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Debate

The Contradictory Logic of Global Ecosystem Services Markets

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ABSTRACT

Commodification and transnational trading of ecosystem services is the most ambitious iteration yet of the strategy of 'selling nature to save it'. The World Bank and UN agencies contend that global carbon markets can slow climate change while generating resources for development. Consonant with 'inclusionary' versions of neoliberal development policy, advocates assert that international payment for ecosystem services (PES) projects, financed by carbon-offset sales and biodiversity banking, can benefit the poor. However, the World Bank also warns that a focus on poverty reduction can undermine efficiency in conservation spending. The experience of ten years of PES illustrates how, in practice, market-efficiency criteria clash directly with poverty-reduction priorities. Nevertheless, the premises of market-based PES are being extrapolated as a model for global REDD programmes financed by carbon-offset trading. This article argues that the contradiction between development and conservation observed in PES is inevitable in projects framed by the asocial logic of neoclassical economics. Application in international conservation policy of the market model, in which profit incentives depend upon differential opportunity costs, will entail a net upward redistribution of wealth from poorer to wealthier classes and from rural regions to distant centres of capital accumulation, mainly in the global North.

SELLING NATURE TO FINANCE DEVELOPMENT?

Policies based on the monetary valuation and marketing of ecosystem services are increasingly prominent in international environmental governance (Gómez-Baggethun et al., 2010). Ecosystem services (ES) comprise the functions of ecosystems that are useful to humans: storage of carbon by soils, vegetation and oceans, habitats for plants, animals and micro-organisms, filtering of fresh water and even the aesthetic or spiritual significance of landscapes (MEA, 2005). Commodification and international trade in ES is

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the most ambitious iteration yet of the strategy of 'selling nature to save it' (McAfee, 1999).

Trade in ES is well established in the United States and Europe. Schemes for Payments for Ecosystem Services (PES), some in place for a decade in Latin America, are being expanded into Asia and Africa. They are sponsored by United Nations agencies, governments, conservationist and development-oriented non-government organizations (NGOs), and for-profit investors and brokers.[1] PES projects typically remunerate landholders for environmentally benign practices such as planting or preserving trees to serve as carbon sinks or managing livestock in ways that protect water sources or limit greenhouse-gas emissions.

Under the rubric of Reducing Emissions from Deforestation and Degradation (REDD) and REDD+, the World Bank is promoting ES payments on a grand scale as a means to engage formerly colonized regions — where states are loath to shoulder the costs of the industrial world's pollution legacy — in a global climate-change regime.[2] Currently in their early stages, REDD schemes are meant to minimize CO_2 emissions caused by deforestation in the tropics and sub-tropics and to conserve and enhance forests and peat lands as sites of carbon sequestration. REDD funds are to be paid to governments, which can opt to disburse some or all of the payments to individual landholders, corporations or communities through PES or other arrangements.

By steering public and private conservation investments toward the global South, ES trading programmes aim to use 'market instruments' to foster efficient use of conservation funds. Their core rationale is that the greatest total conservation gains will result when scarce funds are spent on activities or in places where pollution reduction or avoidance can be achieved most cheaply. ES marketing discourse echoes the neoliberal emphasis on private initiative, monetary valuation and cost–benefit analysis that has pervaded environmental policy making since the 1980s (Liverman, 2004; Okereke, 2007; Speth, 2008). How to fund PES and REDD programmes is hotly debated, but under currently leading proposals, large-scale REDD would ultimately be financed through global, for-profit carbon markets (Point Carbon, 2010; World Bank, nd.a).[3]

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1. Not all PES projects in the global South involve international transfers: some, particularly those for hydrological services and local pollution reduction, are financed by governments or ES users in the same countries where the services are produced.
2. REDD+ refers to policies and incentives 'relating to reducing emissions from deforestation and forest degradation and the role of conservation and sustainable management of forest and enhancement of forest carbon stocks in developing countries' (Bali Action Plan, 2008: paragraph 1 b iii).
3. Carbon markets involve trade in credits that allow their ultimate buyers to release a given amount of greenhouse gases into the atmosphere. Tradable carbon credits, or 'allowances', can be obtained by enterprises that emit less total GHGs than permitted under 'cap and trade' or other regulations in regions where such rules are in place. Offsets, another category

Prominent advocates assert that transnational trade in carbon-sequestration ES can not only slow global warming but can also alleviate rural poverty and help finance a transition to low-carbon industrialization in would-be developing countries (Stern, 2009; Watson, 2007; World Bank, 2010a). In effect, ecosystem services have become the latest in a long series of miracle export crops promoted as a key to economic development in the global South.

It is doubtful, however, that markets in ES can contribute to development of a kind that benefits the majority in these regions while simultaneously achieving net global conservation gains. Evidence for this has accrued from the ground-level experience of PES projects in Latin America, in which market-efficiency criteria very frequently clash with poverty-reduction priorities. A growing body of case studies indicates that cash or other material resource transfers to 'ES providers' have been minimal, or even negative in cases where landholders' costs have exceeded payments. Moreover, it has proved all but impossible to ensure that PES schemes result in actual, net avoided deforestation (Caplow et al., 2011; Pattanayak et al., 2010).

Some PES analysts conclude that PES and REDD policy must therefore eschew anti-poverty or development goals in favour of a strict focus on conservation. Others interpret PES problems as consequences of particular local conditions or of the still-experimental status of PES, proposing more finely tuned PES guidelines to address these shortcomings (Bond et al., 2009; Broughton and Pirard, 2011; Persson and Alpízar, 2011). Analysis of the theoretical claims that underpin ES marketing for conservation and development, however, reveals deeper problems. This article argues that the case for ES markets as a dual conservation and development strategy depends on contradictory premises, such that the evident tension between anti-poverty objectives and conservation efficiency is inevitable in projects framed by the asocial logic of neoclassical economics.

The following section places the controversy over PES and market-based REDD within wider debates about neoliberalization of nature and post-neoliberal development policy. In the two next sections, I summarize the origins and scope of ES markets and some of their conundrums. I then gather lessons from recent literature about PES: the deceptive characterization of PES schemes as markets, the simplistic construction of peasant and indigenous ES providers as benefit-maximizing individuals, and the pattern of tension between conservation and poverty reduction. The section that follows discusses how the conceptual framework of market-oriented PES makes conflicts between anti-poverty and market-efficiency goals unavoidable. I argue that use of opportunity-cost estimates in the design of

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of tradable credits, are generated when an enterprise takes actions or finances activities in a different location that are expected to result in increased sequestration of carbon or that prevent a certain quantity of anticipated GHG emissions.

