

CHAPTER IV

The Clean Development Mechanism and sustainable development: An economic analysis

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1. Background

The purpose of this paper is to provide a conceptual framework for clarifying the issues surrounding the Clean Development Mechanism (CDM). The CDM is part of the broad framework established by the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) for initiating steps to curtail or reverse the growth of emissions of greenhouse gases.² The Kyoto Protocol has two broad objectives, cost-effective mitigation of greenhouse gas (GHG) emissions, and sustainable development. Its central feature is an agreement on binding targets, i.e., quantified emission limitation or reduction commitments (QELRC) for emissions reductions by Annex B countries³ by an average of 5.2 percent⁴ below 1990 levels⁵ in the “first budget period,” 2008-2012, and demonstrable progress in this regard by 2005.⁶ While the agreement reiterated the consensus of the Berlin Mandate not to impose any new obligations on non-Annex I countries, the window created through the CDM is intended to facilitate voluntary actions in pursuit of the two objectives.

The CDM is one of the four mechanisms introduced by the Kyoto Protocol to enable GHG emissions reduction to take place, presumably at a lower cost, beyond the geo-

Opportunity and challenge

graphical borders of the country making the commitment. These mechanisms are Joint Implementation (JI, Article 6), the Bubble (Article 4), (International) Emissions Trading (ET, Article 17) and CDM, Article 12. Given the overlap between these mechanisms, some of the following analysis also covers JI and ET, though not the fourth mechanism, the “Bubble”, which is relevant mainly to the European Union (EU) at this stage.

To summarize, the CDM appears to be both an opportunity and a challenge. First, it is supposed to create an incentive for industrialized countries to support suitable projects in non-Annex I countries. An additional, albeit tacitly expressed implication is that, notwithstanding the absence of legal or moral requirements on non-Annex I countries to undertake abatement efforts, the CDM might provide an incentive for them to do so anyway and thus develop a development path that emits lower carbon than otherwise. This is relevant especially in view of concerns that while per capita emissions of non-Annex I countries are projected to remain well below those of Annex B countries, their aggregate emissions are growing much faster and will exceed the latter's beyond 2020. Thus, it is important to find mechanisms that can help curb the fastest growing component of global emissions without compromising the legitimate social and developmental needs of the countries concerned.

On the other hand, there are recurrent concerns about the operation of this mechanism, and especially whether in practice it will further or impede the goal of sustainable development. These concerns have centered on the possibility that the bulk of the rents (or economic surplus) from the activity will accrue to the Annex B countries. There are also concerns that the CDM will utilize only the most economical options (the so-called “low hanging fruit”), and force non-Annex I countries to subsequently undertake the more expensive investment from their own resources. Finally, there are renewed concerns about the operation of transnational corporations, which will be encouraged by such a mechanism.

In the following pages, we begin with a brief background on the relationship between GHG emissions and economic growth. This is followed, in Section 3, with a detailed description of the elements of CDM.

The CDM poses somewhat different questions for implementation than JI, given that the estimation of baselines and the monitoring systems in the two sets of countries are likely to differ considerably from each other.

2. GHG Emissions and Economic Growth

Briefly, the literature on climate change has underscored two points. First, that atmospheric commons, namely, the earth's carbon-absorbing capacity, are finite and depletable, and the growth of GHG emissions and even their current level pose a substantial threat to humankind. Second, that under existing technological conditions, the right of access to the atmospheric commons, or more specifically the right to emit GHG, is strongly correlated with the conditions for economic prosperity. In particular, without access to either atmospheric commons or alternative technological options, non-Annex I countries would not be able to pursue their socioeconomic goals.⁷

However, there is no agreement on the acceptable levels of aggregate global emissions consistent with the capacity of the atmosphere to take up carbon dioxide (CO₂) without endangering global climate and ecosystems. As a result, the rights to the global atmosphere are neither explicit nor defensible. The existing distribution of GHG emissions (or the implicit distribution of rights to the global atmosphere) is highly skewed in favor of Annex 1 countries, but there is no presumption either that the distribution is just or proper, or that it has been frozen in perpetuity.⁸

From the very outset, therefore, the climate discussion has been framed in terms of the differential responsibilities, vulnerabilities, obligations, and capacities of industrialized⁹ and developing countries.¹⁰ On all indicators of climate interference, the per capita contribution of Annex 1 countries is far higher than non-Annex I countries and will continue to remain so for the foreseeable future. But in aggregate terms, the latter will begin to catch up with the former—first in terms of annual emissions, next in concentration, and last in radiative potential. This has led to two divergent inferences: First, that since the climate problem has been caused mainly by industrialized countries, they should bear the main cost of mitigation.¹¹ And second, that notwithstanding the responsibility for causation, since non-Annex I countries contribute a significant and growing share of aggregate emissions, their participation in mitigation will be necessary.¹² This combination of arguments is at the heart of current efforts to induce non-Annex I countries to undertake mitigation actions on a voluntary basis. The CDM is part of this effort.

Table 1 shows that while the emissions of non-Annex I countries are well below the world average of 1 ton (t) of carbon per capita, those of industrialized countries are generally above 2 t per capita, with the US (at 5.6 t per capita) being among the top of the list.¹³ The right hand column summarizes the data in the form of carbon inten-

sity, namely, the tons of carbon emissions for every PPP\$ of GNP. While there are some obvious outliers—transition economies (500) and Latin America (76)—the carbon intensity of most countries falls within the range of 100–200 t. These differences come through in all measures of climate interference:

- Annual emissions of GHGs are measured in billion t or Gigatons of carbon (GtC) or CO₂ equivalent per year. Global emissions increased from 5.8 GtC to 6 GtC from 1990 to 1996, and are projected to 9.8 GtC in 2020.¹⁴ Currently, Annex 1 countries emit roughly 64 percent (3.8 GtC) of the total, but since non-Annex I emissions are growing at 3.5 percent per year compared with 1 percent in Annex 1, the two will converge to rough parity in aggregate emissions by about 2020.
- Cumulative concentration of GHGs in the atmosphere, measured as parts per million of CO₂ by volume (ppmv), increased from less than 300 ppmv in pre-industrial times to 360 ppmv in 1995. Under existing trends, it is projected to rise to 700 ppmv by the end of the 21st century. Currently, Annex 1 countries are predominantly responsible for such concentration, but non-Annex I countries will overtake them by about 2060.
- The global warming potential (GWP) of the accumulated gases. A well-known measure is the GWP Index (GWP),¹⁵ which expresses the cumulative radiative effect of various GHGs (with different atmospheric lifetimes for each) over a given time horizon (usually 20, 100, or 500 years). Under the existing trends, non-Annex I countries are projected to surpass Annex 1 countries in this regard by about 2120.

Now, the long-term solution advanced by most experts on climate change is to seek a stabilization of GHGs concentration at a reasonable level. While there is no agreement over the precise stabilization target, figures of 450, 550, and 750 ppmv have been mentioned in the literature. Scenario exercises indicate that under any reasonable target, annual emissions must decline to about 2–4 GtC, i.e., between a third and two thirds of current levels. For example, under a stabilization target of 450 ppmv—namely, a doubling of carbon concentration from pre-industrial times—by 2100 translates into an “emissions budget” of about 650 GtC for the whole of the 21st century (Raskin et al. 1998).¹⁶ By that time the annual emissions would need to have tapered off to less than 3 GtC per year, roughly half of the current level of 6 GtC per year. The final aggregate level of emissions amounts to roughly 0.25 tC/cap, which

Table 1: **Per Capita Income and Carbon Emissions in various Regions**

	Population 1996 (millions)	Income (1994 PPP\$)		Carbon Emissions (1996)		Carbon Intensity (tC/mn\$)
		Total	Per Capita	Total (mtC)	Per Capita (tC/cap)	
World	5,666	32,141	5,798	5,983	1.1	186
Annex I	1,229	19,631	15,986	3,822	3.1	195
USA	262	6,995	26,397	1,463	5.6	209
European Union	369	6,945	18,570	904	2.5	130
Japan	125	2,698	21,581	291	2.5	108
EE/FSU	411	1,685	4,203	842	2.0	500
Non-Annex I	4,438	12,561	2,904	2,161	0.5	172
PRC	1,232	3,146	2,604	805	0.6	256
India	951	1,231	1,348	230	0.3	187
Other Asia	892	3,355	3,763	722	0.8	215
Africa	708	1,228	1,734	198	0.3	161
Latin America	478	2,724	5,873	206	0.4	76

Sources: Population (UN, 1997); income in PPP\$ (UNDP, 1997); carbon emissions (EIA, 1998).

is less than one tenth of the current average per capita emissions of Annex I countries, and half the average for non-Annex I countries.¹⁷

However, the close historical correlation between economic growth and per capita emissions implies that restrictions on carbon emissions would—unless offset by technological, managerial, demographic, or social changes—reduce the economic growth rate. This suggests sustained economic growth will require either an increase in carbon emissions or a decline in carbon intensity.¹⁸ The following graph plots per capita carbon emissions and per capita income (in PPP\$) in selected countries.

The bold trend line captures the stylized fact of proportionate increases (or, as in some economies in transition recently, decreases) in per capita emissions and income over time. Industrialized countries have per capita incomes over PPP\$20,000 and carbon emissions between 2 t and 6 t per capita. Non-Annex I countries have much lower incomes as well as emissions, while the economies in transition fall in the middle of the range. In particular, the bulk of the world's poor live in a small number of non-Annex I countries, which are bunched at the bottom left corner of the graph, with incomes below PPP\$5,000 per capita, and emissions below 0.5 tC/cap.

More specifically, the stabilization problem can be divided into two components. First, industrialized countries need to find a way to reduce their per capita emissions by over 90 percent, namely, from the current average of 3tC/cap to 0.25 tC/cap, while maintaining their quality of life and productivity. On the other hand, non-Annex I countries can at most maintain their current levels of per capita

Correlation between economic growth and GHG emissions

Environmental space for growth

emissions and preferably decrease by half to 0.25 tC/cap, while finding a way to increasing their per capita and aggregate incomes to adequate levels—possibly to the level of industrialized countries. In terms of Figure 1, the goal is to induce Annex B countries to move downwards and to enable non-Annex I countries to move horizontally to the right, without having to force the former to move to the left, or require the latter to move upwards. Alternatively, two things have to happen. First, the emissions of industrialized countries have to come down in order to create the GHG emissions space for non-Annex I countries to grow; and second, the carbon intensity of non-Annex I economies has to decline in order for them to realize even modest growth targets within the aggregate GHG emissions space currently projected to exist.

Stabilization would be impossible without these goals being achieved. The Annex B countries do not appear to be willing to accept drastic declines in their quality of life simply to allow growth to the non-Annex I countries. On the other hand, the non-Annex I would not be willing to accept a permanent consignment to poverty and underdevelopment simply to enable the Annex B countries to continue to enjoy their level of material comfort. This combination is at the base of the efforts in climate negotiations to combine economic efficiency in GHG mitigation with the goals of equity and burden sharing.

Some analysts argue that the only solution to the climate crisis is an international climate regime that drastically sets lower global emissions limits, and translates these into national limits for every country including non-Annex I countries. Since national emissions limits are

equivalent to national rights to the global commons, these limits could ipso facto become significant determinants of the right to future development. An international climate regime could allocate these rights in a number of possible ways, i.e., cumulative or annual, forward-looking or historical, per capita or per unit of economic output, or other possible measures.¹⁹ The absence of political support for such schemes reflects the fear of both Annex I and non-Annex I countries of the consequent restriction of their flexibility to pursue domestic goals. However, climate regimes also have an incentive effect, which does not depend on the specific allocation formula adopted. Regardless of the formula adopted, climate regimes will reward countries that keep their emissions in check (by allowing them to sell excess allocations on the global emissions market at prevailing market prices) and penalize those whose emissions exceed their entitlement (by forcing them to purchase emission rights from surplus countries).

