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Valuing Pollution: Problems of Price in the Commodification of Nature

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Abstract

In recent years, 'environmental economics' has provided the dominant logic underpinning policies for 'sustainable development' in the form of government managed price-based and rights-based mechanisms. The advocacy of property rights in environmental management is taken further in the libertarian 'free market' approach and this 'privatisation' perspective is reflected in the growing use of property rights instruments in climate change policy. This article examines the efficacy of using economic instruments in the environmental context where 'market ecology' promotes the commodification of environmental 'goods' and 'bads' and their management by market forces. It argues that the pricing of 'nature' or its useful properties is a crude abstraction that implies ecological values can be alienated, but this is incompatible with the material and relational qualities of such values. The limits of this conceptualisation are further demonstrated through an examination of the Kyoto Protocol's Clean Development Mechanism (CDM), a price and property rights instrument which enables private project developers in developing countries to produce carbon credits in order to offset greenhouse gas pollution in developed countries. The evident negative social and environmental effects flowing from implementation of the CDM reinforce the limitations of economic logic in the environmental context.

JEL Codes: Q01; Q51; Q54; D61; D62

Keywords

Clean Development Mechanism; climate change; commodification of nature; environmental economics.

Introduction

Extending the sphere of the market as a mechanism for environmental policy was enthusiastically embraced by governments during the 1990s following the Brundtland Commission's (WCED 1987) promotion of 'sustainable development'. The conflation of 'sustainability' (the ecological problem) with 'development'

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(the economic problem) was a key factor in laying the foundation for economic norms in environmental policy and management to the neglect of preserving ecological integrity. After two decades of national and international policies for sustainable development, global environmental degradation continues and a new wave of concern has emerged (Kovel 2002: 4; UNEP 2007). The recent *Reviews* by Stern (2006) and Garnaut (2011) sought to tackle climbing global emissions of carbon dioxide (Worldwatch Institute 2002: 5), but have ensured that any debate about the use of market instruments neglects the question of their suitability in this circumstance. Rather, debate is confined to the problem of how best to implement such instruments (Paton 2008: 107). This was evident in the establishment of the Australian Multi-Party Climate Change Committee, convened to investigate ways of 'pricing' carbon and resulting in the negotiation of the 'Clean Energy Future' emissions trading scheme.

The United Nations Conference on Environment and Development (UNCED 1992) institutionalised the role of market instruments in climate change policies through the *United Nations Framework Convention on Climate Change* (UNFCCC). Economic approaches, central to UNFCCC, gained practical momentum with the *Kyoto Protocol* in 1997. The only global agreement to mandate quantitative greenhouse gas (GHG) emission limits for developed economies of the North, it institutes economic instruments as the means for achieving targets. The Protocol embodies three 'flexible mechanisms' which pivot on the creation of emissions trading schemes and the pricing of GHG emissions. A new commodity in the form of 'emissions reductions' (or removals) is the basis for a process whereby GHGs (primarily carbon dioxide) are monitored, priced and traded in a 'carbon market' (UNFCCC 2010). Of the three Kyoto mechanisms, the Clean Development Mechanism (CDM) represents the most extensive carbon trading instrument in terms of the volume of economic activity it has generated and its spatial reach between global North and South.

The CDM is a baseline-and-credit carbon offsetting instrument which allows for the development of carbon pollution 'reducing' projects in Southern countries. Common project types include hydropower dam and biomass waste renewable energy projects, industrial gas destruction factories, carbon sequestration from tree plantations and energy efficiency installations. Projects produce carbon credits, known as Certified Emission Reductions (CERs). These are traded on financial markets and finally surrendered by governments and businesses in Northern countries in order to meet their carbon emission reduction requirements. CER credits commodify the capacity of the climate system to absorb and cycle one tonne of carbon dioxide-equivalent because they are used by companies and governments in the North to 'offset' their real GHG pollution. Significantly, the Kyoto Protocol states that in addressing climate change through the production of such credits, the CDM will also 'contribute' to sustainable development in the South (UNFCCC 1997: 11). The inclusion of this second goal demonstrates the perceived congruence between economic instruments and sustainable development, particularly as a means to resolve North-South tensions in global environmental politics.[1]

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However, it is far from self-evident that economic theories provide an appropriate basis for managing the environmental commons or for meeting the normative challenges of sustainability, climate change being the ultimate test of both. The unavoidably collective and interdisciplinary character of ecological problems makes suspect their amenability to the atomistic theory and method of free market economics. The OECD (1994: 181), itself a key advocate of market instruments, has acknowledged that such instruments have proven difficult to put into practice and, once in place, are less successful than anticipated. Trading schemes, such as that proposed by Garnaut, are generally more costly and administratively complex than traditional regulatory or taxation mechanisms (Sachs 2008). The choice of market mechanisms is often the result of ideological, rather than empirical, criteria (Majone 1989: 145). These problems are apparent in the CDM which is delivering questionable climatic benefit, negative social and environmental outcomes, and growing tensions between administrative requirements and the interests of project developers and carbon traders.