PES schemes favours the relatively wealthy and effectively rules out the hoped-for synergy between sustainable development and markets in carbon-sequestration services. The penultimate section describes how the dubious assumptions built into market-based PES are being extrapolated to claim that global, market-financed REDD programmes can simultaneously mitigate global warming and foster development. I conclude that market-based PES practice, and analysis of the logic that supports it, demonstrate instead that market-efficiency criteria, based on opportunity cost calculations, threaten to displace the poor majority further from the means of achieving their own development.

NEOLIBERALISMS AND MARKETS IN 'NATURE'S SERVICES'

Commodification of ES, especially of carbon-sequestration services, is arguably the fastest-growing form of the neoliberalization of nature (Bakker, 2010; Castree, 2006; McCarthy and Prudham, 2004). Recent efforts to manage the multiple crises of advanced capitalism have largely been framed by neoliberalism. In the post-1970s context of slowed economic growth and intensified international competition, owners and managers of capital have sought to cut their losses and regain the momentum of accumulation by shifting geographic locations and by betting on the future through further rounds of financialization (Harvey, 1991). Neoliberal trade and investment policies have supported this effort by prying open markets in the would-be developing world and removing barriers to capital flows and restrictions on banking and investment.

Consonant with the neoclassical economic principles from which it is derived, neoliberal discourse emphasizes individual and corporate property rights and the primacy of 'the market' in determining the uses of productive resources and the distribution of what is produced. It equates the values of things with their exchange values: market prices that supposedly reflect the preferences of individual actors in the market. Applied to policy, neoliberalism diverges from its neoclassical antecedents in endorsing particular forms of economic intervention by states and supra-state institutions: 're-regulation' that supports private capital accumulation (Jessop, 2002; Peck and Tickell, 2002; Peck et al., 2010). Neoliberal development policy emphasizes the benefits of globalization and economic growth by means of competitive exporting.

Globalization on neoliberal terms has failed to deliver its promise of poverty reduction and social peace through growth (Wolf, 2004). Instead, a widening rich–poor divide both between and within world regions, along with more frequent and deeper economic crises, engenders destabilizing social upheavals (Harvey, 2010; Wade, 2005). Climate change, by disproportionally burdening the poor, is likely to exacerbate this social polarization and volatility (Storm, 2009).

One capitalist response to rising poverty and instability has been 'inclusionary' neoliberalism (Bello, 2008; Gills, 2010; Porter and Craig, 2004). In development policy, this takes various forms: payments, made conditional upon behavioural conformity, to so-called marginalized groups and to individuals deemed unable to compete; microfinance loans that promote adherence to market principles; World-Bank Poverty Reduction Programs to enrol developing-country states in such 'compensatory' strategies (Fine and Jomo, 2006; Macdonald and Ruckert, 2009; Roy, 2010). Similarly, neoliberal environmentalism promises to foster greener economic growth, but with a human face: a multiple-win outcome for nature, private investors and publics, including the poor, yet one that requires minimal public expenditure.[4] It attempts to address the ecological consequences of industrialization as 'market failures' while reinforcing capitalist modes of thought and interaction and promoting new methods of accumulation, of which ES markets are one.

Conventional environmental economics supports this effort by reconceptualizing nature as a subsystem of the economy, aiming to enclose the natural world within the market world (Turner et al., 1994).[5] This requires the monetary valuation of natural assets and of the social costs of environmental damages, so that so-called environmental externalities can be internalized into the cost–benefit accounting of individuals, enterprises and states. Some environmental economists also apply the conceptual tools of institutional economics in order to analyse the 'imperfections' of markets, the complexities of various marketing arrangements and the transaction costs involved (Ferraro, 2008; Swallow et al., 2007).[6] That said, most advocates of ES markets, in keeping with neoclassical economic premises, view land users as rational individuals who respond mainly to material incentives, and see competition among private actors, rather than state-centred 'command-and-control', as vital to the efficient allocation of nature's functions (Chicilinsky and Heal, 2000).

A foundational postulate of market-based environmental management has been that, once property rights are established and transaction costs are minimized, voluntary trade in environmental goods and bads will produce optimal, least-cost outcomes with little or no need for state involvement (Coase, 1960). However, it is widely accepted today that regulation that sets

4. After the US government pledged to contribute US$ 100 billion to a new global climate fund, US officials reassured the press that those funds would be raised mainly 'from the private sector, in particular through the buying and selling of carbon credits, and not from government coffers' (Ball, 2009).
5. By partial contrast, most theorists who identify themselves as 'ecological' economists envision the economy as situated within and limited by the ecosphere (Daly and Farley, 2003).
6. Institutional economics analyses the institutions that mediate markets and, in some cases, the power relations that shape and are shaped by those institutions (Bromley, 1989; Ostrom, 1990; Vatn, 2005).

limits — caps — on pollution is necessary in order to make the right to pollute relatively scarce and therefore valuable enough to be worth owning (Dales, 1968). This, along with recognition or creation of tradable property rights to ecosystem functions, lays the foundation for the commodification of ecosystem functions, especially carbon sequestration. The most controversial form of carbon trading involves sales of offsets, permits that finance greening activities at sites dissociated from the source of environmental damage (Böhm and Dabhi, 2009).

Proponents of market-based climate management assert that global carbon markets can support a no-regrets climate policy that enables continued economic growth. Critics of ES markets, and of carbon offsetting in particular, have raised vigorous objections: that offsetting enables the wealthy to buy their way out of responsibility for past and current environmental degradation; that the illusion of a no-sacrifice, no-cost climate strategy impedes more realistic action to stem production of greenhouse gases (GHGs) at their sources; that market-based conservation policy has already been undermined by conflicts of interest and piecemeal programmes that allow environmental damage to be merely postponed or displaced from one site to another (Carbon Trade Watch, 2009; Dooley et al., 2011; Lang, 2009; Spash, 2010; TNI, 2005).

