Third World Quarterly, Vol 22, No 5, pp 795–811, 2001

The Kyoto Protocol's 'Clean Development Mechanism': a sustainability assessment

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ABSTRACT *The purpose of this article is to assess the Kyoto Protocol's Clean Development Mechanism (CDM). Drawing upon the literature on sustainable development and sustainability, the criteria for assessment consist of ecological, economic and social elements. Three key debates about the CDM are placed under investigation: proposals to clarify 'supplementarity' by capping the extent to which the CDM can be used to allow industrialised countries to meet their greenhouse gas emission limitation commitments; proposals to restrict CDM eligibility to particular kinds of projects; and proposals to introduce 'geographical quotas', to encourage CDM activity to take place throughout the developing world. Based largely upon its positive consequences for ecosystem and biophysical functions, further study of how restrictions upon CDM project eligibility could be implemented is encouraged.*

In December 1997 representatives from around the world reached agreement on the terms of the Kyoto Protocol (UN, 1997). The purpose of this international treaty is to bring about reductions in the net emissions of greenhouse gases and thereby achieve 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system' (UN, 1997: Article 2). In short, it is meant to address—or at least begin to address—the considerable challenge of global climate change.[1]

To achieve this goal, the Kyoto Protocol has many of the hallmarks of recent international environmental agreements—in particular, commitments on the part of individual countries to reduce their national levels of greenhouse gas emissions by a particular percentage from a particular base year.[2] But the Kyoto Protocol also contains new approaches. Among them is the 'Clean Development Mechanism', a means whereby industrialised countries can meet their greenhouse gas emission limitation commitments by supporting activities in the developing world. Indeed, not only is the Clean Development Mechanism one of the most innovative elements of the Kyoto Protocol, it is also one of its most controversial.

Much of the debate about the Clean Development Mechanism (CDM) has been dominated by two opposing views. On the one hand, a number believe that, because the CDM allows developed countries to use the international market to

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ISSN 0143-6597 print/ISSN 1360-2241 online/01/050795-17 © 2001 *Third World Quarterly*
DOI: 10.1080/01436590120084601

reach their emission limitation objectives, it is inevitably flawed (eg Atthakor, 2000). On the other hand, a number believe that, because the CDM tries to base international activity on economic principles designed to maximise efficiency, it is without doubt the best way forward (eg WBCSD, 2000). Alternatively, when more explicit criteria for assessing the CDM have been used, 'national interests' have often been the lens through which this mechanism has been examined. A Canadian group of stakeholders, for example, considered a potential national position on the CDM. They agreed that a 'balanced approach' (defined as 'decisions reached internationally on the Mechanism should not compromise Canada's international competitiveness, trade balance or its regional economies') should be one of the key guiding principles (NCCP, 1999: v). Thus, more 'objective' analysis of the CDM tends to be the exception rather than the rule.

This article aims to fill that gap by evaluating the Clean Development Mechanism's consequences for sustainability. More specifically, after briefly describing the Clean Development Mechanism, the article examines the term 'sustainability', in particular focusing upon how it might be used to assess a policy proposal (like the CDM). Following this, some of the debate surrounding the proposals for the Clean Development Mechanism will be investigated with reference to the sustainability criteria that have been previously laid out. Finally, conclusions will be offered and implications for future policy discussions about global climate change will be highlighted.

Clean Development Mechanism

The Clean Development Mechanism is defined by Article 12 of the Kyoto Protocol (UN, 1997). In brief, it is a so-called 'flexibility mechanism'[3] designed to help industrialised countries—those with emission limitation commitments in the Kyoto Protocol—meet these commitments by undertaking activity in the developing world. It is also meant to assist developing countries 'in achieving sustainable development' (UN, 1997: Article 12.2).

Perhaps it is best illustrated by means of a potential example. Consider two countries: Canada and Zimbabwe. Under the terms of the Kyoto Protocol, Canada is obliged to reduce its greenhouse gas emissions by 6% below 1990 levels by the years 2008–12 (UN, 1997: Annex B). The cost of doing so might be perceived as being particularly high in Canada (see eg Holling & Somerville, 1998). Zimbabwe, being a developing country, has no specific emission limitation obligations. By contrast, the cost of emission reductions might be perceived as being somewhat lower in that country.[4] More specifically, given Zimbabwe's vast coal resources (it has a reserve to production ratio of 131 years (BP, 2000)), it is anticipated that, in the absence of action to reduce greenhouse gas emissions, coal will continue to be the main fuel for the country's power stations during the years to come. Fuel-switching in electricity, therefore—something that many argue is among the cheaper greenhouse gas abatement activities—is a possibility (for more information, see Ishitani & Johansson (1996)).

Of course, the world at large would rather that Zimbabwe did not use its coal reserves to satisfy its electricity demands. Other possible means of meeting rising electricity demand include less carbon-intensive sources like small hydro stations

and solar power. These, however, are presently often more expensive than coal, so would not normally be pursued in Zimbabwe.

