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Nature in the Market-World: Social and Developmental Consequences and Alternatives

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Abstract

New, international policies to address global warming and promote 'green development', such as Payments for Ecosystem Services, REDD, and carbon-offset trading, are framed in terms of a world-as-market paradigm. This approach favors the resolution of conservation-growth tensions by subsuming equity and other social goals within a project of globalized eco-economic management. Such a project, however, would intensify the ecological unequal exchange that has long characterized South-to-North resource flows. Green-economy strategies based on commodification of nature would reinforce existing patterns of property claims and resource control. The values of nature, and the fates of the communities that steward and depend upon living ecosystems, would be determined even more fully than they are today by those with the greatest discursive dominance and purchasing power worldwide. The market-world paradigm excludes more equitable existing and possible socio-natures and other understandings of what sustainable development might entail. Relatively little research has been supported at the international level on the alternative paradigms which, I argue here, offer more promise. Key to unlocking the potential of these alternatives is understanding that all economies, green or otherwise, are shaped by and gain strength from both the unique ecologies and the particular societies within which they exist and evolve.

Overview: The market panacea and its problems

Plans for green-economy transitions face daunting challenges. Among these are rising mean global surface temperatures, the closing of land frontiers in most tropical and temperate regions, the persistence of hunger, net losses in agricultural production due global warming, and growing joblessness and underemployment. These trends are intertwined with increasing inequality both within the majority of nations and between the advanced industrialized countries as a group and much of the global South and, now, a multifaceted, global political-economic crisis that has been long in the making.

At present, the prevailing paradigm that frames policies meant to address these challenges is market-centered. Ideas about the superior efficiency and effectiveness of private enterprise, monetary pricing, and commodification and market-based allocation of resources, both natural and social, underlie the most influential proposals in international arenas for environmental governance, food security, labor management, and pathways to 'green economies' (Le Blank 2011; OECD 2011).

Advocates of market efficiency in environmental management and economic greening aspire to subsume ecology, theoretically and practically, within a globalized, liberal-capitalist economy. They contend that this approach can achieve optimal allocation worldwide of the benefits of nature and the burdens of coping with pollution and resource depletion. To this end, market-oriented environmental economists proponents of 'ecological modernization' attempt to quantify, price, and privatize the functions and components of nature and to devise policies and practices to expand this approach from the United States and Europe to the global South (Pearce et al. 1989; Mol and Sonnenfeld 2000).

A prominent, current example is the effort to slow global warming and foster conservation by conceptualizing natural landscapes as the sources of 'ecosystem services'. Property rights can then be ascribed to ecosystem functions, such as the storage of carbon by forests, so that they can be bought and sold as internationally tradable commodities. Through schemes for Payments for Ecosystem Services (PES) and Reduced Emissions from Deforestation and [forest] Degradation (REDD and REDD+), nature is given a means in the global marketplace to earn its right to exist, while 'market instruments' are depicted as mechanisms to slow global warming and species loss.[1]

The market panacea, however, overlooks the varied social contexts and the uneven social consequences of market-based policies and itself gives rise to a new series of problems. With regard to global greening, these problems include:

- Monetary pricing and market-based allocation of environmental assets, both tangible, biophysical resources and ecosystem services, tend to redistribute those assets upward, giving those people and places with the greatest purchasing power in globalized markets the greatest ability to obtain environmental benefits and avoid environmental harms.

1 In addition to reducing emissions from deforestation and forest degradation (REDD) in developing countries, REDD+ is meant to support conservation, sustainable management of forests and enhancement of carbon stock.

- Market-based, 'global' environmentalism builds upon a-social, narrowly economistic logic. It relies upon ill-founded assumptions about the universal commensurability of nature's values from place to place. It fails to grasp how values differ in relation to the meanings and use-values of nature in different ecological and cultural settings and fails to take account of the disparate sources and social contexts of greenhouse-gas emissions.

- Market logic creates a superficially persuasive rationale for offsetting environmental harms to those places and populations where conservation and pollution mitigation can apparently be achieved at the least cost to 'society'. This rationale, however, derives from a false notion of society as homogenous and of humanity's interests as unitary. It both depends both upon and reinforces inequalities within societies at global and local scales.

- The trading of pollution credits, particularly the offsetting of greenhouse-gas emissions by purchases of carbon-sequestration ecosystem services or by payments for adoption of lower-emissions technologies, creates a misleading impression of net environmental gains in the form of lower, total climate-warming GHG emissions. But markets alone cannot achieve this; much less can markets alone reset economies onto low-carbon pathways.

- Expectations for market-based climate mitigation through global carbon trading are detracting attention from the urgent need to reduce greenhouse emissions at their sources. This approach underplays the need for major public spending to support, and strong regulation to require, the institutional transformations and technological investments and sharing that are necessary to phase out and replace fossil-fuel-based production.[2]

- Similar logic frames market-based responses to food insecurity. Together, global carbon-trade and food-trade approaches put greening and biodiversity conservation on a collision course with agriculture. Market-led, efficiency-seeking climate mitigation schemes alongside market-based food production and trade creates competition between seemingly incompatible land uses in the same geographic locations, primarily in the global South.

- The market-centered paradigm discourages rigorous research on and public investment in approaches to sustainability in which social development and greening are complementary and interdependent. There are compelling reasons to expect that such alternatives have far greater potential than does strictly market-led growth for positive synergies between conservation and climate mitigation, on the one hand, and food production, rural employment, and equity, on the other hand.

Section II of this paper describes the rise over the past two decades of environmental policies based on the monetary valuation, commodification, and trading of natural assets. I summarize the origins of what I call 'selling nature to save it' (McAfee 1999) and describe the promotion of this paradigm as a combined conservation-and-development strategy. I consider parallels between current, market-based environmental

[2] Increasingly, such shifts are practically feasible but not necessarily not profitable in comparison to business-as-usual for private investors.

initiatives and past efforts by private and multilateral institutions to promote 'green development' by means of biodiversity prospecting. I then focus on today's trade in ecosystem services because these putative markets have become the most widely endorsed means of managing the environmental aspects of anticipated 'green growth'.

