Journal of Environmental Management 159 (2015) 245–253

Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman

Research paper

Re-establishing an ecological discourse in the policy debate over how to value ecosystems and biodiversity

Clive L. Spash [a], Iulie Aslaksen [b, *]

[a] Institute for the Multi-Level Governance and Development, Department of Socio-Economics, WU Vienna University of Economics and Business, Gebäude D4, Welthandelsplatz 1, 1020 Vienna, Austria
[b] Statistics Norway, P.O. Box 8131 Dep, 0033 Oslo, Norway

ARTICLE INFO

Article history:
Received 21 March 2012
Received in revised form
20 April 2015
Accepted 22 April 2015
Available online 28 May 2015

Keywords:
Biodiversity policy
Ecological discourse
Ecosystems
Environmental management
Nature index
Social ecological economists

ABSTRACT

In this paper we explore the discourses of ecology, environmental economics, new environmental pragmatism and social ecological economics as they relate to the value of ecosystems and biodiversity. Conceptualizing biodiversity and ecosystems as goods and services that can be represented by monetary values in policy processes is an economic discourse being increasingly championed by ecologists and conservation biologists. The latter promote a new environmental pragmatism internationally as hard-wiring biodiversity and ecosystems services into finance. The approach adopts a narrow instrumentalism, denies value pluralism and incommensurability, and downplays the role of scientific knowledge. Re-establishing an ecological discourse in biodiversity policy implies a crucial role for biophysical indicators as independent policy targets, exemplified in this paper by the Nature Index for Norway. Yet, there is a recognisable need to go beyond a traditional ecological approach to one recognising the interconnections of social, ecological and economic problems. This requires reviving and relating to a range of alternative ecologically informed discourses, including an ecofeminist perspective, in order to transform the increasingly dominant and destructive relationship of humans separated from and domineering over Nature.

1. Introduction

At the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD) held in Nagoya, Japan, 18–29 October 2010, new ambitious targets were set: "By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced" (UNEP, 2010a). Yet the loss goes on, as reported by The Living Planet Index—measuring more than 10,000 representative populations of mammals, birds, reptiles, amphibians and fish—there has been a decline by 52 per cent since 1970 (WWF, 2014). Two key open questions remain ever present: How are targets to be met? How are potential conflicts with other societal goals to be addressed? A primary concern in this policy debate has always been the divide between the values of conservation/preservation and economic growth and industrial development.

Thus, for example, deforestation has accelerated the loss of biodiversity as governments and multi-nationals exponentially increase resource extractivism. Growth and profit seeking prioritise the short term financial interests of developers and corporations (e.g., see investigative reports by Sumatra based Eyes on the Forest www.eyesontheforest.or.id). Conversion of old growth forests to mono-culture palm oil production destroys habitat, threatening species existence (e.g. orangutans in Borneo and Sumatra) and pushes forest communities off their land. Besides the food product market, palm oil production has been growing to supply 'clean Green fuel' from plantation forest which (having removed the original land use) may then claim to be 'sustainable' sources of palm oil. Palm oil production is big business and spreading rapidly in South East Asia (Indonesia, Malaysia and Thailand) and Africa (Gasparatos et al., 2012). Conflicts between developing new industrial agricultural production, and the negative impacts on biodiversity and local people are described as necessary trade-offs. Nothing new there, but what has been changing is the role of ecologist and conservation biologists in the general conflict over development and values as they adopt a new environmental pragmatism (Spash, 2009).

* Corresponding author.
E-mail address: iulie.aslaksen@ssb.no (I. Aslaksen).

http://dx.doi.org/10.1016/j.jenvman.2015.04.049
0301-4797/

This is exemplified by the Nature Conservancy in the USA which, under its director, ecologist, Peter Kareiva, advocates widespread use of biodiversity offsets in "development by design, done with the importance of nature to thriving economies foremost in mind" (Kareiva et al., 2012). In this framing, conservation should not pursue the protection of biodiversity for its own sake, but rather as instrumental to providing economic benefits. Traditional conservation is painted as the enemy of the poor. "In the developing world, efforts to constrain growth and protect forests from agriculture are unfair, if not unethical …" (Kareiva et al., 2012). A moral righteousness is evident in the necessity of poverty alleviation achieved through a very particular form of economic 'development'. The recommendation is that: "Instead of scolding capitalism, conservationists should partner with corporations in a science-based effort to integrate the value of nature's benefits into their operations and cultures." (Kareiva et al., 2012). Such strong rhetoric in favour of traditional economic growth via resource extractivism, under a capital accumulating corporate imperialism, firmly places Nature and human labour in the role of resources to be exploited by the best available technology. The advocacy of the neoliberalisation of Nature, as a conservation strategy, is indicative of the increasing dominance of a narrow economic discourse (Arsel and Büscher, 2012).

As part of this trend, the arguments of environmental economists have come to the fore in conservation. Their position is that markets can work well to allocate resources efficiently, but that all costs and benefits must be taken into account. This means calculating social and environmental costs and internalising the resulting values within the institutions of the market place. That there are unpriced objects in the world is then the central problem that must be corrected by calculating hypothetical market (shadow) prices. This is meant to allow optimal resource management decisions to be taken on the basis of a comprehensive understanding of the financial consequences of all possible actions. Environmental management then becomes a form of accountancy.