It is at this point that the CDM plays a role. Conceivably, a Canadian entity could pay the incremental cost of the less-carbon-intensive means of generation (that is, the difference in cost between coal and, for example, small hydro). The result would be that Zimbabwe's greenhouse gas emissions would be lower than they otherwise would have been. If the project were 'certified' as a CDM-eligible activity, then many of the emission reduction credits would be transferred to the Canadian entity.[5] Although emissions resulting from activities within Canada's borders would not have changed, Canadian emissions (as recorded under the Kyoto Protocol's inventory process) would have declined. At its most basic, this is how the CDM could proceed.

The reader will note that the discussion above is couched in conditional terms. The reason for the repeated use of words like 'could' and 'would' is that the specific details of the Kyoto Protocol (including the details of the CDM) have yet to be agreed. The 1997 document contains a number of ambiguities and omissions that must be clarified and/or elaborated. Negotiators have been trying to do this for more than three years. By the end of 2000 they had reached a stalemate, for their self-imposed deadline of the year 2000 had come and gone without agreement being achieved. Instead, the talks at which a consensual view on outstanding items was supposed to be realised had to be 'suspended' in November 2000 (see Soroos, 2001; Paterson, 2001). Moreover, before these talks' planned resumption in July 2001, the USA announced (in March 2001) that it would not work to implement the Kyoto Protocol (Drozdiak & Pianin, 2001). This led some to say that the Kyoto Protocol 'had been killed' (Vulliamy, 2001; Victor, 2001), or at least that the negotiations themselves were effectively 'dead' (Techawongtham, 2001). Even if reports of the Kyoto Protocol's demise end up being mistaken, it is beyond doubt that the 'Kyoto process' presently faces considerable challenges. Indeed, it must be remembered that the document has yet to enter into force: as of 19 March 2001 only 33 countries had ratified the Kyoto Protocol, and only one of these (Romania) was an industrialised country. Hence, at the time of this writing (June 2001), the Protocol was a long way from receiving the ratification of 55 countries (which together represent 55% of industrialised countries' emissions), which is required for it to enter into force.

Given this, is it wise to be assessing any element of the Kyoto Protocol, including the Clean Development Mechanism? The answer is certainly 'yes'. For one, the Kyoto Protocol is, according to many, the 'only game in town' (eg Morgan & Lashof, 2000). They argue that 10 years of work will not be readily replaced by an alternative process. Indeed, one possible future scenario is that the Bush Administration's intransigence will simply serve to reinforce the commitment of the Kyoto Protocol's supporters. Even in other scenarios—for example, were an alternative US approach to the problem to be presented and acted upon—it would undoubtedly be predicated upon increased use of market forces and increased involvement of the developing world (Drozdiak & Pianin, 2001). These two themes are in many ways the cornerstones of the CDM. Accordingly, a rigorous analysis of the CDM is all the more crucial.

Sustainability criteria

For those who study sustainable development and sustainability perhaps the only point of widespread agreement is that the world's present path of development is not sustainable.[6] A second point of agreement might be that sustainability[7] is increasingly being used as a criterion for the evaluation of policies, plans or programmes, as well as projects. We see this in national activities, as well as internationally. Canadian federal government obligations to evaluate the sustainability of the projects with which they are involved is an example of the former (CEAA, 2001), while the Rio Declaration on Environment and Development is an example of the latter (UN, 1992a).[8] And, although the international regime for climate change has as its primary objective atmospheric ambitions (as noted at the beginning of this article), there is still reference to broader ambitions about sustainable development.[9] Consequently, it is certainly appropriate to judge this individual mechanism in the light of its ability to achieve a broader goal; the fact that the CDM is supposed to help countries achieve sustainable development (UN, 1997: Article 12) serves to highlight further the importance of this task.

Nevertheless, although all may agree that we should be trying to advance it—and perhaps implicitly feel that we should be trying to evaluate proposals against it—there is not necessarily uniform opinion as to what 'it' (namely, 'sustainability') is. Many, for example, have highlighted the wide number of definitions of sustainable development and sustainability being advanced in the international debate (for an early such example, see Pearce *et al*, 1989: 173–185; for a more recent example, see the contributions in Becker & Jahn, 1999). Others, moreover, flag the fact that definitions are often alternatively presented in the form of 'circles', 'legs to a stool', 'principles', 'goals' or 'indicators' (Gibson, 2001). The vast range of means of presentation is again suggestive of divergent opinions as to what should constitute 'sustainability', or at least progress towards it.

That said, there is perhaps more convergence in the field than some suggest. Notwithstanding the dangers of 'compartmentalisation' that some highlight, many of the aforementioned definitions or interpretations of 'sustainability' present elements that revolve around three themes—namely, ecology, economy and society. Consider the following examples, drawn from each of the aforementioned 'means of presentation'.

