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Redefining Baseline for Forestry Projects Under Clean Development Mechanism

By

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Abstract:

Inclusion of afforestation and reforestation as eligible activities in clean development mechanism (CDM) under the Kyoto Protocol has necessitated change in the existing definition of the baselines. The Subsidiary Body for Scientific and Technical Advice (SBSTA) constituted under the United Nations Framework Convention on Climate Change (UNFCCC) has suggested five options for this purpose for discussion and adoption at the ninth Conference of Parties to UNFCCC. The authors have analyzed the relative merits of these options and have argued that on account of scientific desirability, technical feasibility and economic considerations the most appropriate definition for baselines for forestry projects under the CDM is a variant of one of the options that defines the baseline as the "scenario that represents the net changes in carbon stocks within the project area in the most likely prospective land use at the time the project starts. It is subject to the condition that the construction of the scenario be based on the land suitability classification, land ownership and legal and policy restraints at the beginning of the project and, further, that the project shall take all necessary and possible measures to reduce the emission of methane and nitrous oxide gases due to project activities**.**"

Key Words:

UNFCCC, Kyoto Protocol, SBSTA, Afforestation and Reforestation.

Introduction:

The third Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Kyoto Protocol in December 1997 under which the industrialized countries were required to reduce their combined greenhouse gas emissions by at least 5.2 % compared to 1990 levels by the period 2008-2012. In order to facilitate compliance by these countries the Protocol provided for a number of flexibility mechanisms of which the clean development mechanism (CDM) is an important component. The objective of CDM is to assist the non-industrialized countries in achieving sustainable development and in contributing to the ultimate objective of the convention, and to assist industrialized countries in achieving compliance with their quantified emission limitation and reduction commitments (Kant *et al*, 2003). Paragraph 5 (b) and (c) of the article 12 of the Protocol states that the emission reductions resulting from each CDM project activity shall be certified on the basis of real, measurable and long term benefits related to the mitigation of climate change; and reduction in emissions that are additional to any that would occur in the absence of the project activity (UNFCCC, 1998). A project under the clean development mechanism (CDM) of the Kyoto Protocol must thus cause reductions in the *baseline* greenhouse gas emissions and the baseline is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity. The estimation of GHG emissions 'before and after' would be the necessary and sufficient requirement to measure the effect of the CDM project and issue "certified emission reduction" (CER) units to the investing CDM partner (Kant *et. al.*, 2003).

As is evident from above the Kyoto Protocol had envisaged the CDM as a tool for reducing emissions by sources, and not removal by sinks, for facilitating compliance. In fact even the name assigned to the certificates issued under CDM reveals this underlying original objective of emission reduction of the CDM. However, in subsequent Conferences of the Parties, particularly the sixth conference at Bonn and the seventh at Marakesh, reforestation and afforestation were added as eligible activities under

the CDM. But with these activities the original definition of baseline no longer holds good as these mitigation efforts work through greenhouse gas removal rather than emission reduction. This expansion in the scope of CDM by the inclusion of removal by sinks along with emission reduction by sources has necessitated change in the definition of the baseline. The COP, by its decisions 11/CP.7 {para 2(e)} and 17/CP.7 {para 10(b)}, requested the Subsidiary Body for Scientific and Technical Advice (SBSTA) of the UNFCCC to develop definitions and modalities for including afforestation and reforestation project activities under the CDM in the first commitment period taking into account the issues of non-permanence, additionality, leakage, uncertainties and socio-economic and environmental impacts including impacts on biodiversity and natural ecosystems (SBSTA, 2002). The SBSTA invited Parties to submit their views on these issues. On the basis of submissions by the Parties the SBSTA has formulated a range of options for redefining baselines, additionality, leakage and permanence etc. This paper seeks to examine the options presented for redefining baseline for forestry projects under the CDM in details from the point of view of developing nations in general and India in particular and present the authors' choice for the reasons stated.

Reasons for expansion of eligible CDM activities:

Land use management can mitigate atmospheric CO_2 increases through protection of existing carbon stocks, sequestration of more carbon, and substitution of fossil fuel use by bio-fuels. It has been estimated that globally these measures can reduce atmospheric carbon by about 83 to 131 GtC by 2050 (60 to 87 GtC in forests and 23 to 44 GtC in agricultural soils). Further, the cost of these measures is quite low compared to alternatives, and range from 0 to $ 12/tC. These are significant opportunities for mitigation and incentives and policy interventions are required to realize their potential (IPCC, 2001a; IPCC, 2001b). The Parties to the UNFCCC were convinced of these opportunities of mitigation and wanted to provide economic incentives in the form of market payments for capturing and holding carbon on lands. This led to the inclusion of afforestation and reforestation as eligible activities in the CDM.