Ecologists and conservation biologist have for some time been engaging in the realm of economic discourse both in terms of the subject matter, its language and concepts (e.g., Daily et al., 2000). Increasingly, Nature has become capital, ecosystem structure and functions have become goods and services, and what was valued in its own right requiring protection has become instrumental for providing consumers with utility. Simple money numbers, ideally large and aggregated (e.g., Balmford et al., 2002; Costanza et al., 1997), are seen as using the economic language of business and politics. The UNEP, European Commission and branches of various governments (German, Norwegian, Swedish, Japanese) have supported a major international initiative to establish a dominant monetary value discourse under the title of *The Economics of Ecosystems and Biodiversity* (TEEB), with the central aim of "mainstreaming the economics of Nature" (TEEB, 2010). Most recently international support has been given for an experimental accountancy approach which shifts uneasily from physical measurement into monetary valuation, where apparently all the world's assets (whether human, natural or social) are to be conceptualised as capital to be made commensurable and traded-off one for the other as necessary (United Nations, 2013). In the world of the mainstream economists and accountants, everything has a price and nothing is sacrosanct or inviolable.

More than this, biodiversity values can be 'captured' by developing new financial instruments which represent units of biodiversity that can be traded and bought to offset the impacts of development (UNEP Finance Initiative, 2010). As Sullivan (2012 p.9) states: "Monetisation here is the process whereby something can be converted into money, and thus behave as a commodity that can be exchanged for a monetary payment. A key strategy [in promoting monetisation] is the recent discursive shift towards the use of language that brings ecology into the domains of economics and accountancy." We might well ask why natural scientists are prepared to effectively drop their own language in favour of this economic and finance discourse? This has little to do with a traditional scientific understanding of biodiversity or ecosystems or indeed the discourse of ecology that helped establish the modern environmental movement.

The central aim of this paper is to explain and characterise three different approaches that currently coexist and compete in framing ecosystems management and biodiversity policy, and contrast these with a needed fourth approach. In Section 2, we argue traditional ecology remains highly relevant as an independent policy approach, via the use of biophysical indicators, as exemplified by the Norwegian Nature Index. Section 3 explores orthodox environmental economics, based on welfare theory, as providing a discourse spread by academic economists and used rhetorically by various interest groups. In Section 4 we describe how ecologists and conservation biologists have also adopted elements of this discourse as a pragmatic strategy. This has increasingly shifted debate to discussing conservation and management in terms of both monetary valuation and value capture via market-based governance. Problems with all three existing discourses, and the way in which they frame environmental policy, lead us to suggest the need for a new approach whereby social, ecological and economic goals are brought together without reducing one to the other. The potential for such an approach is sketched in Section 5. We close by reflecting upon all four positions. In Table 1 we offer, as a guide to the reader, a summary of key points raised, and referenced in the text, relating to the approaches of traditional ecologists, environmental economists, new environmental pragmatists, and social ecological economists.

2. Ecosystem management and biodiversity policy as an ecological discourse

Ecologists helped establish the importance of natural systems structure and functioning (e.g. nutrient cycles) as a fundamental basis for the survival and health of the inhabitants of Earth. The ability of humans to contaminate systems, disrupt functions and create unintended consequences (e.g. bioaccumulation of toxic chemicals) was a message initially ignored and eventually accepted. The scientific evidence became overwhelming from DDT in the food chain to nuclear tests contaminating mother's milk. Yet, ecologists and others had to fight hard to get the message across. For example, long range transport of air pollutants was denied and needed empirical evidence before acidic deposition was taken seriously. Linking fossil fuel combustion to the death of forests and lakes took even longer, and was again denied as possible by polluting sources (e.g. coal fired power stations) and nations (e.g. USA, Germany, UK). Ecological understanding helped emphasise the role of complexity and strong uncertainty (ignorance and social indeterminacy) in public policy formation and the need for precaution (European Environment Agency, 2013). This recognised that destroying and/or degrading natural systems' richness and functioning could lock human society into undesirable, unintended and irreversible consequences.

Long-term adaptations of ecosystems to changes in climate and other environmental variables then became linked to dependence upon available biodiversity (Christensen et al., 1996). The basic idea being that when ecosystems' processes are subject to disturbance or shocks, greater biodiversity improves stability (resistance) and the ability for recovery (resilience). For example, multiple species with similar capabilities allow for redundancy so that loss of one will not disturb ecosystem functioning. However, the complexity of

Table 1
Contrasting approaches to ecosystem management and biodiversity policy.