Indicative of the 'circles' approach is that interpretation presented by Holmberg and Sandbrook (1992: 25), in which they identify the 'biological system', the 'economic system' and the 'social system'. They maintain that sustainable development involves 'trade-offs between (and within) [these different] systems' (Holmberg & Sandbrook, 1992: 25). Indeed, Eichler (1999: 198) calls this kind of approach the 'dominant view of sustainable development' while labelling the three circles 'environment', 'economy' and 'society'.

In contrast to the 'circles' approach, others adopt the same three elements, but argue that they should be conceived of as 'legs to a stool'—suggesting that each must be present in order to advance sustainability. Though not using the 'stool' metaphor explicitly, a high-profile example that captures the same sentiment comes from the (US) President's Council on Sustainable Development (PCSD): '[The PCSD's goals] are truly interdependent and flow from the Council's under-

standing that it is essential to seek economic prosperity, environmental protection and social equity together'.

Turning to those who explicitly use 'principles', consider the 'four system conditions', as advocated by The Natural Step.[10]

> In order for society to be sustainable, nature's functions and diversity are not systematically:
> (1) … subject to increasing concentrations of substances extracted from the earth's crust;
> (2) … subject to increasing concentrations of substances produced by society;
> (3) … impoverished by physical displacement, overharvesting, or other forms of ecosystem manipulation; and
> (4) … resources are used fairly and efficiently in order to meet human needs globally. (TNS, nd-a)

Although there is a clear emphasis on ecology elements in The Natural Step's work, the fourth system condition clearly has social ('used fairly') and economic ('used … efficiently') tones to it as well.

In terms of 'goals', a report from the US National Research Council argued that 'the primary goals of a transition toward sustainability over the next two generations should be to meet the needs of a much larger but stabilizing human population, to sustain the life support systems of the planet, and to substantially reduce hunger and poverty' (NRC, 1999: 31). Again, the ecology element is clear ('sustain the life support systems of the planet'). Economic elements are, however, also evident, for poverty reduction is an oft-cited economic goal. With respect to social elements, meanwhile, efforts to meet human needs can be interpreted as such.

Finally, in terms of 'indicators', the International Institute for Sustainable Development has presented a 'dashboard model', highlighting indicators in the areas of 'environmental quality', 'economic performance' and 'social health' (IISD, nd). Along with the aforementioned 'circles' approach, the link with identified areas of ecology, economy and society is probably most direct here.

Following what is thus perceived to be a significant strand in the literature, this article adopts this three-fold understanding of sustainability and seeks to assess the impacts of the Clean Development Mechanism upon ecology (in terms of climate change consequences particularly, and ecosystem and biophysical functions more generally), economy (with a focus upon economic efficiency and poverty reduction) and society (considering, in particular, equity issues and the potential for adaptive management). Though by no means 'the final word' on sustainability (that is not the main purpose of this article), a clear articulation of how the term is understood nevertheless allows for an assessment of the CDM, which is the main purpose of this article. Others, of course, are encouraged to present their own interpretation of the term sustainability and to assess the CDM accordingly.

Assessment—overview

Efforts to evaluate the CDM in the light of its consequences for sustainability

immediately raise a number of questions. Stated most bluntly, with what should the prospective impacts of the CDM be compared? Should they be compared with 'doing nothing', in the spirit of seeing whether this particular initiative advances sustainability to a greater extent than would have otherwise been the case? If this is the tack taken, how should 'doing nothing' be defined? As doing nothing to address global climate change (and, consequently, assuming that the Kyoto Protocol will not be implemented, nor will any alternative treaty with similar intentions)? As doing nothing in terms of the flexibility mechanisms (and consequently, assuming that the Kyoto Protocol's goals will be worked towards, but by means of industrialised countries taking action within their own individual borders)? Or as doing nothing in terms of the Clean Development Mechanism (and, consequently, assuming that the Kyoto Protocol ambitions will be worked towards, but without Northern countries' receipt of emission credits 'earned' through activities in the developing world)?

Alternatively, critics of assessment procedures often lament the fact that the introduction of environmental assessment activities are usually at such an advanced stage of project or policy development that the assessment inevitably ends up comparing the proposal with only slightly revised ways of doing the same thing (Wood, 1995: 88). In other words, given that commitments to particular approaches have already been made, all that is feasible, the argument continues, is to consider changes 'at the margin', in order to 'make it the least bad'. Though flawed, it might nevertheless be potentially most influential to compare the prospective impacts of CDM with slight variations on the same policy.

Finally, many argue that 'good' assessment necessarily requires an examination of all possible alternatives to achieve the same goal (Commissioner of the Environment and Sustainable Development, 1998: 6–8). Therefore, the argument continues, assessment should consist of evaluating not only the proposed activity against some benchmark, but also of assessing all conceivable alternatives against the same benchmark—that is to 'compare with all possible alternatives'. In so doing, one may find that the proposed activity is 'good' for sustainability, but not as good as some other potential activity. In terms of climate change, this might encourage consideration of alternative 'architectures' to try to reduce global emissions of greenhouse gases, for example, instead of using the CDM, and the Kyoto Protocol more broadly, working towards the same goal by means of a 'World Environment Organization' (Newell, 2001).