The disjuncture between economic rhetoric and environmental reality has done little to stem the enthusiasm for market instruments, the promotion of which often rests on incompatible epistemologies. On the one hand, the extension of neoclassical welfare theory in 'environmental economics' need not abate state 'intervention' because environmental markets have to be created and managed. On the other hand, the advocates of 'free-market environmentalism' reject elements of the neoclassical method and are far less sanguine about the activities of government. In their most libertarian form, they effectively advocate the de-politicisation of environmental decision-making through the 'privatisation' of nature.

This article engages with the intellectual cleavages in economic approaches to the environment. It investigates the extension of neoclassical welfare theory into the environmental area where 'environmental economics' has provided the dominant logic underpinning policies for 'sustainable development' and climate change in the form of government managed price-based and rights-based mechanisms. Secondly, the article examines alternative 'free market' positions that strongly advocate private property rights as the basis for environmental management and sustainability. In both cases, the limitations of market logic in the environmental context are discussed with illustrative evidence from the CDM because of its status as a global price- and rights-based instrument which constitutes a significant component of both the European and recently announced Australian emissions trading schemes.

Environmental Economics and Market Instruments

The gradual recasting of environmental problems as economic problems since the 1980s has given the tools and methods of neoclassical theory legitimacy in environmental policy development. 'Environmental economics' has served as a vehicle for rendering the environment a technical rather than normative issue, making it amenable to policy based on 'economic' calculation (Rosewarne 1993). This economic subsumption of environmental issues removes such questions from the realm of democracy and political contestation, effectively converting

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arguments that are political and ethical into 'economic argument … about which it is assumed … there can be agreement' (Barry 1987: 13). Although the OECD (1994: 181) has acknowledged that economic instruments have been less successful in the environmental context than anticipated, they are nevertheless the policy prescription of choice. This is underpinned by a fundamental belief in the 'intellectual veracity' of neoclassical economic theory, despite its problematic assumptions, and a conviction it can be extrapolated to social and environmental phenomena (Rosewarne 2002: 197).

However, neoclassical theory may not be appropriate when the problems posed relate to non-market environmental entities. Carl Menger, although a pioneer of marginalism, did not think that price theory was capable of answering *all* economic questions, especially those associated with the elements of production (in Polanyi 1971: 21). The resources of 'nature' are 'factors of production' but at the same time, they come into being and have value extraneous to the economic system. Their commodification is necessarily 'fictitious' because, as Polanyi (2001: 75) noted, nature is 'not produced for sale' and cannot be fully governed by the market mechanism. This contradiction directly challenges the idea that the state is 'outside' the market and that market instruments are the most 'efficient' means for regulating the production and distribution of commodities. On the contrary, the commodification of nature requires extra-market regulation if the market-system is to be made compatible with the sustainable reproduction of society. The tension between concrete processes in real economies and the idealist constructs of neoclassical theory extends to the commodification of carbon emissions and their trading in government constructed markets.

Neoclassical advocates argue that it is 'arbitrary' to limit the use of price theory to traditional commodity markets because anything that can be 'valued instrumentally' is amenable to the economic method (Edwards 1987: 78). Building on the edifice of welfare economics, the theory of environmental economics constructs the depletion and degradation of the environment as a problem of inefficient market allocation due to inadequate pricing. The presence of pollution *may* indicate 'market failure'. When costs of production (such as pollution) are not reflected in the price of the commodity, the market mechanism is unable to achieve an 'optimal' allocation of resources (Pearce 1976: 24). At the lower cost of production, a price-output imbalance occurs. As a result, society will have available more product than it may want relative to a clean(ish) environment (Sagoff 1994a: 289). The 'distorted' price is said to deny consumers the ability to make optimal tradeoffs between the commodity they wish to purchase and the level of pollution created by its production.

Under these circumstances, it is considered appropriate for governments to restore equilibrium through price-based modifications such as taxes. The idea that market failure can be corrected in this way stems from Pigou's (1932: 192) argument that state taxes could serve as 'extraordinary restraints' on 'divergences between private and social net product'. Thus, polluters ought to pay a tax consonant with the (marginal) cost of pollution abatement in order to 'internalise the externality' thereby laying the conditions for efficient allocation. However, Coase (1960: 41) challenged elements of the Pigovian analysis, arguing that in

the presence of clearly defined property rights, efficient outcomes (optimal allocation) could be generated without government 'intervention'. This idea has been fundamental in the rise of 'free market' approaches to environmentalism, and to the growing interest in rights-based mechanisms in public policy.

