there is a strategic endorsement of valuation as a pragmatic and transitory short-term tool to communicate the value of biodiversity using a language that reflects dominant political and economic views (Daily et al., 2009; de Groot et al., 2002). This strategic endorsement of valuation has become an increasingly dominant position as the environmental movement attempts to look for novel conservation strategies where traditional ones have failed to halt biodiversity and habitat loss (Armsworth et al., 2007; Daily et al., 2009).

This notwithstanding, we revisit the valuation controversy in the light of existing institutional structures for environmental governance to develop a critical perspective on the adequacy of the strategy of valuation that is now apparent. More specifically, we make the case that environmental scientists endorsing valuation as a transitory short-term tool often failed to analyse valuation in connection to two key issues. First, the broader economic and sociopolitical processes driving the expansion of the economic value domain in market economies (Gorz, 1994; Polanyi, 1944/1957). Second, the institutional setting within which environmental policy operates since the emergence of market conservationism in the late 1980s and the related expansion of market-based instruments for conservation (Peterson et al., 2010; Robertson, 2004; Smith, 1995). We argue that such advocacy has overlooked the unintended and potentially counterproductive consequences of the valuation process.

The paper is structured as follows. The next section examines the crisis of traditional conservation and the emergence of the ecosystem service approach. Section III analyses the incorporation of ecosystem services into policy and markets. The fourth section scrutinizes the phenomenon of ecosystem services commodification in the context of market conservationist

environmental policies emerging in the late 1980s. The final section discusses issues and problems related to commodification of ecosystem services, and highlights the impossibility of isolating valuation and commodification processes within existing institutional setups. We end with some concluding remarks.

## **II The ecosystem services approach**

### *I The crises of traditional conservation*

Four decades after the emergence of the modern conservation movement, it is apparent that ecological life-support systems are declining worldwide (Ewing et al., 2010; MA, 2005), biodiversity loss remains unabated (Butchard et al., 2010), and anthropogenic pressures have reached a scale where the risk of abrupt global environmental disruption can no longer be excluded (Rockström et al., 2009). In spite of its numerous achievements in terms of protection of rare species and habitats, traditional conservation approaches have been powerless to reverse or stabilize the metabolic patterns of the global economy, characterized by ever-increasing demands on natural capital stocks, ecosystem services, and biodiversity (Guo et al., 2010; Krausmann et al., 2009). Although the state of the environment would undoubtedly be worse if conservation strategies had not been in place, traditional conservation has so far failed to reverse biodiversity and habitat loss (Armsworth et al., 2007). Arguably, this failure cannot be understood without connecting it to the long-established reluctance of much of the environmental movement to mix economics and conservation (e.g. Child, 2009). The conservation movement has thereby failed to act upon the economic and sociopolitical drivers of change that are at the root of many present environmental problems (MA, 2005; Steffen et al., 2004).

The segregation of economics and conservation into separate policy spheres can be seen, for example, in current approaches to territorial

planning. Natural areas protected through ‘fortress conservation policies’ are embedded in a matrix that is ecologically unsustainable in so far as it is devoted to economic development and growth. This approach reflects the dominant ontological position in western cultures that conceives humans as being separated from the environment, and nature conservation as a concession from economic development. In this context the ecosystem services approach is proposed as a strategy for moving away from the logic of ‘conservation *versus* development’ towards a logic of ‘conservation *for* development’ (Folke, 2006). From the ecosystem services approach the conservation of ecological systems stands out as a necessary prerequisite for long-term economic sustainability.

## 2 Emergence of the ecosystem service approach

The ecosystem services approach portrays ecosystems as natural capital stocks that provide diverse goods and services for human societies (Costanza and Daly, 1992; Daily, 1997; de Groot et al., 2002; MA, 2005; TEEB, 2010). Despite the long-term awareness of the importance of ecological functions for livelihoods (see, for example, Polanyi, 1944/1957), the origins of the modern ecosystem service approach are to be found in the late 1960s and the 1970s (Ehrlich and Ehrlich, 1981; Helliwell, 1969; King, 1966; Odum and Odum, 1972).