Given these alternative approaches, different conclusions could well result depending upon the terms of the assessment decided upon. A policy, for example, could be judged to be 'better than nothing' (ranks 'positive' on the 'do nothing' criterion), 'just as good as it could be' (ranks 'neutral' on the 'make it the least bad' criterion), but 'not nearly as good as other alternatives' (ranks 'negative' on the 'compare with all possible alternatives' criterion). Thus, the same policy proposal could be cast in different lights, depending upon the means of evaluation.

Given the assertion above—namely that the Kyoto Protocol is now the 'only game in town'—it seems appropriate to use the 'make it the least bad' criterion, thus comparing alternative proposals while accepting the assertion that the Clean

Development Mechanism will persist. Thus, assessment of alternatives (including complete abandonment of a CDM-type tool) is not undertaken in this article. Without that kind of investigation, however, the assessment undertaken here can not determine whether some unimplemented alternative is better than that which is being supported by the majority of policy makers at this point. Unequivocal conclusions about the value of the CDM will therefore not be able to be made. With that in mind, consider now three of the key outstanding issues in policy debates about the appropriate details of the Clean Development Mechanism.

Assessing supplementarity

It is stated in the Kyoto Protocol that the use of the Clean Development Mechanism (and, indeed, all of the flexibility mechanisms) should be additional to emission reduction action taken within a country's own territory. It is left ambiguous, however, as to how much of that effort should be 'at home' and how much 'abroad'.[11] Therefore there is much debate as to what share of Northern countries' commitments should be undertaken within their own territories, and what share in developing countries. This debate is known as 'supplementarity'.

It is generally thought that, without any restrictions on its use, a significant amount of countries' emission reduction activities would take place through the CDM. A report from the OECD, for example, reviewed a number of models and found that 'between 31 and 55 percent … of the total abatement effort required by the Kyoto Protocol' could be through the CDM (OECD, 2000: 23). Additionally, a study by the Center for Sustainable Development in the Americas suggests that 57% of emission reductions would be achieved through the CDM (CSDA, nd). Such findings are not unexpected, for many have highlighted the fact that cheaper mitigation options exist in the developing world. For example, energy efficiency retrofits that have already been implemented in industrialised countries could cost-effectively be implemented in developing countries. Such options would achieve the same greenhouse gas emission reductions as, and be cheaper than, the 'next generation' of energy technologies (for example, increased use of renewable energy) in the industrialised world. Indeed, this provides much of the rationale for the CDM in the first place.

With some one billion tonnes of carbon reductions needing to be made by industrialised countries by 2008–12 (if they are to meet their Kyoto Protocol obligations), the decision on supplementarity will be consequential. If no quantitative restrictions are put in place, the international CDM market has the potential to be worth something of the order of US$5.6 billion annually (CGS, nd: 9). Presently, the debate is relatively polarised. On the one hand, the so-called Umbrella Group (a negotiating group of countries that includes Australia, Canada and the USA) has been arguing against any kind of cap on CDM. On the other hand, many European representatives have been maintaining that some sort of limit is required.[12] What follows is a consideration of the sustainability consequences of each of these alternative positions.

First, consider the environmental impacts. In terms of greenhouse gas emissions, there should be no difference, for the same reductions in greenhouse gas emissions will have occurred (simply in different places).[13] Other environ-

mental impacts, however, may be different as a result of the CDM.

More specifically, greater use of the CDM would encourage more widespread use of existing technologies than would have been the case if emission reductions had to be made 'at home'. Alternatively, restricted use of the CDM would serve to stimulate new technological developments, because those same existing technologies (which, with greater use of the CDM, would be bound for the developing world) would have already been deployed in industrialised countries, motivated by the potential for cost savings. It is for this reason, therefore, that many argue that reduced use of the CDM would help to foster the 'next generation' of energy technologies.

Nevertheless, more widespread use of existing technologies in the developing world might serve to have positive environmental impacts (apart from the impact upon global climate change, that is). Efforts to reduce greenhouse gas emissions in power generation, for example, might improve local air quality as well: fuel-switching from coal to natural gas not only reduces carbon dioxide emissions, but also emissions of acid precipitation and smog precursors.

Alternatively, however, climate change-motivated activities might serve to worsen the local environment in the developing world. An example is the conversion of trucks from gasoline to diesel fuel. While the lifecycle greenhouse gas emissions would fall (from 222–282 g carbon dioxide equivalent/km to 173–266 g carbon dioxide equivalent/km (Michaelis, 1996: 696)), local well-being would deteriorate, because diesel is a more significant public health hazard. While one problem would have been addressed, another would have been created or exacerbated.