This background would be useful in exploring the issue of consistency or otherwise of the CDM with sustainable development. Before we begin the analysis, however, it is important to review the main features of the CDM.

3. The Clean Development Mechanism

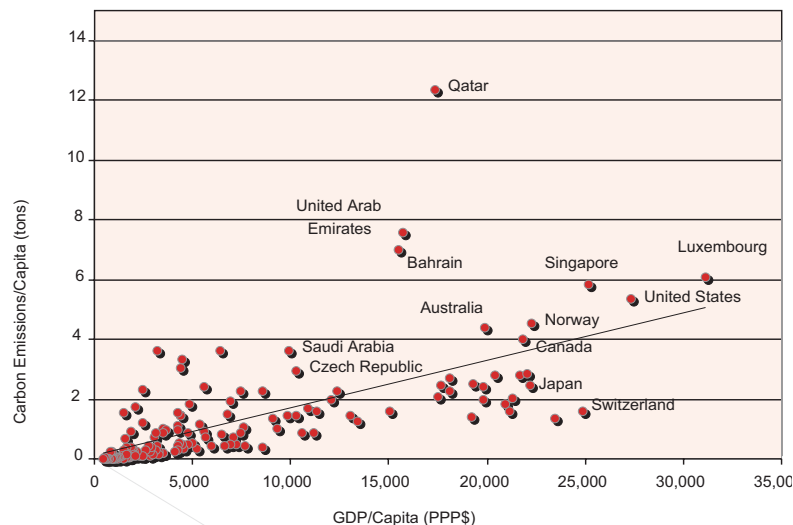
The CDM is defined in Article 12 of the Kyoto Protocol as follows:

“The purpose of the clean development mechanism shall be to assist countries not included in Annex I in achieving sustainable development and in contributing to the ultimate objectives of the Convention,²⁰ and to assist countries included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.”

This is an innovative concept based partly on Activities Implemented Jointly (AIJ) with transfer of carbon credits and the Clean Development Fund (CDF) proposed by Brazil prior to the Kyoto Protocol.²¹ The main difference between the CDM and JI is that while the latter involves two (or more) countries each with binding commitments of their own, the former will involve at least one country with no existing commitment to emission reduction.

The Kyoto Protocol also specified some of the elements of the operationalization of the mechanisms. The operation of CDM is envisaged as follows. A legal entity (presumably, but not necessarily, from an Annex I country)

Figure 1: Per Capita Carbon Emissions and Income



Source: World Bank (1998); Marland, *et al.* (1998).

invests in a project which results in emissions reduction in a non-Annex I country. The investment decision would include an agreement between the countries on the dispensation of the emissions reduction resulting from the project. These emissions reductions have to be certified by an appropriate authority, and once this is done, the certified emission reduction unit (CERs) can be used to meet the Annex I commitments under the Kyoto Protocol.

A project activity resulting in abatement of GHG emissions would be considered eligible under the CDM process on the basis of contribution to the national sustainable development priorities of the host country and compatibility with their national priorities and needs. The developing country Party participating in the project activity should be the sole judge for determining whether the project under consideration meets its sustainable development requirements²². Furthermore, as stated in Article 12.5, the project must fulfill the following criteria in order to be eligible:

- Voluntary participation approved by each Party involved.
- Real, measurable and long term benefits related to the mitigation of climate change.
- Reduction in emissions that are additional to any that would occur in the absence of the certified project activity.

Apart from these, the project activity must:

- Ensure access to environmentally-sound technology needed by the developing country Party participating in the CDM project activity.
- Ensure financial additionality, that is, funding for the CDM project shall be additional to ODA, GEF and other financial commitments of the developed country Parties.

The monitoring and certification requirements for the CDM will have to be more stringent than those for JI or ET. The reason is that in the latter two cases, both parties to the transaction are subject to binding emission reduction commitments. Thus, a reduction in the obligation of one country will be exactly offset by an increase in the obligations on another country. For the purposes of the goals of the Kyoto Protocol, it does not matter whether credit goes to one Party or another. However, in case of the CDM, since the host country does not have a binding commitment for emission reduction, possibilities of cheating, results inflation, and gaming are likely to be higher²³ (see Jackson et al. 1999). As such, CDM will be subject to the authority and guidance of the COP serving as the meeting of the Parties (MOP) and be supervised by an executive board. Emis-

sion reductions resulting from CDM projects will have to be certified by operational entities to be designated by the COP and MOP.

The precise manner through which the CERs would be made available to one of the Annex B countries is not entirely clear, but it would depend, naturally, on whether the host country acquires a right in all or part of the CERs. If the host country does acquire such a right, the simplest mechanism would be for it to sell it to the highest bidder in the open market established for emissions trading.²⁴ However, other possibilities could also be envisaged, in which the CERs would be surrendered to an Annex B country, either as part of a commitment made by the investing entity, or as a side agreement between the host country and the buyer. As we shall see later, the former route appears to be in the best interests of the host countries. In either event, however, it is also possible that secondary markets would develop to distribute risk and channel resources.

A third feature of the CDM, unlike the JI or ET, is the banking provision, through which emission reductions before 2008 can be “banked” for use during the first budget period, 2008-2012. No AII project or a project implemented before the year 2000 would lead to generation of CERs at any point in time. This provision is meant to provide an incentive for early action on mitigation. However, some writers (Begg, 1999), have criticized it on the grounds that it will amount to relaxation of the emissions reduction agreement. The point is that without the banking provision, the total emissions in the first budget period (2008-2012) will be 5.2 percent below what they would have been in absence of the agreement. However, the banking provision enables some of this reduction commitment to be met over 13 years (2000-2012) instead of 5, and will thus allow the emissions for the budget period to be higher than what they would have been under the simpler rule.

However, the banking provision seems to be based on the need for reducing cumulative global emissions or equivalent to the concentration of GHG in the atmosphere. If so, the inclusion of early reductions is not inconsistent with the objective. Under this line of reasoning, the exclusion or inclusion of banking in the different mechanisms would be based on the (counterfactual) baselines in either case. Since the emissions target for the Annex B countries are national rather than project-based, their baseline is the level of emissions that they would have reached under pre-existing trends. On the other hand, the baselines for non-Annex I countries are based on specific projects or activities that would have been undertaken without the

Features of the CDM

*Ensuring
sustainable
development
through the CDM*

CDM. In the former case, the reductions in the budget period imply a trend decline in emissions in earlier periods as well; hence credit for the earlier reductions would amount to double counting of credits.²⁵ On the other hand, since the counterfactual in the case of CDM is a specific project or single decision, there is no reason for a run up to the aggregate target. In Annex B countries, the meeting of the ultimate target requires an earlier decision, therefore rewarding earlier decisions would be inappropriate. In non-Annex I countries, the relevant decisions are piecemeal in nature, and can be taken at any time, hence an incentive for early action would lead to a net lowering of cumulative emissions.

In theory at least, irrespective of the allocation of the rights to the CERs, the developing country is expected to benefit from such a transaction, since a project which is designed to contribute towards sustainable development and would otherwise not be feasible, is implemented. However, this raises two questions. First, how do we define sustainable development; and second, will the inflow of resources necessarily promote sustainable development. Neither the Kyoto Protocol nor the UNFCCC provides an operational definition of sustainable development for purposes of project screening. However, there appears to be an attempt to bypass this problem by placing the responsibility of project screening and approval on the host country—under the belief, presumably that it would automatically select projects that would advance the national interests and therefore sustainable development. Or, alternatively, that whatever a host government chooses is by definition sustainable development. In practice, however, this might not be the case, and the problem might prove to be somewhat more complex than anticipated. All experience with foreign direct investment and with development assistance suggests that governments can vary widely in the quality of the projects they select, and that these may or may not lead to sustainable development.

Finally, a share of the proceeds from CDM projects will be deducted to cover administrative expenses and to contribute towards an adaptation fund that will assist developing country Parties that are vulnerable to the adverse effects of climate change. However, since this charge is levied only on CDM, it is likely to prove a handicap for CDM projects in comparison with other cooperative implementation mechanisms (CIMs).

Given that the Kyoto CIMs are in keeping with the worldwide trend towards greater liberalization of international trade, they have been assumed to be unequivocally beneficial and effective for the achievement of the objectives of the UNFCCC. However, there is a degree of

hesitation in the response of the non-Annex I countries towards these mechanisms, the CDM in particular, which raises some doubts regarding the validity of this consensus. Some of these doubts are due, undoubtedly, to the fact that a number of operational details of the mechanisms still have to be worked out. However, others may be the result of a premature exclusion or inclusion of certain elements that might be critical in the success or failure of the mechanisms. In this paper, we ask precisely this question—whether and under what conditions will the CDM help in the achievement of the objectives of the UNFCCC and the Kyoto Protocol, namely, cost effective and equitable GHG abatement, and the pursuit of sustainable development.

The answers to these questions can help in the formulation of agreements on the areas in which details still have to be worked out. In some of these areas, one can discern an implicit partiality towards particular options, which may also be a reason for the hesitation. Be that as it may, the areas on which further decisions need to be taken include:

- Institutional arrangements for monitoring, certification, adjudication, and allocation;
- Definitional questions: What is meant by “proceeds of CDM projects,” “sustainable development,” “equity,” “financial and environmental additionality” (or baselines).
- The degree of flexibility: In other words, whether there are any restrictions on who is eligible to undertake CDM projects, or own CERs, or on the agreements between these Parties, and whether there would be a secondary market.
- Transparency of the process, including rules of disclosure of financial details, especially the price of the emissions permits.
- Implications of specific clauses of the Kyoto Protocol, especially those on “supplementarity” and the adaptation fund.
- Deliberate or inadvertent omissions, e.g., penalty for noncompliance with emission targets, carbon sequestration projects, and fungibility of various mechanisms.
- Basis for the discrimination of the CDM in comparison with the other mechanisms, in particular its subjection to a contribution for administrative expenses and adaptation fund; the banking provision; the apparent omission of carbon sequestration projects from its purview.
- Finally, relationship with other policy instruments, especially ODA, and whether ODA funds would be provided for CDM projects, or for capacity building or other support work for the CDM.

4. Sources of Concern

On the face of it, the CDM should be in the interest of both Annex B and non-Annex I countries, enabling the former to fulfill their climate commitments under the Kyoto Protocol at lower cost while providing the latter with additional financial resources to pursue their sustainable development goals. Most analyses in Annex I countries appear to be consistent with this assessment, and are generally supportive of the mechanism.²⁶ The situation in non-Annex I is more complex. Ever since its adoption, scholars and institutions (including governments) from these countries have subjected the CDM to criticism and opposition (Agarwal and Narain 1999a, 1999b; Sokona et. al. 1999).²⁷ These critics express a number of concerns, some of which are described below. At their root, however, is not an irremediable defect in the CDM itself, but rather the lack of credible analysis and information on the long-term consequences of CDM projects.

