Elements of a certification system for forestry-based carbon offset projects[1]

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Abstract

Implementation of the Kyoto Protocol will require the establishment of procedures for monitoring, verification and certification of carbon offset projects. In this paper, the steps required for independent certification of forestry-based carbon offset projects are reviewed, based on the procedures used by the international certification company Société Générale de Surveillance. Firstly, a project must be evaluated for its suitability in relation to eligibility criteria of the Kyoto Protocol. These eligibility criteria are classified under four headings: (a) acceptability to host country parties and international agreements; (b) additionality, in terms of demonstrated positive greenhouse gas effects additional to the "business-as-usual" case; (c) externalities or unwanted side effects; and, (d) capacity to implement project's activities. Secondly, the scientific methodology for calculating the carbon offsets and the methodology for data collection and statistical analysis must be evaluated. Additionally, the amount of carbon offsets quantified must be adjusted to reflect the uncertainty associated with the methodology and data used. Only when these steps have been completed can carbon offsets be certified. Finally, the paper discusses the importance of standardization of methods and procedures used for project monitoring and verification, and the need for accreditation to ensure that the activities of certifiers are regulated.

Abbreviations

Activities Implemented Jointly (AIJ), Clean Development Mechanism (CDM), carbon dioxide (CO_2), greenhouse gas (GHG), International Organization for Standardization (ISO), Intergovernmental Panel on Climate Change (IPCC), Joint Implementation Registration Center (JIRC), Société Générale de Surveillance (SGS), United Nations Framework Convention on Climate Change (UNFCCC), United States Initiative on Joint Implementation (USIJI).

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1. Introduction

During the last ten years, a variety of forestry projects have been established with the objective of sequestering, storing or preventing the release of CO_2 to the atmosphere to offset emissions taking place elsewhere (e.g., Moura-Costa, 1993; Putz and Pinard, 1993; Faeth et al., 1994; Verweij, 1994; Tattenbach, 1996; Tipper and de Jong, 1998; Moura-Costa and Stuart, 1998, Brown et al., 1999). The number of carbon offset projects[2] is expected to increase after international agreement is reached on the use of forestry as a means to achieve the objectives of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC).

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[1] Mitigation and Adaptation Strategies for Global Change, 2000.

[2] A variety of terms have been used to refer to different project-level climate change mitigation mechanisms (Joint Implementation, JI, Activities Implemented Jointly, AIJ, Clean Development Mechanism, CDM) and their outputs: carbon offsets, carbon credits, emission reduction units (ERUs), certified emission reductions (CERs). This paper will use the generic terms *'carbon offsets'* and *'carbon offset projects'* to refer to all different technical formulations, with specific terminology used only as and when appropriate.

Although there is still uncertainty about which modalities of forestry will be accepted for implementation of the Kyoto Protocol, the Protocol is explicit about the need for verification and, in the case of the Clean Development Mechanism (CDM - Article 12), certification of project activities. This requirement for verification and certification is not yet matched by any official set of rules, regulations or guidelines.

In this interim phase, rules and regulations have been created by national greenhouse gas (GHG) regulatory bodies (e.g., USIJI, 1994; JIRC, 1997) for the evaluation of projects under the Activities Implemented Jointly (AIJ) Pilot Phase, and specialized institutions (private sector, NGOs, academic institutions) have developed their own methods for the quantification of the performance of carbon offset projects. It is likely that these early experiences will provide inputs for the formulation of internationally-agreed guidelines for verification and certification of carbon offsets. This paper describes the authors' views of the steps required for certification of forestry-based carbon offset projects. These steps also form the basis of the Carbon Offset Verification Service used by the international monitoring and verification firm Société Générale de Surveillance (SGS) (Moura-Costa et al., 1997). To date, SGS has already applied this methodology to 11 projects in Africa, Latin America and Europe.

2. Institutional requirements for certification

In this paper, verification is defined as the activity of checking the validity of the claims of a project, usually based on the data gathered by the project's internal monitoring program. If a project fulfils all regulatory requirements, verification may lead to certification.

Essential components of a verification/certification system include a published standard, an accreditation body, and certification agencies accredited to use the standard. The standard used for certification must be adopted by an independent standard-setting organization, and must be accepted by the parties concerned. In the case of the standards developed by the International Organization for Standardization (ISO, the major standard-setting organization world-wide), this is done by technical committees working within the ISO framework (Upton and Bass, 1995). In the case of the Forest Stewardship Council (FSC, an organization working with certification of sustainable forest management), generic Principles and Criteria have been set by the FSC while country-specific standards based on these are being set up by national working groups (Higman et al., 1999). Currently there is no universally-accepted standard for certification of carbon offset projects. In order to address this issue, SGS (the first certification company offering such services) compiled a series of criteria from the project selection requirements of GHG regulatory bodies world-wide (namely, the USIJI, the Canadian JII, the Australian AIJ Pilot Initiative, the Netherlands JIRC, and the German AIJ Pilot Phase Programme).

Certification agencies must be independent from the standard-setting body and the organizations seeking certification, and they must have well defined procedures, guidelines and training to ensure that they can provide independent verification of whether a project's activities are in accordance with the standard (Upton and Bass, 1995).