Indeed, an argument can be made that this pattern would replicate itself more readily in the developing world than would the more virtuous cycle described in the fuel-switching example. Many of our existing environmental technologies have been born out of a traditional 'sectoral' approach. Dryzek (1997) argues that this has resulted from the fact that administrative bureaucracies have been structured so that environmental problems are addressed in a disaggregated manner—sectoral challenges have been identified and handled by sectoral experts. The result, he maintains, is that 'there is little in the way of problem solving that occurs, but a great deal in the way of problem displacement … Such displacement occurs when an air pollution problem is solved by creating a water pollution problem—for example, prohibition of the burning of waste may lead a company to discharge the waste in watercourses instead' (Dryzek, 1997: 80–81). Like squeezing the proverbial balloon, therefore, contraction ('attention') in one area may well lead to expansion ('problems') in another area.

Returning to our CDM discussion, more widespread use of existing technologies in the developing world—technologies created by 'sectoral processes'—may inadvertently lead to more environmental problems. Alternatively, given increased recognition of the complexity that we face, there are hopes that the aforementioned 'next generation' of energy technologies might have greater sensitivity to interactions across various problems and thus lessen the occurrence of 'problem displacement'. Hence, restrictions on the use of the CDM could encourage new technologies created by 'interdisciplinary processes' and thus address many environmental problems.

Turning to the economic consequences, the CDM is justified, as noted above, by its claim to increase economic efficiency. Indeed, some suggest that use of these kinds of flexibility mechanisms can 'save 20–50 percent of global abatement cost, relative to simple equal-abatement formulas' (Parson & Fisher-Vanden, 1999: 207). While the argument that the cause of economic efficiency is well-served by the CDM is probably true in the short term, and also true from the perspective of the individual firm that is obliged to reduce its greenhouse gas emissions, challenges arise when a longer-term perspective is taken, or when broader society is considered.

As noted above, greater use of the CDM will serve both to increase the use of existing technology throughout the world and to dampen the uptake of new technology in any part of the world. Consequently, it could well be that the long-term cost of mitigating global climate change will be higher with the CDM than without it. Assume, as many scientists suggest, that greenhouse gas emission reductions of the order of 60% or more are needed (IPCC, 2001: 76, Figure 25), compared with the roughly 5% reduction (only among industrialised countries) required by the Kyoto Protocol. If this is indeed the case, then those more costly reductions in the industrialised world—those requiring what is being called here the 'next generation' of energy technologies—will have to be made, sooner or later. The point is simply that steady introduction of new technologies (paced over time) would be cheaper than rapid introduction of new technologies (bunched in time, at some point in the future). The former (which would be encouraged by a cap on supplementarity) would allow capital to be replaced at the end of its working life and thus avoid the need to retrofit prematurely (which would be a result of no cap on supplementarity).[14]

What will occur for poverty reduction is unclear. On the one hand, reduced use of CDM will mean reduced flows of capital to the developing world. One consequence of this may well be less economic growth than would otherwise have occurred in the developing world and greater incidence of poverty (Steer & Mason, 1995). This argument, however, is premised on the assumption that more capital transfers from North to South lead to more growth, which leads to less poverty. Although this is not without its own logic, there are of course many who argue that North–South flows of resources have actually served to increase poverty rather than to reduce it (eg Rich, 1994). Nevertheless, many argue that North–South transfers, if well managed, can promote sustainability.

In terms of social ramifications, limits on the use of the CDM would, as argued above, serve to lessen the quantity of projects in the developing world and hence reduce the involvement, in the short term, of these countries in efforts to address climate change. Nevertheless, 'equity' ambitions would not be affected significantly, for decisions about the kinds of CDM projects to advance would still be left, at least in principle, to developing countries.

Also considered under the rubric of society is the potential for adaptive management. In our future, we will undoubtedly continue to face a number of 'surprises' (NRC, 1999)—environmental and otherwise. Our ability to respond constructively as a society to these surprises will be, to a large extent, a function of our ability to adapt. Our ability to adapt will, in turn, be increased if we have a larger portfolio of response strategies available to us. Consequently, because

supplementarity (that is, a limit on the use of the CDM) would encourage increased development of new technologies (for the reasons advanced above), it would also serve to increase our potential to adapt in the face of future surprises.[15]

Assessing project eligibility

There is much debate as to what projects should be allowed to operate under the CDM. While the Kyoto Protocol suggests that only 'mitigation' projects are allowed (and therefore not, for example, forestry activities; see UN, 1997: Article 12.3(a)), there are relatively few restrictions upon what would or would not qualify for inclusion (UN, 1997: Article 12). Debate has followed as to whether these intentions should be operationalised in a detailed manner through restrictions on project eligibility.

Largely consistent with their position in the debate on supplementarity, members of the Umbrella Group have argued that few restrictions should be placed upon CDM projects (UNFCCC, 2001: 142). Indeed, they have argued that the range of permissible projects should be widened to include a whole range of land-use (forestry and soil management) activities as well. No particular kind of activity, however, should be privileged so as to increase the chances of its uptake. Instead, decisions should be left to participating countries to decide so that the market can work most efficiently and effectively.