The logic rests on property-owners negotiating exchanges based on the premise of compensation, no matter in which direction the transaction occurs: polluters may purchase 'pollution rights' from property owners or property owners may purchase 'amenity rights' from factory owners. However, the Coase Theorem depends on the assumption of zero transaction costs (which does not hold in practice) otherwise the outcomes of exchange *will* be affected by the initial distribution of property rights. If, for example, a factory is already present (has the 'right' to pollute), residents must bear the costs of organising and compensating the polluter to move elsewhere, or of themselves relocating. These costs may simply be too high and greater than the compensation required. Conversely, factory owners must bear the costs of transferring the relevant right if they seek to locate in the district. The factory may, therefore, be located elsewhere. Hence, environmental outcomes vary, depending on the initial distribution of rights; the 'direction' of exchange *does* matter (Sagoff 1994a: 297). Yet this theory of subjective preferences underpins the idea of 'privatising' the commons.

The problematic assumption of zero transaction costs and the impacts of the distribution of property rights are evident in the CDM which was created by interstate agreement during negotiations for the Kyoto Protocol. Ongoing operation of the CDM requires considerable state support and institutional complexity. Projects are registered and CER credits issued (CDM Executive Board) according to specific guidelines established by the CDM Methodology Panel (CDM Watch 2010: 8–14). CER trade is also registered in accordance with UNFCCC rules (Bumpus and Liverman 2008: 140), complemented by the transaction registries of the European Union Emissions Trading Scheme (EU ETS) (European Commission 2011). Within developing countries which host CDM projects, national government authorities are also required to govern the 'sustainable development' component of CDM (CDM Watch 2010: 8–14). The costs associated with these regulatory structures have caused the World Bank (2010: 3) to lament that the 'rules, modalities, and procedures, which were developed to ensure a rigorous project approval process and the issuance of credible emission credits, have inadvertently resulted in excessive delays and bottlenecks'.[2]

The logic of welfare economics is also applied to commons that cannot be 'fenced off' as property, including the existence of wilderness or unpolluted views. Through contingent valuation methods, the consumption of environmental 'assets' is determined by consumer preferences, in the form of 'willingness to pay'. This serves as a proxy for value where the inability to 'break up' such 'assets' requires a mechanism that can ration access according to 'rights'. The same method is used to determine how much compensation would be required to cover the loss of an environmental good (Dryzek 1997: 114). Hence, individual preferences can be given the task of determining levels of environmental resource use as well as their preservation, thereby purportedly overcoming the incommensurability between intrinsic (ecological) and economic value (Edwards 1987: 79). Such

calculations underpin cost-benefit analysis in political decision making which determines the 'efficiency' of say, preserving a wetland or permitting a commercial development in its place. However, such trade-offs never exist in concrete carbon markets, as offsetting instruments like the CDM enable companies to pollute *and* meet their emissions reduction requirements.

In extending markets through price-based and rights-based mechanisms, sustainability is portrayed as a positive rather than normative issue where markets are understood as 'neutral' or 'value-free' instruments for addressing environmental problems while also being 'cost-effective' (Stavins and Whitehead 1992: 8). Yet, any notion that the use of market instruments is a prescription for 'small government' is quite misplaced. These are *quasi*-market instruments. They require the authority of government and the expertise of bureaucrats to design and implement green taxes or to establish relevant property rights. They are also dependent on the tools of neoclassical theory to make the appropriate calculations. Once the incentives or rights are in place, individual actors are assumed capable of deploying the expertise to produce good results for society as a whole (Dryzek 1997: 113; Rosewarne 2002). The approach of environmental economics almost denies ecological sustainability is a problem at all because it implies that if environmental 'goods' are brought within the purview of the market, sustainability can be achieved.

However, 'sustainability' here defines economic development as ensuring that 'essential welfare values' are preserved 'without sacrificing an acceptable rate of economic growth' (Pearce 1992: 10). And 'welfare' always relates to the satisfaction of consumption preferences. Market instruments are, it turns out, not about eradicating pollution as such because they have *economic* rather than *environmental* 'efficiency' as their primary goal. Pollution does not exist in an economic sense unless it poses a loss of 'welfare'. Even then it need not be eliminated if within the 'optimal level of externality', where 'marginal net private benefits' (of polluter) are equal to 'marginal external cost' (of sufferer) (Pearce and Turner 1990: 61–62). If costs of reparation are greater than the perceived benefits, then such pollution may be deemed a 'Pareto-irrelevant externality', therefore requiring no further action (Bromley 2007: 677). In embracing market instruments it is accepted that 'un-sustainability' derives from a failure to adequately 'value' (price) the environment and therefore the only solution is 'an extension of markets' (Beder 2001: 131).