There were other reasons as well. Originally the concept of CDM was developed as a tool for transfer of "green" technologies from the industrialized nations to the developing countries that would help reduce GHG emissions in the host countries. Essentially it was a take off from the Montreal Protocol in which the more developed among the industrialized nations found it profitable to invest in technologies to reduce use of ozone depleting substances in non-industrial countries. The confining of CDM projects to investments in reducing GHG emissions, however, would have practically limited the flow of benefits from this important flexibility mechanism to the USA, EU and Japan as others among the Annex 1 countries do not have the technological advance needed to transfer green technologies. Adding afforestation and reforestation to the list of eligible activities under the CDM thus enables the Annex 1 Parties lacking the technological advance to also benefit from the provisions of CDM.

Baselines:

The efficacy of any mitigation project is determined by the extent to which the project activities lead to the GHG reduction benefits that are additional to "business-as-usual". The first step in determining the project's additionality of benefits is the construction of a without-project scenario against which the changes in carbon stocks occurring in the project can be measured (IPCC, 2000). It is then necessary to demonstrate that the additional benefits are not merely incidental or due to non-project factors like policy changes, new legislation, market responses or environmental changes like warmer and more humid climate and carbon fertilization effect. Baselines are the reference scenario against which a change in greenhouse gas emissions and removals is measured. These scenarios can be established on the basis of projections of the carbon stock changes that would have occurred from "business-as-usual" activities or from continuation of pre-1990 activities or from standard management practices or from maintaining the same rate of change of stocks as in the years preceding 1990 (IPCC, 2000).

Construction of baseline scenarios is based on a range of assumptions. It requires intimate knowledge of conventional practices in the project area, local social and economic conditions, population and urbanization trends, local and regional market trends, and even wider global market trends in certain types of forests like that containing sandal, important timber and paper pulp species etc. It is then established by projecting these past trends into future (IPCC, 2000; IPCC, 2001a).

The baselines could be global, regional, national or project based depending on the objective. In the case of CDM pilot projects developed so far the baselines are project based, and determined by the project developers themselves, to measure the GHG benefits caused by the particular CDM project for which the baseline was established. Because land use practices and change processes are highly variable, a detailed project-specific study is likely to yield a more accurate prediction of the GHG emissions and removals than a broader regional or sectoral assessment (IPCC, 2000). However, the risk is that a project developer is more likely to maximize the perceived benefits from the project and, therefore, cause distortions in the baseline (IPCC, 2001a).

Generic methods, as against project specific methods, for establishing baselines have also been studied. One example is standard management practices and baselines could be set to reflect the level of carbon sequestration or emission avoidance that would occur if these practices were uniformly applied (IPCC, 2000). One obvious advantage is that this would avoid the deliberate maximization of benefits possible in project specific approach (which can also be avoided by having an agency other than the project developer establish the baseline). It would also bring consistency and transparency thereby enhancing credibility and tradability of the ensuing carbon credits. Another likely outcome would be the reduction in the cost of establishing baselines that can otherwise be a significant part of the cost of a CDM afforestation project (IPCC, 2000).

Options for baseline definition:

The SBSTA in its discussion paper on the methodological issues has presented five options for adopting definition for baseline for CDM projects (SBSTA, 2002). These options, capturing the essence of the different views expressed by the Parties to the UNFCCC, are

Option 1: The baseline definition is adapted to cover removal by sinks and the term “emissions by sources” is replaced by “removal by sinks”. It would thus read “the baseline is the scenario that reasonably represents the removals by sinks of greenhouse gases that would occur in the absence of the proposed project activity. A baseline shall cover removal of all gases and by all sink categories listed in Annex A to the Protocol within the project boundary. A baseline shall be deemed to reasonably represent the anthropogenic removals by sinks that would occur in the absence of the proposed project activity if it is derived using a baseline methodology referred to in paragraphs 37 and 38 of the modalities and procedures of the CDM”.

Option 2: In addition to Option 1 it is clarified that non-CO_2 greenhouse gas fluxes and emissions linked to afforestation and reforestation CDM project activity are included and that natural emissions and removals, occurring in the absence of the project activity, shall be tracked.

Option 3: In addition to Option 1 the baseline scenario shall be updated at regular intervals to account for changes due to cultural traditions, trends in land use patterns, and changes in socio-economic conditions, as well as policies at national and regional levels.

Option 4: The baseline is defined as the scenario that represents the net changes in carbon stocks and greenhouse gas emissions that would have taken place on the project land in the absence of the project.

Option 5: The baseline is defined as the scenario that represents the most likely prospective land use at the time the project starts.