	Traditional ecologists	Environmental economists	New environmental pragmatists	Social ecological economists
Knowledge Generating Process	Expert led; Closed	Expert led; Closed	Expert led; Closed	Expert/Lay; Closed/Open
Metrics	Biophysical	Monetary	Monetary	Multiple criteria; Biophysical; Social; Economic
Information Presentation	Disaggregated	Aggregated	Aggregated	Disaggregated
Data Source	Primary & secondary data	Primary & secondary data	Secondary data	Primary & secondary data
Method of Value Articulation	Biophysical index	Stated/revealed preferences; Benefit transfer	Value transfer	Participatory; Deliberative; Inclusive
Value Basis/Ethics	Instrumental; Intrinsic	Preference utilitarian	Instrumental; Hedonic	Value pluralism
Policy Instrument	Regulation	Prices	Prices; Innovative financial markets	Institutional design
Policy Goal	Biodiversity protection; Conservation	Efficiency; Economic growth	Economic growth; Corporate profits; Financial returns	Harmony with Nature; Care; Respect; Meaningful lives

the relationship, between ecosystem functions and the biodiversity that supports them, raises numerous challenges (Mace et al., 2011). Managing the mix of genetic, species and ecosystems diversity that constitute biodiversity and deciding on what should not be lost (let alone what humanity cannot afford to lose) is far from straight forward. Yet, these are exactly the problems ecologists and conservation biologist (amongst others) have been directly tackling for decades using expert judgement and scientific understanding.

The Nature Index for Norway provides a recent example of a traditional ecological approach being put into practical use for policy and exemplifies some of the challenges (Nybø, 2010; Nybø et al., 2012; Skarpaas et al., 2012). This is described as a comprehensive integrated management tool combining 300 biodiversity indicators and aiming to inform management targets (Certain et al., 2011). For each indicator the current state is compared to a reference, representing a given interpretation of intact ecosystems. The ideal reference state, or highest quality environment, is unlikely to be a policy target for biodiversity because of human interaction with and use of ecosystems. Hence, there is a crucial distinction between a reference value and an environmental management target, aimed at representing an acceptable level of intervention in ecosystems structure and functioning.

Just from this simple introduction issues start to arise. The aggregation of the index raises concerns over the comparability of different measures and the meaning of an aggregated measure. That is, creating a single number to represent the state of Norwegian biodiversity would combine the state of say forests and marine fisheries, let alone different fisheries and different forests. Deciding the appropriate level of aggregation involves not only claiming commensurability but also impacts on the potential use of the index. Is the index a number for aiding management, highlighting problems or creating newspaper headlines? If disaggregation is maintained then at what level?

The Nature Index chose to avoid a single headline number and remain disaggregated at the level of nine major habitats: mountain, forest, mires and wetland, freshwater, open lowland, coast pelagic, coast bottom, ocean pelagic, and ocean bottom (Certain et al., 2011). Disaggregated indices allowed public communication about specific narratives concerning biodiversity, e.g. in mountains the role of small rodents, birds and the impact of reindeer grazing. This approach has been described as informing the public by the use of multiple narratives about the meaning of the data (Aslaksen et al., 2012). This may also highlight the relatively poor performance of a given sector and create public debate over policy, as actually happened for forestry on first release of the Index.

Then there is the issue of the reference state and how this should be determined? What is the ideal richness and diversity of a natural system? Does this include humans or not? What about systems which require human activity? Clearly answering these questions involves considerable judgement and can easily lead into conflicts over the appropriate approaches, especially where there are substantive social and economic implications.

In the natural science tradition, the Nature Index appealed to three information sources namely expert opinion, models and monitoring data (Certain et al., 2011). Construction of the Index involved 125 experts in ecology and conservation biology. An innovative aspect was engaging experts in forecasting trends in biodiversity 10 years into the future (to 2020). At the same time the role of judgement was recognised along with the need to explicitly address the uncertainty involved in these expert assessments.

Uncertainty was dealt with by asking experts to give their personal evaluation of the degree of uncertainty in the data they provided. Eliciting an overview of biodiversity is a complex process involving discussions about concepts, methods, uncertainties and values, and this complexity permeates the construction of the Index far beyond being a technical exercise (Aslaksen et al., 2012). Challenging experts to adopt a forward-looking approach is a first step to enhancing the knowledge basis for “early warnings” to be applied for precautionary policies (European Environment Agency, 2013). The Nature Index is being used in Norway to provide a non-monetary, biophysical indicator that makes Nature visible for policy makers and creates debate on some critical aspects of policy.

How to engage in public debate is at the crux of the divergence between seeing biophysical indicators as essential or redundant in public policy. Ecologists define ecosystem functions as biophysical system traits, independent of human preferences (Lubchenco et al., 1991). Ecosystem management does not then focus primarily on the delivery of goods and services for human use, but rather on the sustainability of ecosystems. Under a traditional ecological approach:

> “Ecosystem management is management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem structure and function”. (Christensen et al., 1996 p.669)

This type of approach derives from a specific philosophy of science that involves belief in objective truth, separation of facts from values and designation of expert judgment as independent from political process.

The overall thrust of that scientifically informed approach has traditionally been quite powerful. However, this has also been increasingly brought into question in a postmodern world where strong social constructivist positions claim all knowledge is culturally relative and politically loaded. Politically, expert processes are seen as top-down and potentially undemocratic. Experts

are then criticised as holding implicit value judgments that bias their scientific understanding and for making-up their own reality. The counter to this is to call for open and transparent processes of knowledge creation, that involve the public in public policy and allow them to critically appraise the content and quality of scientific positions in open fora (e.g., van der Sluijs et al., 2005). In a given context, this might, for example, expose the mix of underlying intrinsic and instrumental values in ecology that Naess (1973) termed deep and shallow, respectively, and raise questions over whether and how to address them.