Besides conventional commodities such as timber, fibre and raw materials, this notion of an ecosystem service also incorporated nature’s non-market benefits such as clean air, climate regulation, flood buffering, and other non-material benefits like recreation, cultural heritage and cognitive development (Daily, 1997). These had tended to be overlooked in economic accounting and decision-making. At this time, however, the ecosystem service concept was mainly used as an eye-opening metaphor to overcome the ecological blindness of conventional economic accounts, and to alert on the

impossibility of perpetual economic growth. Economic analyses were rarely relied on, except for illustration purposes (Norgaard, 2010).

## 3 Ecosystem services in the international policy agenda

The expansion of the ecosystem service approach beyond specialized academic circles took place in the 1990s. A critical benchmark was the move from theory to policy through the partial endorsement of the ecosystem services approach by the Convention on Biological Diversity in 1992. In the following decade the first comprehensive frameworks for the analysis of ecosystem services were published; first with the seminal work of Daily (1997) and later with the development of frameworks and methods for the identification and classification of ecosystem services (e.g. de Groot et al., 2002).

Following the publication of the Millennium Ecosystem Assessment in 2005 (MA, 2005), ecosystem services have become firmly settled into the international environmental policy agenda. This agenda includes international efforts to develop integrated systems of ecosystem and economic accounts (United Nations et al., 2003; Weber, 2007) and standardized classifications of ecosystem services (Costanza, 2008; Haines-Young and Potschin, 2010). Such initiatives have developed in parallel with the use of cost-benefit analysis to address large-scale environmental problems like global climate change (Stern, 2006) and biodiversity loss (TEEB, 2010), and by the promotion of markets for environmental commodities (Bayon, 2004) and payments for ecosystem services schemes (Engel et al., 2008). Each has been supported by different organizations with different – but related – aims (Table 1).

## III Ecosystem services in public policy and markets

The expansion of pricing mechanisms to ecosystem services has followed two main approaches.

**Table 1.** International initiatives incorporating the ecosystem services approach

| Project  | Main institutions   | Aim   | Webpage   |
|--|---|---|---|
| Millennium Ecosystem Assessment (MA)   | United Nations Environment Program (UNEP), Convention on Biological Diversity (CBD), and many other international organizations   | Assessing ecosystem changes and the consequences for human well-being, at scales from global to local   | <a href="http://www.millenniumassessment.org/">http://www.millenniumassessment.org/</a>                           |
| The Economics of Ecosystems and Biodiversity (TEEB)                                      | United Nations Environment Program (UNEP), German Federal Ministry of the Environment, Department for the Environment, Food and Rural Affairs (DEFRA), European Commission (EC)                         | To draw attention to the global economic benefits of biodiversity and to highlight the growing costs of biodiversity loss                                 | <a href="http://www.teebweb.org/">http://www.teebweb.org/</a>   |
| Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) | United Nations Environmental Program (UNEP), Food and Agriculture Organization (FAO), International Union for Conservation of Nature (IUCN), International Institute for Sustainable Development (IISD) | Act as an interface between the scientific community and policy makers that aims to build capacity for and strengthen the use of science in policy-making | <a href="http://www.ipbes.net/">http://www.ipbes.net/</a>   |
| System of Integrated Environmental and Economic Accounting (SEEA)                        | United Nations (UN), European Commission (EC), International Monetary Fund (IMF), Organization for Economic Cooperation and Development (OECD), World Bank (WB)   | Create a common framework to measure the contribution of ecosystems to the economy and the impact of the economy on ecosystems                            | <a href="http://unstats.un.org/unsd/envaccounting/seea.asp">http://unstats.un.org/unsd/envaccounting/seea.asp</a> |

(continued)

**Table 1 (continued)**

| Project                                 | Main institutions  | Aim  | Webpage   |
|---|--|--|---|
| Beyond GDP                              | European Commission (EC), European Parliament, The Club of Rome, World Wide Fund for Nature (WWF), Organization for Economic Co-operation and Development (OECD)   | To develop and improve widely applicable indicators to assess social, economic, and environmental progress   | <a href="http://www.beyond-gdp.eu/">http://www.beyond-gdp.eu/</a>                                   |
| Ecosystem Services Partnership (ESP)    | Environmental Systems Analysis Group (Wageningen University), the Institute for Ecological Economics (Portland State University), the Netherlands Environmental Assessment Agency and up to 40 other core and full members | To build a network to enhance and encourage a diversity of approaches in the application of ecosystem services to promoting better science, policy, and practice | <a href="http://www.fsd.nl/esp">http://www.fsd.nl/esp</a>   |
| The Ecosystem Services Expert Directory | World Resources Institute (WRI), World Business Council for Sustainable Development (WBCSD), Ecological Society of America (ESA), International Union for Conservation of Nature (IUCN), Earth Watch Institute (EWI)       | Serves as a resource for policy-makers and professionals looking for information or guidance on a particular ecosystem trend or management practice              | <a href="http://projects.wri.org/ecosystems/experts">http://projects.wri.org/ecosystems/experts</a> |