There are recurrent fears that since current abatement targets are only a fraction of the estimated needs, non-Annex I countries might find themselves burdened with an inequitable proportion of the deeper cuts that are expected to result from subsequent negotiations. In such a scenario, CDM might make the situation even worse. CDM projects will naturally concentrate on the relatively inexpensive abatement options (the “low hanging fruit”) in non-Annex I countries, forcing them to undertake more expensive abatement efforts on their own.²⁸

Similarly, there are fears that CDM agreements could become international transfer of rights from non-Annex I to Annex B countries to (fractions of) the global commons, in return for a transfer of resources (in the form of investment projects). Some in non-Annex I countries fear that the reduction of emissions through CDM activities could position them to stake a smaller claim in the global allocation of emissions allowances, and thus prejudice their claim to the right of access to the global commons concomitant with their developmental aspirations. Some CDM projects could also prove to have been premature and inadequately compensated transfers of increasingly scarce emission rights from host countries to investing countries.

CDM promises additional resources for investment in climate related projects in the south. However, given the disappointing record of earlier financial commitments for the environment, there are good reasons to doubt this promise. More concretely, it is quite possible that the acceptance of the CDM mechanism leads to, and indeed provides a justification for, equivalent reductions in ODA flows.

An especially troublesome aspect of this issue is the differential treatment of various countries. There is a widespread perception that CDM projects would end up being restricted to the handful of large countries favored by transnational investors, and that for example Africa (except South Africa) will be almost entirely excluded from purview.

Like other foreign investment, CDM projects could promote technology transfer and learning for sustainable development as well as emissions reduction. On the other hand, it is also possible that they inhibit indigenous technological development, lead to “enclave” development (whose benefits are captured by a few domestic and foreign entrepreneurs), and limit access to cost-effective options.

At a macroeconomic level also, the availability of international resources combined with international pressure could distort developmental priorities towards international agenda and away from domestic human, social, and ecological needs. These fears are exacerbated by the perception of inequality in the relationship between foreign investors and domestic economic and political institutions. In particular, it is feared that the needs of the poorest segments of the population will not be addressed through such mechanisms.

5. Net Benefits of CDM Activities: Alternative Perspectives

In order to assess the impact of the package of policies under the Kyoto Protocol on equity and sustainable development, we will follow three complementary lines of inquiry:

- Classic welfare analysis, based on hypothetical demand and supply curves for emission reduction;
- Public Choice analysis of the incentive effect of rents created through various policy actions; and
- Political economy analysis of the ecological space for sustainable development under different scenarios.

The difference between the three lines of inquiry lies in the framing of assumptions. In the welfare analysis, it is generally assumed that a net inflow of resources is unambiguously beneficial for a society. In this approach, the key questions pertain to the aggregate and distributional welfare effects of market restrictions.

In principle, from a purely economic point of view, the issue of CDM can be analyzed in one of two different ways. Either it can be seen as the creation of a global market for a new “product” (i.e., CERs), which the non-Annex I coun-

Possible distortions of development

tries can now produce, or it can be viewed as an inflow of resources for particular types of investment, which can contribute to economic development and social progress. The important distinction between the two lies in the emphasis placed on the two components of the CDM package, production of CERs, and foreign direct investment. Although the wording of the Kyoto Protocol leaves some room for divergence, it is evident that the CDM is envisaged both as foreign direct investment and the generation of a new product that the non-Annex I countries might be able to produce cheaply.

Before we proceed, it may be important to underscore this point. Given the current trends from aid towards trade, the critical element in the assessment of net benefits of the CDM would be the assurance that it is indeed an opening for a new tradable commodity, and not a diversion of foreign aid from conventional to new uses. Below, we begin the analysis by focussing on the trade side of the bargain, and proceed from there to bring the issue of aid into perspective.

Neoclassical welfare analysis

The basic framework in this approach is captured schematically (and very simply) in the accompanying paper by Ghosh (this volume), which constructs the basis for a “market” for GHG abatement. The basic idea is that abatement can be viewed as a “commodity” just like apples and oranges, which can be produced in response to price signals.

In this framework, it is assumed that trade clearly benefits all Parties. This is consistent with much of the insights from conventional economic analysis, including not only the Ricardian insight of comparative advantage, which analyzes static comparisons, but also with dynamic theories of trade and economic development. For example, a classic theory of economic development underlined the significance of the “vent for surplus”, namely, the creation of a market for the utilization of surplus resources in a country. More recent literature on trade liberalization has also sought to demonstrate the powerful role that trade can play in promoting economic development.

However, the practical record is mixed, and is subject to competing interpretations. While many countries have flourished due to trade liberalization, many others, possibly the vast majority, have languished. The key difference between the two is not the liberalization process, but rather the underlying enabling conditions—the distribution of income, the system of governance, the strength of institutions of monitoring and criticism, and the transparency of laws and rules.

This is particularly true in the current trend towards globalization. For example, between 1950 and 1997, while the gross global product increased five-fold, and international trade increased 12-fold, the distribution of income has worsened dramatically. The ratio of the income of the top quintile in the global population to the lowest quintile has increased from 30 in 1950, to 60 in 1989, and 78 in 1997. In other words, while the growth of world trade has been correlated with an increase in the world income, this increase has accrued disproportionately to a small minority of the world’s population. At an aggregate level, it is not clear why the vent for surplus for the new product will produce a different outcome.

This concern is heightened by the recognition that the comparative advantage for the new product lies squarely in the Annex B countries. This is partly because of the perception that the UNFCCC process will emphasize the foreign direct component of the CDM, thereby effectively disenfranchising the non-Annex I producers.²⁹ Partly, and more importantly, it reflects the fact that the key components in the production of new products is the ability to certify and package the product. This ability is distributed extremely unevenly in the world,³⁰ and even if the UNFCCC allows open competition for the production of CERs, it will be biased in favor of Annex B transnational corporations.

Value chains and economic rents

A useful framework to develop this line of argument is that of value chains (Gereffi 1995; von Moltke, et al. 1998). In this approach, the effects of trade liberalization are analyzed by examining the rents created at various points in the commodity chain—production of raw materials, industrial processing and finishing, and marketing. In some of the internationally traded goods, Gereffi finds that the commodity chain is dominated either by buyers (namely, large retail stores, Wal-Mart, Kmart, JC Penneys, Tesco, etc.), who have a comparative advantage in labeling, packaging, and advertising. In other products (automobiles, steel), oligopolized industrial producers dominate the market. The effects of trade liberalization are therefore contingent on the strategies and actions of such corporations.

A concrete example is the case of the cotton and cotton products industry in Pakistan (Banuri, 1998). According to survey figures for 1995, the production cost on one hectare (ha) of cotton was approximately Rs18,000 (about \$400). The finished cloth produced from this cotton sold for about Rs180,000 (about \$4000), while the garments

Mixed record of trade’s contribution to economic growth

produced from the cloth would sell for up to Rs1.8 million (about \$40,000). The point is that the changes in cost for producing organic or sustainable cotton pale in comparison with the value of the finished output. Conservative estimates place the cost of organic production to be about 20 percent higher than that of conventional cotton. This amount is 2 percent of the cost of the finished cloth, and possibly 0.2 percent of the value of the finished garments produced from the cloth—hardly a premium that would affect the pocketbooks of those who would prefer organic cotton garments. However, the system of international trade is such that unless there is an explicit partnership between the retail corporations and the cotton producers, there is no way to get the premium on organic cotton to the producer. Indeed, even where such partnerships have developed, the bulk of the rents accrue to the retailer, and the cotton producer continues to operate at very low and risky margins.

This leads us into a different direction of analysis. Instead of focusing on the incentives provided by price signals, it would be more useful to look at the surplus created by the new market opportunity, and to ask who would be in a position to exploit these opportunities. It is important to note here that the term surplus (rent) is defined very precisely in economic analysis as income that accrues from a situational advantage, as opposed to income that accrues because of work expended by labor or machinery. This is different from the popular connotation of the word “rent.”

The surplus-creating aspect of the CDM can be described very simply in terms of Figure 2. Here, suppose the final price of the CER is fixed at a level P_6 , which corresponds to the marginal abatement cost of Option 6. In this case, Options 4 and 5, which were uneconomical in the absence of a value for carbon abatement, suddenly become profitable. Indeed, given well-behaved cost curves, they would attract excess profits, in other words “economic rents” (surplus) because of their situation. The question is who would get access to such surplus? First, the primary claimants would be those in a position to market and sell these commodities.³¹ Because of a combination of legal as well as practical considerations, these would tend to be transnational corporations. Second, to the extent that operating in many non-Annex I countries often requires some mechanisms to cut through the red tape, they would involve collaboration with domestic elites, either in the form of kickbacks, or as explicit joint ventures with corporations established specifically for the purpose of sharing the surplus. Indeed, the larger is the quantum of the initial surplus, the greater the probability of pure rent seeking. To put it most charitably,

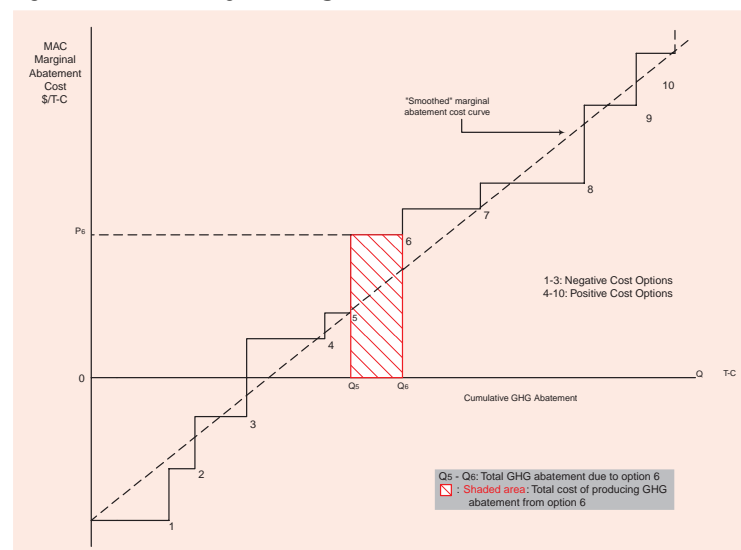
it is not clear whether this will lead to sustainable development.

This analysis can be complemented by taking a slightly different view of the CDM process, namely, viewing it not as a market opportunity, but as a form of foreign resource inflow to encourage domestic investment. Here, the considerable literature on the impact of foreign aid on development is relevant. We rely on a recent detailed study undertaken by the World Bank (1998), which finds that the impact of foreign aid is determined neither by the quantum nor by the type of aid, but by entirely different factors, namely, the policy and institutional environment in the country. Indeed, in the successful cases, a dollar of foreign resource inflow on average led to (or was associated with) an increase of an additional \$2 of domestic private investment. In contrast, in the unsuccessful cases, a dollar of aid inflow was associated with an average decline of \$0.5 of private investment. In other words, the impact of a dollar of resource flow depends on whether it is treated as a resource for investment or as a target for rent seeking.

This analysis can be deepened further by asking whether the resource inflow or the market opportunity will benefit the poorest 2 billion in the South. Here, the available evidence suggests that the answer is emphatically in the negative. Neither the market opportunities in rent seeking societies, nor aid inflows have succeeded in reaching the poor. Without proper and stringent safeguards, there is no reason to believe that the CDM process will reach the poor. The upshot of the above discussion is that the assumption that the inflow of resources will be beneficial unambiguously and unequivocally for a country is not borne out by experience. This skepticism is linked

The important issue is who gets the surplus from CDM projects

Figure 2: A Country's Marginal GHG Abatement Cost Curve



*We need to analyze
the long-term
impacts of the
distribution of
surplus from CDM
projects*

to other analyses that reach a similar conclusion from other theoretical premises.³² The literature on the “Dutch Disease” shows for example that resource inflows can lead to deindustrialization and, thus, to a decline in productivity growth and economic capacity.³³

It can be argued that these literatures take a more dynamic approach to social welfare, focusing on the rate of change rather than equilibrium levels. While the assumption here too is about the relationship between welfare and productivity, here it is approached in terms of the rate of change, i.e., of *increase* in productivity. Resource inflows could add to the stock of assets of society at a point in time, but may or may not lead to sustained increases in the stock of assets, and thus may or may not enhance the discounted present value of social welfare.