This economic logic, which is the basis of the CDM, is embodied in the text of the UNFCCC (1992: 4), which states:

> … policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost … cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors.

The corollary of this rationale is that the extension of markets allows carbon pollution to be 'optimally' allocated through the price mechanism to its most profitable uses (Hamilton 1997: 49; Pearce 1976: 103). The CDM has been reasonably effective in achieving narrowly defined economic efficiency, albeit with

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significant political and economic barriers to its expansion. Firstly, the total value of primary and secondary CDM markets was $19.8 billion in 2010 (World Bank 2011: 9), generating economic activity for the financial industry and CDM project developers. Secondly, European companies covered by the EU ETS have been able to pollute over their allocated credits yet comply with their regulatory requirements. For example, in 2010, European installations surrendered over 277 million CERs (European Commission 2011), supporting continued economic activity and avoiding potentially costly emissions reductions. The Australian emissions trading scheme proposed for 2015 will extend this system in allowing 50 per cent of emissions reductions to be met through the purchase of CERs from the CDM (Australian Government 2011: 107).

Nevertheless, the relationship of the price of CERs — representing the equivalent of a one tonne reduction in carbon pollution — to the climate problem is much more questionable. Such valuations are notoriously difficult and there is a lack of unanimity among economists about how to deal with inter-temporal valuation especially, this being evident in the varied responses to the valuation framework posed in the influential *Stern Review* (2006) (cf. Quiggin 2006).

It is unsurprising then that Pearce (1992) makes a somewhat qualified and necessarily 'pragmatic' claim for market instruments which he argues must sit alongside state-based regulative initiatives in a policy-mix (1992: 10–13). Even though market-based instruments are supposed to ensure that the price of a commodity reflects the true cost of production, Pearce (1992: 10) qualifies the argument that *optimal* allocation can be secured because of the uncertainty surrounding 'valuations'. To speculate on the minimum 'price' necessary to secure the integrity and reproduction of ecological entities and processes is an absurdity and ignores the political context in which prices are determined.

This is no doubt why Pearce is more circumspect than other advocates in his claims for environmental economics. Their faith in neoclassical theory is misplaced because it 'explains' aggregate phenomena in terms of a static market equilibrium (methodological equilibration) derived from the interaction of individual consumers (methodological individualism) seeking to optimise their preference satisfaction (methodological instrumentalism) (Arnsperger and Varoufakis 2006). The integrity of neoclassical theory is not consistent beyond the context of the 'individual' — be that a single consumer, commodity, or sector — and it is only coherent at this level in the presence of very restrictive assumptions (Di Ruzza and Halevi 2004: 142). These methodological issues are clearly problematic for the collective and relational nature of environmental problems. But neoclassical theory is also the object of critique in other 'free market' approaches which purport to offer alternative paradigms for addressing the environmental questions of sustainability.

Free-Market Environmentalism and Ecological Privatisation

The green taxes and tradeable permits endorsed in environmental economics are rejected by more libertarian free-market advocates. They argue such instruments are bureaucratically administered and require the (impossible) calcula-

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tion of appropriate tax rates or pollution levels on the assumption an efficient allocation toward equilibrium can be delivered. Furthermore, mass elections and processes of policy making are considered 'irrational'; 'a mixture of incomplete theory and bad information' (Anderson and Leal 1991: 161). In the place of government constructed and managed markets and quasi-market incentives, the free-market approaches promote an extension of private property rights. With the 'tragedy of the commons' as the paradigmatic case, these authors endorse the idea that the 'over-exploitation' of natural resources derives from unclear or poorly enforced property rights, whereas markets that are based on such rights can 'encourage good resource stewardship' (Anderson and Leal 1991: 3). Environmental problems are thus conceived 'as failures by government to specify property rights [rather] than as offshoots of private profit-seeking' (Mitchell and Simmons 1994: 148).

The theory of Free Market Environmentalism (FME) proposed by Anderson and Leal (1991) continues to subscribe to the idea that, under certain conditions, markets maximise welfare and therefore 'markets in environmental goods should be no exception' (Dryzek 1997: 104). This claim follows from the idea that owners of environmental rights (whether individuals, corporations or environmental groups) take care of their 'assets' because their 'livelihood' or 'wealth' depends upon it (Anderson and Leal 1991: 3). In the absence of market discipline, as in the case of 'political control' of environmental assets, Anderson and Leal (1991: 3) suggest it is unlikely that 'good resource stewardship will result'. Yet property owners may accept higher levels of pollution than desirable, either through ignorance (the information problem) or financial imperatives (Sagoff 1994b: 470).