The first consists of a ‘Pigovian solution’ where public intervention plays the leading role in the correction of ‘market failures’ through state taxes and subsidies. The second approach, prominent since the 1980 and 1990s, follows a ‘Coasean solution’ whereby correction of market failures is addressed through private transactions, often in markets where ecosystem services can be freely sold and bought. This is so, at least in theory, because in practice most markets for ecosystem services have been set up, subsidized and actively regulated by governments. These approaches for correcting market failures have been implemented via two main mechanisms: ‘markets for ecosystem services’ and ‘payments for ecosystem services’. Thus the ‘polluter pays principle’ which underlies the former is complemented by the ‘steward earns principle’ which underlies the latter.

### *1 Markets for ecosystem services and the ‘polluter pays principle’*

The ‘polluter pays principle’ is grounded on an alleged ethic of responsibility, according to which the economic agents causing environmental harm should carry the economic costs of the negative externalities they create. Since the 1980s the polluter pays principle has been incorporated in legal texts. In Europe it was included in the *Single European Act* of 1986 (article 174), in the *Maastricht Treaty* (article 130.2), and in the Treaty establishing a Constitution for Europe (article III, 233.2), which has stagnated since 2004. At international level, the polluter pays principle was adopted by the Organization for Economic Cooperation and Development (OECD) in 1972, and was contemplated in the Declaration of the Rio Summit on Sustainable Development of 1992 (article 16).

Since the 1990s the leading instrument used to operationalize the polluter pays principle are the so-called Markets for Ecosystem Services (MES). For example, the 1990 US *Clean Air Act* promoted cap and trade mechanisms for sulphur

dioxides (Stavins, 1998). Another example is the wetland banking systems put into practice through the US *Clean Water Act*. This system grants permits to deteriorate wetlands in exchange for commitments to create, restore or protect them elsewhere (Robertson, 2000). New markets followed these experiences such as the emission trading system of the United Kingdom, the *Chicago Climate Exchange* established in the USA in 2003, and the *Greenhouse Gas Abatement Scheme* of New South Wales established the same year in Australia (Bayon, 2004; Spash, 2010). The first international emission trading scheme (ETS) was set up in Europe in 1997. When the Kyoto protocol came into force in 2005, the ETS expanded to other countries creating a market of US\$142 billion in 2010 (World Bank, 2011).

### *2 Payments for ecosystem services: the ‘steward earns principle’*

If negative environmental externalities are addressed through the polluter pays principle, positive externalities are dealt with through the ‘steward earns principle’, as an underlying logic for making payments for ecosystem services. Payments for Ecosystem Services (PES) have been defined as conditioned and voluntary transactions between at least one provider and one beneficiary, of well-defined ecosystem services (Wunder, 2005). The underlying rationale is that beneficiaries of ecosystem services should compensate the stewards that maintain or protect the services from which they benefit.

Rudimentary forms of PES have been in place for many decades. For instance, in the 1930s the US Government promoted payment for farmers that adopted measures against soil erosion, and in the 1950s similar mechanisms were established to protect farmlands from urban expansion (Jacobs, 2008). Other early examples of PES are payments to promote agri-environmental measures in Europe (Dobbs and Pretty, 2008). The widespread expansion

of PES as integrated development and conservation scheme, however, dates fundamentally from the last two decades (Wunder et al., 2008). Costa Rica was the first country to set up PES schemes at the national scale, through a programme established in the mid-1990s that offered US\$45 per hectare to landlords endorsing the conditions of the scheme (Pagiola, 2008). More recently, schemes for international PES have been promoted. These include the *Clean Development Mechanisms* launched in the 6th Conference of the Parties (COP) of the Kyoto protocol, the *Joint Action Mechanisms* (Capoor and Ambrosi, 2009), and the so-called *Reducing Emissions from Deforestation and Forest Degradation* (REDD) and REDD+ programs of COPs 13 and 16, respectively.