Section III is a short account of contradictions that emerge in practice when market-based criteria for conservation efficiency are used to design projects that are also intended to reduce poverty or to transfer wealth to low-income populations or states. My main example, PES, is the model in many respects for much more ambitious schemes under the rubric of REDD. I summarize common patterns that can be identified after more than ten years of PES experiments in the global South. I note that the majority of these projects have not met their stated environmental and social goals and that these two categories of goals frequently conflict in actual PES projects.

Section IV summarizes the economic reasoning upon which claims for the superior efficiency of market-based environmental governance is based. I contend that the conflict between market-efficiency criteria and anti-poverty or pro-development objectives - a tension that is certain to arise in market-based REDD and similar strategies for greening, just as it has in PES - is entirely predictable in light of the exclusion of the social from the logical justification and the practical application of market-based valuation, management, and allocation of natural assets.

My analysis considers why, to the extent that conservation policies are 'market-based', and particularly when they involve transnational trade in carbon offsets, such policies both require and reinforce inequalities. While my examples are limited here to policies for land-based biodiversity conservation and carbon sequestration, my reasoning is applicable to the generation industry-based carbon offset allowances under the Clean Development Mechanism of the Kyoto Protocol and other pollution-offsetting schemes. Other authors have explained persuasively elsewhere the reasons why carbon markets are likely to do nothing, or less than nothing, to reduce net global emissions of greenhouse gasses or to spur shifts toward low-carbon or no-net-emissions methods of production and distribution (Upsetting 2009; Lohmann 2009; Storm 2009).

Section V observes that similar assumptions about the superiority of market-based allocation have been applied to justify multilateral policies governing agricultural trade and, to a degree, food production, despite the fact that market principles in agriculture have been honored largely in the breach by their most forceful industrial-state advocates. I take note of the closing of land frontiers throughout the tropics and subtropics and the trend of transnational 'land grabbing'. I mention the debate over whether sustainable food security requires further liberalization of food trade and farm policy or whether, instead, food security requires more policy flexibility in global governance to permit developing regions to pursue 'food sovereignty' and less dependence on food imports and exports. I summarize contrasting approaches to the 'sustainable intensification' of agriculture: their differing assumptions about the relationship between nature and society and their distinct implications with regard to the role of soils and agriculture in averting climate catastrophes and with regard to the future of small- and medium-scale farmers and rural society.

The brief concluding Section VI contrast the world-as-market model with what I believe is a more promising eco-social alternative.

II Markets in ecosystem services as a strategy for global greening

Currently-leading models for a global green-economy transition aim to incorporate so-called natural capital into economic accounting, trade, and strategies for growth. This approach, for example, frames the ambitious World Bank and United Nations schemes to finance low-carbon industrialization and forest conservation in developing countries by means of international trade in ecosystem services, particularly transnational sales of forest carbon-sequestration services in exchange for greenhouse-gas (GHG) emissions offsets (World Bank 2010; UN REDD 2010).

The ontology of natural capital was first applied in development policy in the last quarter of the 20th century (Serageldin 1995). This period also saw the rise of economic neoliberalism and its interpretation for development policy in the form of the 'Washington consensus', according to which state austerity, privatization, trade liberalization, and competitive, export-led integration in the global economy are keys to economic development in the global South. In this context, policy advisors sought to address problems of planetary resource limits, species extinctions, and global warming in ways consistent with conventional economic methods and compatible with expanded economic growth and continued, fossil-fuel based patterns of production, transportation, and consumption. To this end, they conceptualized nature as a subsystem of 'the economy'. The environmental economists who first attempted to put price tags on nature reasoned that the quantification and monetary pricing of nature's benefits to society would help to persuade publics and politicians that conservation and climate-change mitigation were worth paying for (Costanza et al. 1997). Their original purpose was mainly heuristic: to illustrate the likely costs to 'society' of the loss of the human benefits provided by healthy ecosystems.

By the century's turn, however, market-oriented reasoning about nature was being used to devise policies based on the actual commodification and marketing of environmental assets and functions. At the global level, market-based strategies for greening were linked to the discovery of putative new values in tropical forests and other landscapes in the global South. As part of efforts to persuade reluctant states to support the treaty outcomes of the 1992 Earth Summit, mainly the Convention on Biological Diversity (CBD) and the Framework Convention on Climate Change (FCCC), proponents argued that export markets in genetic information, carbon sinks, species habitats, and eco-tourism experiences could transfer revenues from advanced industrial nations and enterprises to governments and forest-dwelling communities in poorer regions. Thus, conservation-by-commercialization was put forward as a means to promote economic development simultaneously with mitigation of global warming and preservation of biological diversity.

An early application of this strategy was biodiversity prospecting, widely endorsed in the 1980s as a means to finance forest conservation while transferring wealth to indigenous and other landholders in the tropics. Expectations for bioprospecting were so high that 'equitable sharing of the benefits' from the commercialization of genetic resources was enshrined, alongside the conservation and sustainable management, as one of the three core principles of the CBD. Critics observed that the valuation of genetic information in terms of its prices on global markets reduces the worth of biological diversity to those values that are useful to distant buyers, such as pharmaceutical firms hoping to use collected medicinal plant samples to 'invent'

profitable drugs. This method of valuation disregards the multiple values of ecosystems and their components to people living in close interdependence with those ecosystems (McAfee 1999). As predicted, the prices paid to providers for biological samples turned out to be extremely low, reflecting the vastly greater bargaining power of buyers compared to that of competing sellers of these 'biodiversity benefits'. Consequently, the promised conservation incentives and wealth transfers have been minimal and bioprospecting is seldom cited today as a model for markets in nature that can also address poverty or development.

During the past decade, ecosystem services has become a central concept, alongside biodiversity, in environmental policy discourse, displacing once-iconic concepts such as endangered species and wilderness (MA 2005). Ecosystem services are presently the main commodity at the center of strategies for 'selling nature to save it' by means of global trade in GHG offsets and projects for Payments for Ecosystem Services (McAfee and Shapiro 2010; Katoomba Group 2011; Tacconi, Mahanty and Suich 2011). As noted, the ecosystem services concept has been adapted as a tool for thinking about and managing environmental problems in ways congruent with established, fossil-fuel-based capitalist trajectories.[3] It has arisen to policy prominence in the context of neoliberalism and the international policy paradigm that equates GDP growth with development, substitutes trade for aid, and supplants public planning with private initiative.