In order to formalize such an analysis, it is useful to take an institutionalist approach (North 1995). This approach sees growth and development as a dynamic process, that is based on the rents created by exploitation of hitherto idle resources, creation or emergence of new markets and market opportunities, and policy actions. However, the impact of the surplus creation on the economy depends upon the conditions that promote rent seeking, and those that lead to increased investment.

The upshot of the argument is that it may be more fruitful to look at the long-term impact of the current decisions, rather than focus on the static changes in welfare. Indeed, this is a critique of the bulk of the literature on equity and welfare in the climate change debate. This literature has tended to look at static distribution of welfare, often as a zero-sum game, rather than at the opportunities it provides for future development. However, the difficulty in pursuing this line of argument is that it endogenizes a number of variables (e.g. transparency, institutions, environment policy) without a clear prescription on reform.

Political economy analysis

An alternative formulation, which has the merit of integrating both the above approaches, is a political economy framework that focuses instead on the *sustainable development capacity*, namely, the flexibility available to policy makers to pursue sustainable development under various scenarios. Here, the question is not whether the net resource flows are an addition to the society’s welfare, nor whether under practical conditions, they will lead to sustained growth, but whether they enhance or limit the “space” available to a country to pursue sustainable development.

The concept of “ecological space” can help in approaching the above questions in an integrated manner.³⁴ Given

that under present technological and financial conditions, future development prospects of non-Annex I countries depend to a considerable extent upon their rights to these commons. If these rights are restricted, these countries will have less room to grow. Either they will have to curb their developmental aspirations or will need to compensate for the restricted ecological space by acquiring greater access to technology, including the financial means to access such technology. In other words, the loss of ecological space will have to be compensated by the provision of “technological” and “financial” space in order to retain the possibility of pursuing sustainable development.³⁵

A related theme is the institutional capacity available to non-Annex I countries to pursue national agenda. This comprises the generalized organizational strength of the policy-making machinery, including the capacity for analysis and policy design within and outside government, the fiscal basis of the government, and its degree of legitimacy. Not all projects necessarily affect this “institutional space,” but to the extent that CDM projects do so they may enhance or restrict future choices.

Finally, given that sustainable development implies, besides ecological sustainability and economic prosperity, some measure of social justice, the possibility of sustainable development will be restricted if current policy choices impose high social costs. For example, if current choices lead to inequitable or unjust outcomes, future policies will have an additional objective—of offsetting previous inequity, whether through targeted investment or appropriate policy choices—which might restrict the range of future possibilities.

Summary of net benefits

The above discussion suggests that CDM projects will definitely create some additional benefits. Under a free market regime these benefits are expected to accrue largely to non-Annex I countries. However, it is not clear to *whom* in these countries would the benefits accrue, and whether this accrual would lead to sustainable development. Second, it is also not clear whether under the existing market structures,³⁶ non-Annex I countries would be able to realize the bulk of the potential gains from the activity. Finally, if the number of CDM projects are restricted by other means e.g., a limit on the total volume of such projects, it is also not clear whether the balance of negotiating power would then shift to the investing agencies.

The implication of CDM projects for sustainable development can be analyzed in terms of their impact on four types of “spaces.”

- **Ecological space:** Whether CDM will enhance or restrict the ecological space for sustainable development. What is the future of the climate regime? Will comprehensive binding limits on global carbon emissions be established, and at what levels over time, and with what allocations of commitments to nations? Will allocations be directly or indirectly influenced by prior CDM transactions (e.g., might the non-Annex countries allocation be reduced?) How will the markets for these emission permits evolve under changing conditions of economic growth and technology development? Would CDM transactions result in an implicit “sale” of rights to the ecological space, rather than a temporary lease? How would the implementation of a given CDM project affect the non-Annex I’s ability to make carbon reductions later if negotiated emission limits are put in place?³⁷
- **Financial space:** Whether CDM will enhance or detract from the financial resources available for sustainable development. To what degree, if any, will the CDM provide “new and additional resources” to the non-Annex I countries? Will CDM investments be offset by commensurate declines in ODA, and simply become another funding channel to substitute for declining aid levels, and if so will its qualitatively different investments make a difference?
- **Technological space:** Whether CDM projects will stimulate (or hinder) indigenous technological development and more generally access to clean technologies? Will it reduce the cost of clean technologies generally, and in particular, for the non-Annex I countries?
- **Social space:** Whether CDM will enhance or restrict the scope for the pursuit of social justice and equity in host countries. Will CDM projects impose additional environmental or social costs? To what degree will CDM create subtle (or not so subtle) pressures on the non-Annex I to alter its investment priorities, and to shift (a not easily expandable) aggregate investment budget away from socially determined needs into projects that fulfill global environmental needs? More importantly, given the nature of governance in many non-Annex I countries, will the benefits of the CDM deals accrue primarily to the current ruling elite, and the loss of opportunity cost borne mainly by future citizens of these countries?³⁸

This suggests that optimal decisions on CDM would be improved by actions that enhance the transparency of the global climate regime as well as the domestic invest-

ment regime and the international financial regime. Second, it would be helped by agreements that ensure compliance with good business practices by investing agencies. Third, the benefits would be maximized if decision making as well as technological capacity in host countries were strengthened. Finally, it would require a system of incentives that helped channel a significant portion of such resources into activities that benefit the poor and vulnerable communities.

Agarwal and Narain (1999) have argued that the above goals could be achieved by restricting the application of CDM to renewable energy projects. This would reduce the overall rents from the activity, and thus facilitate the transparency of the process. It would also encourage technological development that would benefit non-Annex I countries in the long-run goal of a transition to a carbon-free future. Finally, it would provide a suitable platform for biomass-based or other projects that can create energy security among poor and vulnerable communities. At the same time, it needs to be recognized that only technologically mature and reliable renewable energy projects are considered.³⁹

6. Analysis of Issues in the CDM Debate

From the above discussion of the aggregate net benefits of CDM activities, we turn to micro considerations. These are based on the assumption that answers to the above questions have been identified, and that a global CDM regime has been created through a consensus of all the parties. Most such regimes would require further decisions on a range of issues, including the domestic policy regime to be adopted, the structure of CDM investments, baselines, ownership and marketing of credits, the CDM Fund, regional equity considerations, and the issue of complementarity.

Domestic policy regime for CDM

The net benefits of the CDM (or of any global mechanism for that matter) depend critically on the global policy regime that is adopted to put it into operation. Figure 3 overleaf can help clarify the issues involved in the establishment of such a regime.

To begin with, the Kyoto agreement will require Annex B governments to introduce domestic policy measures—regulatory as well as market-based—to induce corporate and other actors to modify their behavior. Economic actors in those countries will respond to such incentives both through changes in their operations and their deci-

Should CDM investments be restricted to renewable energy projects?

Domestic policy frameworks for CDM projects in non-Annex I countries

sions on domestic and international transfers of -C, including CIMS. The environment faced by non-Annex I countries comprises the international agreements as well as the domestic policies introduced by countries with climate obligations. Non-Annex I countries need to introduce policy measures to enable their own economic agents to respond to the opportunities and challenges created by this environment. In particular, non-Annex I countries need to introduce policy measures in the following areas:

- Institutional development,
- Capacity building,
- Project approval,
- Monitoring and reporting, and
- Certification

More concretely, the host countries will have to establish a framework for approval of projects, for incentives to domestic producers to engage in such activities, especially those that further the long-run goal of sustainable development. Host countries will also need mechanisms to ensure that resources are channeled toward the poor, and that indigenous technological development is accelerated rather than inhibited. Finally, there will be a need to ensure greater transparency of individual decisions, and to monitor the compliance of transnational institutions with agreed upon codes of conduct.

Structures for CDM

A primary area for international agreement is the structure of the CDM. Michaelowa and Dutschke (1998) discuss three possible frameworks, namely a multilateral fund, a clearinghouse and a project exchange. Other studies have similarly discussed multilateral and bilateral frameworks. The broad features of these forms are discussed below.

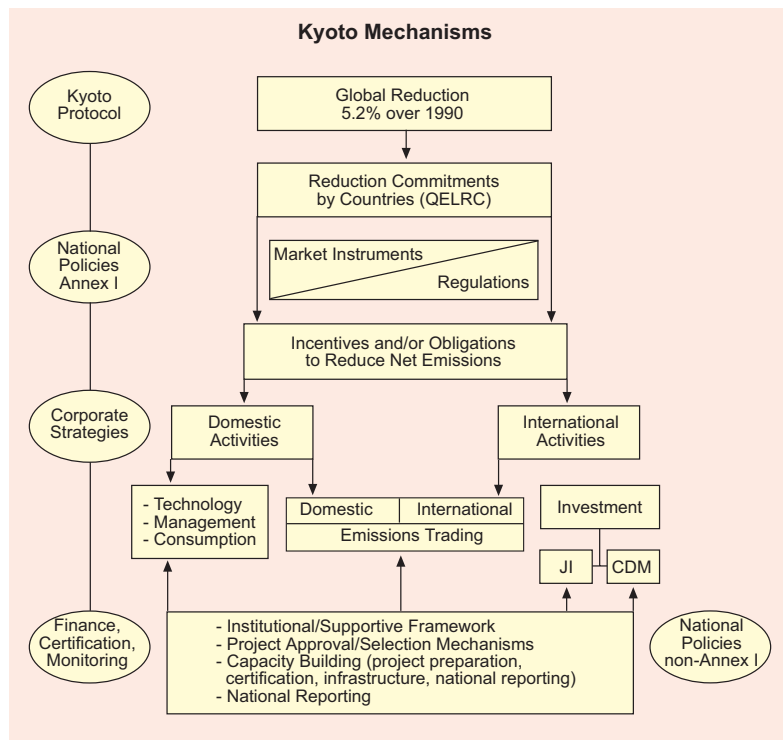
In a multilateral fund scheme, CDM investments are channelled through a global fund created specially for this purpose. Correspondingly, all emission reduction credits accrue to the Fund. All projects are registered with the Fund, which is controlled by the Executive Board (COP/MOP). Under this arrangement, investors are protected from risks of non-materialization of credits, they can participate with a small amount of capital, and there is no direct link between the investment and carbon credits accruing from projects. Small investors and small host countries—especially those with CDM projects that are less attractive to outside investors—would favor this framework. A variant of the multilateral fund is the World Bank's Prototype Carbon Fund (PCF). It operates in a similar manner to the model discussed above, the main difference being that the fund is controlled by the World Bank rather than the Executive Board. The main criticism that PCF has attracted is that the World Bank policies will control sanction and disbursement of funds. The proponents on the other hand argue that the World Bank's PCF facilitates the development of a market for CERs.⁴⁰

In a bilateral approach, the CDM project is viewed primarily as a transaction between two entities—one each in the investing and host countries—who reach a mutual agreement on the sharing of financing, risks, and the expected carbon credits. The partner entities could be either government or private sector parties.