## **IV Market conservationism and the commodification of ecosystem services**

### *1 Neoliberalism and market environmentalism*

The broader political-economic context in which international policy has been embedded since the 1980s is often referred to as ‘neoliberalism’ (Harvey, 2005). Neoliberalism has been defined as the theory of political-economic practices that proposes that human well-being can best be advanced by liberating individual entrepreneurial skills with an institutional framework characterized by strong property rights, free markets and free trade. Neoliberalization includes political-economic practices such as privatization, reduction of state intervention in the economy, and expansion of market valuation to spheres that were formerly unaffected by commerce (Bakker, 2005; Harvey, 2005; Robertson, 2006).

These political-economic practices have also unfolded in the fields of environmental science, policy and conservation (Castree, 2003; Foster et al., 2009; Liverman, 2004; McAfee, 1999; O’Connor, 1994; Robertson, 2004; Spash,

2008). According to some authors, the advocacy of valuing ecosystem services in monetary terms is embedded in the logic of *market environmentalism*, prominent since the late 1980s alongside the expansion of the neoliberal ideology (Bakker, 2005; Smith, 1995). Market environmentalism can be seen as an approach to environmental governance aimed at conciliating economic growth, allocation efficiency and environmental conservation (Anderson and Leal, 2001; McCarthy, 2004). Basic ingredients of the market environmentalism toolset include the establishment of well-defined (usually private) property rights for ecosystem services with public good character, valuation of environmental externalities, and the use of market-based instruments for conservation (Bakker, 2005). The logic of valuation, property allocation, and market-based instruments in conservation is grounded in the institutional analysis of Coase (1960) and Hardin (1968), which has fitted with the privatization policies promoted since the early 1980s under the influence of the Chicago School (Stiglitz, 2002).

Although processes involving the commodification of nature have been documented at least since the late 19th century (Polanyi, 1944/1957), since the 1980s the commodity frontier has expanded towards entirely new types of ecosystem services (Robertson, 2006). These include regulating services such as carbon sequestration and watershed regulation that have traditionally operated outside the market sphere.

### *2 Commodification of ecosystem services*

The concept of commodification refers to the expansion of market trade to previously non-marketed areas. It involves the conceptual and operational treatment of goods and services as objects meant for trading. It describes a modification of relationships, formerly unaffected by commerce, into commercial relationships. Commodification of ecosystem services thus refers to the inclusion of new ecosystem functions into pricing systems and market relations.

Commodification of ecosystem services takes place through four main stages: economic framing, monetization, appropriation, and commercialization, although these stages sometimes overlap in time and are not always necessarily concomitant. The first stage consists of the discursive *economic framing* of ecosystem functions as ecosystem services, which started with the anthropocentric interpretation of ecosystem functions and continued with the application of the ecosystem service concept from the 1960s.

The second stage takes place when the use values embedded in ecosystem services are expressed as exchange values through *monetization* or pricing. The conceptual roots of this process in economic theory have been traced back to the early 19th century (Gómez-Baggethun et al., 2010), but relate more directly to the origins of the externality concept coined in the 1920s (Pigou, 1920/1932) and even before (e.g. Dupuit, 1844, quoted in Maneschi, 1996). Although economists have tried to attach monetary values to ecosystems since the late 1950s (e.g. Clawson, 1959; Krutilla, 1967), environmental scientists did not pay much attention to this work until the 1990s, when they systematized valuation frameworks (Bateman and Turner, 1993; Freeman, 2003; Heal et al., 2005; Pearce, 1993; Pearce and Turner, 1990; Turner et al., 2004). Finally, after the publication of the much-discussed paper by Costanza et al. (1997) that estimated the total worth of the Earth's natural capital, valuation became the most frequent target of ecosystem services research.

The third stage consists of the *appropriation* of ecosystem services, and operates through the formalization of property rights on specific ecosystem services, or on the lands producing such services. This stage has often involved privatization, through which ecosystems that were previously in openly accessible regimes, or in communal or public property regimes, have been turned into private property. Although the origins of this process can be traced back several

centuries (Ingold, 1986) the direct theoretical roots of the recent cycle of the privatization of nature lie in the influential contributions of Coase (1960) and Hardin (1968). The defence of the former for well-defined property rights was complemented with the advocacy by the latter for privatization (or alternatively appropriation by the state) of common pool resources as the way to avoid overexploitation.