Ecosystem services, in this world view, comprise the functions of living nature that are said to be useful to humans: carbon sequestration by the oceans, vegetation, peat lands, and soil; habitat for valued species of flora, fauna, and microorganisms; containment and filtering of rainwater by wetlands and woods, buffering of tides by marshes and mangroves; even the aesthetic or spiritual significance woodlands, mountains, or waters. The concept is unabashedly anthropocentric and instrumentalist: elements of nature are valued for what they contribute to human well-being, broadly defined.

Trade in ecosystem services originated in the United States in the 1970s, when Clean Water legislation created the basis for markets in wetland ecosystem services, including wetland banks that sell credits in the form of shares in conserved or constructed marsh, swamp, or riparian ecosystems. Revenue from the sales of credits are meant to maintain substitute wetland sites to compensate 'society' for wetland habitats destroyed by industrial or real-estate development (Robertson 2004)[4]. Biodiversity ecosystem services are also subject to investment and trade in Europe and North America in the form of endangered-species offsets and habitat banking (Pawliczek and Sullivan 2011). Both wetland and biodiversity banking are carried out by for-profit enterprises and by conservation groups, sometimes in partnership.

Since the late 1990s, payment for environmental services projects have been sponsored by governments, multilateral agencies, non-government organizations (NGOs) and private, for-profit enterprises in Latin America, Southeast Asia, and China. PES is being expanded into Africa and other regions of the global South. Trade in land-based ecosystem services, such as carbon sequestration by forests or plantations, has not been

[3] While the idea of 'ecosystem services' is recent and instrumental in origin, the concept of ecosystem functions has a longer history as an object of study in ecological science. Like ecosystem services, 'biodiversity' is a term that was developed in the 1980s context of efforts by conservationists to gain policy influence, although biological diversity does have defined meanings and uses among ecologists.

[4] The 1963 US Clean Air Act, as amended in 1970 and subsequent years, lay the basis for a similar market in allowances for sulphur dioxide emissions. It is credited with a modest reduction in SO_2 associated with acid rain.

part of the European Trading Scheme, the world's largest market in GHG-allowances. Although forest ecosystem services trade is a minor component of the Kyoto Protocol's Clean Development Mechanism, the CDM is seen by the World Bank and other advocates of global ES markets as one model for proposed, grand-scale, United-Nations and World-Bank backed programs to alleviate global warming through Reduced Emissions from Deforestation and [forest] Degradation (REDD and REDD+).

By steering public and private investments toward the global South, these policies attempt to devise market instruments that can slow global warming and facilitate compliance with international environmental treaties. Proponents assert that transnational trade in ecosystem services can: (a) allocate scarce conservation resources efficiently, avoiding 'command-and-control' regulation; (b) reward private investors; (c) foster economic growth; (d) alleviate rural poverty; and (e) help finance a transition to low-carbon industrialization in would-be developing countries (Stern 2009). In effect, ecosystem services have become the latest in a long series of tropical-export miracle crops touted as key to development in formerly colonized regions.

Trade in credits for carbon-sequestration ecosystem services in the form of carbon-dioxide equivalents (CO_2es) is the most widespread form of ecosystem-services commerce. Firms or industry associations purchase offsets in order reduce the cost of complying with legal limits on their own GHG emissions, where such limits exists, or for public-relations purposes, or both. Carbon trading has created new profit opportunities for transnational banks and holding companies such as Goldman Sachs, firms such as Cargill that usually trade grain or other tangible commodities, oil and power companies, energy speculators including former Enron managers, and pension, hedge, private equity funds. Like adjustable-rate mortgages and other risky assets, emissions allowances are often securitized.

Carbon trading is particularly controversial when enterprises invest in carbon credits produced in a distant location in order to offset the effects of their own, continued emissions of GHGs. Critics point out that carbon-offset transactions do nothing in themselves to reduce total, global emissions of GHGs, yet they can create the illusions that 'something is being done' about global warming (Dooley et al. 2011). Some argue that carbon offsetting enables industrialized countries and large-scale polluters to determine the fate of landscapes in would-be developing countries while 'outsourcing' to poorer regions the burdens of coping with the pollution they themselves have caused (Bond 2009; Davis and Caldeira 2010). Nevertheless, leading advocates of REDD contend that REDD projects can be financed largely through international carbon trading.

Schemes for REDD are in their early stages. Funding for various planning and pilot programs has been approved by the World Bank for more than 35 countries. Other proto-REDD projects have been launched under the aegis of UN REDD with funds and technical support dispersed via the UN Development Program, the Global Environment Facility, and other agencies. Still other projects under the REDD or REDD+ rubric have been initiated by NGOs and government agencies in forested regions of the tropics and sub-tropics. Much debate surrounds the issue of whether all REDD programs can be or should be 'market-based' as opposed to being financed by public grants and private donations. Notably, the World Bank in particular, endorses a market-based model of REDD that extrapolates from the market-oriented principles upon which most existing PES projects have ostensibly been designed.

III Payments for ecosystem services (PES) and its contradictions in practice

While REDD policies are in formation, projects billed as PES, or sometimes 'compensation for ecosystem services' (CES), have been in effect in countries of the global South for more than a decade. A 2002 survey of PES forest projects identified 287 cases of established or incipient forest-related markets in carbon sequestration, biodiversity, watershed protection, and landscape beauty (Landell-Mills and Porras 2002). The number and scale of ES projects in the global South has since multiplied substantially, although there is no single repository of PES records.

PES in developing countries typically remunerates landholders for practices such as restricting the movements of livestock, abstaining from farming, and most commonly, planting or preserving trees for the purpose of CO_2 storage or for watershed management.[5] Ecosystem services providers may be individuals, communities, or states with property titles or other ownership or access rights to the land where the services are said to be produced. In some cases, payments for more than one service are made, separately from or in combination: carbon or watershed services, protection of habitats of interest to conservationists, scenic features of value to operators of tourism enterprises, and so on.

The beneficiaries or 'buyers' of ecosystem services may be private conservation organizations, biodiversity brokers, for-profit enterprises, or, especially in the case of hydrological services, state or municipal agencies. In the fastest-growing category of PES, governments, multilateral agencies, or private firms or individuals invest in or provide donations to pay for carbon-sequestration services. Sellers' are paid to maintain or to increase the carbon-storage functions of natural forests, new plantations, or, more rarely, peat land or farm land. Expansion of such PES on an international scale is the basic idea behind REDD as a climate-change mitigation strategy.