Despite this, FME advocates argue that for resources to be allocated efficiently, 'well-defined, enforced, and transferable property rights which are at the heart of the market process must be allowed to evolve spontaneously through private contracting' (Anderson 1988: 19). In establishing a property right, the good in question would be 'sold' to the individual (or firm, or other entity) that 'values' it most — can 'pay the most for it' — and can make the most profitable use of it (Sagoff 1994a: 290; Dryzek 1997: 104). The CDM employs elements of this logic in moving beyond the simple extension of property rights to pollution of the atmosphere — as stipulated in emissions trading schemes — to the *production* of carbon credits by private companies. Anderson and Leal (1991) see no limits to the property-right concept which, having long applied to land, they seek to extend to water, species, and wildlife. Although conceded as an apparently more challenging case, even the 'atmosphere' would be privatised, given sufficient technological development. Such rights may refer to the useful properties of an asset, rather than the actual water or atmosphere which cannot (as yet) be fenced off. The right to breathe clean air, for example, could be held in tandem with a piece of land (Anderson and Leal 1991: 34; Dryzek 1997: 105–106).

With property rights established, commercial owners (or conservationists) are said to have every incentive to invest in the health of their 'stock' (be it forest or wildlife), as do the farmers of more traditional land and animal stocks (Dryzek 1997: 107). However, with the trading of property rights in CERs, the geographical separation between the creation and use of rights negates this

incentive completely, while regulatory compliance (the inescapably primary source of demand for the credits) rather than sustainability becomes the singular concern of most companies. Moreover, 'self-interest' could easily be nullified by changes in preferences for the associated 'products' making it 'efficient' for owners to capitalise their stock and invest in a new area of consumer preference. Certainly, there have been some successes with water rights. In Britain, for example, private recreational fishing rights include water that is sufficiently clean 'for fish to flourish' with the result that the waterways are apparently 'much cleaner than they would be otherwise' (Dryzek 1997: 106), However, in the case where motives are commercially driven, the results of similar experiments in Australia and New Zealand are far less encouraging, with fish stocks declining and bad practices perpetuated (Beder 2006: 239–245).

Indeed the commercial imperative, while driving the market discipline at the centre of the FME framework, is also the bearer of some complicating factors for that theory, even in the case of traditional landed property. The sale of use-rights (say, the right to pollute) to a capitalist firm independently of ownership absolves it of risk, which is transferred to the private owner. The latter is responsible for monitoring adherence to their privately negotiated contract, the (monetary) costs of which would have been factored in prior to the trade (Anderson and Leal 1991: 5). The owner, being responsible for monitoring and risk, has recourse to the legal system for strict enforcement of rights and for reparation if harm or transgression occurs, such as a greater level of pollution than is acceptable to the land-owner. Thus, the system of private property rights is claimed to be efficient because environmental conflicts can be resolved in the (expanded) legal framework and outside the realm of 'inefficient' government.

However, this poses some unique problems, especially in identifying polluters (when there may be multiple sources) and tracing the health effects of pollution (Dryzek 1997: 106). Until the 'harm' is known and causality established, neither remedial action nor compensation could be imposed. And ecological impairment is notoriously problematic in spatial and temporal terms because it can be cumulative and does not respect the boundaries of property. These difficulties of liability are compounded when harm is caused to future generations because they must be 'present' in order to enact enforceable property rights. While FME exhibits a strong ideological aversion to state activities, its own prescriptions do not avoid the 'calculation problem' said to be at the core of government management. Rather, environmental conflicts are merely displaced 'from the administrative and legislative apparatus of the state to the judicial apparatus' (Smith 1995: 133).

Despite its justification in the 'tragedy of the commons', FME is unable to deal with the 'tougher problems' posed by true commons (Anderson and Leal 1991: 154; Cordato 2004: 15). It is not just that air and water cannot be fenced off and privatised, but that the pollutants that affect them cannot be 'contained' by property rights either. These represent some of the more intractable environmental issues. Yet Anderson and Leal (1991: 161) avoid the analytical imperative by focusing on disputed evidence for global warming, while asserting that even if 'Chicken Little' is right, the warming of the atmosphere does not warrant co-

ercive state action. Rather, they emphasise the importance of removing subsidies and 'getting the signals right' in existing markets, as well as expanding markets through the property-rights approach. This, according to Anderson and Leal (1991: 165) 'has the potential to yield the only truly innovative solutions to atmospheric pollution'.