The last stage in the commodification process consists of the *commercialization* of ecosystem services – i.e. the creation of institutional structures for ecosystem services sale and exchange. As with any other monetary market, MES and PES involve the definition of one or more services, which then become commodities subject to trade. The extension of MES and PES towards new ecosystem functions therefore involves, by definition, a process of nature commodification – i.e. an expansion of the commodity frontier into previously non-marketed spheres of the environment (Kosoy and Corbera, 2010).

Contrary to what is often assumed, the process of commodification is not necessarily unidirectional or irreversible. As noted by Bakker (2005: 545), 'objects move in and out of, and back and forth from, commodity status'. Limits in the scope of the market sphere at a given point in time are determined by the set of norms, conventions and formal rules shared by a particular society or group of people, e.g. by the existing institutional structures. By making use of institutions, societies decide not only what to commodify but also what to decommodify (Harvey, 2005). Historically, decommodification processes have occurred as specific forms of commodification failed or were socially contested (Polanyi, 1944/1957; Sayer, 2003). Prominent examples include the abolition of slavery and the removal of the late Middle Age practice of selling letters of indulgence (Fromm, 1942/1987: 61). Commodification can thus be looked upon as contested and transient (Bakker, 2005). Within modern market economies, however, the dominant direction has been

towards commodification (Polanyi, 1944/1957), a tendency that has intensified since the 1980s (Harvey, 2005).

## V Discussion

### *I Why is commodification an issue?*

There are several lines of criticism of the commodification of ecosystem services. The most intuitive and general critique posits that for ethical reasons some things ought not to be for sale (McCauley, 2006). These controversies around commodification concern where to draw the line demarcating the commodity frontier – i.e. what should be within the sphere of markets and trade and what should not. In fact, material elements of nature have been sold as commodities since the birth of markets and few contributions criticize commodification in its totality. The main issue is where to set the limits of commodification in the realm of ecosystems and wildlife (Prudham, 2007). For instance, some protest responses in contingent valuation surveys (e.g. refusal to bid) have been interpreted as opposition to monetize ecological values and to frame ecosystem services as commodities (O'Neill and Spash, 2000).

A second line of criticism concerns the alleged effect of commodification as complexity blinder and mystification. This is manifested by the masking of critical processes underlying the production of ecosystem services behind the homogeneity of monetary figures, thereby transforming a symbolic value into an objective and quantifiable relationship. This criticism is rooted in the classic analysis of commodification by Karl Marx, who noted how in the modern (capitalist) mode of production complex social relations between people took on the appearance of simple exchange relations between objects, a phenomenon he referred to as 'commodity fetishism' (Marx, 1867/1965: 38–50). The pertinence of the commodity fetishism analysis in the field of ecosystem valuation was hinted at by Martínez-Alier (1987), and then taken up and

developed in recent critiques of the commodification of ecosystem services. Peterson et al. (2010), for example, noted that just as commodification obscures the labour of human workers in the production process so it obscures the importance of biodiversity and related abiotic factors that contribute to ecosystem functions. In a similar line of critique, Kosoy and Corbera (2010) argued that the commodification of ecosystem services masks ecological complexity, non-economic values of ecosystems, and power asymmetries underlying environmental trade.

A third line of critique concerns problems involved in the treatment of things that are not produced by humans as commodities. An early reflection on this is found in the writings of Karl Polanyi, who used the concept of 'commodity fiction' to refer to the way in which land (together with labour and money) was incorporated to markets as a tradable commodity (Polanyi, 1944/1957: 121–128). The commodity fiction presents serious technical difficulties at the operational level. The first of them is the interrelated nature of ecosystem functions and services. Recent research on ecosystem services has stressed the need to establish discrete and well-defined ecosystem service units that can be incorporated within economic accounting systems (Boyd and Banzhaf, 2007). The attempt to compartmentalize ecosystem services as discrete units, however, neglects the fact that ecosystem functions are inextricably linked to each other (Vatn, 2000). In words of Georgescu-Roegen (1971), this corresponds to an attempt to frame as an *artimomorphic concept* (i.e. a concept with discrete and well-defined limits) what in reality is a *dialectical concept* (i.e. a concept with overlapping, interactive and diffuse borders). It therefore reflects an attempt to fit the complex nature of ecosystem functions into a mechanistic analytical framework used to handle the relatively simple nature of human-made commodities. The difficulty of separating entangled ecosystem functions into discrete exchangeable units explains the