A third approach, which for most purposes can be considered as a variant of the bilateral approach is the unilateral approach. In this case, both the entities involved in the agreement would be from the host country. As in the bilateral approach, the certified credits from the CDM project would accrue initially to the investing Party, which would sell them in the open market. This would require the existence of a secondary market for CERs.⁴¹

In all cases, the Executive Board has to specify rules and regulations with respect to additionality, verification, monitoring, and certification of the emission reductions. The main characteristics of the Parties directly involved in the project are also the same in all the structures. In all cases, an investor brings financial or technological re-

Figure 3: Schematic Presentation of Working of CIMS



sources while a host entity identifies a particular activity where abatement could take place. The host entity could be engaged in industrial production, power generation, regulation, or other economic activity with abatement potential. In the bilateral approach, the investor and the host together identify an abatement opportunity and seek the approval of both the host and the investor governments. Since the project has to meet the CDM guidelines specified by the Executive Board and COP/MOP, an implicit approval of the latter is involved. In the multilateral approach, the investor and the host Party do not interact directly through the market. Instead, the investor places investment funds at the disposal of a centralized body (presumably the Executive Board), which in turn identifies the potential host as well as a suitable CDM project, subject of course to the approval of the host country government. The funds are duly allocated for the identified project and the project implemented.⁴²

However, emissions credit is obtained only after the project is implemented, emission reductions actually take place, and these reductions are verified and certified by an independent body. Once this process is complete, certified emission reductions (CERs) are generated. As required by the Kyoto Protocol, part of the CERs is contributed towards the adaptation fund. In the bilateral approach, the balance is shared between the investor and the host Party on the basis of their contractual agreement. In the case of the multilateral approach, the balance accrues to the Executive Board, which then transfers the credits to different investors according to its rules.

In other words, whereas under the bilateral approach the matching of the supply and demand for CDM projects is achieved through the market, in the multilateral approach, it is done through a clearinghouse (in the above example, the Executive Board). There are other differences as well:

- If other goals are also important (e.g., a regional distribution of projects), the bilateral model would require additional regulatory arrangements.⁴³ These would not be necessary in the multilateral approach, since the allocative process could internalize these additional criteria.
- In terms of the sources of funds, the bilateral attracts predominantly private resources, which overlap with foreign direct investment, whereas the multilateral model would attract public resources,⁴⁴ which could crowd out other ODA. However, the division is not perfect. For example, the World Bank, though a multilateral entity could contribute funds to either model through the PCF.

- In the bilateral model, the credits are owned by the one or both contracting Parties (depending on contractual agreements and the development of secondary markets) whereas in the multilateral approach, they are controlled by the Executive Board.

As was argued in the previous section, the benefits of the various structures would depend critically on the approach to the problem. In terms of a static welfare analysis, the precise mechanism does not matter, except insofar as it affects transaction costs. In the political economy approach, however, the differences are crucial. The unilateral approach emphasizes the market orientation of the CDM process, creating in effect a new market over which the non-Annex I Parties may have a comparative advantage; it could also be described as a model of *trade-led growth*. The bilateral model is equivalent to a foreign direct investment (*FDI*)-led scenario, whose net benefits would depend on the behaviour transnational corporations, who would obtain a degree of monopoly power over the process. The multilateral model on the other hand, takes us back into a *foreign assistance framework*, along the lines of the GEF. This model has, so far, not been very successful in promoting sustainable development or early action on carbon abatement.

Regarding public and/or private participation, Article 12 clearly states that both Parties are eligible to take part irrespective of the structure that is likely to be implemented. Yamin (1998) argues that the CDM was intended primarily for private sector investments, and that a publicly funded CDM will compete directly with GEF and ODA. A clause in Article 12 is designed to prevent the diversion of funds from ODA or GEF to CDM by stipulating that emission reductions resulting from an activity are additional to any that would occur in the absence of the activity. However, in the past, there has been a decline in aid as a percent of GDP in OECD countries. Also the limited flow of funds into GEF and their constrained disbursement is indicative of the reluctance with which public funds are contributed to a global cause. This would suggest that the design of CDM should encourage private parties to participate more actively in the mechanism⁴⁵.

Baselines

Baselines are crucial for establishing the additionality (environmental and financial) of projects and to determine the carbon credits that will ensue from a CDM project. The main consideration behind the baselines is quite clear, namely the assurance that a project leads to verifiable, sustained, and long-run reduction in emissions. Accord-

Implications of different CDM structures

ingly, the baselines have to describe a counter-factual, namely, what would have happened in the absence of the project. Several types of baselines have been discussed in the literature. There can be divided into four broad categories depending on whether they are macro or project-based, and static or dynamic.⁴⁶

In terms of the neoclassical theoretical frameworks, the choice of baselines is not critical for the selection of projects, since the incentive effect is independent of the specific level of the baseline. However, it does have different distributional implications, since a higher baseline will generate larger revenues for the project. In the political economy framework, however, the important question is the distribution of the surplus revenues generated by the project. As mentioned, these depend on the relative bargaining power of the investor and host entities.

Ownership of credits

Ownership of credits depends on the structure adopted for CDM. In a multilateral fund (or aid-based) structure, all credits flow initially to the coordinating body (Executive Board and COP/MOP), although they might get allocated to the partners through a yet to be specified mechanism. In a bilateral framework (foreign direct investment), the prevailing presumption is that the Annex I will claim the credit in order to meet its abatement obligations.⁴⁷ However, the non-Annex-I Party could be interested in sharing the monetary value of the CER. As mentioned, if the CERs are viewed as a new commodity to be produced and sold in a market, the host country would benefit from a transparent rendering of the value of the commodity produced on its terrain. This would be the case especially if a secondary market develops for CERs and ERUs (these being completely fungible). Sharing of credits would be beneficial to the investor, as it would give the host Party a stake in generating the CERs.

Another element in this issue is the impact of transparency on rent seeking and in the distribution of rents between different Parties. A non-transparent system would actually tend to divert the bulk of the rents to industrialized countries, or to political entrepreneurs in the South. A more transparent system will attract greater competition, and induce additional actions in the South.

CDM credits and secondary markets

In principle, a secondary market in CERs and ERUs is inevitable. Assuming that ERUs and CERs are completely fungible,⁴⁸ a legal entity in an Annex I country may find that it has a surplus of carbon credits. If so, it would trade

the surplus units with other legal entities within or outside the country. Such transactions would need the sanction of the concerned country government. Surpluses or deficits at the national level need to be corrected through trade with other nations. International trade is a means to correct imbalances in carbon credits at the national level. International trade could involve sale of credits by some entities and purchase by other entities, that is, the same country could be the buyer of credits in some transactions and a seller in others. All such trade will have to be registered with the national body monitoring international transactions. It is necessary to ensure that such trade or secondary markets do not conflict with the caps specified for the nations. Therefore, it is necessary to ascertain that only those exchanges of credits that are finally used towards meeting commitments are included as credits acquired and only these have to be below the specified ceiling for acquisition of credits (supplemental to domestic action).

Credit sharing between the host and investing Party may prove to be a strong incentive for the developing countries to participate as they can bank some of these carbon savings resulting from the sale of their “low-hanging fruits.” Also, it gives the developing countries a means to participate in a GHG trading market if one were to develop. This would enable a developing country without any quantified targets to participate in emissions trading market and reap part of the rent. For the investor, such sharing is advantageous as it reduces the element of risk as the host now has a stake (self-interest) in generating these credits.

The literature suggests that each CER would have all the details of its origin—specific project or activity, year of generation, certification or verification information, etc. This means that in principle, restrictions could be placed on secondary transactions, in particular, CERs. However, given that the same parties could hold CDM-origin CERs and other CERs, a secondary market could develop through fungibility between the two types of units. In fact, it is difficult to envisage a situation in which such trade could be blocked altogether.

Proceeds of CDM projects

Proceeds from CDM projects can be defined as the extra “value added” by the project, in other words, “value added” that would not accrue to non-CDM projects. This extra value added consists of the CERs, namely, additional emissions reductions generated from CDM activity (approved by respective governments), monitored, verified by independent entities, and certified on an ex-post basis

Who owns the CERs from CDM projects?

by operational entities. Emission reductions from the project are certified as and when they happen based on an agreed baseline, and CERs are created with the implementation and operation of the project.

The CERs are therefore, the proceeds from the CDM projects. CERs from different projects may be valued differently, partly because of differences in their costs of production and partly due to the bargaining capacity of the entities involved and the level of risk associated with different projects. It is not clear whether the price of the proceeds from specific projects will be publicly disclosed or not.

Adaptation fund and administrative expenses

The proceeds from CDM have to make a contribution to the Adaptation Fund as well as cover administrative expenses (Article 12.8). The other Kyoto Mechanisms (JI and ET) are not required to contribute to this fund or incur such administrative expenses. This contribution could be in the form of a monetary payment or in the form of a percentage of CERs from the project, the latter more likely in the case of a multilateral framework for CDM. Both interpretations have similar implications for CDM relative to the other Kyoto mechanisms, namely, that they make CDM projects more expensive vis-à-vis the others. Often this contribution in the form of “share of proceeds” to the adaptation fund has been referred to as a tax on CDM (Siniscalco et al. 1998, UNDP and TERI 1998).

A contribution to the adaptation fund only by the CDM is a tax on this particular mechanism. In the original Brazilian proposal, where an Adaptation Fund (Fund) had been proposed, Annex I countries unable to meet their targets were to contribute to the Fund, and proceeds were to be used for assisting vulnerable developing countries. Contrary to the spirit of the original proposal, the implications here are that the developing countries are contributing to the Adaptation Fund.

Several developing and vulnerable countries are strongly in favor of the Fund suggested in the Kyoto Protocol. This Fund is the only way in which the Protocol addresses the impacts of and adaptation to climate change, albeit in a rather limited manner. The inequity of the proposal lies in the fact that developing countries that are likely to be impacted most and developing countries that have not contributed to the problem, indirectly contribute towards adaptation expenses in other vulnerable countries. The main polluters, Annex B countries do not pay for impacts resulting from their emissions. Rather, part of the funds, which are intended to flow to developing countries

for their sustainable development would now be diverted to the Fund or for covering administrative expenses.

In order to lend some balance and recognize the need for the Fund, the following is suggested:

- All Kyoto Protocol mechanisms contribute to the Fund. For ERUs resulting from JI, Emissions Trading, and CERs, the rate is determined by the COP and MOP.
- To ensure that the tax is not borne by the developing country Party or the host, the contribution should be made at the time the CER is used by the Annex I Party towards meeting the target.
- The Fund should include noncompliance fees imposed on Parties unable to meet their quantified emissions reduction target. The fee should be higher than the market price/tC to ensure that Parties adopt control measures in their economies and try to meet their targets/commitments.⁴⁹

Other key questions that need to be addressed in this regard are the fraction of the proceeds that should go towards the Fund, the fraction allocated for administrative charges, and the eligibility criteria for the deployment of the proceeds of the Fund. Goldemberg (1998) suggests a ceiling of 3 percent of the market value of the CERU for administrative charges. At this stage, it should be ascertained that the framework for CDM should minimize these expenses. For example, a market-based mechanism (portfolio approach) vis-à-vis a multilateral fund would reduce such expenses.

The qualification for receiving assistance from the Funds has to be decided by criteria that are outside the scope of CDM. The Fund has to be redefined to be sourced from all Kyoto Protocol mechanisms as well as from a non-compliance fee. A vulnerability index could be defined which determines how the Fund proceeds are shared.