Maintaining an independent ecologically informed policy discourse is then something that has become increasingly challenged. More than this ecologists themselves have begun to question their role in the policy process. The concern is explicitly regarded as speaking the wrong language. As ten Brink (2006 p.4), who provided biophysical data for TEEB, states: "While economists and policy makers speak the same language, ecological scientists appear to be in a different world, governed by different rules."

3. An environmental economics discourse

Mainstream economics prioritises the efficient allocation of resources as a policy goal set within a framework of increasing human well-being through production and consumption (i.e., economic growth). Environmental economists working on biodiversity policy are essentially worried that too many resources will be wasted on saving bits of Nature that nobody values. From this viewpoint, some things are just not worth saving and especially so if they can be substituted for by something else which is cheaper. Such economists therefore discuss the policy debate in terms of the optimal extinction of species and back their arguments with highly abstract mathematical models (e.g., Swanson, 1994). The discourse is framed in terms of textbook supply and demand theory. Supplying life is costly and if there is inadequate demand to meet the cost then life should not be supplied.

In this mode of reasoning environmental economists contrast the benefits of any action, to say preserve or protect species, against the costs, of that protection. Costs here include opportunity costs, that means any alternative possible use of resources that anybody might conceive. For example, a given land area for species preservation might alternatively be used for housing, roads, dumping waste, mining minerals or any number of human activities. The counter weight to such development is the value of the benefits offered by Nature from maintaining an environmental status quo. Markets fail to take social benefits into account which means they should be calculated and internalised (e.g. using taxes) so that price signals can work. Those social benefits are almost exclusively now reduced down to what people are willing to pay, even though in theory the correct question should be what compensation they would be willing to accept (Knetsch, 1994).

In an effort to include all the social benefits in an aggregate total environmental value, economists have become ever more inventive at creating new value concepts (e.g. option, bequest and existence values). Producing numbers that can claim to be related to non-market, social values has then required developing new valuation methods (e.g. travel cost, hedonic pricing, production function analysis, contingent valuation, choice experiments). Over the last 50 years this research has encouraged extension of the categories of objects being assessed, moving from recreation and tourism, to air and water quality, to health and safety, to peace and quiet, to aesthetics, to the cultural and historical, and finally to ecosystems functions and biodiversity. Economists redefine ecosystem functions as the capacity to provide goods and services as tangible and quantifiable outputs. Those outputs are only valuable if individuals prefer to pay for them to avoid their loss rather than doing something else with their money.

This journey has involved moving from assessing direct use values for recreation using actual expenditures via travel cost methods to attributing existence values for biodiversity loss using choice experiments. When original studies prove too difficult, or expensive, numbers are lifted from previous work, termed benefit transfer. Even within economics the uncertainty over the content and meaning of the numbers being produced has increased, raising serious questions about their validity (Spash, 2008a; Spash and Vatn, 2006). Yet, despite severe limitations and numerous problems the methods of environmental cost-benefit analysis have been extended well beyond their theoretical bounds in microeconomics as measures of marginal change in economic welfare.

This mainstream economic approach to the environment is essentially predicated on the mistaken belief that all choices are trade-offs between competing human preferences (Holland, 2002; Spash, 2008b). Preferences are taken to be what determines peoples' demand and willingness to pay, and those preferences cannot and should not be questioned because people are assumed the best judge of their own interests (as noted by Easterlin, 2003). Allowance might be made for better informing people, but this should somehow avoid forming preferences, otherwise individuals would be unable to make independent choices and the implicit liberal political foundations of economics would crumble. The application of this approach to the environment reduces complex ethical questions—such as whether elephants, tigers, bees or phytoplankton should have a place on the planet—to a matter of personal preferences. Once all choices are made analogous to consumer desires or wants then optimal species extinction (as discussed, for example, by Swanson, 1994), becomes little different from choosing between flavours of ice cream (see Sagoff, 2004). You just need some basic product information, a means of payment and an institution that delivers the product when you pay.

4. A developing pragmatic financial discourse

Most ecologists and conservation biologists have little of no training in economics and political science. They have traditionally opposed economic exploitation via excluding land from human use and seeking legal, planning and regulatory restrictions to protect species, habitat and ecosystems. The move to engage in an economic policy discourse represents a strategic and political decision that can then be regarded as being based upon a form of simple pragmatism (Spash, 2008b, 2009, 2013). That is, believing that environmental concerns lack a voice at the political table and that modernity is obsessed with economics is meant to justify changing to the language of money and finance as a necessary evil; a key to political power that ecologist think they can grasp.

The idea that ecology and conservation biology must compete with the power and prestige of economics has led to the popularity of economizing the language of ecology. Following the Millennium Ecosystem Assessment (MEA) the term "ecosystem service" became widespread and increasingly gained influence as a central policy metaphor. Taxonomic divisions have then been employed in order to aid the conceptualisation of Nature as capital and ecosystems as services (including the cultural and spiritual). Clearly, such "classification is inherently somewhat arbitrary" (Brauman et al., 2007 p.69), but this does not prevent the ongoing effort to represent everything in monetary terms.