uncooperative nature of many ecosystem functions to become commodified, as theorized by Vatn and Bromley (1994). This is also supported by empirical case studies that document the obstacles confronted by attempts to fulfil the commodification of water supply in the United Kingdom (Bakker, 2005) and to develop wetland banking systems in the United States (Robertson, 2006).

A fourth line of criticism is political in nature, and addresses equity issues involved in the commodification process. Commodification turns ecosystem services that in principle were in open access, public or communal property into commodities that can be accessed only by those having purchasing power. This involves a substantial institutional and social change that we can evaluate positively or negatively depending on our normative ideology. For example, from the political ecology perspective, commodification is assumed, rather than empirically proven, to be socially undesirable, because by institutionalizing differential access to ecosystem services according to the ability to pay, commodification is likely to exacerbate social inequalities. Corbera et al. (2007) documented cases in Central America where increased inequities in the access to ecosystem services and related economic benefits followed the implementation of markets for ecosystem services and their commodification. Similarly, the literature on political ecology has devoted much attention to the social and political struggles taking place at the border of the commodity frontier, as markets extend into new ecosystems and societies where they are not the prevalent institutions for allocation (Martínez-Alier, 2002). Finally, Harvey sees in commodification a form of 'accumulation by dispossession' that is likely to foster social inequity and contribute to civil unrest (Harvey, 2003).

The criticism of commodification reviewed in this paper does not address the question of whether commodification is likely to be environmentally useful or harmful from a sound

scientific basis. In fact, the normative character that pervades much of the ongoing discussion on commodification is an obstacle to addressing the empirical question of its effects on ecosystem service quality and quantity. More empirical research is needed to provide a scientifically sound assessment of the effects of commodification in environmental standards.

## *2 Disentangling valuation and commodification processes*

A key question that the present paper aims to address is whether monetization of ecosystem services can be detached from commodification processes, as suggested explicitly by some notable proponents of valuation.

Advocates for the strategic use of valuation have emphasized the need to discern economic framing of the environment, monetization and commodification as distinct processes. For example, Skroch and López-Hoffman (2010) caution against conflating the 'necessary critique of PES programs' and the 'broader generalized critique of current trends to value ecological functions in relation to their contribution to human well-being' (p. 325). Similarly, in response to McCauley's (2006) critique to the ecosystem service approach, Costanza (2006: 749) defends the economic valuation of 'ecosystems without commodifying them'. Indeed, criticism of the ecosystem service approach sometimes suffers from analytical imprecision resulting in the merging of distinct concepts such as valuation, privatization and commercialization under the broader rubric of commodification. As we have seen above, these concepts represent interrelated but well-differentiated aspects that are linked to different stages of the commodification process. Disentangling this confusion involves two tasks. The first consists of clarifying these concepts at the theoretical level. The second involves analysing how these processes co-evolve, interact and reinforce each other when examined in a specific institutional setting or sociopolitical context.

The key difference between economic framing of the environment and valuation resides in the distinction between goods/services and commodities, and between use value and exchange value. Goods and services refer to any object or act with the capacity to fulfil human needs or wants. By definition, goods and services, and by extension all ecosystem services, are useful for humans and therefore have use value. However, only the subset of ecosystem goods and services produced for sale or for exchange in markets are commodities. Besides having a use value, commodities also have exchange value, which in our economy generally is expressed in the form of money. The first relevant implication to be extracted from this analysis is that framing the environment economically, i.e. conceptualizing ecosystem functions as services, does not involve in principle any form of monetary valuation.