Advocates of carbon-offset markets admit that they are devilishly difficult to implement in ways that ensure reductions in global GHG emissions or sustained conservation of carbon sinks (Chomitz, 2006). Some acknowledge that it is even harder to design such markets to yield social as well as environmental gains (Wunder, 2008). World Bank publications nevertheless assert that a global REDD programme financed largely by private carbon-offset trading can both slow global warming and transfer resources for development and poverty relief (Storm, 2011; World Bank, 2009). Yet, while the Bank endorses PES as a means to generate social benefits from forest conservation schemes, the Bank's own guidelines warn that excessive focus on poverty reduction is 'counterproductive' to the more fundamental PES objective of maximizing efficiency in conservation spending (Pagiola, 2007: 1).

This ambivalence reflects an inconsistency inherent in the argument that ES markets can be both efficient and pro-poor. The logic of market efficiency that supports ES trading and private REDD financing pivots on the neoclassical economic notion of differential opportunity costs. The application of this concept in putative ES markets both depends upon and reinforces inequalities between poorer and wealthier landholders, between urban and rural areas, and between the global South and North. It is therefore no surprise that in actual, on-the-ground projects framed by market logic, efficiency criteria conflict with anti-poverty goals and state development priorities, as I illustrate in the section on PES practice below.

MARKETS IN PERMITS TO POLLUTE

Conservationists and ecologists devised the concept of ES in the 1980s to highlight the ways in which individuals, communities and economies depend upon the 'life-support' functions of ecosystems, both proximate and distant. Monetary valuation of ecosystem functions, they expected, could help clarify the consequences of different environmental-policy and land-use options, at least heuristically (Costanza et al., 1997; Norgaard, 2010). This period also saw the incorporation of ES and other forms of so-called natural capital into the conceptual universe of neoclassical economists, as World Bank staff and others began including environmental assets in their estimates of the relative wealth of different countries (Serageldin, 1995).

Markets in ES had already emerged in the United States in the 1970s following passage of legislation limiting industrial air pollution and destruction of wetlands (Robertson, 2004). Systems of permits allowed those who cause pollution or damage to 'offset' that damage by paying for conservation or pollution abatement at another site or by buying permits from another party that has paid for such abatement. Thus, ES became tradable commodities. Markets in biodiversity offsets have appeared more recently: buyers include conservationists who pay to preserve species-rich habitats, tourism enterprises that benefit from the presence of wildlife, and investors who profit from biodiversity banking (Carrol et al., 2009; ten Kate et al., 2004).

Markets in permits to emit GHGs are by far the largest and fastest-growing form of ES trading. The European Emissions Trading Scheme (ETS), the world's biggest emissions trading programme, has proved highly profitable for sectors of European industry and finance but has not brought a net reduction in European GHGs (Kanter and Mouowad, 2008). As in the case of all ES trading schemes, with the partial exception of 'voluntary' ES markets, the ETS is made possible by state regulation — legal constraints on the amounts of pollution that enterprises may produce. ETS caps are linked to the targets for GHG emissions reductions that European Union countries accepted as signatories of the 1997 Kyoto Protocol.

The Kyoto Protocol's Clean Development Mechanism (CDM) established the first framework for an international market in GHG emissions credits. It allows polluters to offset a share of their emissions, while continuing to produce them, by paying for global-warming mitigation projects in lower-income countries (Vlachou and Konstantinidis, 2010). As defined in Protocol Article 12, the CDM is meant to both foster sustainable development and make it easier and less costly for industrialized countries to comply with their Kyoto obligations.

The CDM is not linked to any coherent strategy to achieve global GHG reductions. Because it permits the continuation of business-as-usual by GHG-emitting industries in the global North, it is not designed to bring about net emissions reductions there. A three-year British university study found

that 'CDM finance is seen as a useful extra revenue stream for large corporations keen to prop up existing investments in fossil fuels' (Newell and Phillips, 2011). There is scant evidence that the CDM has achieved any greater reduction or avoidance of emissions in global South countries than would have occurred there in the absence of the CDM (Böhm and Dabhi, 2009; Lohmann, 2005). With regard to development, the World Bank acknowledges that 'the treatment of sustainable development in [CDM] project documents is sketchy and uneven' and that 'project developers display only a rudimentary concern for or understanding of the concept' (World Bank, 2010a: 265).

The Bank nevertheless cites the CDM as the main model for REDD and ES trade as a climate policy strategy: 'Looking forward, stabilizing temperatures will require a global mitigation effort. At that point carbon will have a price worldwide and will be traded, taxed, or regulated in all countries. Once an efficient carbon price is in place, market forces will direct most consumption and investment decisions toward low-carbon options' (World Bank, 2010a: 271). The United Nations Food and Agricultural Programme (FAO) and the Environmental Programme (UNEP) are building ES trading into their programmes. A joint statement by UNEP and the world's largest conservation body, the International Union for the Conservation of Nature (IUCN), explains that the ES concept has become central to the theory and practice of environmental management thanks to its 'capacity to provide a unifying language between the economic, business and environmental communities' (UNEP/IUCN, nd).

Transnational NGOs including Worldwide Fund for Nature, Conservation International and The Nature Conservancy have placed conservation-by-commodification at the centre of their forest-preservation strategies. The non-profit Ecosystem Marketplace is a self-described 'one-stop-shop of timely and transparent information on … the market for ecosystem-based carbon, the market for water and watershed services, the market for biodiversity, and the burgeoning markets for wetlands and endangered species in the US' (Katoomba Group, 2005). Forest Trends sponsors the Business and Biodiversity Offset Program to help oil and gas, mining, tourism and real estate firms to pay recompense for the damage caused by their projects by financing conservation activities in the US and the global South (Forest Trends, 2006).

Sales of carbon emissions credits reached an estimated US$ 144 billion during 2009 (Kossoy and Ambrosi, 2010). Among the major players in transnational carbon trading are transnational banks, commodity trading firms, oil and power companies, energy speculators, pension, hedge and private equity funds and aggregators, brokers and other firms set up specifically to deal in the new carbon commodity (iGlobal Forum, 2010). Like investments in mortgages, investments in carbon allowances and offsets can be securitized (Hoffman and Twining, 2009). While the bulk of carbon trade is linked to the ETS, most forest-related carbon trade to date has taken place in

'voluntary markets' that are not directly linked to state regulations or multilateral climate targets and cater primarily to enterprises seeking to improve their public image.[7]

After soaring from US$ 10.8 billion in credits traded in 2005 to US$ 136 billion in 2009, carbon markets as a whole grew only 6 per cent in 2009–10 (Business Green, 2011; Kossoy and Amrosi, 2010). This lagging growth reflects the effects of recession but also, more importantly, the failure of a new, multilateral agreement to strengthen or replace the Kyoto Protocol to emerge from climate negotiations. Carbon-trading scandals may also be a factor: ES markets are ideal arenas for high-risk investments, fraud and outright thefts, as when computer hackers robbed € 30 million in ETS allowances, and for double-dipping, when credits for the same claimed emissions-avoidance actions are sold to more than one buyer (*Financial Times*, 2011).