The over extension of environmental economics has done little to deter natural scientists and non-economists from becoming proponents of money values, and their lack of concern over economic theory means employing ever cruder methods. Two highly controversial studies, both with natural scientists as lead authors, have made claim to have assessed the monetary value of the

World's ecosystems (Costanza et al., 1997) and all remaining wild Nature (Balmford et al., 2002). In the United States, the ecosystems services approach has been promoted, amongst others, by ecologists Paul Ehrlich and his student Gretchen Daily (e.g., Daily, 1997; Daily et al., 2000). The services approach perceives of an entity having value only in as far as it has a productive, service providing, role to play in the economy. The result has been adoption of an exclusively instrumental value discourse.

Pragmatically driven supporters may themselves have considerable doubts about this approach. For example, Sodhi and Ehrlich (2010 p.4) claim most ecologists have switched to the "admittedly risky instrumental arguments for conservation", and recognise the dangers of "promoting instrumental approaches that might backfire or be effective in only the short or middle term". Indeed, focussing on value instrumental for human utility is a "tactical issue", rather than a recommended ethical system. New environmental pragmatists may also be aware that the numbers they are helping to create lack scientific credibility and meaning. However, that is not the point. If their environmental concerns get a new voice in the political arena then that is justification enough.

So now the value of Nature is the services it can provide the economy as a productive employee. For example, the total economic value of agricultural pollination by wild insects is estimated at about €150 billion (Gallai et al., 2009). Conservationists presumably believe such big numbers will protect species like wild bees, but they should reflect upon the history of economic ornithology. In a forty year period (1880–1920) over 1000 studies calculated the value of services provided by birds, but this failed to prevent the replacement of their services (and loss of birds) due to new human technology, namely insecticides and pesticides (Kronenberg, 2014). Valuing the services of bees is not equivalent to valuing bees themselves.

The TEEB (2010) project is the most international and widespread advocacy of the approach so far. This has been headed by Pavan Sukhdev, a Managing Director in the Global Markets division at Deutsche Bank, who prefaced the interim report with his personal philosophy of 'you cannot manage what you cannot measure' (TEEB, 2008 p.6). The project proposes monetary valuation of ecosystem services (excepting possibly life support functions and 'spiritual values'), benefit transfer and reducing intergenerational ethics to a variable discount rate (TEEB, 2008 pp.33–36). The expressed purpose of TEEB is to incorporate the economic values of Nature into decision making at all levels using market pricing (TEEB, 2010 p.3, p.14). The synthesis report states the intention of:

> "**creating a common language** for policymakers, business and society that enables the real value of natural capital, and the flows of services it provides, to become visible and be mainstreamed in decision making". (TEEB, 2010 p.24 emphasis original)

Others have made similar statements. For example, Carpenter et al. (2006 p.258) claim "Valuation translates ecosystem services into terms that decision-makers and the general public can readily understand", and reference support for this from the National Research Council report *Valuing Ecosystems Services: Toward Better Environmental Decision-Making* (Heal et al., 2005).

TEEB employs the environmental economics discourse on 'getting the prices right' to allow markets to function efficiently. This involves explaining that, waste sinks have no cost for the private sector, and non-market benefits provide no reward to the market investor. In this framing private companies that destroy and pollute are innocent victims of a failing price system and cannot be blamed because they lack the right incentives for ecologically sustainable management. So, we are told that: "Companies do not clear-cut forests out of wanton destructiveness or stupidity. On the whole, they do so because **market signals** […] make it a logical and profitable thing to do" (TEEB, 2010 p.9 emphasis original). The economic framing is also advocated on the grounds that otherwise politicians will fail to take into account the 'right' values: "ignoring or undervaluing natural capital in economic forecasting, modelling and assessment can lead to public policy and government investment decisions that exacerbate the degradation" (TEEB, 2010 p.10).

The value estimates produced by TEEB, and the highly cited studies in *Nature* and *Science* led by ecologists, rely heavily on value transfer methods not original studies. For example, estimates of a specific class of ecosystem may be taken from previous studies then averaged on a per hectare basis and applied to all such ecosystems no matter where or when. There is little attention to alternatives or problems (Spash and Vatn, 2006). The strong focus on financial values coming out of TEEB aims to promote economic growth and "capture values" for profit maximisation, rather than protect ecosystems, species or biodiversity. The monetization of ecosystems claims to show politicians the way to a 'green' economy: "investment in natural capital can create and safeguard jobs and underpin economic development, as well as secure untapped economic opportunities from natural processes and genetic resources." (TEEB, 2010 p.10). The motto is: "pro-biodiversity investment the logical choice".

This new environmental pragmatism makes ecosystems into commodities, or capital investments with a rate of return, in a way that provides corporations and financiers with business opportunities and intertwines the policy area of biodiversity policy and ecosystem management with financial markets: "Hardwiring biodiversity and ecosystems services into finance" (UNEP Finance Initiative, 2010). It extends the mechanisms of carbon trading and expands financial instruments to create biodiversity banking and offset programs to trade financially in biodiversity loss (Spash, 2009, 2011; Sullivan, 2012). An indication of the treasure trove awaiting to be unlocked is the market for wetland credits with estimated turnover of US$1.1–1.8 billion (TEEB, 2010 p.24).