A growing body of literature describes and debates the theory and practice of PES. Most project sponsors, including government agencies, multilateral development institutions, NGOs, and for-profit intermediaries, assert that PES has a double purpose: first, to create or restructure land-use incentives in ways that results in more conservation and, second, to foster development or reduce poverty by providing a market for a commodity, ecosystem services, which landholders would not otherwise be to able to sell and which they probably did not even know existed prior to the PES project. Much of the 'grey' literature and academic publications about PES and REDD lack rigorous or consistent measures of project success (Pattanayak et al. 2010; Caplow et al. 2011).

Nevertheless, a number of problems occur repeatedly in PES projects across different settings and with different project sponsorship and designs (McAfee 2012). This pattern can be discerned from published PES case studies, evaluation reports, conference papers, and field work analyzed by McAfee and Shapiro (2010) and others. These problems are recognized even by prominent advocates of PES as a conservation mechanism (Engel et al. 2008; Wunder 2008). Taken together, they raise strong doubts about whether PES, in the majority of individual projects and particularly PES *en*

[5] Many forest-conservation projects are also based on the assumption that tree cover is associated with increased quantities or improved quality of water flowing to downstream users, although the scientific evidence for this is lacking in many cases.

masse, is making any net, positive contribution to environmental sustainability, much less to conservation and development simultaneously (Storm 2009).

Reasons to doubt the effectiveness of PES as a conservation and climate-change mitigation strategy first arise from a number of scientific and technological issues:

- ***Ecological complexity* and *scientific uncertainty*:** Human knowledge about the relationships among various land uses and species conservation, water supplies, and, especially, the sequestration of carbon in soils, peat lands, and vegetation is limited and much-disputed. Consequently, it is very difficult to determine or predict whether and how much carbon is stored or released, or how much water is conserved or consumed, as the result of activities paid for through PES. It is all but impossible to devise methods and formulae for applying such estimates over various time scales and across ecosystems, which are always unique.

Additional problems that plague PES are related to the various socio-economic and institutional contexts in which such projects takes place. They include:

- ***Leakage***, which occurs when environmentally destructive activities, such as logging or farming for profit or for subsistence, are shifted from the lands targeted for conservation to other sites;
- ***Non-additionality***, the term used in cases where payments are made for practices, such as abstaining from felling trees, that would have occurred even in the absence of PES;
- ***Perverse incentives*** may arise when expectations of conservation payments prompts states or landholders to threaten to engage in more deforestation than they actually intend to carry out or when they overestimate past deforestation rates to demonstrate conservation progress;
- ***Rent-seeking*** and or other forms of ***moral hazard*** are linked to the conflicting priorities of officials, NGOs, or consultants in charge of monitoring, enforcing, or certifying compliance with PES requirements, on the one hand, and ecosystem services buyers or project sponsors, on the other hand. Even when outright corruption is not a factor, more subtle conflicts of interest can create incentives to base project designs and claims of success on selected, favorable data or on optimistic but unsupported assumptions.[6]

Two other types of problems, widely reported in published PES case studies, evaluation reports, and conference papers, cast doubt on the claim that ecosystem-services markets can foster both development and conservation at the same time. Both patterns merit elaboration here because they arise from the social and cultural contexts of PES and reveal serious limitations and internal inconsistencies in the market-centered conservation-and-development paradigm.

Equity versus efficiency

Market-based criteria for PES efficiency very commonly conflict with social goals such as poverty alleviation. This tension between social and economic-efficiency goals is inherent *a priori* in the market-centered environmental-economic paradigm, as

[6] For example, agencies or consultants paid to determine whether contract terms have been met and whether ecosystem services have in fact been produced may have an incentive to cut costly corners or to certify carbon credits, regardless of spotty evidence, in order to obtain more work or claim project success.

explained in section IV below. The tension is not merely theoretical. Case studies and reviews of published since 2003 illustrate the conflicts that have arisen as those who design, implement, and participate directly in PES schemes attempt to balance equity and efficiency objectives or are forced give up one in favor of the other (McAfee 2012).

Some PES or CES advocates view increased equity for poor landholders as the primary purpose of such projects. They view ecosystem-services 'markets' mainly as a means to enable indigenous and other poor communities to support themselves more sustainably, whether the payments come from conservation grants or from for-profit investments in carbon or biodiversity offsets. At the opposite end of the spectrum are those proponents of ecosystem-services markets who insist that mixing social with conservation goals can only undermine the latter. Although World Bank publicity often depicts PES and REDD as boons to development, 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).

Another common pattern in PES practice points to the fallacy of the market paradigm as a framework for greening:

Non-economic motives

The behavior of ecosystem services providers often fails to conform to the model of the economically rational, individual-benefit-maximizing individual that is at the core of conventional, neoclassical economic theory and its neoliberal variant. Landholders, especially those with long-term or direct ties to the land and to their neighbors, rarely base their decisions about whether to fell, conserve, or plant trees solely on the pecuniary gains to had from one option or another. The actions and motives of ecosystem services providers are far more complex, varied, and context-contingent than the tenets of market-based conservation theory can account for.

Other factors that may influence their choices are traditional cultural values and respect for other species, new appreciation of ecosystems and characteristics gained from interactions with environmentalists, rules of common-property management or other communal pressures to conserve (or not to conserve), individual preferences that vary with household sizes, structures, and survival strategies, especially over time frames that extend beyond those of PES projects, and the situatedness of land users in relation to other kinds of income-generating opportunities or markets. Some studies have suggested that new, monetary incentives may 'crowd out' collective norms that have contributed to relatively equitable and sustainable management in the past (Kosoy et al. 2007).

These patterns are all, in on way or another, linked to reality that 'nature' and 'society' are inextricably interconnected, mutually and dynamically constructed, and impossible to measure, manage, or predict in isolation from each other. The truism that nature and society are inseparable bears repeating because the effort to devise efficient, market-based instruments and greening policies depends on the conceptual separation of the social from the natural sphere of life, so that the latter can quantified, priced, and incorporated as a component of 'the economy'.