ENVIRONMENTAL GOALS AND EFFICIENCY IN ES MARKETS

Market efficiency is said to ensure that conservation goals will be achieved voluntarily and more cost-effectively than 'command-and-control' conservation: the invisible hand points toward the most efficient arrangements for mitigating ecological damage. By the conventional economic theory of gains to trade, market exchanges necessarily benefit both buyers and sellers of ES. Moreover, within the closed circuit of the imagined market world, sales of ES or other environmental property — or of any asset, for that matter — entail no net costs to society: they merely convey utility from one consumer to another (Miller, 2008).[8] '[I]t is important to stress that the payments themselves are *not* a social cost — they are a transfer, which cancels out in calculations of social welfare' (Pagiola, 2005, cited in Wunder et al., 2008: 847).

Free-market fundamentalists see no need for government involvement in rational bargaining among holders of property rights to environmental and other assets (Anderson and Leal, 1992). Theorists who are more sceptical that markets alone will yield an optimal allocation of environmental benefits and burdens, endorse supplementing market-based pricing and trade with public intervention: pollution caps, taxes, fees or subsidies to compensate landowners, producers or consumers for adopting less damaging practices and technologies (Engel et al., 2008; Muradian et al., 2010).

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7. The largest voluntary carbon trading scheme, Chicago Climate Exchange, closed in 2010 after the failure of US climate legislation that might have made its products less voluntary and thus more valuable.
8. However, those who set up or administer ES markets may incur some transaction costs of doing business, and landholders may face short-term costs in making the shift from environmentally damaging to greener land uses.

In these accounts, it is the market characteristics that ensure conservation success in PES. The World Bank's Stefano Pagiola argues that 'by basing payments to service providers on payments from service users, PES programs have a built-in feedback mechanism: service users have a strong incentive to ensure that their money is spent effectively, and to request changes in the program if it is not' (Pagiola et al., 2005: 238). Because buyers of ES will be paying for things they need, the quality of the product — in this case, its positive effect on conservation — will be ensured by the magic of the market through its conditionality criterion. This tenet of conventional economics holds that buyers will not pay, or will not pay much, for an inferior service or good.

However, Pagiola's logic hardly applies to typical ES trading arrangements in which the product's actual environmental effects are separate and distant, institutionally and spatially, from the trade transaction and are virtually impossible to measure. It is rarely possible to know with certainty whether a credit-generating activity would have taken place in the absence of ES payments. It is often impracticable to prevent a destructive activity banned under the terms of an ES contract from being relocated to another factory or forest site. For forest and farm carbon projects, it is rarely feasible to determine exactly how much and for how long carbon is stored, emissions avoided, water produced, or species saved as a result of the actions for which ES sellers are paid (Norgaard, 2010).

Short ES-project timeframes contrast with the unpredictability of future prices and incentives for competing land uses and with the long-term effects of environmental change. Controversy about discount rates used to compare the future costs and benefits of conservation and deforestation reveals the impossibility of answering ethical questions by means of equations, no matter how sophisticated. Further problems arise from conflicts of interest, even when deception is not intended. States and local officials may be amenable to bribery or unwilling or unable to enforce conservation agreements. Consultants who make a living by designing or verifying credit-generating projects have little incentive to uncover evidence that credits sold may not have yielded actual environmental gains (Lohmann, 2009).

Together, these problems of 'non-additionality', 'leakage', 'scientific uncertainty', 'impermanence', 'intergenerational equity' and 'moral hazard' cast doubt on the likelihood of achieving net conservation improvements by means of trade in carbon and biodiversity credits.

EFFICIENCY VERSUS EQUITY IN PES PRACTICE

'Selling nature to foster conservation while alleviating poverty' is not a new notion. Biodiversity prospecting, widely endorsed in the 1980s and billed as 'market-oriented', is meant to finance tropical forest conservation while

transferring wealth to indigenous communities or governments.[9] Proponents expected that income from sales of medicinal plant samples and other so-called genetic resources would encourage land users to conserve endangered ecosystems. Valuation of biological materials based on their prices in international markets, however, disregards the multiple use values of ecosystems to people living in close interdependence with those landscapes, reducing their worth to the purposes of distant buyers, such as pharmaceutical firms hoping to use 'undiscovered' organisms as models for profitable drugs (McAfee, 1999).

Most bioprospecting deals are better described as subsidies or donations than as market exchanges. The prices that prospectors pay for biological samples are typically very low, reflecting far greater power of buyers than competing would-be sellers, and wealth transfers have been meagre. Bioprospecting is seldom cited today as a template for markets in nature that also address poverty. Lessons of the bioprospecting bubble are all the more germane to transnational ES markets, in which there is a similar, immense inequality between most potential purchasers and providers of commoditized nature.

Like bioprospecting, other attempts to commodify nature fall short of an idealized scenario market-exchange with no state involvement (Larner, 2003; Mansfield, 2004). PES projects rely on rule-making, subsidies and other interventions by governments at local, national and multinational levels and on financial support from states, multilateral agencies or private organizations (McAfee and Shapiro, 2010; Muradian et al., 2010; Vatn, 2010). Non-market interventions and subsidies are especially necessary in projects that aim explicitly to remunerate the poor.