Analysis:

The ***existing definition*** of the baseline is the “scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A to the Kyoto Protocol within the project boundary. A baseline shall be deemed to reasonably represent the anthropogenic emissions by sources that would occur in the absence of the

proposed project activity if it is derived using a baseline methodology referred to in paragraphs 37 and 38 of the modalities and procedures of the CDM" (SBSTA, 2002). It concerns itself with only the anthropogenic emissions by all sources and not removals by sinks. One would also notice the absence of the word 'net' emissions implying a deliberate omission of removal by sinks and the fact that emissions from all sources are included in this original definition. This definition is incapable of covering mitigation opportunities provided by the enhanced carbon sequestration removing carbon from the atmosphere and its longer storage by human efforts.

The ***Option 1*** addresses this shortcoming by replacing the words "emission by sources" by "removal by sinks". But in doing so it introduces a new shortcoming by way of excluding the emissions that always accompany removals. In the biological world there are no removals without at least some emissions. Further, the quantum of emissions and the removals may depend upon altogether different factors thus denying quantitative linkages between them making their separate assessments necessary. A baseline that does not account for emissions by sources would show lowered GHG benefits due to project activities than the benefits actually occurring and thereby lower the project value.

The ***Option 2*** addresses this situation by accounting for the natural emissions and removals and, additionally, accounts for changes in the non-CO_2 GHGs also. This is in recognition of the scientific fact that non-CO_2 emissions make up a significant fraction of the total GHG emissions that must be reduced under the Kyoto Protocol (IPCC, 2001a). Methane and nitrous oxide are among the six GHGs that can be affected by land use, land-use change & forestry (LULUCF) activities. In afforestation and reforestation projects the activities that influence the methane and nitrous oxide fluxes the most are the water-logging, fires and application of nitrogenous fertilizers. When biomass is burnt in the presence of moisture a fraction of the carbon and nitrogen in the biomass and the soil is released in the atmosphere as CH_4, CO, N_2O, and NO_x. Similarly application of nitrogen fertilizers can result in significant emissions of N_2O (IPCC, 2000). Draining wetlands reduces methane emission. Conversely, creation of waterlogged areas through irrigation of plantations or checking rain water run-off for moisture conservation would enhance methane emissions.

Smaller reductions in non-CO_2 gases can produce larger impacts at lower costs because of the high global warming potential (GWP) of these gases. It has been estimated that the scenarios that omitted measures for reducing non-CO_2 gases would have about 20% higher annual costs than those that included them (IPCC, 2001a; IPCC, 2001b; Reilly et al, 1999; Tuhkanen et al, 1999). Sequestration of carbon in woody biomass, being a biological process, requires considerable length of time depending upon the species and other factors of growth and decay but most methane reduction measures (like draining waterlogged areas) can be carried out more rapidly. Also since the atmosphere responds more rapidly to changes in methane than to CO_2 concentrations the reductions in methane concentrations will have a more immediate impact on mitigating climate change (IPCC, 2001a; IPCC, 2001b).

The above discussion points towards the scientific desirability of taking the non-CO_2 gases into account in the baseline construction. But it can be argued that the article 3.3 of the Kyoto Protocol had expressly restricted accounting of GHG emissions and removals in LULUCF activities to those measurable as verifiable changes in carbon stocks (UNFCCC, 1998). Since non-CO_2 GHGs do not appear as changes in stocks the tracking of fluxes in these gases is not a legal requirement (IPCC, 2000).

More important, however, is the enormous complexity in data collection and analysis that the inclusion of non-CO_2 gases would bring into play (IPCC, 2000; IPCC, 2001a). This may make it beyond the technological capabilities of most developing countries, who are to host the CDM ventures. This would lead to severely limiting the spread of CDM to a few localities even among the more advanced of the developing nations like India and China. It would also greatly enhance the cost of measurement, verification and monitoring.

The authors are of the opinion that, on balance, the technological limitations of the potential CDM hosts, high costs of measurements and the legal position on account of the provisions of article 3.3 of the Kyoto Protocol outweigh the scientific desirability of including non-CO_2 GHG fluxes in the immediate future and, therefore, suggest that this inclusion of non-CO_2 GHG fluxes may be postponed

till after the first commitment period by which time technological advances may make the non-CO_2 GHG data collection and analysis within the reach of a majority of the developing countries. Till such time, the strategy may be based on reducing non-CO_2 GHG emissions in afforestation and reforestation activities under CDM. The reduction in the emission of methane and nitrous oxide, the two main non-CO_2 GHGs linked to afforestation and reforestation projects, could be achieved by ensuring that no water logging is created, no nitrogenous fertilizers are used and fires are not used as project activities to promote regeneration or growth. These restrictions could form part of the CDM methodology for the first commitment period.