Many Europeans, meanwhile, are arguing that only a subset of conceivably eligible projects should be allowed to go forward under the terms of the CDM. Often advanced are both a 'positive' list and a 'negative' list. The European Union (EU), for example, argues that negotiators 'should adopt a "positive list" of projects that would be accepted under the mechanism, based on renewable energy sources, energy efficiency improvements and demand-side management in the fields of energy and transport' (EU, 2000: 8). Small projects are often included on some peoples' 'positive lists' as well, with the argument being that, although they often serve to advance sustainable development, they are not able to benefit from economies of scale and so are often overlooked in international development efforts (UNFCCC, 2000: 8).

Similarly, many suggest that nuclear power should be excluded from projects that are eligible. This is one of the key elements of many critics' negative lists (eg Greenpeace International, nd). Additionally, the EU also states strongly that 'carbon sinks' (which, presently, primarily means various kinds of forestry activities) should not be allowed. The EU position is that '… the scale of sinks is potentially huge. This means that, unless properly controlled, their use could fundamentally change the nature of the Kyoto agreement.' (EU, 2000: 4).

Considering the environmental impacts of these alternative approaches to project eligibility, there should be little difference for global climate change. Other environmental impacts, however, may occur.

Although it depends upon what is included (and conceivably excluded) from the final list of eligible projects, it is clear that 'no restrictions' have the potential to give rise to the 'problem displacement' phenomenon mentioned above. In particular, the introduction of nuclear power in many developing countries could

create numerous safety and waste disposal problems. Alternatively, restricting project eligibility could serve to encourage those activities that have the largest local environmental (and sustainability, more broadly) benefits. Those studying energy efficiency and renewable energy projects often highlight the 'win-wins' that arise from their implementation (eg Nogee *et al*, 1999).

With respect to the economy, the same argument applies as that which was noted in the discussion on 'supplementarity' above. Indeed, the overall efficiency gains resulting from restricted project eligibility have the potential to be even less than those arising from limited supplementarity, because one could argue that, even with a cap on the use of CDM (that is, some kind of supplementarity), there would be 'efficient' allocation within that smaller CDM market. Alternatively, however, if a list of eligible projects exists, there is no guarantee that those that are most economically efficient will be on the list. Nevertheless, the same points about 'long-term costs' raised above should also be noted here. Moreover, the 'reduction of poverty' debate largely covers the same territory, although by targetting particular kinds of activities the potential for having a set of project eligibility criteria that serve to reduce poverty is perhaps higher here than in the case of supplementarity.

The consequences for society, as a result of restricted project eligibility, are varied. On the one hand, it would seem to be a significant affront to aspirations for equity, particularly in terms of empowering local decision making (something that is often highlighted as a key element of sustainability).[16] By limiting the choice of CDM projects through international agreement, decision making is effectively transferred from the local (or national) level to the global level.[17] This approach has been opposed for other reasons too: Haites and Yamin suggest that 'the most practical way to proceed is to allow host governments to decide whether a proposed CDM project is likely to contribute to sustainable development' (Haites & Yamin, 2000: 31). Positive and negative lists would preclude this.

However, the potential for adaptive management could rise considerably. In a similar manner to that described in the discussion above about supplementarity, a restricted list of projects would encourage greater development of new technologies and hence create a wider range of response options in the face of future 'surprises'. Additionally, because the new technologies would be at least partially developed with the developing world in mind (because the CDM market would be 'reserved' for them), they have greater potential to offer world-wide options for adaptive management (rather than a primary focus upon the industrialised world).

Assessing geographical quotas

In the absence of any direction to the contrary, many argue that most CDM activity will occur in a relatively small number of developing countries. Baumert and colleagues, for example, highlight the fact that:

> Several economic models suggest that up to 75% of CDM investment could be concentrated in China and India, where large volumes of low-cost abatement opportunities exist. While such future estimates are necessarily shaky, the experiences

> under the AIJ [Activities Implemented Jointly] pilot program suggest that concerns over concentration and lack of geographic density are not misplaced—of over 125 AIJ projects, only 5 have taken place in Africa. (Baumert *et al*, 2000: 12)

For this reason, some argue that the final agreement should ensure that a particular proportion of the CDM market be reserved for particular countries or regions.

The key proponent on this issue is neither the Umbrella Group nor the Europeans, but instead the African countries. Recognising that, unlike Asia and South America, they do not have a large country that serves to attract significant amounts of foreign direct investment, a number of African representatives (governmental and nongovernmental) have been championing the cause of 'geographical quotas' (eg Sokona *et al*, 1998). Northern countries have generally been united in their opposition to such a proposal, although there has been some difference of opinion on how small projects might be 'fast-tracked' (which might effectively serve to encourage a more widespread geographical distribution of projects) (UNFCCC, 2000).

There are no unambiguous differences in ecology impacts that would arise as a result of imposition of a geographical quota (as compared to no imposition of a geographical quota). As was the case for the first two issues, the impact upon the global climate should be neutral. In terms of other ecological characteristics, contraction of the global CDM market could well generate the same kinds of environmental consequences as supplementarity. In other words, it could catalyse development of new environmental technologies that serve to address multiple environmental (and sustainability) challenges.