The spread of such financial instruments is part of an international political project aimed at the neoliberlisation of Nature (Arsel and Büscher, 2012). Thus, at Rio+20 the Natural Capital Declaration was launched as a financial sector, CEO endorsed, initiative to mainstream natural capital into loans, bonds, equities and insurance, as well as accounting and reporting frameworks; internationally 44 financial institutions are signatories. This provision of financial rewards is presumed to outweigh the numerous problems associated with the use of biodiversity offsets (Spash, 2015; Sullivan, 2013) and ecosystem services (Gomez-Baggethun and Ruiz-Perez, 2011; Redford and Adams, 2009), and their orientation towards the continued expansion of economic growth, capital accumulation and financial markets (Norgaard, 2010; Spangenberg and Settele, 2010).

5. Social ecological economics: institutions, value and ethics

Social ecological economics has in part developed as a response to the trend for expressing values of Nature predominantly in economic and monetary terms. This questions the assumptions underlying valuation work in environmental economics (O'Neill, 1993; O'Neill and Spash, 2000; Soma, 2006; Vatn and Bromley, 1994). The economic logic of imposing commensurability and choices as trade-offs is that harm is treated as a financial cost that in principle can be compensated by payment. Good acts are those producing net gains once victims have been paid-off. As Martinez-Alier (2002) has noted, the poor sell cheaply so this approach allows the rich to do what they want. This is why the social aspect cannot be left out of the policy debate either by adopting a scientific

expert approach or a market driven economic discourse about efficiency. Neither can environmental issues be regarded as some luxury item for the rich because the poorest most of all depend directly for their daily health and well-being on the quality of ecosystems functions and structure.

The use of simplistic value transfer methods, as in TEEB, is in itself highly problematic (Spash and Vatn, 2006). In addition, the approach contradicts the thrust of valuation theory in social ecological economics and replaces recognition of incommensurability and value pluralism calling for multiple criteria assessment (Martinez-Alier et al., 1998), with a universal monistic money measure (e.g., see criticism by Norton and Noonan, 2007). However, even within ecological economics new environmental pragmatism appeared forcefully with the Costanza et al. (1997) study. Advocates of ecosystem services valuation hold an implicit model of human behaviour and political process. Thus, Costanza (2006 p.749) states "I do not agree that more progress will be made by appealing to people's hearts rather than their wallets". In this case the model of human motivation is psychological egoism i.e., "the claim that people are incapable of regarding as important anything other than their own interests" (Holland, 1995 p.30).

This runs counter to the evidence for multiple values and the motives behind environmental valuation (Spash, 1998, 2000b, c; Spash et al., 2009). In the context of work on contingent valuation of biodiversity and ecosystems the occurrence of refusals to trade-off, rights-based beliefs and lexicographic preferences all bring into question the use of economic logic, let alone new environmental pragmatism. For example, on being given options between rights-based and economic consequentialist motives for explaining their stated willingness to pay, for wetland re-creation to protect bird species, over 37% of respondents agreed with the statement: "Such endangered species need protection because they have a right to life which cannot be traded against economic considerations" (Spash, 2000a).

While rejection of the money motive and refusals to trade-off may seem strange and inexplicable to some ecologists, and most economists, they are in fact widely recognised in a variety of literature. Similar concepts arise in terms of intrinsic values in philosophy, protected values in psychology, taboos in anthropology, and sacred values in various religious and spiritual traditions. This position is also strongly reflected in deep ecology (Naess, 1973). Shallow ecology can be summarised as a fight against pollution and resource depletion, framing Nature in terms of instrumental values, with a central objective of health and affluence for the 'developed countries'. Deep ecology appeals to the intrinsic values of Nature, suggesting a relationship between the human and nonhuman world reflecting an ethics of responsibility. The problem of modernity is how to allow for and respect these values.

Promotion of a specific value articulating institution can then be seen to have unintended consequences. Money has a fundamental influence on human perception of value and may lead to crowding-out of desired behaviour and non-market considerations. More than failing to reflect important values, a strong reliance on the monetary approach can be destructive e.g., undermining community values (Claro, 2007). At stake is the fundamental ethical concern over the commodification of Nature: "If the valued goods that give richness to our lives are reduced to commodities, then what makes those lives meaningful is itself betrayed" (Funtowicz and Ravetz, 1994 p.197). The contradictions, conflicts and plurality of values require institutions that allow them to be expressed (Vatn, 2005). More than this the actors holding these values need to be empowered.

The fundamental issue being raised here is how human-Nature relationships should be expressed and can evolve in a sense of care and respect rather than exploitation and dominance. Civilization has evolved at the cost of losing the "body's silent conversation with Nature" (Abram, 1996 p.21). Losing the language of Nature, we are impaired in developing a language of ecology. Loss of beloved Nature has been argued to lead to a psychological state of denial of that loss (Nicholson, 2002). This calls for a transformation in human understanding of our relationship with the natural world.

In pre-modern cultures people view themselves as part of the wider community of Nature in active relationships with animals, plants, landscapes, mountains, rivers, wind and weather patterns, and it is only in recent centuries that humanity has come to think of Nature as an inanimate object or, even more recently, as a human artefact. Western rationalism is too quick to condemn alternative claims to understanding Nature as asserting "super-natural" powers. This discards conviviality with Nature, a recognition of non-human sentience and the continuity between humanity's physical and spiritual connection to Nature (Abram, 1996).