FME asserts that the market process will generate the innovation and experimentation necessary to solve environmental problems by harnessing the force of self-interest (Anderson and Leal 1991: 5). Thus, it distinguishes itself from environmental economics by emphasising that 'the question is not whether the right solution has been achieved but whether the relevant trade-offs are being considered in the process' (Anderson and Leal 1991: 5). Although they remove some troublesome assumptions — zero transaction costs and perfect competition — FME theorists continue to presuppose consumer sovereignty; price signals where costs and benefits are internalised; and gains from trade with efficient allocation as the inevitable result (Anderson and Leal 1991: 10). The notion of (socially) 'efficient resource allocation' is still lurking, even if as a by-product rather than direct goal (because incalculable) of their rights-based prescriptions (c.f. Anderson and Leal 1991: 10).

In the Austrian School view, externalities and any notion of 'social cost' or 'social value' do not exist as measurable or even valid concepts because 'costs' are determined by individuals and cannot be known 'objectively' by an outside observer (Cordato 2004: 5–7). Rather, (opportunity) costs are subjective and value is revealed through trading. Therefore, the Austrians reject the notions of cost-benefit analysis and contingent valuations as methods of 'valuing nature' (as do many environmentalists). On this view, such tools of 'market interference' ought to be abandoned in favour of extending markets to encompass the natural environment which 'should in fact be traded' because in this way, the (instrumental) 'value' of nature to individual humans can be revealed (Mulberg 1992: 338). And, of course, to permit such trading, it is argued private property rights in nature must be established. On this view, 'environmental controversies' are essentially arguments about property rights; contests over the use of particular 'chunks' of environmental resources that would not exist if property rights were clearly defined and strictly enforced (Meiners and Yandle 1993: viii; Cordato 2004: 10).

The assignment of private property rights favoured by the Austro-libertarians attempts to depoliticise environmental decisions. It shifts control of such decisions from (collective) 'public' political processes to (individual) 'private' economic processes. CER carbon credits are awarded to project developers that claim to emit a lesser quantity of GHGs than would have occurred without the CDM project. Claims are validated and verified according to highly technical UN approved methodologies. These construct 'baseline scenarios' for business-as-usual emissions using economic models that assume development is determined by rational companies responding to market forces. The difference between baseline and actual emissions determines the quantity of CERs issued. For example, a hydropower project in India will produce CERs on the basis that the project is less polluting than a coal-fired power station which the baseline

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scenario calculations assume would be operating in the absence of CDM revenue. Social and political factors are excluded and 'climate benefit' (Lohmann 2010: 238) is reduced to marginal units of change by economic actors, represented in CER commodity form.

CDM projects, and the idea of 'privatisation' more broadly, do not overcome the problems of government management; they merely privatise them. Contracts, the necessary corollary to private property exchange, require certainty and this gives rise to the very same calculation and information problems that are said to occur in the case of state managed market instruments (Paton 2011: 146). Sale of an environmental good — say, the right to pollute — requires more than the determination of cost (the role of subjective value in determining 'price' need not be disputed here). The parameters of the right must also be specified — effectively, what constitutes pollution and how much of it is permissible under the contract. In addition, the integrity of the contract will often require some form of monitoring, such as of pollution levels to determine whether the right to pollute has been exhausted or tradable reduction has been made. These measures are necessary to de-limit the 'commodity' and to specify what constitutes a breach.

Clearly, environmental issues are scientifically complex, and a certain level of knowledge and expertise about pollution is therefore required in determinations of the parameters and use of property rights. Because contractors accept responsibility and risk for their own trades, such information would also be necessary to enable polluters to anticipate the spatial (and temporal) consequences of their 'right to pollute' so that they could negotiate with all those whose property rights might be at risk (future generations are obviously problematic). Yet, negative environmental effects are pervasively external, travelling beyond the boundaries of 'property' or the rights attached to its useful attributes. Thus, the impossible (scientific) calculations required of government management are not solved by redirecting environmental decision-making from the preferences of *homo politicus* to the preferences of *homo economicus*. In the case of the environment, there are no evident mechanisms that can translate self-interest into collective rationality. 'Privatisation', as the CDM experiment shows, fails to result in 'appreciable gains in rationality' (Friedman 1992: 442).

Regulation in the Clean Development Mechanism: Economic or Ecological?

Aspects of the *theory* of environmental economics as well as free market environmentalism are evident in the design of the Clean Development Mechanism (CDM). Examining how the CDM functions at the local project level provides an opportunity to determine the potential for price- and rights-based instruments to incorporate social and ecological values in *practice*. Evidence collected by non-government organisations (NGOs) from a range of project types and countries points towards the association of CDM projects with seriously negative social and ecological impacts. These exist in the context of a high degree of government oversight in the existing CDM institutional structure, which is itself a departure from the theoretical prescriptions behind the instrument. However,

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the regulation is directed towards the economic requirements of global carbon markets rather than the environment.