Early in the history of PES, several investigations concluded that programmes not structured from the outset to target the poor are unlikely to benefit them and may harm them (Rosa et al., 2003). Because wealthier people usually control more environmental assets and hold other forms of power, they are more likely than the poor to become aware of PES opportunities, to hold or obtain formal property titles, and to be capable of demonstrating compliance with project stipulations. A survey of 287 PES-type forest projects found that, 'Hampered by inadequate political representation, informal property rights and weak negotiating skills, poor communities face an uphill struggle in defending their rights. In many cases . . . these groups are not only excluded from the market, but also lose access to the forests and land' (Landell-Mills and Porras, 2002: 101–2). A report to the US National Academy of Sciences found that of all the surveyed World Bank ES projects, 'with objectives of alleviating poverty and protecting

9. Expectations for the commercialization of medical and other 'discoveries' by bioprospectors were so high that 'equitable sharing of the benefits' from the commercialization of such genetic information was enshrined as one of the three core principles of the 1993 international Convention on Biological Diversity.

biodiversity ... only 16 per cent made major progress on both objectives' (Tallis et al., 2008).

Case studies of individual PES projects corroborate that poverty alleviation and development objectives very frequently conflict with market-efficiency criteria. Fieldwork on one of the first international PES projects, Fondo Bioclimato in southern Mexico, revealed that peasant participants learned improved land-management methods, that ES payments provided added income, and that involvement of established, locally-respected community organizations was vital to project success (Brown and Corbera, 2003). However, relatively well-off landholders benefited more than poorer ones and women were largely excluded, especially when project managers began to emphasize carbon-storage accounting more than community well-being. Other researchers observed that early in the life of the same project, community-development goals became decoupled from and subordinated to carbon ES marketing (Nelson and de Jong, 2003). In a later analysis, Corbera concluded that that ES payment arrangements 'can be heavily influenced by existent unequal property arrangement and thus carbon forestry activities can induce social differentiation' (Corbera, 2005: 53).

An early study of the EcoMarkets PES project Costa Rica, one of the first large-scale PES schemes, found that benefits accrued disproportionately to urban owners of forested tracts (Miranda et al., 2003). A recent study of the same programme concluded that 'payments generally go to larger landholders and tend to exclude smallholders', and that 'a nominally market approach to climate-change mitigation has come to resemble state subsidies for forestry and agriculture', particularly export agriculture that makes use of wood products to package and transport food products (Lansing, 2010).

Mexico's national PES programme offers another telling example. McAfee and Shapiro (2010) analysed project documents and interviews with participants at all levels in one of the world's largest PES schemes, sponsored by the federal government and partially funded by the World Bank. We found that government subsides, regulation, and active restructuring of state institutions have been central to this PES project at all stages, further confirming that the 'neoliberalization of nature' is rarely if ever a matter of private economic transactions independent of state intervention. We also found sharp conflicts between the market-oriented rules for payment eligibility stressed by the programme's resource-economist designers and World Bank evaluators, on the one hand, and the poverty-alleviation priorities of the federal state and its agencies and the cultural-survival goals of rural social movements, development NGOS, and the *campesino* project participants themselves, on the other hand. Again, anti-poverty and conservation-efficiency goals were found to be at odds.

Many advocates of ES markets recognize that market-efficiency goals put smallholders at a disadvantage (Chomitz, 2006; Vatn, 2010; Wunder, 2007, 2008). In the language of institutional economics, there is typically an inverse

relationship between project size and the transaction costs involved in constructing and maintaining markets: costs of estimating and pricing ecosystem functions, matching sellers and buyers, ensuring that payments are made, and assessing compliance with conservation guidelines. Diseconomies of scale make it more expensive to enrol and monitor many smallholders than to pay fewer, larger-scale landholders. Transaction costs may be even higher when the intended recipients of PES lack individual property rights or abide by complex, overlapping systems of tenure or usufruct rules, as is common among forest-dwelling peoples. Some pro-poor PES programmes are designed to overcome the inequities that result from this by establishing ES providers' cooperatives or by helping smallholders establish property rights, negotiate with buyers, and develop land-use plans, but such efforts add to project costs. In some cases, initial measures to facilitate participation of smallholders or the landless have been deemed unaffordable as the projects have progressed.

Whether or not prioritizing the poor is economically efficient, some argue that it is necessary because much of the world's forested territory is managed, *de facto,* by poor people (Scherr et al., 2004). Conservation therefore requires cooperation by the poor, at least, and can be enhanced if the poor are actively working to increase ES production (Molnar et al., 2004). Others question the conceptualization of ecosystem payment arrangements as market-type contracts: they argue that healthy ecosystems are socially reproduced and that rural communities that practise sustainable management — or would do so if economic pressures on peasants and forest dwellers were eased — deserve to be recognized and rewarded for the ES benefits they already provide. Such compensation requires 'frameworks that transcend traditional economic valuation' (Rosa et al., 2003: 52). Other analysts have compared 'payment', 'compensation' and 'reward' approaches and proposed recommendations for pro-poor project design in light of the inadequacies of 'market instruments' alone (van Noordwijk and Leimona, 2010; Swallow et al., 2007).

International NGOs have argued for some time that the privatization and trading of ES threatens to dispossess indigenous and other forest dwellers of their lands and livelihoods. Some interpret ES commodification as the latest phase in a long history of resource enclosure and expropriation (FOEI, 2005; GRAIN, 2005; Lovera, 2004). Some governments, too, voice concerns that international ES markets might exploit landholders and place new burdens on cash-poor states. Leaders of the *Millennium Ecosystem Assessment* felt compelled to defend the term 'ecosystem services' after some Southern country governments 'argued that referring to benefits obtained from nature as a "service" implies that individuals must begin to pay for benefits that were formerly obtained for free' (Reid et al., 2005: 1). Advocates of ES markets reported that potential PES project participants in Latin America have been similarly wary: 'while many in the North continue to insist religiously on

markets as the universal remedy, this discourse — often led by economists — frequently ends up fostering more resistance than persuasion in developing countries' (Wunder and Vargas, 2005: 2).

PES AND THE RATIONAL PEASANT

The experience of PES also illustrates that, in predicting or explaining the resource-management choices of project participants, cash payments or other direct material incentives are hard to distinguish from other motives for conservation, and that economically 'rational' behaviour aimed at individual gain is often less determinant than social obligations and communal norms.

Whether rational or not, from a neoclassical economic perspective, peasants often have their own reasons for practising conservation when they are able to.[10] Recent examples of PES in Mexico and Central America show that intangible benefits are often more important than cash payments in encouraging project participants to adopt or continue practices that conserve trees, soil and biological diversity (Corbera et al., 2007). Authors of a study of PES in Honduras, Costa Rica and Nicaragua explain that, as in many PES projects, payment amounts were based on estimates of participants' opportunity costs — income foregone because landholders could not clear the land for cultivation or pasture while receiving ES payments for the same land. Although most participants chose to improve their conservationist practices as required by the projects, the cash and in-kind stipends paid to them often failed to cover the actual costs of these conservation actions (Kosoy et al., 2007).