Meanwhile, the accumulation in PES projects of the problems listed above has given rise to a burgeoning consulting industry. Experts employed by public agencies and private firms work on fine-tuning project designs, payment amounts and criteria, and

monitoring methods. They mobilize data from ecological studies, satellite imagery, and, more rarely, social surveys, feeding the results into ever-more-sophisticated models based on comparative opportunity costs and related econometric methods (Kemkes et al. 2009; McKinsey and Associates 2009; World Bank 2010b; Ebeling and Olander 2011; OECD 2011)[7]. These technocratic calculations are doomed to come up short, however, because they cannot cope with the place-specific variety ecosystems. This is the essence of bio*diversity*, after all. Nor can they apprehend the complexity and the dynamics over time of local eco-social systems and their diverse articulations with wider national and local economies.

Even if it were possible to quantify and model every significant ecological function, social factor, and their interactions for each and every time-and-place-specific eco-social system, a major flaw of the market paradigm as a guideline for green economies would remain, as the following section explains.

IV Markets for ecosystem services and their contradictions in theory

Framed by an economic discourse of efficiency, ecosystem-services trading are intended to achieve environmental gains at the least possible economic cost. The use of putative market instruments is meant to preclude the flaws of political bias and economic inefficiency that are said to have caused the failure of 'command and control' conservation strategies centered on legal prohibitions and boundary policing (Pagiola et al. 2002). In common with other market-centered theories, the discourse of eco-marketing is anchored by the presumptions that markets are able to produce optimal allocations of resources and that human behavior can be understood in terms of individual choices in pursuit of self-interest, especially material interest (Barnes and Sheppard 1992).

A related premise is that self-interested action ends at property boundaries, so that the establishment of clear property rights or enforcement of existing property rights is essential to functioning ecosystem-services markets (DeAlessi 1998; Murtough, Aretino and Matysek 2002). Private ownership of ecosystems and their services is expected to ensure that conservation goals will be achieved voluntarily. In theory, once the values of nature's attributes are known, property owners will act in ways that conserve or increase those values**.** In this view, market-based payments for ecosystem services, by the economic definition of market exchanges, necessarily benefit both buyers and providers. Moreover, within the closed circuit of the imagined market-world, sales of ecosystem services or other environmental property – or of any asset – entail no net costs to 'society' because they merely convey utility from one consumer to another (Wunder et al. 2008; Miller 2009)[8].

[7] Some PES analysts are less strictly committed to the categories of neoclassical economics and make use of concepts from institutional economics and literature on collective action and community-property resources.

[8] 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, advocates say. "…it 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)." Quoted in Wunder et al. 2008, 847.

Thus, claims about the superior efficiency of market-based greening resonate with the neoliberalism that dominates the discourse of global-governance institutions such as the World Trade Organization and the World Bank. Market rhetoric harmonizes nicely with the version of environmentalism based on private-sector partnerships that emerged from the Earth Summit+10 conferences in 2002 and that now figures prominently in the policies the Global Environment Facility (GEF), other multilateral environmental institutions, and increasingly, agencies of the United Nations such as UNEP. This market rhetoric, however, is at odds with PES practice.

Few ecosystem 'markets' are actually markets

An argument on behalf of PES as a conservation strategy pivot on the idea that PES is 'market-based' and, as such, is preferable to regulation by governments. However, very few PES arrangements conform to the conventional, economic definition of 'market' for at least two reasons (Wunder 2008; Muradian et al 2010). First, payments are rarely conditional on the actual production of the ecosystem-service commodity that is supposedly being bought. As noted in Section III above, buyers often have no reliable means of knowing that a certain amount of species survival or carbon storage results from the activities they are financing. They also may lack incentives to ensure that the PES transaction results in a net environmental benefit: once a buyer has obtained credit for the paid-for service in the form of a greener public image or a tradable carbon-offset allowance, the quality or quantity of the ecosystem-service product may be of little or no concern.

The second reason why most PES projects are not pure markets is that most of them depend partially or entirely on active state intervention and on subsidies (McAfee and Shapiro 2010; Vatn 2010)[9]. As in most markets, the value of any ecosystem-service commodity depends upon its scarcity as well as its desirability, but would-be suppliers and project sponsors outnumber buyers.[10] There are more landholders, NGOs, and states that want to be paid for conservation activities than there are firms and organizations ready or able to purchase the resulting services. Stronger regulation, in the form of strict and low legal limits on GHG emissions ('caps') would increase the value of carbon credits, at least in principle. However, because of the failures of the world's main such market, the European Trading Scheme, the lack of cap-and-trade-legislation in the United States, and the failure of international negotiations to extend and strengthen the Kyoto Protocol and expand it to industrializing regions, the ability and the 'right' to emit GHGs has not become scarce at all. In this context, private markets for carbon and biodiversity services remain weak, even though the prices of ecosystem services, especially in the global South, are extremely low in relation to the estimated social and ecological costs of the damages caused by global warming (Ackerman and Stanton 2010).

Consequently, nearly all PES schemes in Latin America, Asia, and Africa are financed by grants from governments or multilateral agencies, local-government subsidies, donations by conservationist NGOs, or some combination of these. In some cases, for-profit investors buy shares in carbon funds in the expectation that future, stricter GHG

[9] Of course, all markets are supported and constrained by rules and procedures established by human decisions and institutions, typically states. The ideal of a pure, 'free market' exists only in certain versions of economic theory.

[10] In some cases, certified, 'quality' GHG-reduction or GHG avoidance projects have been hard to obtain by those who seek them as a means of offsetting their emissions allowances under the soon-to-expire Kyoto Protocol.

regulations will make those shares more valuable. However, as global carbon trading has stagnated since 2009, advocates of this model have scaled back their expectations.[11] More often than not, PES programs require new laws or regulations and even the creation or restructuring of government water, forestry, and other agencies. Thus, the institutions that support putative markets in most PES schemes, and that often set the terms payments, are constructed and maintained by public action at the provincial and national levels and by multilateral agencies such as the World Bank at the international level.

There is vigorous debate among PES proponents about whether this situation is problematic or proper. Some contend that states, individually or collectively, have a responsibility to support greening and/or to foster development by compensating those whose stewardship of forests contributes environmental and social benefits to communities, the nation, and humanity as a whole (Rosa et al. 2003; McAfee and Shapiro 2010). Critics and advocates of market-based REDD are embroiled in similar controversy[12]. Market discourse, meanwhile, is apparently so persuasive in policy circles that most PES projects, as well as REDD programs modeled on similar, pseudo-market principles, continue to be portrayed as 'market-based' by their advocates.