In order to ensure credibility, the certification process must be overseen by an accreditation body independent from certification companies, ensuring consistency and compliance with the standard and certification procedures (Higman et al., 1999). In essence, accreditation bodies 'certify the certifiers'. In the case of certification of carbon offset projects, no accreditation body has yet been established. It is likely that this role will be fulfilled by some accreditation body selected by the Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC), possibly linked to the Intergovernmental Panel on Climate Change (IPCC, the scientific advisory body to the UNFCCC). In the absence of an official accreditation body, SGS plans to form an advisory board made up of internationally recognized experts to review certification decisions.

3. The certification process

The process of certification of carbon offset projects can be divided into two phases, related to the requirements of the Kyoto Protocol. Firstly, a qualitative analysis must be performed to verify the suitability of the project in relation to eligibility criteria required by the UNFCCC, the Kyoto Protocol, and GHG regulatory agencies. In particular, the Kyoto Protocol requires projects to “promote sustainable development” (Article 2) and that they result in benefits “additional to any that would otherwise occur” (Article 6.1b and 12.5c). Secondly, the GHG benefits of a project must be quantifiable in a “transparent and verifiable” manner, and consequently certification must include a verification of the data and methods used for quantification of carbon offsets. Any quantitative analysis must include an estimate of the uncertainties related to the project, and adjust carbon claims accordingly.

It is often the case that an initial analysis of the estimated carbon benefits of a project is required. Inevitably, this initial analysis would be based on assumptions and projections, and could not provide anything more than a forecast of the likely benefits. This initial analysis increases the credibility of the project, reducing risk to investors, specially if combined with a risk analysis. Certification, however, is only considered completed after an *ex post* analysis of project is conducted, based on real accomplishments.

In the case of the SGS system, three different types of certificate can be awarded to projects: 1) a Certificate of Project Design, the result of the *ex-ante* qualitative assessment in relation to a set of Project Eligibility Criteria (see next section); 2) a Schedule of Projected Emission Reduction Units, stating the expected carbon benefits of the project based on an *ex-ante* analysis of scientific assumptions, data, and quantification methodology used for estimating the project’s benefits; and, 3) after an *ex-post* evaluation of project implementation, a certificate stating the amount of certified carbon offsets. Non-conformance with qualitative criteria is addressed through a corrective action request procedure and if a major non-conformance is outstanding, the Certificate of Project Design may not be issued (or may be suspended or withdrawn). Non-conformance with activities affecting the quantification of offsets (for example, inadequate data collection techniques) may result in the award of a lower amount of certified carbon offsets.

4. Qualitative analysis of project design in relation to eligibility criteria

The first step in the quantification process is to analyze a project in relation to eligibility criteria based on the requirements of the Kyoto Protocol. In the absence of defined rules and guidelines for the implementation of the Kyoto Protocol, projects have been evaluated according to a series of criteria required by GHG regulatory bodies (e.g., USIJI, 1994; JIRC, 1997) and verification companies (e.g., Moura-Costa et al., 1997; Trines, 1998). As rules and regulations for implementation of the Kyoto Protocol become clearer, project analyses would become easier and more objective. We classify these criteria for project assessment into four areas of qualitative analysis: acceptability; additionality; externalities; and, capacity.

4.1 Acceptability

Acceptability relates to the perspective of all governments and agencies involved in a project in relation to the host country's development objectives and economic priorities; host country's carbon offset regulations and priorities; and, the investor country's and international standards. Different countries have slightly different criteria for accepting and encouraging different types of carbon offset projects, which may affect the potential for project placement within various national portfolios. In relation to the Kyoto Protocol, carbon offset projects in developing countries are required to promote sustainable development (Articles 2.1 and 12.2). On a wider perspective, the evaluation must also ensure that the project parameters do not run counter to other related international agreements and guidelines, such as the UN Convention on Biodiversity, the Agenda 21, the Convention on Trade in Endangered Species (CITES), the RAMSAR Convention for the protection of wetlands, the Geneva Convention on Human Rights, and the ITTO Target 2000, among others.

4.2 Additionality

Additionality is a requirement to ensure that carbon offset projects result in real effects on the current rate of GHG accumulation in the atmosphere. In the context of the Kyoto Protocol, no project can claim carbon offsets unless its proponents can reasonably demonstrate that the project's practices are 'additional' to the 'business-as-usual' or baseline scenario. This baseline scenario is broadly described as the collective set of economic, financial, regulatory and political circumstances within which a particular project is implemented and will operate. The validity of any particular project rests upon the case made that environmental performance -- in terms of carbon offsetting -- exceeds historical precedents, legal requirements, likely future developments, or a combination of the three.