For the economy, geographical quotas would serve to distort the market and hence some potential short-term efficiency gains would be lost. As Andrew Pape and colleagues (2000: 6) argue: 'Under a quota system, large unexploited quotas, due to their higher costs relative to countries where quotas have been exhausted, will increase the total costs of emission reductions and make CDM investment less attractive than other emission reduction investment opportunities.' Haites and Yamin (2000: 33) also highlight a number of administrative challenges associated with a geographical quota, which together could well serve to increase total costs. These include: determining an equitable quota (and deciding whether it should be assigned to a region or a country; if the former, there could still be some countries that are ignored within the region) and the enforcement of the quota. Alternatively, however, by inadvertently encouraging greater activity in the North (for alternative greenhouse gas abatement investments in industralised countries would appear more attractive), the 'next generation' of energy technologies would be catalysed. As above, there may be short-term losses, but these would be more than outweighed by long-term benefits.

Geographical quotas, however, have the potential to do more for poverty alleviation than any other proposal associated with the CDM. Notwithstanding the reservations associated with North–South transfers noted above, quotas would serve to direct finance to those parts of the world that most need it—low-income countries (primarily African) that would otherwise not receive an infusion of new capital as a result of the CDM and the Kyoto Protocol. This economic goal, there-

fore, could be extremely well served by geographical quotas.

In terms of consequences for those elements labelled 'society', there would clearly be benefits for equity. Involvement around the world in global climate change issues would result, with developing countries setting priorities for their particular share of the CDM pie. Indeed, some argue that, if geographical quotas are not adopted, there is the 'risk of making the CDM so unattractive that some Parties lose interest in establishing it. Or worse, become actively hostile to its establishment' (Haites & Yamin, 2000: 33). Additionally, for the reasons identified above, development of a wider portfolio of technologies would also serve to increase the prospects for effective adaptive management.

Other outstanding issues

There are, as of June 2001, other issues that remain outstanding in discussions about the CDM. Among the most prominent are:

- How should the CDM be governed? What should be the composition of the Executive Board and what responsibilities should it (and any other involved bodies) have?
- How should the CDM be structured? Should it have a bilateral architecture (in which deals are made between individual investors and host countries), a multilateral architecture (in which a new central agency undertakes much of the management) or unilateral architecture (in which developing countries could independently create and offer credits through CDM projects)?
- What share of the credits (the 'certified emission reduction' units, in the language of the Kyoto Protocol) should be used to finance administration of the CDM and what share should be used to finance adaptation investments in the developing countries most vulnerable to climate change?
- What liability structure should exist? If emission reductions do not result and credits are not created, should sellers (ie host or developing countries) or buyers (ie investor or industrialised countries) be held responsible?

Although these questions are potentially significant, space limitations preclude their full examination. The reader is directed to other sources for additional information (eg OECD, 2000; Toman, 2000).

Summary and conclusion

Table 1 presents a summary of the arguments presented above. In this, the consequences of CDM with a particular characteristic (eg supplementarity—that is, a 'cap' on CDM activity) is compared with the consequences of CDM without that particular characteristic. The results—that is, the most desirable policy route for sustainability—are not clear, for no particular approach appears to be a panacea.

Alternative techniques could be employed to try to determine which option might be 'best' for sustainability. For one, the various 'improvements' and 'deteriorations' could be summed. From this, both 'project eligibility' and 'geographical quotas' come out on top ('plus-2' in each case), slightly ahead of

TABLE 1
Summary of findings

	Supplementarity 'impose a cap on CDM activity'	Project eligibility 'restrict CDM eligibility to particular kinds of projects'	Geographical quotas 'ensure that CDM activity takes place throughout the developing world'
Ecology–climate change	○	○	○
Ecology—other ecosystem and biophysical functions	+	++	+
Economy—efficiency	○	–	– –
Economy—poverty reduction	–	○	+
Society—equity issues	○	–	+
Society—potential for adaptive management	+	++	+

Notes: ++ large improvement (as compared with no introduction of the option); + small improvement; ○ no difference; – small deterioration; – – large deterioration.

'supplementarity' ('plus-1'). Then again, it might be argued that ecology factors are so important ('without them, nothing else matters') that they should somehow be weighted more heavily (Eichler, 1999: 200). Following this, 'project eligibility' comes out 'on top'.

To a significant extent, it is the main intention of this article to stimulate and advance the debate surrounding the CDM. Though one position is supported (see below), what seems more important is to make transparent the criteria for sustainability and the process of assessment. With this, simple evaluations of CDM will effectively be challenged, and the prospects for the CDM to make a positive contribution to sustainability around the world will increase. Thus, as mentioned at the outset of this article, readers are encouraged to elaborate their own interpretation of sustainability and to examine the CDM accordingly.