'Markets' cannot be simultaneously efficient and equitable

I have pointed out flaws in the claim that market discipline makes PES and market-based REDD superior to 'command-and-control' conservation policies. The other pillar of the argument in favor of the efficiency of markets-based management 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 the foundational rationale for all cap-and-trade systems for managing pollution.

This reasoning has extremely troubling implications with regard to poverty and development. The logic of market efficiency that frames this strategy pivots on the notion of differential opportunity costs, a concept that arises from and depends upon the existence of great variations in power and wealth. Applied to PES and REDD, this logic would reinforce both North-South and urban-rural inequalities.

In the first place, PES measures that intentionally channel benefits to the poor introduce the very sorts of politicized decision-making and 'market distortions' that are decried by conventional economists. Thus, criteria meant to prioritize the poor in PES or REDD projects may be ruled out on economic-efficiency grounds[13]. It is more labor-intensive to enroll many smallholders and to monitor their compliance with project requirements than to pay a smaller number of larger-scale landholders. In the language of mainstream institutional economics, there is typically an inverse relationship between scale and transactions costs. It is often more expensive to involve less literate people, women,

[11] Some PES projects are financed through so-called voluntary carbon markets, through which corporations or individuals seek to offset the global-warming impacts of activities such as air travel, but such markets, while growing, are the minority.

[12] This debate is sometimes muddied by confusion between for-profit markets as a *source* of funds to support REDD and other conservation schemes, one the one hand, and markets as *mechanisms for disbursing* such funds to suppliers of ecosystem services, on the other hand. Funds for PES and REDD projects might be obtained from for-profit investors or from public or philanthropic sources (Personal communication from Jutta Kill, FERN.).

[13] PES schemes 'cannot, for example, target their interventions to areas of high poverty, as these may not be the areas that generate the desired services. PES programs also cannot choose to promote particular land use practices solely on the basis of the poor being able to undertake them' (Pagiola et al 2005, 238)

those who lack formal land-tenure credentials, or indigenous and other groups who hold property in common. In some PES projects, measures meant to facilitate the participation of smallholders or the landless have been rejected *a priori* or have been deemed unaffordable as the projects have progressed (McAfee and Shapiro 2010; McAfee 2012).

A deeper conflict can be seen in the use of so-called opportunity costs as the method of determining where in the world to obtain ecosystem services, from whom, and how much to pay for them. Resource economists engaged in PES design view opportunity cost as a neutral benchmark that can determine the proper amounts and allocation of ecosystem-services payments (de Janvry and Sadoulet 2006; World Bank 2011b). However, valuation based on opportunity costs is anything but neutral. The concept itself abstracts away the power relations that determine *whose* opportunities are more or less costly and *whose* land-use choices shall prevail.

More prosperous hand holders, by virtue of the size of their holdings, or their security of tenure, their ability to hire labor or buy machinery, livestock, or fertilizer, or their proximity or connections to agricultural or timber markets, are likely than the very poor to be positioned to profit by opting to fell trees for timber sales or for pasture or crop land. Therefore, their opportunity costs are higher than those of less prosperous or less well-connected farmers, ranchers, or forest dwellers and their ecosystem-services payments would need to be correspondingly higher. More conservation per dollar could be bought elsewhere (Chomitz 2006). Furthermore, given limited funds, it would be inefficient to pay very poor land users who would be unable to deforest much land even if they so desired. Thus, more environmental benefit per dollar spent can be obtained by buying small and medium-scale farmers, ranchers, or loggers out of business than by channeling payments to the poor or by limiting the practices of the wealthy, such as larger-scale, industrial soy or palm-oil plantation owners or powerful logging and mining interests. As one leading PES analyst observed, “The ideal PES recipient is the guy who has enough capital to buy a chain saw and is on the verge of putting it to use” (CIFOR/POLEX 2009)[14].

This exposes a contradiction at the heart of the market paradigm for conservation and development. The more strictly the disposition of ecosystem-services-producing forest, pasture, and farm land is determined by the logic of market efficiency, the more likely it becomes that environmental-services trading will reinforce existing inequalities in localities targeted for PES-based conservation or similar programs under REDD/REDD+. Conversely, ecosystem-services trading projects that are designed primarily to reward the poor for environmentally benign practices will rarely measure up to market-efficiency criteria. Moreover, the kind of economic development that would result in higher monetary incomes would also make conservation options more expensive. Consequently, continued and likely increased inequality in the distribution of environmental benefits and burdens is an outcome is that is inherent, even

[14] Application of the opportunity-cost costs criterion might result in forest-conservation payments flowing to relatively poor land-holders in certain cases: where low-income farmers or forest dwellers are in a position to enforce their own property rights to land that is considered by ecosystem-service purchasers to produce valuable services. Because they are poor and have limited ability or incentive to deforest, these landholders might be influenced by modest payments, so that paying them would be a bargain from a conservation-scarcity and efficiency perspective. But, to the extent that the same poor landholders manage to expand their earning options, for example, by gaining access to agricultural, timber, or cattle markets, they might price themselves out of the efficiency equation. This, in order to 'benefit' from ecosystem-service markets, they would need to remain poor.

overdetermined, in the design of ecosystem-services markets that are meant to maximize conservation-funding efficiency.

This contradiction has even more serious implications for international ecosystem-services markets, especially for REDD programs that are financed by carbon trading. As noted above, advocates of North-South ecosystem-services commerce often describe conservation and development objectives as linked and mutually supportive. But, to the extent that global schemes for markets in environmental assets and obligations are financed by for-profit investors and brokers, they require the continued existence of great inequality in incomes, land values, and development options between the world's wealthiest and its poorer regions.[15]

Moreover, global ecosystem-services markets require that the human-nature interactions that produce environmental services be constructed as an array of discrete, fungible units amenable to commodification and transnational trade. The most prominent example is the concept of carbon dioxide equivalent units (CO_2e) that is used to compare the damage caused by different GHGs. To be tradable transnationally, these standardized units of nature must be priced in terms of some globally accepted currency such as the U.S. dollar. But, the choice of what is to be measured and the definition of what is 'equivalent' entails political decisions that inevitably favor some places and some categories of GHG-producing activities over others (Agarwal and Narain 1991).[16]

The power/wealth dynamic in ES trading is made tangible in the price difference between the market value of carbon credits in Europe and those in the global South. GHG-emissions credits to pay for conservation or pollution avoidance in the global South can be bought for a fraction of the cost of carbon offsets based on comparable activities in wealthier regions. Carbon offsets derived from conservation in the tropics generally range from less than US $1 to $12 per carbon-equivalent unit, compared to US$30 or more in the global North, at least until the recent crashes in the EU's official carbon market.