The authors opine that participants' own personal and collective motives for conservation outweighed the influence of inadequate ES payments: 'Local social and cultural features, such as religious and social habits, environmental awareness and education programs, may induce forest conservation, even though it may be economically inefficient from the individual point of view' (ibid.: 452). Those findings challenge a key premise of market-based PES: the assumption that land users will make individual decisions based on likely monetary gains or losses (ibid.: 452). The authors conclude that PES schemes 'face a trade-off in meeting environmental goals in the most cost-effective way and contributing to poverty alleviation' (ibid.: 454). Another study by some of the same authors of PES in Chiapas, Mexico, found that incentives other than cash payments, such as 'sacred values and intergenerational concerns' were inducements for conservationist practices,

10. Literature by geographers, anthropologists and other scholars of political ecology, as well as decades of work on common property, document and theorize the multidimensional systems of values and practices that govern local eco-social systems, only some of which involve monetary exchange or individual, material incentives.

calling into question 'the idea that resource managers follow only an individual rationality' (Kosoy et al., 2008: 2073).

Similar findings emerged from a field study of the 2002–08 Regional Integrated Silvopastoral Ecosystem Management Project in Nicaragua, Costa Rica and Colombia, a PES project sponsored and deemed 'successful' by the Global Environment Facility (GEF) and the World Bank (van Hecken and Bastiaensen, 2010). The authors observe that the calculation of opportunity costs and predictions of land-management choices by PES recipients cannot be understood in isolation from multiple economic, ecological and social factors specific to each locality. In the Nicaraguan case, project outcomes were shaped in part by participants' opportunities, or lack thereof, to participate in the region's growing dairy industry. The study also found that non-economic factors, including collective learning during the project but also pre-existing communal practices and values concerning the natural environment, were largely overlooked by the market-oriented project planners.

Peasants' decisions to join another early PES scheme, the Scolel Té project in the Lacandon forest zone of Chiapas, were likewise only partially and indirectly linked to ES payments, which were only US$ 4–8 per tonne per hectare annually for a maximum of five years (Nelson and De Jong, 2003; Osborne, 2011). Rather, participants saw the scheme as a way to win official recognition of their tenure rights in the context of land-control conflicts and rising prices in tropical timber markets. Osborne (2011: 33) observes that, 'the land and labor requirements for carbon timber act as a type of enclosure mechanism that constrains more traditional land uses such as the *milpa* [polyculture farming system] and annual cash-crop production'. While about half of those enrolled left the project, those who continue 'participate in carbon forestry in part as a way of maintaining a foothold on their land in the wake of neoliberal agrarian policies that threaten to displace them' (ibid.: 32). Some expect to earn income by selling newly-planted trees after the project's required twenty-five year tree maturation period. Nevertheless, 'participants are genuinely concerned about the high levels of deforestation taking place across their territory' (ibid.: 17) and many do not anticipate earnings from timber sales in their own lifetimes.

During visits to indigenous communes in Nochixtlan, Oaxaca, Mexico in 2003, I saw sites of extensive reforestation that were improving water catchment, production of wood and organic matter, animal habitat and landscape beauty: ES of direct benefit to the peasants themselves. The arduous work of tree-planting and terracing, then in its eighteenth year, had been initiated by the *comunitarios* and organized through their indigenous governance institutions. The *campesinos* who carried out the reforestation had received some support for tree nurseries from the state and technical assistance from Guatemalan farmer-agroecologists through a Campesino-to-Campesino exchange arrangement. They received no ES payments, nor did they use the terms 'carbon' or 'environmental services'. They explained that their recreated forests produce construction materials, provide leaf litter to replace

expensive, purchased fertilizer, revive desiccated springs and pleasing vistas, and offer shelter for game. Above all, they expressed determination to maintain farm productivity in a verdant setting so that at least some of their children would remain on the land.

These findings discredit the presumption that *homo economicus*, the individual-benefit-maximizing protagonist of conventional environmental economics narratives, is an appropriate model for predicting the behaviour of potential PES recipients, particularly where collective property rights and communal traditions and institutions remain strong. They illustrate that, even when project sponsors emphasize the virtues of market-based ecosystem management, the majority of PES projects are, at most, 'PES-like' (Wunder, 2007: 50). Moreover, the more market-like the scheme, the less likely it is to contribute to development even in the very narrow sense of boosting incomes of the rural poor. As studies of PES accrue, they confirm that conservation and anti-poverty goals are commonly in opposition and that the 'pure market approach dominating the conceptualization of PES in the literature cannot be easily generalized and implemented in practice' (Muradian et al., 2010: 1).

OPPORTUNITY COSTS AND MARKETS IN NATURE

The assertion that well-managed ES trade can produce multi-win outcomes for nature, the poor and private investors disregards the conflict between anti-poverty priorities and efficiency criteria that is built into the foundational economic rationale for ES markets and overlooks implications of this conflict with regard to resource control and equity.

A central tenet of the market-centred approach is that properly-managed trade in environmental assets will steer investments in greening toward those places and activities where conservation can be carried out most cheaply. This is how anti-poor bias is built into environmental governance schemes that are conceptualized as markets. In theory, once GHG caps or other pollution limits are set and property rights to ecosystems and their services are established, price signals lead rational market actors to pay for pollution reduction or mitigation by the least-costly means and in those locations where economic opportunity costs are lowest (World Bank, 2010b). The notion of opportunity cost — the value of something that must be given up in order to obtain something else — appears in many contexts in economic theory and business practice. But a comparison of opportunity costs across social, geographic and temporal distances assumes that the costs and benefits of various society–nature interactions are commensurable in a unitary, global market world.

As noted above, in the design of market-oriented PES projects, opportunity costs are used to determine the amounts of ES payments and who is to receive them (Pagiola et al., 2004). Calculations of the opportunity costs of various land-use options — potential earnings from timber sales or conversion of

forest to pasture or farm land — are intended to ensure that ES payments will be just high enough to tip land-use decisions in favour of conservation (World Bank, 2010b). The corollary of this reasoning, rarely acknowledged in theory but evident in PES practice, is that within any country or region designated for PES, payments are more likely to flow to better-off landholders than to poor ones.