The CDM is designed to support the 'ultimate objective' of the United Nations Framework Convention on Climate Change (UNFCCC 1992: 4) to stabilise 'greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'. The unevenly developed global economy is dependent on the combustion of fossil fuels and the complex geological, biological and chemical processes through which the climate system cycles the carbon from the resulting GHGs (IPCC 2001: 87–89). This renders the objective an unavoidably collective and interdependent problem. However, market-based instruments for climate change reduce these complexities into 'measurable, divisible greenhouse-gas "emissions reductions" ' (Lohmann 2010: 238). Market principles are thereby extended to the environment in a very limited way, based on properties required for trading. In the case of the CDM, this means creating a common 'currency' — carbon credits — upon which the 'market' can function.

The production of carbon credits (CERs) by individual CDM projects is calculated according to the global warming potential[3] of the particular GHG deemed to be reduced from an alternative scenario. This enables the creation of a homogenous CER commodity with the singular property of representing a one tonne reduction in carbon dioxide-equivalent. The functioning of the CDM market depends on the equivalency provided by this abstraction. It permits the integration of a diverse range of CDM projects, reducing different types of GHGs in line with the emission reduction requirements of (also diverse) polluting companies through emissions trading schemes in developed countries. The compliance value of CERs gives them an instrumental value in allowing companies to overcome socially imposed ecological limits on the use of the climate system as a carbon sink. However, such value relates only to carbon emissions. Broader social and ecological factors are not priced or covered by property rights despite their centrality to CERs and the CDM.

The processes which enable the production of CERs often directly require the appropriation or degradation of nature, including land and ecological systems which are also the source of livelihoods for surrounding communities. For example, the Sasan coal power project in Madhya Pradesh, India required the appropriation of land to situate its technologically advanced power plant (Sasan Power Limited 2010: 2). With minimal compensation, the appropriation of 946 hectares, which included government-owned land, displaced more than 1200 families from already disadvantaged communities (Nandi et al. 2009: 43–44; Starr 2011). Another project, the Gujarat Flourochemicals Limited HFC-23 destruction plant in Gujarat produces CER credits because it destroys a potent by-product from the production of the refrigerant gas HCFC-22. However, the process of destruction itself is a highly polluting one. It releases toxic pollutants which have damaged human and livestock health, as well as agricultural livelihoods for subsistence farmers in the villages surrounding the plant (GFL 2005: 9; Dabhi 2009: 142; Ghouri 2009).

The alienation of social and ecological values in carbon pricing is also acute in the case of other indirect, but inseparable, impacts of many CDM projects which support existing unsustainable practices or exacerbate existing social conflicts. In the Montalban power generation project in Rizel province, the Philippines, CERs are produced through capturing methane from the nearby (pre-existing) Montalban landfill site to create electricity which 'displaces' more carbon intensive forms of electricity (Montalban 2009: 2). Problematically, the waste dump has repeatedly leaked (or discharged) toxins into local water sources (Docena 2010: 33). Yet continuation of the landfill site and its polluting practices is supported because the CDM project requires an ongoing supply of rubbish in order to meet its CER production projections (Montalban 2009: 7; Cote 2010: 36–37).

Similarly, the Aguan palm oil project in Bajo Aguan, Honduras will produce CERs because it recovers biogas from its own wastewater in order to power its extraction and refining activities; the sale of those CERs will in turn provide an additional revenue source for the company (Exportadora del Atlántico 2011: 3). However, during the period when the project was being validated and registered, there was significant social unrest. Indeed, the project developer's private security force was linked to the killing of 23 local peasants who had been campaigning to regain the land they claimed was unlawfully acquired for use in the project (Afrika-Europa Netwerk et al. 2011: 1; CDM Watch 2011a: 3). The direct and indirect social and ecological impacts evident in the Aguan, Montalban, Gujarat and Sasan schemes have been repeated in numerous other CDM projects (see Lohmann 2006; Böhm and Dhabi 2009; Ghosh and Sahu 2011), demonstrating both the limitations and potential problems of price and rights based approaches to nature.

Land, ecological systems, existing unsustainable practices and other contested resources are inseparable from CDM projects and production of the carbon commodity. Yet impacts on these natural conditions are excluded from calculations for CER production levels. This is because they fall outside the purview of baseline emissions scenarios which are directed towards creating abstract carbon credits that satisfy the requirements of narrowly defined carbon emissions caps in developed countries. Despite prominent public campaigns, the Executive Board has not initiated a review into the negative impacts associated with the examples discussed here or, indeed, any other CDM projects. This is not because of a general 'hands off' approach to the regulation of the CDM, as demonstrated by the significant state and quasi-state governance in the CDM. Rather, it is because such impacts fall under the 'sustainable development' provisions of the CDM, which is the domain of host country governments (UNFCCC 2001: 81) and therefore considered as separate from calculating the commodification of carbon reductions.