The ***Option 3*** seeks to update the Option 1 at regular intervals to account for changes due to cultural traditions, trends in land use patterns, and changes in socio-economic conditions and policies. In other words, option 3 is a review-adjusted version of the option 1. Baselines could be fixed for the lifetime of the project or adjusted following periodic reviews or the occurrence of unexpected events. The main argument for revising the baseline over the length of the project is that such revisions would ensure more realistic carbon offsets (IPCC, 2000). But a continuous revision would impart great uncertainties to the CDM projects, leading to costlier insurance covers and reducing their economic potential seriously. Even scientifically also the revision of the baselines, several years after the project activities also begin showing their effects, would be nearly impossible because it would then be difficult to distinguish between the contributions of the changes in cultural traditions, socio-economic factors and policies and the direct and indirect effects of the project activities.

In the ***Option 4*** the baseline is defined as the scenario that represents the net changes in carbon stocks and greenhouse gas emissions that would have taken place on the project land in the absence of the project. It is an improvement on the option 2 in that it accounts for net changes in carbon stocks caused by both natural and anthropogenic factors anticipated in the project area in the absence of the project. But it suffers from the same handicap as discussed above for option 2 due to inclusion of non-CO2 gases. Thus the analysis for option 2 also applies to this option.

This option suffers from another handicap of lack of clarity as to how to construct the scenario in the absence of the project. For example it does not indicate whether the future scenario construction shall be on the basis of the past uses of the proposed project land use, the current trends in land use, a land use with the highest internal rate of return, the legal status of the land in question or the present level of carbon storage and sequestration rate, etc.

In the ***Option 5*** the baseline is defined as the scenario that represents the most likely prospective land use at the time the project starts. It is the more flexible of the options presented and the qualification of most prospective land use of the project site at the time of project initiation makes it quite definitive reducing confusion and enhancing the tradability of the credits generated on the basis of such a reference scenario. The economically developing countries have a higher turnover of policies and regulations because these countries have to continually experiment with the policy options that would help them reach their desired social and economic goals at the earliest and at least costs. And, since land is the major resource of these countries, their changing policies interfere with this resource use the most. This policy uncertainty reduces the economic attraction of CDM forestry projects but, for this reason, the developing societies cannot be expected to give up their search for appropriate policies. It is obviously the CDM that would have to adjust and the present option 5 limiting baseline assessment to the policies at the beginning of the project is, therefore, an appropriate response to this particular problem.

The most prospective land use of the project site can be established using the legal classification of the proposed project land, its suitability for agriculture, tree growing or other specific uses and ownership. For example, a land which is classified as an agriculture land in India is likely to be put to that use but if it has degraded top soil, is un-irrigated and the market rewards tree growing more than the agricultural crops that can be raised in such lands, the most likely prospective land use could be tree growing since tree growing is a permissible activity in lands classified as agricultural lands. In the cases of lands classified as forests in India, however, tree growing may be the only option as use of forest lands for non-forestry purposes is prevented by law even when the forests are degraded and land is otherwise suitable for raising agricultural crops.

The ownership of the land may also play a decisive role in projecting the most prospective land use. While private ownership is likely to decide in favour of a changeable land use pattern rather than a long term commitment to one type of use as is required in tree growing, governments and communities may invest significant parts of their land resources in projects which ensure supply of a larger basket of goods and services to a greater number of people, an objective which may be better served by ecologically sound sustainable forestry projects.

This option 5, however, is inadequate in that it does not indicate whether the scenario envisaged considers the net changes in carbon stocks or merely the removals by sinks, and whether these changes would be measured within the physical boundaries of the project land. It is also silent on the treatment of non-CO_2 GHGs. As has already been discussed elsewhere in this paper, since all removals by biological sinks are always accompanied by some emissions, the net changes in carbon stocks would present a far more reliable estimate of the baseline. Further, while it is a fact that forestry activities may influence carbon stocks beyond the physical boundaries within which these activities are undertaken, such influences are primarily due to the leakage effect. Since leakage issues are being addressed separately it would be appropriate to limit the baseline projections to the project area only. With regard to the non-CO_2 GHGs the conclusions arrived at in the analysis of option 2 in would also apply here.

Conclusion:

Based on the discussion above the authors propose that the most suitable definition of baseline is a modification of Option 5, which is a "scenario that represents the net changes in carbon stocks within the project area in the most likely prospective land use at the time the project starts. It is subject to the condition that the construction of the scenario be based on the land suitability classification, land ownership and legal and policy restraints at the beginning of the project and, further, that the project shall take all necessary and possible measures to reduce the emission of methane and nitrous oxide gases due to project activities**.**"

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