Economists who design PES projects concede that during the phase of ES market development, when buyers have not yet been found for the ES services to be sold, governments or other project sponsors may set ES payment rates (Alix et al., 2003). To do this, project planners can estimate conservation opportunity costs by calculating the market values of trees that landholders would cut, or the income from crops they might grow, were they not offered ES payments as an incentive to abstain from cutting trees. Once markets have been established, the 'right prices' of forest carbon storage ES will be determined by supply and demand.[11] In the meantime, opportunity-cost estimates are considered a neutral benchmark that can insulate fledgling ES markets from political influences and non-conservation goals that might undermine project efficiency.

However, valuation based on opportunity costs is anything but neutral. Critics have pointed out the incommensurability across world regions of environmental goods and bads in international policy at least since Agarwal and Narain (1991) asserted the distinction between GHG emissions that support 'luxuries' and those that support 'survival'. Opportunity-cost comparisons in ES price setting ignore the fact that the market prices of land, labour, ES, or any commodity, and especially commodities traded between richer and poorer places, reflect not simply the preferences but also the relative purchasing power, bargaining power and degree of desperation of the buyers and sellers (Martinez-Alier, 2003).

The opportunity-cost concept abstracts away the histories and power relations that determine *whose* opportunities are more or less costly, and *whose* land-use choices shall prevail. More prosperous landholders, by virtue of the size of their holdings, their security of tenure, their ability to hire labour or buy machinery, livestock or fertilizer, or their proximity or connections to agricultural or timber markets, are more likely than the very poor to be in a position to fell trees on their land for timber sales, pasture or crop land. Their opportunity costs are therefore higher than those of less prosperous or less well-connected farmers, ranchers or forest dwellers and their ES payments would need to be correspondingly higher.

By this logic, no funds should be wasted on payments to people who are too poor to engage in deforestation or too prosperous to be influenced by added PES income (Chomitz, 2006; Wunder, 2007). It would be inefficient

11. In theory, actual opportunity costs can be discovered through reverse auctions in which landholders compete for ES payments by offering to conserve forest for the least price. When this system is not practicable, as it often the case, opportunity-cost estimates can serve as proxies for market prices.

to pay very poor land users: assuming they manage to remain on their lands, they will continue to provide ES *gratis*. Similarly, payments to the very sorts of enterprises most heavily involved in deforestation in the tropics — large-scale ranches, palm oil or soy plantations and transnational forestry firms — would also be inefficient. To out-bid such profitable land uses, payments would have to be high. More conservation benefit per dollar can be had by buying small- and medium-scale farmers and ranchers or local loggers out of business than by limiting the practices of industrial agriculturalists and timber TNCs. As one influential analyst observed, 'The ideal PES program recipient is not the environmentally benign community too poor to do much harm to the forest, but rather the guy who had enough capital to buy a chainsaw, and is on the verge of putting it to work' (CIFOR, 2008).

In rare cases, the opportunity-cost criterion might direct forest-conservation payments to relatively poor landholders: low-income farmers or forest dwellers in a position to enforce their own property rights to land that produces valuable ES. Given their limited ability or incentive to deforest, these landholders might be influenced by modest ES payments, so that paying them would be a conservation-efficiency bargain. But, to the extent that the same poor landholders manage to expand their earning options, for example, by gaining access to agricultural, timber, dairy or livestock markets, or by participating in successful regional development that raises the values added and incomes earned from local, productive activities, they might price themselves out of the ES-efficiency equation. Thus, in order to benefit from ES markets, the providers need to remain poor, yet capable of opting to deforest in the absence of PES.

These scenarios expose contradictions at the heart of the ES-marketing paradigm. PES measures that intentionally channel benefits to the poor introduce the very sorts of biases, politicized decision making and 'market distortions' decried by neoclassical economists. As McAfee and Shapiro reported (2010), World Bank analysts objected to pro-poor priorities in Mexico's PES programmes on exactly these grounds. Moreover, by the logic of opportunity costs, should economic development result in higher monetary incomes and land values, conservation options might become prohibitively expensive. Consequently, continued if not increased inequality in the distribution of environmental benefits and burdens is an outcome that is inherent, even overdetermined, in ES markets designed to maximize conservation-spending efficiency.

PROFIT, OPPORTUNITY AND INEQUALITY IN GLOBAL ES TRADE

According to the World Bank, climate change is 'the biggest market failure in human history' and markets in carbon ES are key to correcting that failure (World Bank, 2010a: 61). 'The Bank's efforts to catalyze a market

for greenhouse gas mitigation and sustainable development hopefully contribute to the success of the market mechanisms, which are essential to lowering the cost of global action on climate change' (World Bank, nd.b).

The Bank depicts transnational trade in ES as a triple-bottom-line strategy to address poverty and deforestation while stimulating growth. As the world's pre-eminent broker of environmental credits and debits, it works to leverage private carbon investments and ensure their profitability. 'Through the establishment of Carbon Funds, and by pooling early participants in the market, the World Bank has reduced the market entry risk for other market players' (ibid.). Although most of these funds have been financed by governments, led by oil-rich Norway, the Bank's Carbon Finance Unit expects that billions of dollars for REDD and other climate mitigation measures will be raised from private investors in carbon offsets and in green technologies for the global South (Watson, 2007; World Bank, 2010a). While market-based REDD financing is opposed by some governments, such as Brazil and Bolivia, other global South governments look toward international carbon markets in the hope of substantial inflows of funds.[12]

In the World Bank's vision, tropical forest conservation is nearly cost-free for states and for beneficiaries of ES trading. Because carbon-offset trading offers economic advantages to investors and to GHG-producing enterprises, participation will be voluntary. Market-based solutions to climate crisis thus appear politically practicable, particularly since the ecosystems to be commodified are geographically and socially distant from the centres of power and calculation where such policies are formulated. Although plunges in carbon-credit prices and revelations of fraud in offset markets have dampened expectations that private investment will finance significant climate mitigation, the Bank remains undaunted, at least officially, in its support of market solutions leveraged by public expenditures and 'flexible' regulation.