The extensive government regulatory arrangements of the CDM are only concerned with CER calculation and are therefore pro-market, being focused primarily on the economic rather than social and ecological integrity of the CDM. Furthermore, the approval by developing country governments of projects with negative local impacts as meeting sustainable development guidelines (the only regulatory safeguard for non-carbon impacts) suggests an incompatibility

between economic efficiency and broader notions of sustainability in the context of market instruments. A greater regulatory enforcement of notions of ecological sustainably and social justice in the CDM could potentially prevent many of the negative outcomes of projects. Creating mechanisms for appeal by civil society and strengthening sustainability criteria in the calculation of carbon credits, for example, has been the focus of NGOs such as CDM Watch (2011b: 7–9), particularly in the wake of the Aguan project.

However, existing regulatory institutions already go well beyond the theoretical prescriptions of environmental economics, which foresees a limited role for the state in setting up markets for tradeable permits. They also clearly exceed the free-market approach which foresees a depoliticisation of ecological 'transactions'. The CDM shows that wide-ranging state support is required in order to reconcile the abstract, reduced and atomised notions of nature with concrete market practices. Yet even this pro-market regulation has been criticised for reducing the flexibility of the market by causing time delays for project registrations and CER issuance (World Bank 2010: 3). Proposals for further regulation allowing appeals and project deregistration have been resisted by market actors because they claim such processes will reduce 'efficiency' and raise costs (International Emissions Trading Association 2010). The scale of state regulation required to genuinely integrate ecological concepts would augment this contradiction to the point that the already questionable 'efficiency' or 'stewardship' rationales of the CDM as an economic instrument would be completely negated.

Conclusion

The functioning of the CDM market depends on an alienated notion of carbon sink capacity. This is expressed through its carbon credits which are abstracted from many of the ecological processes of the natural climate system as well as its interrelations with human collectivities. Such abstraction has created negative impacts in the practice of CER credit production. This is because the economic value of credits is completely separated from any notion of ecological sustainability beyond the reduction of carbon emissions, which is itself a contested sustainability strategy (for example, Haya 2007). The extension of the existing CDM regulatory structure to counter such impacts runs contrary to the rationale of the CDM as a market instrument. This contradiction indicates that market-based mechanisms and socially just and ecologically sustainable outcomes may not be reconcilable and that climate change mitigation, including some of the activities of CDM projects, should not be financed by the commodification of carbon reductions. Yet this problematic is not recognised in economic theories or economic policies which continue to deny any incompatibility between the values of economic growth and environmental protection (Leff 2002; Bernstein 2002: 14).

The emphasis on economic criteria in policy has furthered the opportunities for profit generation without achieving the promised social and environmental benefits. Economic theories are constrained by their inability to integrate ecological processes into their analytical structures. Nor can they explain the very social institutions that support the market trading upon which their schemas

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depend. Market instruments aim to optimise individual consumption thereby compromising any sense of the commons while free-market environmentalism advocates the de-politicisation of environmental decision-making through the privatisation of nature. In economic theory, nature has no intrinsic value and exists only in the form of resource inputs to be bought and sold at will, depending on the most profitable human use. Market approaches therefore promote the idea that market failure arising from the fictitious commodity status of 'nature' is best addressed by extending (equally fictitious) marketised relations. This stems from the mistaken belief that ecological values can be monetised and marketised, because such values, like all other commodities, are simply means to individual ends.

Ecological values must be protected because they cannot, in fact, be alienated. The conceptualisation of 'nature', or its useful properties, as a commodity utilises an abstraction that has no material basis. Ecological services that constitute the commodity being bought and sold cannot be treated as a purely 'economic' (market) category. Such services are not produced in markets; they are embedded in 'nature' which has extraneous purpose and value unknowable to the purveyors of price. In the CDM, the abstract distinction between nature and its useful properties — the capacity to absorb carbon pollution — may displace but does not transcend the material effects of commodification, because nature's absorptive capacities cannot be separated from the ecological body. Similarly, the economic sphere cannot be dealt with in isolation from society and its values, nor can the environment be separated 'from the wider issues of political process, community and democracy' (Mulberg 1992: 339–341). Economic theories provide an insufficient framework for addressing ecological sustainability and the problems of climate change, because the focus on individualised market exchange neglects the ecological, social and political processes that are also necessary considerations in the sustainable reproduction of human society.

Notes

1. Governments in the South have sometimes been suspicious of plans for environmental protection that might impede their economic development.
2. However, the negative impacts of CDM projects discussed below suggest that state structures are primarily directed towards managing the economic, rather than social and ecological, contradictions of the carbon commodity.
3. Global warming potential (GWP) is an index used to compare the radiative properties of different greenhouse gases over a particular time period, most commonly over 100 years (IPCC 2001: 385).

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