Second, valuation and commodification are not equivalent concepts. Modern political economy defines commodities as ‘products that are produced to be sold on markets’ (Polanyi, 1944/1957: 127) or simply as ‘any object intended for exchange’ (Appadurai, 1986: 9). This definition is consistent with the one offered by classical economists. For example, Marx defines commodities as ‘any product with the capacity to satisfy human needs of any kind’ (Marx, 1867/1965: 3), but adds later that to become a commodity ‘such a product has to pass from one hand to another, through an act of exchange’ (Marx, 1867/1965: 9). Thus, the second relevant implication that follows from these definitions is that assigning an economic value to an object or act does not automatically involve commodification. Valuation is a necessary but not sufficient condition for commodification, as valuable goods and services have to be alienable in order to become commodities. In other words, a complementary institutional structure that allows appropriating ecosystem services (property rights) and their sale or exchange (a market) has to exist before commodification can

take place (Gómez-Baggethun et al., 2010). The demarcation between economic framing of the environment, monetary valuation and commodification as distinct processes is thus consistent from a theoretical point of view. As we shall see, however, the distinction between these processes partly fades when analysed within the broader political, institutional and economic context in which ecosystem policy and science operate, with a special intensity since the late 1980s.

### *3 Institutional setup and valuation outcomes*

The institutional setup in which environmental science and policy operate provides the basic matrix that shapes the application of valuation outcomes. Because in market economies the institutional and economic framework often favours that environmental decisions are made with cost-benefit analysis (Salzman and Thompson, 2007) environmental science and policy have evolved within terminologies and logics that are relevant to this dominant framework (Peterson et al., 2010). Thus, whereas in theory it is possible to advocate the monetary valuation of ecosystems without commodifying them, in practice we see more realism in the statement that ‘valuation is only one stage of a two-stage process’, the second of which would be to ‘devise ways in which those valuations can be realized as cash flows’ (Pearce, 2002: 4) – i.e. by developing ways of transforming ecosystem services into real commodities. In fact, in the decade that followed the mainstreaming of ecosystem service valuation in the 1990s, we have witnessed the exponential establishment of market instruments for conservation, such as PES schemes (Gómez-Baggethun et al., 2010; Spash, 2010). In many cases the successful functioning of such instruments has involved the commodification of regulating ecosystem services, such as carbon sequestration and watershed regulation (Corbera et al., 2007; Pagiola, 2008).

Since valuation outcomes are inevitably attached to the ideological and institutional

structures in which environmental policy operates, valuation practitioners cannot expect monetary figures to be neutral in relation to the process of nature commodification. In the context of ongoing privatization, monetization of ecosystem services will act directly or indirectly as a precondition and driver of commodification.

## VI Conclusions

Traditional conservation strategies have been shown to be insufficient to reverse biodiversity and habitat loss and we support the environmental movement's attempt to improve the effectiveness of conservation efforts through novel means. We believe that the idea of ecosystem services is a powerful concept that can advance the ontological position that ecosystems are not only a matter of ethics and aesthetics, but also a basic condition for human life and subsistence (Gómez-Baggethun and de Groot, 2010). Our criticism is not directed at the ecosystem service concept itself, but at the belief that economic valuation will solve the problems and shortcomings of traditional conservation. More specifically, we claim that within the ideological, institutional and economic context in which ecosystem services science operates it is not realistic to assume that monetary valuation can be used without acting as a driver of commodification. Appraisal of valuation cannot be detached from the analysis of the sociopolitical processes through which the market expands its limits and through which economic value colonizes new domains. Monetary valuation of ecosystem services does not equate to commodification of ecosystem services, but it paves the way (discursively and sometimes technically) for commodification to happen.

A question that remains open is whether the process and outcome of economic valuation can be blamed for failure if institutional setups are inadequate or lopsided. This question takes us back to the old epistemological debate on the political and ideological neutrality of scientific

frameworks and tools (see, for example, Myrdal, 1970, 1978; Söderbaum, 1999; Weber, 1919, 1978). Although exploration of this question is beyond the scope of this paper, we believe that economic framing of the environment and monetary valuation methods cannot be considered neutral tools. Concepts like natural capital and ecosystem services set human-nature relations into one of utility and exchange, thereby expanding the economic rationality of the profit calculus into the sphere of ecosystems and biodiversity. Similarly, valuation methods frame choices within a narrative of scarcity, efficiency and profit maximization (Vatn, 2005; Vatn and Bromley, 1994), often serving as metrical technology for the commodification of ecosystem services (Robertson, 2006). Through the effort it has put into monetary valuation of market-based instruments, the ecosystem service approach has served, often against the will of its promoters, the market conservationism agenda of ecosystem services commodification. This is the tragedy of well-intentioned valuation.

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