Feminist philosophy and ecofeminism have drawn attention to how the cultural and societal devaluation of feminine and Nature values are intertwined (Merchant, 1980; Plumwood, 1993; Shiva, 1988). Part of the feminist perspective is the emphasis on relationships, interdependence and the role of caring in sustaining and reproducing society. Feminist economists have pointed out the parallel between the economic and political invisibility of Nature in supporting humanity and women's care work—echoed by the invisibility of indigenous cultures and of the poor (Mellor, 2005; Nelson, 1992; Waring, 1989). The economic conceptualization of Nature reflects a division or "hyperseparation" between humans and the non-human world (Plumwood, 1993, 2008). Nelson (1992) questions the implicitly gendered thinking about rationality, agency and values underlying economics. The idealised economic model describes individuals as autonomous entities operating in an economy that has no biophysical reality, let alone a conceptualisation of human-Nature relationships. Economics is embedded in a dominant patriarchal, dualistic and hierarchical structure that defines a world of opposition with humans vs. Nature and men vs. women.

A new transformative approach is called for that recognizes connection and relation to others and the natural world, as well as separateness and individualism, in the complex of elements fundamental to human identity and fulfilment.

> "A transformative feminism would involve a psychological restructuring of our attitudes and beliefs about ourselves and 'our world' (including the non-human world), and a philosophical rethinking of the notion of the self such that we see ourselves as both co-members of an ecological community and yet different from other members of it" (Warren, 1989 p.19)

This appeal for a transformative approach, that integrates the social and economic with the ecological and sustainable, is a vision of human society and Nature in balance. Rather than the economy being seen as an independent entity a social ecological economic ontology recognises the ordered structure of reality in which the economic is embedded in society which is in turn embedded in the biophysical.

The transformation looks for new institutions for value articulation as well as different means for organising society to reflect the values of human-Nature relationships currently being purposefully excluded under systems of capital accumulation and resource extractivism. The mistaken presumption of new environmental pragmatism is that the global biodiversity crisis can be solved without major political will or institutional change. The prevailing use of the ecosystem service approach and neoliberal markets as 'solving' the biodiversity crisis obscures the ecological, economic, and political complexities. The policy instruments required for

biodiversity and ecosystem protection need to be framed, interpreted, and implemented in an understanding that involves "a reconfiguration of state-market-community relationships" (Vatn, 2010 p.1251).

6. Discussion and conclusions

In 1982 the UN World Charter for Nature expressed the need for protecting Nature without its translation to economic values. The approach made explicit the idea of living in harmony with Nature on an openly non-instrumental ethical basis:

> "Every form of life is unique, warranting respect regardless of its worth to man, and, to accord other organisms such recognition, man must be guided by a moral code of action" (United Nations, 1982)

The concepts of ecosystems functioning and structure that originated within an ecological discourse maintained the potential for a deep understanding and respect for Nature. However, recent policy framing has undermined the idea that humans have an ethical responsibility for protecting anything absolutely and has reduced moral considerability to instrumental usefulness.

Instead of a scientifically informed biophysical discourse we increasingly have the financially oriented and market-based strategies of new environmental pragmatists. The framing of ecosystems and biodiversity as valuable because they provide goods and services is claimed to speak directly in the language of the political and policy community. This is also meant to be appealing to the general public who are characterised as only concerned about their wallets and motivated by a narrow self-interest. There is much conjecture in this position and a lack of reflection upon the literature covering human motivation, environmental values and ethics, political science and institutions. Natural scientists who are careful and rigorous in their own fields of knowledge appear cavalier and unscientific when making pronouncements about the social, political and economic knowledge. They are also too often ready to accept economics at face value.

Environmental economic valuation is theoretically bound, problematic to apply and inapplicable in a variety of situations. Environmental change violates the requirements for a fully informed choice over a marginal adjustment in quantity or quality of a well defined object which people can be expected to readily accept as being subject to trade-offs in monetary terms. Standard economic valuation is then unable to address a range of factors such as non-marginal environmental change, conditions of strong uncertainty and ignorance, irreversibility and non-utilitarian ethics. However, for economists, seriously questioning foundational assumptions, as undertaken by social ecological economists, has for long been perceived as an out-of-bounds heretical activity, not a matter of scientific integrity. This is clear in attempts to change and reinterpret the empirical results coming from stated preference work under contingent valuation e.g., the exclusion of large numbers of respondents (Spash, 2008a). Indeed problems have not prevented new and innovative applications and methods in ever more uncertain areas, nor the development of simplistic and poorly validated value transfer methods.

New environmental pragmatism builds on this approach and goes much further. This reduces the need for theory and raises the profile of specific political goals such as economic growth, employment, financial returns and wealth creation. Mainstream economics, while maintaining a growth imperative, has attempted to avoid anything but pursuit of efficiency as a goal in order to lay claim to being scientific in the sense of physics (Mirowski, 1989). New environmental pragmatism has no such academic pretension and is purely oriented towards the continued expansion of a market-based economic system of capital accumulation. Ecosystems and biodiversity are then necessary only in so far as they create financial wealth and support the economic system.