It is important to bear in mind that these issues are very complex and initially, it is best to arrive at a minimum set of working rules. These rules would evolve and a provision to modify these from time to time should be adopted. An attempt to decipher all possible, and some unlikely problems and situations at the very beginning will lead to complete inertia, and will render CDM a nonstarter. It is in the interest of developing countries to ensure that such an impasse does not emerge and the early start bestowed on CDM vis-à-vis the other Kyoto mechanisms, is capitalized on.

Sinks as CDM projects

Article 12 of the Kyoto Protocol does not mention sink projects or carbon sequestration projects or “emissions avoided” projects and indicates that it authorizes only “cer-

Contributions to, and use of the Adaptation Fund

Uncertainties of sinks as CDM projects

tified emission reductions,” while Article 6 contains an explicit mention to include such projects in JI. However, it is not clear whether “sinks” were intentionally excluded from the purview of Article 12 or whether this was an oversight. Those in favor of excluding them argue that sink projects (e.g., afforestation) do not involve a transfer of technology, and therefore need not involve Annex B countries. Others argue that such projects will limit the options available to non-Annex I countries by locking them into long-term commitments on the patterns of land use (Cullet and Kanveri–Mbote 1997). In the absence of such commitments, the emissions reduction could arguably not be “sustained” or “long-run” in nature, and therefore not qualify for CERs.

Another concern associated with sink projects is related to their permanency. If for deliberate reasons or due to unforeseen circumstances, an afforestation project is destroyed after CERs resulting from it have been claimed and utilized, the objective of “real, measurable, and long-term benefits related to the mitigation of climate change” will not be met (Werksman 1998). It can also be argued that at the current level of data availability, monitoring and verification system, it is difficult to correctly estimate carbon sequestered. Including sinks may give rise to large amounts of carbon savings but one with a high degree of uncertainty. For developing countries with no caps or targets, this could result in all planned forestry activity being included as CDM. Further, in the absence of targets, there are no checks in the system to encourage the permanence of such sinks. This will result in negating the objective of reducing the level of net emissions and concentration of GHGs in the atmosphere.

Estrada (1998) argues that different wordings in the two articles clearly mean that carbon sequestration projects are excluded from Article 12, and that “. . . it is against any legal methodological interpretation to hold that different wordings in the same legal text have equal meaning.” Further, he argues that a project on forest management to reduce emissions (because in the absence of proper management, there would have been deforestation and hence carbon emissions) does not qualify for CERs, the reason being that in such projects it is difficult to specify the baseline. Estrada goes further to say that it is the normal responsibility of governments to protect their own natural resources. Few will argue in favor of making large-scale deforestation a baseline scenario. Recent trends in reforestation and in plantation agriculture makes a deforestation baseline difficult to defend.

On the other side, Brown et al. (1998) while arguing

strongly in support of sequestration projects in CDM given their ancillary benefits (like arresting the loss of biodiversity, protection of critical watershed and accelerated reforestation of degraded forests), emphasize that these projects must deliver credible GHG reductions. They are also concerned that carbon savings in forestry projects will divert attention from energy sector projects, which save fossil fuel-based carbon. Brown et al. (1998) estimate forestry projects in the US to be 3 percent of the total reductions required. The issue is that several forestry projects worldwide could prevent any action in the energy sector in the US. Brown et al. (1998) warn against projects that to reduce GHG emissions may destroy other natural ecosystems. They also oppose tracking carbon stored in timber, as often timber products are short-lived or the activity to extract timber releases greater amounts of GHG. Tracking and crediting such storage has limited potential to mitigate climate change.

On balance, while Brown et al. (1998) are in favor of conservation or avoided deforestation as having significant emissions reduction opportunities, they concede that for reliable GHG reductions, the reference case has to be confirmed. Agricultural productivity increases will reduce deforestation according to Brown et al. and can be considered as a CDM project. However, the authors of this study suggest a cautious approach that such increases in productivity do not qualify as CDM projects. For example, with higher yield levels, agriculture becomes a commercial and profitable activity. As at present agriculture is more than a subsistence activity, this may result in increase in diversion of forestland towards agriculture and hence to deforestation. In response to the issue of carbon stored in biota being temporary, Brown et al. (1998) suggest discounting and creating buffer zones. These options are still more difficult to resolve, for example, discount at what rate? Till a reasonably creditable monitoring and verification process is in place, these solutions have limited application and hence sinks should not be considered as CDM projects.

Hare (1998) also lists the loopholes and problems in including sinks as CDM projects. Points raised by him include the following:

- Fossil fuel carbon cannot be exchanged for carbon in forests. This allows developed countries to increase their use of fossil fuels so long as these are offset by the amount of emissions absorbed by sinks. Fossil fuels release carbon which has been locked up for millions of years in exchange for carbon in forests which will only be stored for a few hundred years at best. Another reason not to encourage these swaps

is that increased emissions allowed from fossil fuels could also slow the rate of introduction of energy efficiency and renewable energy.

- There are huge uncertainties involved in calculating carbon stored by sinks
- The long-term survival of forests planted is impossible to guarantee, specially with the predicted increase in droughts and forest fires due to climate change.
- There is no agreed method for measuring carbon absorbed and/or released from afforestation and deforestation. For example, some estimates include carbon in the soil and others do not.

Hare (1998) argues that given the uncertainties, ambiguities, perverse incentives, the outstanding issues need to be resolved in a way to minimize potential loopholes. No decision on sinks should be taken according to Greenpeace until the IPCC Special Report is complete and its contents assessed fully.⁵⁰

Regional equity

A major concern about the CDM is that it might result in a concentration of projects in a few countries, and thus exacerbate regional inequities within the non-Annex I countries. Indeed, it could also be said that within each country, these projects will tend to be concentrated on the most prosperous segments of society, and thus may exacerbate intra-national inequities as well. The original Brazilian proposal had favored large emitters among developing countries and had stipulated that 90 percent of the resources were to be used for mitigation projects and the balance of 10 percent were for countries vulnerable to climate change.⁵¹

This is a key point. However, it can be interpreted in either of two ways. One possibility is to reassert that the CDM is, after all, a market mechanism, and will, in itself, not guarantee equitable outcomes. If so, other alternatives will have to be explored to ensure equity. The other alternative is to modify the CDM mechanism to ensure that it addresses both concerns—equity as well as cost-effective GHG mitigation. Below we provide both arguments.

The argument that the CDM needs to be modified to address both concerns has been made most effectively by Yamin (1998) and Sokona et al. (1998). In addressing the regional equity issue related to CDM, Yamin suggests that CDM projects could be “undertaken equally in all UN regions” or “fixed CERs could be generated in a few countries thereby spreading the benefits that accrue from CDM”.

A free market (bilateral) framework for CDM may not generate projects in a democratic system. As may be clear, a new market will not provide equal opportunities to all countries. However, most of the alternative options (e.g., those suggested by Yamin are not readily implementable). CERs originate once the emissions reductions are “certified,” i.e., the emission reductions have to occur, be verified, recorded, and finally, certified. To establish a quota system based on future production of such CERs has practical difficulties. To draw an analogy, this is like saying that future production of additional agricultural output should be determined on the basis of pre-determined quotas. Further, although market distortions may emerge, limiting the role of the market will perhaps inhibit the use of CDM.

Forcing a widespread distribution of CDM projects may have two negative effects. One effect would be on the total flow of CDM funds and the other in terms of the quality of emission reductions. Given the emphasis on private sector funds for CDM, clearly such capital will venture into avenues, and show a reasonable return. Small CDM projects (assuming these occur in countries less likely to get CDM projects) will entail a high transaction cost making them nonviable for the investors. This will restrict funds under CDM much to the collective and individual disadvantage of developing countries.

Under a quota system, large unexploited quotas (due to their higher costs relative to countries where quotas have been exhausted) will “generate” dubious CDM projects, which may in turn inflate emission reductions and/or stretch rules and procedures to include projects, which may not yield “long-term” emission reduction.

It is argued by Sokona et al. (1998) that African nations, given their low level of industrialization and low level of emissions, can qualify only in the future for many emission reduction type of projects as specified under CDM. The authors argue that CDM looks only at existing emission reductions rather than “future reductions.” Given that projects that qualify for CDM should have “real, long-term, and measurable benefits related to climate change,” the inclusion of sinks and forestry sector projects, which are more readily identifiable in African and Latin American countries, becomes difficult. Projects that will hasten and help in leapfrogging to better technologies are clearly in but the underdeveloped infrastructure may restrict these types of projects. In such cases, the original role of GEF and ODA becomes paramount in addressing this deficiency in the infrastructural development and in correcting inequities among non-Annex I countries.

How to ensure equity in CDM projects across countries?

Technology transfer and CDM projects

Sokona et al. (1998) go on to suggest that the CDM functions as a means to promote equity among Annex B and non-Annex I countries, as well as among developing countries. They view the CDM as a project clearinghouse where both Annex B and non-Annex I countries private or public actors could submit proposals.

The structure envisaged by them is that of multilateral body. Sokona et al. (1998) suggest defining quotas for CDM projects as one-third of projects should be implemented in Africa. However, quotas are more easily determined for the Adaptation Fund where there would be some "pie" to be shared. For example, one third of total annual disbursements could be earmarked for Africa. The basis (that is, in terms of resources or in terms of future CERs to be generated) in allocating quotas for CDM projects is not clear and may be difficult to implement.

Equity can be addressed using other options. For example, the contribution to the Fund may be directly linked to the level of per capita income in the host country.⁵² This will increase the cost of CDM projects in countries with high level per capita income vis-à-vis those with low per capita income and consequently lower levels of development. Projects in less developed countries will become relatively less expensive and hence more attractive to investors.

CDM does not address the issue of transfer of technology. Transfer of technological knowhow under CDM would be undertaken in exchange for CERs, whereas, the UNFCCC states that developed countries take steps to promote and support technology transfer to developing countries.⁵³ Under CDM, the transfer of technology is a "trade" proposition whereas the UNFCCC proposes technology transfer as "aid" and assistance to developing country.

To summarize, it is clear that as currently constituted, the CDM will guarantee neither regional nor intra-national equity. It is, after all, a market mechanism, and market mechanisms have notoriously failed to address equity concerns.

A solution is to place selective curbs or quotas on the CDM, which again, given the functioning of the market system, would be difficult to implement. Another alternative is to focus the CDM exercise entirely on renewable technologies and energy security for the poor. This restriction is not selective and can be implemented more easily. It is also consistent with the longer-term goals of mitigation, since it will introduce a transition to a carbon-free economy in the region where emissions are growing at the fastest speed.

Supplementarity and flexibility

The rationale behind making the emission reductions achieved under the 3 Kyoto mechanisms only "part of" the QELRC of Annex I countries was to make mandatory the domestic action on part of Annex I countries. It was to ensure that the entire reduction target was not achieved by acquiring ERUs or CERs through the Kyoto Protocol mechanisms. There is a big debate on the definition of "part of." The EU put forward a proposal at SBSTA-10, which is unacceptable to the JUSCANZ group and Russia, and is alleged to be unacceptable to some EU member countries as well. The G-77 and PRC, however, have welcomed the EU proposal.

Given the uncertainty associated with CERs that are likely from CDM and the option of banking the same between 2000 and 2008, it becomes necessary to specify a cap specially if the quantity of CERs and ERUs can be very large. In a scenario (one which favors Annex B countries) where CERs are available in large quantities at relatively inexpensive prices, little domestic action will be undertaken in Annex B countries as the targets can be met in developing countries. This makes a ceiling on purchase of emissions reduction necessary. A cap on these mechanisms is not necessarily beneficial for developing countries, as this may restrict the flow of resources to developing countries under the CDM. However, financial flows under CDM are meant to be supplemental (the additionality clause) and should not be viewed as the sole means of financing development. There is no cap on FDI for non-CDM projects and CDM financial flows are not supposed to impact ODA or funding under GEF.