In this view, because mitigation financing will flow toward regions where forests are vast and costs are small, market-guided climate investments will also be efficient. The option of buying credits at bargain prices for resale at a profit is what provides the incentive for private investments in global carbon banking and trade. In the words of the CEO of the industry group, International Emissions Trading Association, 'There's really no harm in people making money out of emissions reductions. Indeed if there wasn't that prospect, there really wouldn't be any interest in achieving it' (Cannane, 2011). As in market-based PES, the efficiency claim for carbon trading with

12. In 2005, a group of eleven tropical countries formed the Coalition of Rainforest Nations, led by Papua New Guinea's ambassador to the United States. The coalition claims forty-one country members and says it is 'formally offering voluntary carbon emission reductions by conserving forests in exchange for access to international markets for emissions trading' (Coalition for Rainforest Nations, 2011).

the global South rests on the idea that poorer people and countries have lower opportunity costs for their labour and land.

The low prices of carbon-storage options in Amazonia, Indonesia or the Congo reflect the vastly different monetary values of the foregone opportunities there compared to those in the global North. Since they could earn less than their Northern counterparts could by felling or selling forests, Southern governments and people are expected to accept less compensation for conserving forests.[13] The inequality between buyers and would-be sellers of ES is made tangible in the price differential between the market value of carbon credits in the global North and South. Carbon credits in Latin America have generally ranged from less than US$ 1 to US$ 12 per carbon-equivalent unit, compared to US$ 40 or more before the 2006 slump in the EU's official carbon market.

The REDD-Readiness Proposals submitted by fifteen countries to the World Bank's Forest Carbon Partnership Facility illustrate that the same logic applies within countries as between world regions (Dooley, 2011). As in PES projects, opportunity-cost criteria channel investment toward activities and places where conservation gains can be achieved for the lowest cost. The approved plans for Indonesia, Peru, Panama, Guyana, the DR-Congo, Republic of Congo and other forested tropical countries identify the reduction or elimination of smallholder agriculture and pasture as the least-costly sources of climate-mitigation gains. Programme consultants identify other land-use activities, such as 'REDD-intensive' pulpwood or palm-oil plantation or reduction of illegal logging, as sources of greater but much more costly carbon-sequestration gains (McKinsey and Associates, 2009). Given limited conservation funds, and given that profit incentives drive transnational investments in market-based REDD, low-hanging fruit in the form of projects to limit swidden and subsistence farming and small-scale ranching are more likely to be paid for.

As in the PES cases described above, market-efficiency reasoning would restrict smallholder and communal land and forest use while allowing more profitable, more destructive activities to continue. Fears of such consequences have led to calls for reformulation of REDD as a grants-based programme and for strengthened Social and Environmental Principles (UN REDD, 2011). More radical rural social movements and some international NGOS denounce REDD as a new form of 'greengrabbing' that, along with 'landgrabbing' for export agriculture, speeds the dispossession of rural populations, especially indigenous peoples, in the global South (Oxfam 2011; Peluso and Lund, 2011; REDD Monitor, 2011).

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13. Similar thinking informed the infamous memo signed by the World Bank's then-chief economist, Lawrence Summers, which argued that Africa is 'under-polluted' because lives cut short by pollution there are worth less, according to 'impeccable' economic reasoning (Summers, 1991).

CONCLUSION

In market-based PES and REDD, land users are paid for relinquishing pasture or land for cultivation, giving up the use or sale of forest products or wildlife, and sometimes for planting trees. Payments are meant to compensate them for resources lost or for work added, while allowing at least some people to go on living in or near the ES-producing ecosystems. On such fragile grounds, advocates have claimed that international ES markets can be 'pro-poor' or 'pro-development'. Those who contend that ES marketing schemes offer a triple-win for nature, business and development seldom specify what sort of development can thus be achieved.

With market-based management, the futures of most 'ES providers' are unlikely to be as farmers or other producers of goods and services to meet their own needs and those of their communities or nations. They are more likely to become recipients of green charity or, at best, competing exporters of commoditized nature in forms deemed valuable by distant, far wealthier buyers. This approach takes for granted increased trade liberalization and industrialization of agro-food systems worldwide. It reinforces the failed paradigm of development by means of market-led, export-based integration into global markets. The apparent presumption is that ES payments will pacify the poor, easing the transition to modernizing development, urbanization and the virtual elimination of most rural populations as productive sectors of society (Akram-Lodhi, 2008; McAfee and Shapiro, 2010; World Bank, 2007).

Most critical analyses of ES marketing as a global conservation strategy, by opponents and supporters alike, have focused on the technical and institutional obstacles to effective implementation: scientific uncertainty, non-additionality, leakage, conflicting time horizons, conflicts of interest, opportunities for rent-seeking in ES-producing states and localities, and the near-impossibility of enforcing compliance with the terms of credit-producing contracts. These problems are enough to cast doubt on the feasibility of effective market-based strategies for climate change mitigation and biodiversity conservation. Fewer critics directly address a problem at least as profound: the negative redistributional consequences of ES markets, particularly when trade takes place between wealthy and poor regions.

In the market world imagined by proponents of global ES trade, labour, land and lives are cheaper in the global South. In order for biodiversity and carbon-offset markets to work as an efficient climate-mitigation strategy, they must remain cheaper there. The profits earned by buyers and brokers — the *primum mobile* of ES markets — depend upon this ongoing inequality. Debates about whether PES and REDD schemes ought to be constructed as markets appear to revolve around abstractions, but the logic of ES trading based on market efficiency has real, regressive material and social consequences when applied in actual PES projects. At the global scale, too,

transnational trading based on universal monetary valuation, global market prices, and profit incentives would favour those places and those classes of people with the most purchasing power and, thus, the greatest ability to obtain environmental benefits and anything else that is for sale.

Carbon markets construct human–nature interactions as an array of discrete, fungible units amenable to trade. Their currency is the carbon dioxide equivalent unit (CO_2e), used to compare the damage caused by different GHGs and presently priced in US dollars. But the choice of what is to be measured and the definition of what is equivalent entail political decisions that inevitably favour some places and some categories of GHG-producing activities over others. It ignores culturally-specific meanings and values, unless these can be quantified by credentialed experts, and negates other, potentially quite different values that the same ecosystems might acquire in the future, in the context of new strategies for local or national development or autonomously-defined alternatives to capitalist modernization (Escobar, 2010). Genuinely sustainable development and realistic climate-mitigation strategies must instead arise from recognition of the full, multiple, present and future values of ecosystems to local and national populations as well as to wider humanity.

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