The different prices of these credits reflect the vastly different monetary values of the foregone opportunities that determine the relative costs of providing tradable environmental services in one place compared to another. In effect, the notion that it is 'efficient' top offset Northern pollution by paying for cheaper credits in the global South rests on the idea that poorer people and poorer countries have lower opportunity costs for their labor and land because incomes and property prices are lower there. Since they could earn less than could their Northern counterparts by felling or selling forests, for example, Southern states and people are expected to accept less compensation for conserving forests. In other words, labor, land, and lives are cheaper in the global South.[17] In order for ecosystem-service markets to be profitable and 'efficient' even

[15] The lessons of the bioprospecting bubble described above are germane to the claims currently being advanced in support of global ecosystem-services market, in which there is a similar, immense inequality between buyers and would-be sellers.

[16] This critique of reductionism and universalism in global environmental policy is not new: objections to 'environmental colonialism' in climate governance have been raised for nearly 20 years. Agarwal and Narain (1991) insisted on a distinction between 'luxury' emissions of GHGs, such as those produced by private cars in wealthy countries, and 'survival' emissions produced in poor countries by livelihood activities such as cooking, rice production, and livestock raising.

[17] Similar logic 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).

while transferring resources to the global South, land, labor and live must *remain* cheaper there.

This differential is precisely, albeit implicitly, what makes transnational ES trading so attractive to policy makers and mainstream economists. This apparent conservation bargain also makes it seem possible to avert climate disaster while avoiding major 'lifestyle' adjustments, i.e., without wealth redistribution and without the major public policy changes needed to bring about a shift to low-carbon economies. Meanwhile, the option of buying carbon credits at cut-rate prices in low-income countries for profitable resale remains the source of incentive for private investments global carbon banking. Such investments are expected to raise the bulk of the funds from ecosystem-services trading that, according to the World Bank, can finance sustainable economic development (Watson 2007; World Bank 2010a, 2010b, 2011a; Krukowska 2011).

My intention is not to argue that PES and similar schemes under REDD cannot transfer useful resources to poor people, or that they can never foster more sustainable resource management. Under the right circumstances, compensation for ecosystem services may help to sustain viable eco-social systems and might even support more equitable rural development. Nor do I object to paying states and landholders for forest and wetlands conservation. On the contrary, such transfers are the *sine qua non* of any reasonably equitable - and therefore, feasible - strategy to prevent disastrous global warming. Rather, my point is this: the more strategies for conservation compensation are conceived as 'markets', the more difficult it will be to achieve conservation and development objectives simultaneously.

V Climate mitigation versus agriculture in the tropics

While the hungry need no reminding, recent, successive surges in global food-commodity prices have brought renewed attention to persistent hunger and the challenges said to be posed by population growth lagging yields in the developing world. Proponents of the market-centric paradigm point for solutions toward further liberalization of agricultural and food trade. Meanwhile, global warming may already be affecting farm productivity. Lobell et al. (2011: 1) reported in *Science* that for 1980-2008, "...global maize and wheat production declined by 3.8 per cent and 5.5 per cent, respectively, compared to a counter-factual without climate trends" and that "[c]limate trends were large enough in some countries to offset a significant portion of the increases in average yields that arose from technology, CO2 fertilization, and other factors."

It is alarming, then, that conservation-by-commercialization through biodiversity banking and global trade in GHG-emissions credits threatens to set global greening and climate-change mitigation on a collision course with agriculture. To the extent that carbon trading succeeds in fencing-off tropical and subtropical forests, it may impede increased food production in many of the regions where food security is already weak.

Neoliberal policymakers advise food-deficit countries to purchase more food from places such as the United States and Europe that are presumed to be more efficient producers of food calories (Zoellick 2011). This narrowly economic notion of efficiency disregards not only the energy consumption and ecological costs of industrial agriculture, but also overlooks its social costs in the form of lost employment and hollowed-out rural communities. Some analysts further advice farmers worldwide to

adopt transgenic and other 'enhanced', hybrid crop varieties that require costly agrochemicals and machinery and regular repurchases of seeds (McAfee 2003). Some but not all of these agricultural-policy experts acknowledge the extent to which mechanized, high-external-input agriculture itself contributes to global warming (GRAIN 2009; Stern 2006).

Most trade-policy literature fails to recognize that many global-South governments themselves are wary of new conditionalities imposed from abroad, whether economic or environmental. Faced with rising and volatile world prices and worsening hunger, many seek *less* dependence on imported food and on export commodities vulnerable to price fluctuations, of which ecosystem services may be one. Rather, some governments are beginning to pursue greater sovereignty in farm, food-trade, and development policy. National control over land and other food-producing resources is especially contentious in the context of the closing of the global land frontier and the surge in agricultural land-grabbing for food exports by cash-rich nations and transnational firms (Moore 2000; Rights and Resources 2009; Zoomers 2010; Deininger and Byerlee 2011).

Both the World Bank's *World Development Report* and the U.S. Agency for International Development's *Feed the Future* strategy report envision a role, albeit a limited one, for agriculture for domestic markets and for smallholder food production in low-income countries. These and other agencies have begun to endorse this approach under the poorly-defined rubric of 'sustainable intensification' (World Bank 2007; AID 2011). However, the broader strategies these agencies endorse rely on a familiar paradigm of development via modernization along conventional, industrial-country pathways. Their approach calls for high-external-input farming, urbanization, 'open' economies, and import/export-based growth, alongside conservation enclaves. They see little future for today's rural population as food producers or, for that matter, as productive members of society.

This model overlooks promising opportunities to link greening, food production, and equitable development in a much more grounded and integrated manner. Mechanized, high-chemical-input agriculture and large-scale production of animal protein not only consume substantial amounts of petrochemicals and cause serious water pollution and depletion, but also emit GHGs in the form of carbon and nitrous oxides and methane.[18] Many estimates of the contributions to global-warming emissions of agriculture and deforestation for the extension of farming are in the range of 30 per cent of total, anthropogenic causes of climate change.