An alternative is to agree on social minima, a suggestion found in Kapp (1978), which would form inviolable standards constraining the conduct of human activity. A crucial role then exists for biophysical indicators as policy targets with the potential for informing the policy process and overcoming the duality between neglect of biodiversity as a policy issue and a Panglossian economic discourse. The policy issues of wild Nature, ecosystems functions and the preservation of endangered species need to be placed in a different context than the financial market place. An example of the more traditional ecological approach is the Nature Index for Norway. This and similar approaches are necessary as a means for re-establishing the non-monetary ecological discourse in public policy.

At the same time we recognise the traditional ecological approach is not aimed at addressing social and economic aspects of ecosystems management and biodiversity loss. This is where a social ecological economics approach is required. A discourse which recognises explicitly the causes of biodiversity loss and ecosystems degradation, including political systems failure (despotism, corruption, regulatory capture), greed, the industrial–military complex, political and economic power of multinational corporations, poverty, pressures on land use, and population growth. The complexity of society and the perceived urgency of biodiversity loss call for new areas of deliberation and public participation in addition to those of a representative democracy.

Rather than directly addressing the causal mechanisms of environmental degradation, environmental economists and new environmental pragmatists place biodiversity loss in the context of a market failure. This gives predominance to economic valuation as a means to help rectify the situation, as exemplified by the argument that the "failure of society to place a value on nature […] has contributed to a significant decline in biodiversity" (Jones-Walters and Mulder, 2009 p.245). Hence, the argument follows that the decline of biodiversity can be remedied by using economic valuation methods to create a price tag for all Nature, or at least the bits people value (Juniper, 2012; TEEB, 2010). In contrast, the UN CBD identifies five main direct threats to biodiversity globally: habitat loss and degradation, invasive alien species, pollution and nutrient load, overexploitation and unsustainable use, and climate change (UNEP, 2010b). These threats are driven by political systems (power distribution), their failures (e.g. corruption, disenfranchisement of the weak and silent voices), population increases, and economic growth with its demand for ever more resource extraction and energy use. These are structural problems within the dominant capital accumulating political economy, as being pursued by all nation states regardless of political system. There is then a stark contrast between the understanding behind ecosystems management and biodiversity policy requirements amongst different parties.

Therein lies a central issue. Do biologists/ecologists really believe their subject knowledge is so irrelevant to public policy that it should be reduced down to some simple numbers? Do they actually believe TEEB that all necessary information for decision-making is in the asset price of the newly commodified Nature as capital, ecosystems as goods and services? More than this, what exactly is the economic and political system into which they think these values are being fed?

The new environmental pragmatism being championed by many ecologists and conservation biologists, and supported by the corporate, banking and finance communities, advocates use of the wrong methods for wrong reasons. In biodiversity policy there are

multiple incommensurable values in conflict. Oversimplification is not the answer, and single numbers are far from helpful for addressing complex problems. Economic theory has limitations, and supposed pragmatism which ignores them can only produce meaningless numbers for rhetorical purposes. Institutions which demand meaningless numbers are bad institutions whether they be propagated by the UNEP, the World Bank, the European Commission or national, regional or local government agencies, or environmental non-governmental organisations. Ecological scientists have more to offer the ecosystems management and biodiversity policy debate than a set of such pseudo-economic prices.

This is not to deny that the economic and financial discourse is powerful within society and needs to be addressed. We have argued that falling back on biophysical indicators is also inadequate. Ecologists cannot ignore the alternative discourses in society but neither should they merely adopt the language of economists and financiers as a pragmatic political strategy. There is a wider discourse in society that needs to be opened-up. Ecologist and conservation biologist can contribute, as they have done in the past, by maintaining and improving knowledge of threats to and the state of the environment. Even more importantly they can provide meaningful concepts for transforming the dominant destructive, isolationist and domineering relationship of humans with Nature.

The particular discourses circulating in society influence our sense of what is natural, including our practices. Discourses also serve to obscure or legitimate relationships of domination and subordination. Modernist constructions of Nature have produced very particular beliefs defining human (primarily male) dominance and oppositional relationships as normal and indeed inevitable. These beliefs when put into practice have real social ecological and economic consequences. They involve inequities, injustices, violation of others and harm of the innocent. At the same time humans are bound by biophysical reality and getting this relationship wrong, or denying it even exists, comes at a high price, like destruction of half the non-human vertebrate species on the planet (Spash, 2015; WWF, 2014).

The transformation necessary involves respecting the richness of human relationships with Nature, accepting complexity and uncertainty and being inclusive in social and economic policy process. This moves the biodiversity and ecosystem value debate from how best to convert ecology into economics towards what are the best institutions humanity can create that are able to articulate different values, empower silent voices and the disenfranchsed, and recognise and address issues of injustice and abuse of power. We see this as reviving core elements of an earlier ecological discourse, but also redefining the traditional environmental approach in terms of the political and social reality of the science–policy interface. At the same time this requires challenging the institutions and structures driving ecosystem degradation and biodiversity loss.

Acknowledgement

Financial support for writing of this paper was received from the Research Council of Norway, project 190054, *Sustainable development indicators in the context of the precautionary principle*.

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