Nevertheless, on the basis of the investigation undertaken in this article, two key policy-related observations can be offered. First, unfettered enthusiasm for the CDM should be greeted with caution. All the proposals examined here for, in varying ways, 'limiting' the CDM yielded 'positive' results for sustainability as compared to placing 'no limits' on the use of CDM. So although there are clearly 'costs' in terms of economy, there are corresponding 'benefits' in terms of ecology and society that appear to be more substantial.

And second, after this rudimentary assessment, proposals to restrict CDM eligibility to particular kinds of projects are given further support. Although they appear to offer no more benefits than proposals to implement geographic quotas, their ecological advantages have the potential to be so significant that they warrant support here. Therefore, ways should be investigated to ensure that the purported benefits are realised and that the anticipated drawbacks are mitigated or, ideally, eliminated. That is a key direction for continued research upon, and reflection about, the Clean Development Mechanism.

Notes

An earlier version of this article was presented at the Global Environmental Assessment Research Seminar (Belfer Center for Science and International Affairs, Harvard University) on 22 March 2001. The author is grateful for the helpful comments received from those attending the seminar.

[1] For more about the potential impacts of global climate change, see Watson *et al* (1996).

[2] For more about this traditional approach to international environmental challenges, see Hurrell and Kingsbury (1992).

[3] 'Flexibility mechanism' is a term used to describe three of the Kyoto Protocol's 'international' features—namely, international emissions trading, joint implementation and the Clean Development Mechanism (see UN, 1997: Articles 17, 6 and 12, respectively).

[4] For information about potential climate change mitigation activity within southern Africa generally, see Rowlands (1998).

[5] For a fuller description and discussion of such a scenario, see Rowlands (2000).

[6] Others, however, suggest that there may be even less agreement: 'The only consensus on sustainability appears to be that there is no shared understanding' (Becker *et al*, 1999: 3).

[7] Here I follow Gibson's lead and use the terms 'sustainable development' and 'sustainability' synonymously. As he argues: 'The terms have been used differently and there has been much debate about whether and how the usages have differed. But these debates are unresolved and there is not even much agreement on which term is broader' (Gibson, 2001: 6).

[8] Though many, of course, criticise the ways in which documents like these interpret and/or try to operationalise 'sustainable development'. For a critique of the former, see Gibson (2000), and of the latter, Pallemaerts (1993).

[9] In the 1992 Framework Convention on Climate Change, it is noted that 'Parties have a right to, and should, promote sustainable development' (UN, 1992b: Article 3(4)). Moreover, in the 1997 Kyoto Protocol, various climate change-related commitments are justified as means to 'promote sustainable development' (UN, 1997: Articles 2(1), 10).

[10] 'The Natural Step (TNS) is an international organisation that uses a science-based, systems framework to help organizations and communities understand and take the next step towards sustainability.' (TNS, nd-b).

[11] More specifically, the wording in the Kyoto Protocol is that the aim of the CDM is 'to contribute to compliance *with part of* their quantified emission limitation and reduction commitments under Article 3' (UN, 1997, emphasis added).

[12] Compare, for example, US and European reactions to the COP6 President's proposal for industrialized countries to meet their emission commitments 'primarily' through domestic action (UNFCCC, 2000: 7). The USA not only suggested that the word 'primarily' be changed to 'to a significant degree', but also voiced its opposition to more formal scrutiny of its fulfillment (UNFCCC, 2001: 140). The European Union, on the other hand, endorsed the use of the term 'primarily' and suggested a 50% cap for *all* flexibility mechanisms (UNFCCC, 2001: 128).

[13] This statement is predicated upon the condition that the baseline is calculated correctly. For a discussion of this, see, for example, Jepma and van der Gaast (2000: 61–67).

[14] The 'beyond compliance' argument in the environment and business literature offers an analogy (see, for example, Smart 1992).

[15] Not considered here is the explicit potential for 'adaptation' in the wake of global climate change. (A more general sense of the word 'adaptation' is being used here.) Arguably, by reducing the quantity of funds generated by the CDM, any such proposal would also reduce the amount available through the proposed 'Adaptation Fund' (to be financed by credits from the CDM). Though not explicitly examined in this article, it is a point certainly worthy of additional attention.

[16] This has been recognised in international declarations like the 1992 Rio Declaration and the 1998 Aarhus Declaration. Moreover, scholars have argued the same: 'Projects that are not supported by local populations are far more likely to face implementation problems and far less likely to achieve their intended outcomes' (Baumert & Petkova, 2000: 3).

[17] Relatedly, a recent submission by the Government of Nigeria (on behalf of the Group of 77 and China) (UNFCCC, 2001: 89) opposed an effort on the part of the President of COP6 to prioritise particular projects for CDM 'fast-tracking' (namely, 'renewable energy (inter alia small hydro) [and] energy efficiency improvements' (UNFCCC, 2000)). This suggests a resistance to 'direction from above' in terms of CDM eligibility and, by extension, the definition and interpretation of sustainable development.

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