However, far more carbon is sequestered in soils than in forests and other vegetation. This is especially true of closed-loop or organic farming methods in which energy in the form of plant or animal wastes is returned to the soil and water is collected sustainably and partially recycled. Many examples, notably the ancient *terra prieta* soils of Amazonia, illustrate past and present successes of food production based on human-created soils replete with microorganisms and carbon-rich organic matter. Some studies estimate that as much as 30 per cent of atmospheric CO_2 could be removed from the air by means of a transition to such practices on a large scale (GRAIN 2009). While the possibility of sequestering more carbon in large-scale, monocrop agriculture is becoming a topic of study and debate, at present smaller-scale, 'traditional' agriculture fertilized by on-farm sources stores more carbon than do industrial plantations.

[18] Some forms of smaller-scale ranching and farming, such as paddy rice production, may also emit significant amounts of methane.

Conventional agricultural economists, however, generally insist that organic and small- and medium-scale peasant food production cannot produce enough to feed ten billion people. From this perspective, today's peasants and the majority of farm laborers are social burdens, obstacles to development progress, or at best, fading anachronisms. Certainly, nothing is more important to humanity than adequate production of food and availability of clean water. But distribution is a larger, or at least, a more present problem than production: more than enough food calories are produced worldwide today to nourish adequately every person on earth.

Moreover, the productivity of regenerative agriculture today and its potential for the future are presently unknown. Diachronic and geographic studies comparing yields of organic or 'traditional' farming have produced widely different results. No meta-studies of published reports have compared productivity in 'developed' and 'developing' regions in a meaningful way. Most studies consider a single crop during a single harvest cycle. Few comparisons of productivity have been able to take adequate account of the differences between year-round, multi-purpose polycultures and commercial, monocrop farming systems.

Even where this possible, agriculture, like 'environment', is a social product and a social process with many facets and interconnections with other aspects of life. The benefits and costs of farming and food processing cannot be comprehended, quantified, and compared solely in terms of terms of yields per hectare or calories and micronutrients per kilo, much less in terms of prices on international markets.

Meanwhile, a growing literature offers evidence of the scope for greatly increased food production *and* carbon sequestration in farm and forest soils by means of labor- and knowledge-intensive *regenerative agriculture* and silviculture that draws upon a combination of existing or past low-external-input farm practices and modern agroecological science (Altieri 1983; Badgley et al. 2007; Gliessman 2007; Vandermeer 2011; Tomich et al. 2011). Agroecological methods aim to develop rural green economies adapted to place-specific eco-social systems. They depend upon the active participation of rural producers, and in some cases, urban producers, in the context of local cultures, combining scientific methods and knowledge gathered from agro-ecosystems in many different places with the strengths of local practices and institutions (Altieri and Toledo 2011).

This version of agroecology is distinct from a school of eco-agricultural thought commonly represented under the rubric of 'sustainable intensification', although there is some dialog between proponents of the two approaches. These models differ in their understanding of technology, and, most fundamentally, in their conceptualization of the relationship between society and nature. At the risk of oversimplification, it can be said that advocates of ecological agriculture tend to place greater faith in genetic engineering and in inputs of fertilizer from external sources, while placing less emphasis on local knowledge, site-specificity, and the social and cultural dimensions of food production and distribution. Their goal is more to increase production on cultivated land separate from 'wild' places, so that nature is 'spared' from cultivation and has more space to thrive apart from humans.

Rather than presuming that the productive use of landscapes is inimical to conservation, the agroecology paradigm is based on 'sharing' between wild and cultivated nature. In agreement with contemporary literature in political ecology, agroecologists see nature and society as mutually constructed and intimately interdependent. They understand

agro-eco-social systems as repositories of myriad forms of biological diversity as well as vital sources of crop genetic diversity. At scales beyond the individual farm and foodshed, this approach calls for reassessment of long-held assumptions about the drivers of tropical deforestation, the nature of rural employment, and the definition of ‘high' technology in agriculture and climate-change mitigation (Perfecto et al. 2009). From this perspective, peasants and productive rural landscapes are not obsolete, but are key actors in strategies for ecosystem stewardship, conservation of agro-biodiversity, decentralized industrialization, and transition to greener economies.

An important source of support for this approach is the growing and dynamic network of rural-based social movements, exemplified by the Movimento Sem Terras in Brazil, La Via Campesina - perhaps the world's largest organization if its affiliates on six continents are included - and thousands of local, national, and regional organizations of small-scale farmers, ranchers, fishers, agricultural laborers and their allies. The slogan, "No ecology without equity; no equity without ecology", captures the essence of the linkage between environmental sustainability and social justice as many of these food producers and activists understand it.

At the same time, important international voices have begun to highlight the implications of the environmental damages caused by industrial agriculture, the limitations of crop genetic engineering as a solution to hunger, and the social as well as the ecological importance of small- and medium-scale food production for domestic and regional markets. (IAASTD 2009, UNHR 2010; de Schutter 2011).

VI The eco-market panacea and its alternatives

The framing of PES, REDD, and related policies is taking place within the context of the intellectual hegemony of the world-as-market model, coincident with the escalating ambitions of ecological-economic technicians and environmental-management entrepreneurs focused on establishing a single, global climate regime. This combination of factors favors the resolution of conservation-development tensions by the assumption of equity and other social goals within a globalized project of eco-economic management.

By attempting to encompass multiple and varied eco-social systems within a global market economy of nature, such a project would reinforce existing patterns of property claims and resource control. The values of nature, and thus, the fates of particular natures, would be determined even more fully than they are today by those with the greatest discursive dominance and purchasing power worldwide. Policy based on the commodification of nature would intensify the ecological unequal exchange that has long characterized South-to-North resource flows. It would obscure the myriad existing and possible, place-specific socio-natures and would exclude other understandings of what sustainable development and green economies might entail.

Relatively little research has been supported thus far at the international level on the alternative paradigms which, I have argued here, offer more promise. Key to unlocking the potential of these alternatives is understanding that all economies, green or otherwise, are shaped by and gain strength from both the ecologies and the societies within which they necessarily exist and evolve.

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