The ultimate objective of the UNFCCC is to stabilize GHG concentrations at safe levels. The commitments undertaken by Annex B countries in the Kyoto Protocol are limited in achieving this long-term objective. In order to achieve the ultimate objective, much higher reductions are required. If in the first commitment period, all or a high percentage of reductions are achieved outside the concerned Annex B boundary and little is achieved domestically, then the Kyoto Protocol would not have contributed to the longer-term and final objective of the UNFCCC. Though the Kyoto Protocol does not come close to the ultimate objective of the UNFCCC, it is perceived by many as being the first step in that direction. If the group (Annex B countries), on whom the onus lies to lead by example, achieves little in the first commitment period, then the spirit behind the Protocol is destroyed. Some argue that there should be no caps, that the Kyoto mechanisms will not generate significant amounts of carbon reductions, and

that most of the target will be achieved through domestic action. In such a case there should not be any resistance to setting of caps.

The views on flexibility and supplementarity vary considerably. While some argue that domestic action in Annex B countries is absolutely essential and recourse to the flexibility mechanisms should be limited, a diametrically opposite view is that there should be no caps on using the flexibility options. The latter view suggests that the concept of supplementarity should be dropped altogether. This could lead to an unacceptable dependence on external measures. It is argued by those who oppose supplementarity that the high transaction costs accompanying ET,JI, and the CDM will make these mechanisms less attractive and will spur domestic action in Annex B countries.

Future climate change negotiations should consider limiting the CIMs as these could undermine incentives to develop new processes, technologies, and habits that are crucial for tackling climate change in the long term (Grubb, et al. 1999). There is merit in both the arguments. It seems that flexibility is a good provision in the Protocol. However, it is flawed in that it may lead to complete inaction in Annex B countries. Figure 4 illustrates the rationale for supplementarity.

In the absence of any commitments, the emissions would have proceeded along the BAU line. However, with assigned amounts under the Kyoto Protocol, emissions allowed between 2008 and 2012 are constrained. In the absence of the Kyoto mechanisms and in order to achieve the assigned amounts, the emissions path would be AB. If these mechanisms are allowed, this implies an increase in allowable emissions and the emissions path would be AC. Emissions depicted by the area ABC represents the flexibility and scope for domestic inaction in the Annex B country prior to the first commitment period. An extreme case would be when the Annex B country follows the BAU path and avoids domestic control to the extent of ABD and brings about no change in emissions patterns. Therefore, a balance is required between the flexibility argument and the requirement of supplementarity.

The Kyoto Protocol is at best a small step towards meeting the ultimate objective of the UNFCCC. What is really required to achieve the objective of stabilization of concentration of GHGs, is a substantial reduction in emissions by Annex B and a controlled increase in emissions meeting the non-Annex I countries. Complete flexibility and access to CIMs in Kyoto Protocol target, will not induce a change in the trend of emissions by Annex B.

7. Sustainable Development

To summarize, it is useful to ask once again whether CDM projects can lead to sustainable development. The promotion of sustainable development in the host countries is one of the main objectives of the CDM. However, the Protocol leaves the decision on whether a particular project meets sustainable development criteria to the host country government. In the above discussion, we have provided three different approaches to the assessment of the net benefits from a project. The static welfare approach would consider any inflow of financial or technological resources to be beneficial, and thus contributory toward sustainable development. The institutional approach would look at the impact of rents created through this mechanism on the dynamic growth path. Finally, the political economy approach would look at the capacity for sustainable development.

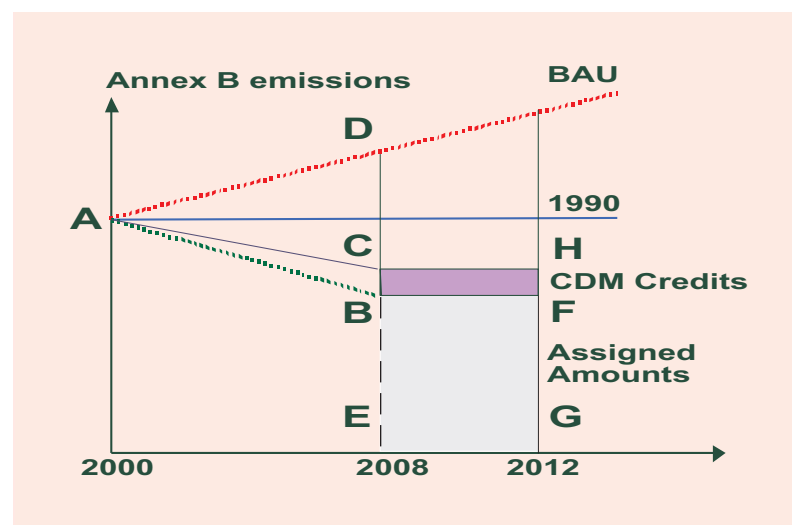
Instead of trying to choose between the three approaches, or presenting a synthesis for decision making, it may be useful to allow this to remain a menu of choices for policymaking. However, in order for such choices to be made effectively, it would help to clarify two definitional issues pertaining to the definition of sustainable development, and project level screening.

Definitions of Sustainable Development

It is useful to recall the immensely popular definition of sustainable development, provided by *Our Common Future*, the Report of the World Commission on Environment and Development (WCED 1987), namely “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological de-

How to ensure that CDM projects contribute to sustainable development?

Figure 4: Rationale for Supplementarity



Three pillars of sustainable development

velopment, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations” (WCED 1987). Indeed, the term was popularized in academic as well as policy circles by the publication of this report, even though its distinctive antecedents predate the report, especially the *World Conservation Strategy* (IUCN, UNEP, and WWF 1980). However, although the ubiquity of references to WCED’s definition suggests a degree of scholarly consensus, this is far from the case, and there is considerable disagreement, not only on how to put the idea into operation, but also on conceptual grounds (see Lele 1991; Murcott 1997). Nevertheless, there is a convergence on three foundational aspirations. First, that human beings should be able to enjoy a decent quality of life; second, that humanity should become capable of respecting the finiteness of the biosphere; and, third, that neither the aspiration for the good life nor the recognition of global biophysical limits should preclude the search for greater justice in the world (Sachs 1999). The concerns for human welfare, ecological integrity, and social justice and equity are together constitutive of the idea of sustainable development (Opschoor 1992, Buitenkamp et al. 1992, Banuri et al. 1994, Carley-Spapens 1998, Sachs et al. 1998). This has often been represented in the literature in the form of the familiar triangular diagram with the three sides representing the three goals: development, equity, and sustainability.

In non-Annex I countries, the traditional focus of policymakers was on financial transfers and transfer of technology to ensure that the growth process is not thwarted. On the one hand, this has tended to marginalize the other dimensions of sustainable development, and on the other hand, it has drawn excessive attention to financial resources.

Both of these tendencies are highly problematic, and might hamstring efforts to make the CDM responsive to broader concerns. First, a large volume of analysis has shown that while the scarcity of financial resources can inhibit the growth process, inflows do not necessarily promote it. Such outcomes are consistent with a perspective that views economic growth as an uneven process, driven by stable and credible policies and initiative and enterprise, rather than one that views it simply in terms of aggregate resource availability. Static baselines are often criticized for reducing the incentive to improve efficiency. This criticism is not entirely justified, since greater efficiency will generate higher returns from CERs irrespective of the particular baseline.

Second, limiting sustainable development to economic

growth, even if defined more broadly, is highly problematic. It has led to a search for models that can encapsulate various dimensions into a single metric. The most common approach is to use “capital” as a proxy for growth. In this approach, sustainable development is defined as the maintenance or expansion of a composite stock of capital—including physical capital as well as natural, human, and social capital. However, while this concept is useful in illustrating the *fact* of growth, it is silent as to the *drivers* of the growth process. Early development and planning literature started with growth models that used the stock of capital to link growth with investment. Subsequently, however, the development profession has moved on to other perspectives that better illustrate why growth rates differ between countries. Attention has been given at various times to such factors as trade openness, fiscal stance of the government, and governance and transparency.

In the CDM process as well, the temptation would be to define sustainable development first in terms of a stock of capital, and second in relationship to the inflow of foreign resources. Alternative approaches would emphasize the structural conditions that induce growth and social change, not the stock of capital per se, nor even the availability of foreign financial or technological resources.

In taking a broader look at the issue of sustainability, the focus could be kept on capacity—including technological development, decision-making capacity, and financial flexibility.

Project screening

How does the above translate into the more mundane activity of screening projects according to sustainable development criteria? Hamwey and Szekely (1998) suggest screening projects at three levels – economic, environmental, and social. Hassing and Mendis (1998) add that in order to help developing countries achieve sustainable development, “proven efforts” rather than “experimental” technologies need to be considered under CDM. Here, improvements in energy efficiency, industrial processes, some tried renewable energy technologies (REIs) are beneficial. Land use change or untried “high-tech” agricultural practices/processes may end up with high costs and without increased productivity, clearly not meeting the sustainable development criteria.

Gupta and Bhandari (2000) suggest the following approach. In the host country, as a first step, the government needs to prioritize the type of projects it perceives as potential CDM projects. These projects should meet the financial additionality criterion and should make a contri-

bution to sustainable development. The concern of developing country governments that CDM projects will trade away less expensive abatement options should be addressed at this stage. Several projects could qualify in meeting the environment and financial additionality criteria.

The government can identify criteria other than carbon abatement to evaluate the project. Table 2 lists four hypothetical projects and additional parameters that the project must address.

The additional parameters of the project are cost per ton of carbon abated (financial aspects), employment generation (social and developmental aspects), local environmental impacts (economic and environmental aspects) and access to technology (technological aspects). The host country may decide to exclude projects of type A as it fears that it is trading “low-hanging fruits” and the additional benefits that result are not significant. On the other extreme, type D projects with high carbon abatement costs and favorable benefits could clearly be included in the list of desirable CDM projects. It is for the government to decide whether to include projects of type B and C. The gov-

Table 2: **Four Hypothetical Projects and Additional Parameters**

Project	Cost of carbon abatement \$/ton of carbon	Employment generation	Positive local environmental impacts	Access to state of the art technology
A	5	Low	Low	Low
B	10	High	Medium	Low
C	30	Low	Low	High
D	50	Medium	High	High

ernment should clearly prioritize projects and define rules of exclusion for potential CDM projects. Once the preferred projects are determined, this information should be in the public domain.

The host country government may want to impose a tax on the transfer of carbon credits through CDM projects.⁵⁴ Again these decisions have to be clearly communicated so that the investors are aware of the different costs related to the project. The host country government has to take into consideration that by excluding the less expensive CDM projects and by imposing any additional costs in the form of taxes, CDM projects from the country would be at a disadvantage in competing with CDM projects from other countries.

*Revenue potential
of CDM projects*

Notes

- 1 Stockholm Environment Institute-Boston (SEI-B), Boston, USA, and Tata Energy Research Institute, New Delhi, India, respectively. The authors are grateful to Anil Agarwal, Steve Bernow, Preeti Bhandari, Sivan Kartha, Adil Najam, Paul Raskin, Ambuj Sagar, and the participants of the ADB workshop on the CDM for comments and discussion.
- 2 The Kyoto Protocol was adopted in Kyoto, Japan in December 1997 by the Third Conference of the Parties (COP 3) of the UNFCCC.
- 3 These are mainly the OECD countries and the transition economies (Eastern Europe and the Former Soviet Union). The specific emissions reduction commitments of these countries are listed in Annex B of the Kyoto Protocol. As such, they are also referred to as Annex B countries.
- 4 The QELRCs of countries differ considerably, ranging from 8 percent for most Western European countries, to 7 per cent for the United States (US), 6 percent for Canada and Japan, and an increase of 8 percent above 1990 levels for Australia. The aggregate of these commitments equals 5.2 percent of the 1990 emissions of Annex 1 countries.
- 5 While the base year for most Annex B countries is 1990, this is not the case for all countries or for all GHG.
- 6 As preparation for action, Annex I Countries also committed to the preparation of inventories of GHG emissions, and reporting national emission reduction plans to the UNFCCC.
- 7 For evidence on the strong correlation between economic growth and carbon emissions, see Baumert et al., 1999.
- 8 Where such a presumption is advanced by any Party, it would be strongly resisted by many individuals and institutions from the Annex B countries as well as the non-Annex I countries. Indeed, current agreements seek to correct the imbalance by placing limits on the emissions of industrialized countries while allowing the rest to enhance emissions. The G77 and PRC have specifically proposed to the UNFCCC to clarify that existing reduction targets should not be assumed to confer property rights of any kind.
- 9 Including the economies in transition, both referred to henceforth as Annex B countries.
- 10 Henceforth non-Annex I countries.
- 11 Another argument for differential burden rests on the advantage of Annex B countries in terms of *mitigation capacity*—especially their higher incomes and readier access to technology. Indications are, however, that despite their disadvantage, some non-Annex I countries (especially PRC and India) have introduced comparatively deeper reductions in fossil fuel subsidies, and consequently, higher savings in carbon emissions (see, Reid and Goldemberg 1997, International Energy Agency 1996, Johnson, Li, Jiang, and Taylor 1996).
- 12 This also brings out the different ways in which emissions data could be represented or organized. Data on per capita emissions is best to highlight the differential responsibilities for climate change as well as difference between necessary and luxury uses of carbon producing activities—and by implication for addressing the climate problem. National emissions data, on the other hand, draws attention to the level at which policy intervention can be organized.
- 13 The average per capita emission levels for the transition economies has declined from around 3 t in 1990 to around 2 t today, a reflection of the deep economic recession suffered by these economies during the 1990s.
- 14 EIA, *Energy Outlook*. These projections do not account for the impact of the recent agreements in Kyoto and Buenos Aires to curb emissions.
- 15 The GWP was developed by Rogers and Stephens (1988) and introduced to the political community by the 1990 IPCC report. For a useful discussion of the intellectual history of the concept and its shortcomings, see Skodvin (1999).
- 16 However, a report of the Dutch government's International project for Sustainable Energy Paths (IPSEP) argues that a final target of 450 ppmv allows for total emissions quota of only 300 GtC between 1985 and 2100 (see Krause et al., 1989; Agarwal and Narain 1999).
- 17 In contrast, the Kyoto Protocol targets seek only a 5.2 percent reduction of industrialized country emissions by 2008-2012. This is a very small fraction of the deep cuts recommended by the above analyses.
- 18 The reduction of carbon intensity from current levels in non-Annex I countries to say 100 will certainly provide a growth opportunity, but this will be limited, given the narrow range of current intensity levels. In any case, even this will require substantial inputs of technology and resources. Further reductions would require technological change beyond what was accomplished in the past.
- 19 A number of allocation schemes have been mentioned in the literature, including per capita allocation

- (Agarwal and Narain 1992), as well as liability-based allocation (Sachs, Panayotou, and Peterson 1999).
- 20 The ultimate objective of the UNFCCC is "...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (UNFCCC, Article 2).
- 21 The origins of the CDM are alleged to be Brazil's proposal for an Annex I Clean Development Fund (see Government of Brazil 1997). Financing of this was to be achieved through non-compliance penalties to be imposed on Annex I Countries. Each Annex I Party found to be in non compliance was to make a contribution for each *effective emissions* unit above the *effective emissions ceiling* (expressed in tC/year equivalent), and a CDF was to be established by the financial mechanism to receive these contributions. The financial resources of the fund were to be made available to the non-Annex I Countries for use in climate change mitigation and adaptation projects (the guidelines for which were to be established by COP-4. The link between CDM as it figures in the Kyoto Protocol and the CDF proposed by Brazil is an "alleged" one as CDM is far removed from the issue of noncompliance by Annex I; rather it deals with mitigation projects undertaken in non-Annex I countries. The only semblance it bears to the original proposal is in the creation of an adaptation fund though not in its sources of financing.
- 22 In terms of Article 12 (5) (a) of the Kyoto Protocol, participation in any CDM project by each Party is voluntary. Accordingly, it is open to the government of the non-Annex I host country not to accept a CDM project that does not meet its sustainable development priorities (e.g., poverty alleviation, saving foreign exchange, etc.). Similarly, it is also open to the governments of Annex B countries not to permit investments in, or transfers of CERs from, CDM projects which it considers objectionable for any reason (e.g. political opposition to nuclear power, alleged human rights violations by the host country government, etc).
- 23 Each partner in a CDM project will have an incentive to exaggerate the quantity of -C produced by the project.
- 24 Many non-Annex I countries have refused to consider proposals that would allow them to collect or receive CERs, presumably for fear that such acceptance would lead toward the imposition of involuntary emission targets on them.
- 25 There is also the consideration that proper accounting for emissions reductions in Annex B countries requires longer lead time in order for the inventories and baselines to be developed properly.
- 26 However, there are exceptions to this generalization. Some US-based writers have criticized the CDM partly on political grounds (i.e., it benefits countries that refuse to commit themselves to climate action) and partly on practical grounds (i.e. the absence of aggregate commitments can result in gaming). Criticism is also leveled at the Kyoto Protocol commitment to an emissions target rather than one with known financial and political costs. Alternative recommendations include a commitment on investment in climate action, although it would not lead to pre-determined climate benefits. Rowen and Weyant 1999.
- 27 This is consistent with earlier opposition other flexibility mechanisms (e.g., JI), especially carbon sequestration programs, which aroused fears of "Kyoto Forests" (with deleterious ecological impacts and uncertain carbon benefits), undermining of the rights of local communities, and even of a creeping recolonization of the South. Indeed, as noted by Jackson and Begg (1999), the initial language of JI has been dropped from UNFCCC documents. JI was initially succeeded by AIJ and now by the CDM. Indeed, the term JI has not been used in the Kyoto Protocol.
- 28 Editor's Note: For an analytical discussion on how non-Annex I countries might resolve the dilemmas posed by "long-hanging fruit," see the paper by Ghosh (this volume).
- 29 Editor's Note: It is curious that at the COP, non-Annex I Countries themselves have sought to restrict CDM projects to FDI by Annex B agents.
- 30 Editor's Note: This would point to the need for relevant capacity building in non-Annex I countries.
- 31 Editor's Note: See the paper by Ghosh (this volume) for an extended discussion of distribution of such rents (surplus) across countries, under various market structures for GHG abatements.
- 32 Editor's Note: These considerations apply generally to all kinds of resource flows and international trade in commodities, not just the CDM. The remedies may lie in various safeguards at multilateral and national levels, which would go well beyond considerations of generation and exchange of GHG abatements.
- 33 Editor's Note: However, policy remedies for "Dutch Disease" also exist.
- 34 The concept of "ecological space" is different from that of "natural capital." The latter implies the availability of income generating capacity, while the former suggests

- the freedom to make policy choices, or in this case, the freedom to achieve certain goals.
- 35 An example of the restriction of the financial space is the existence of high national debt, which limits policy choices as well as developmental aspirations.
- 36 Editor's Note: A number of the proposals listed in the BAPA in fact relate to the market structure for GHG abatements, see also paper by Ghosh (this volume).
- 37 Editor's Note: These issues which largely relate to future allocations of GHG emissions rights across countries and over time may be expected to gain in salience post-COP6.
- 38 There are questions whether, in order to avoid this eventuality, a different procedure should be instituted for negotiating CDM transactions. For example, should the parliament (or another public agency) vet them, at considerable expense in the form of delays and failure? Or should they be allowed to be negotiated in the same manner as most foreign investment projects?
- 39 Editor's Note: Reduction of rents may arise from the higher costs of renewable energy projects in relation to fossil fuel based technologies. On the other hand, it is unclear why energy efficiency projects, for example, should be left out. They may yield higher rents than renewable energy projects, but surely the interest of non-Annex I Countries would lie on accessing a larger share of such rents, rather than in their overall reduction.
- 40 Editor's Note: A major difference between the bilateral and unilateral approaches is that in the latter, the possibility of "market segregation" by Annex B countries is eliminated (see the paper by Ghosh, this volume).
- 41 In other words, the multilateral agency is replacing the market and fixing the price of CERs
- 42 Editor's Note: Presumably the funds would relate only to transfers of CERs. In this case the centralized body would be faced with the problem of raising resources for the major part of the capital investment of CDM projects.
- 43 Ghosh argues (this volume) that if a large number of C sellers could cartelize, this may solve the problem of inter-regional equity, without interference by a multilateral body.
- 44 Editor's Note: It is unclear why the authors apparently believe that private resources cannot be utilized in the multilateral approach.
- 45 Contributions of public resources to the GEF is essentially discretionary. On the other hand, use of public resources by Annex B countries would be driven by their legally binding QELRCs under the Kyoto Protocol. Ensuring that such public resources are not actually diversions of ODA would, of course, be problematic. There may be greater confidence that private sector resources for the CDM are not diversions from ODA.
- 46 Editor's Note: The issues underlying baseline specifications are considered in detail in the paper by Deshunj and Rogers in this volume.
- 47 Siniscalco et al., (1998) assume that the non-Annex I Party is not interested in sharing CERs as they do not have to comply with a commitment.
- 48 Editor's Note: Since ERUs, CERs and AAUs are of value to their users for one purpose only, i.e., to meet their Annex B emission targets in any combination with each other, it is difficult to see that they are not perfect substitutes, and thus fungible.
- 49 It would seem that such stringent fines for noncompliance are more feasible penalties. Trade sanctions would need to be consistent with the global WTO regime, and ensuring such consistency may be problematic.
- 50 Editor's Note: This report has since been submitted and is under consideration by SBSTA.
- 51 This 10 percent share of proceeds from non-compliance fees is the genesis of the Adaptation Fund.
- 52 An approach based on per capita incomes (in terms of purchasing power parity) could be used to ensure equity. A higher percentage is charged towards the administrative fee and Adaptation Fund for those developing countries with a higher per capita income among the non-Annex I countries. The advantage of this approach is that it addresses the equity concern, does not get into quota systems, which are difficult to determine given the uncertainty about the total size of the CDM. Also, this approach does not preclude inexpensive CDM projects in relatively richer non-Annex I countries. The disadvantages are that more "taxation" of CDM, more complicated modalities will restrict the market for CDM. This may need to be implemented in order to address the issue of equity.
- 53 Article 2.5 of the UNFCCC.
- 54 Editor's Note: Such a tax would enable the Government to realize (a portion of) the rents (surplus) from a CDM project, which may otherwise accrue to the project proponents. Such a tax may be considered as akin to a tax on extraction of a natural resource (e.g., oil) on the consideration that the project baseline, which relates to the country's economic and technological history, is a national, not privately held, resource.

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