Various approaches have been proposed for establishing baselines. Firstly, baselines could be established in a case-by-case basis, by project proponents, or by national or regional bodies, in a top-down approach (Baumert, 1998). Secondly, it could be project specific or generic, applicable to a sector, region or country. In the case of generic baselines, these could be based on sectoral or regional benchmarks, or in more detailed technology matrices (Hargrave et al., 1999) (although technology matrices have been developed in the context of energy projects, they may be equally valid for land use projects). Thirdly, baselines could be static, based on a fixed amount or trend, or dynamic, taking into account future changes in current situations or trends. Fourthly, baselines could be fixed, maintained for the whole lifetime of the project, or adjustable, after a certain period of time or the occurrence of a given event. The choice of method used for baseline determination will depend on regulatory requirements. In the absence of clear regulations, it is recommended that the most rigid and thorough method is used, i.e. project specific, dynamic baselines.

Establishing the baseline scenario thus requires historical knowledge of conventional practices in the project area, the local socio-economic situation, and wider (national, regional or even global) economic trends which may affect the outputs of a project. These factors are then used to create projections for the future. Consequently, baseline scenarios are necessarily based on assumptions. The process of verification of a baseline, therefore, varies with individual circumstance, but usually involves a combination of interviews, evaluation of relevant policies and economic analysis.

Once the baseline is established, a project must prove that it satisfies the additionality requirement, by showing that the project's carbon balance differs from that of the baseline and that this difference is attributable to the project's activities. Different tools have been used to demonstrate, or verify, whether a project fulfils additionality. Firstly, the project must demonstrate that it results in a change in carbon emissions or sequestration relative to the baseline. The specific measures which lead to any emission reductions or carbon sequestration must be identified and documented. Secondly, the element of *intent* (or *program additionality)* may be demonstrated, to ensure that projects with coincidental carbon benefits are precluded from receiving offsets. Thirdly, a project could demonstrate additionality through financial analyses, proving that the creation of carbon offsets involves additional incurred costs compared with those of comparable baseline activities. Often, a carbon offset project will either provide a lower rate of return, or will involve higher risk than is conventional to that type of investment. Fourthly, the concept of barrier-removal (be they additional costs, new technologies, risk mitigation, etc.) have also be used to demonstrate project additionality (Carter, 1997). A project may demonstrate additionality through one or more of the tools listed above.

Irrespective of which tool is used to demonstrate project additionality, the first Conference of the Parties (COP1) of the UNFCCC ruled that "the financing of AIJ shall be additional to the financial obligations of Parties included in Annex II to the Convention within the framework of the financial mechanism as well as to current official development assistance flows". In this regard, carbon offset projects in developing countries cannot be operationally reliant on developmental and environmental assistance funds. This applies to country level Official Development Assistance (ODA) transfers, funding mechanisms under the UNFCCC, and the various multilateral development bank and development agency activities. However, at this stage, it is possible that ODA-type funds can be used for project-supporting activities or mechanisms such as monitoring, planning, and capacity building.

4.3 Externalities

Assessment must also include indirect impacts which may arise from the implementation of the project. Projects must not cause negative externalities -- unwanted side effects which counter the overall benefits of the project. In the case of the CDM, the positive side effects of project implementation must also be highlighted. The analysis should include GHG and non-GHG related externalities.

GHG related externalities, or 'leakage', occurs when the carbon offset benefits from a project are partially negated by GHG emissions taking place elsewhere, as a consequence of the project (Brown et al., 1997). Leakage should not disqualify a project, unless projected increases in external emissions are so substantial as to negate much of the projected carbon offsets. However, if a significant amount of leakage is expected to occur, the scope of the project scenario analysis should be widened to allow quantification or estimation of potential losses, which must be deducted from the project's carbon gains.

One example of leakage control is found in the Costa Rican national carbon offset program. In 1997, the Costa Rican government established the Protected Areas Project to consolidate their national parks network through the purchase of privately owned land inside park boundaries, and consequently preventing the release of CO_2 resulting from deforestation in these areas (Tattenbach, 1996). There was the danger, however, that the landowners previously located inside the protected areas would relocate and continue with their previous land use activities outside park boundaries. In order to mitigate the possible negative impacts of forest utilization outside the protected areas network, Costa Rica initiated a parallel program called Private Forests Project (PFP), which provided farmers with financial incentives to engage in sustainable forestry activities, as opposed to deforestation or non-forestry land uses. The project was independently certified, and the potential for leakage was considered negligible (SGS, 1998).

Project analysis must also include non-GHG gas externalities, such as environmental impacts and social and developmental effects. This requires evaluation of issues like biodiversity, creation of long term income opportunities, technology transfer, human development, public participation, capacity building, gender effects, and cultural issues, which the project may impact either positively or negatively. It should also be ascertained whether the techniques and technologies being proposed for the project are appropriate for the level of development in the affected area.

4.4 Capacity

Given that investments in carbon offset projects are likely to take place before projects are initiated, it is important that *ex ante* certification assessments evaluate the capacity of projects to deliver the carbon offsets estimated by project proponents. While this is not a necessary component of certification, as required by the Kyoto Protocol, it provides comfort to investors in a similar way as a credit rating does for conventional investments, especially if associated with a risk assessment (see below). Capacity should be assessed in terms of the financial feasibility of the project, the management skills of the project team, and access to infrastructure and technology. If there are substantial questions about capacity, these issues should be evaluated prior to investment and project implementation. If those concerns are strong enough, it may even be appropriate to reduce carbon offset projections accordingly.

5. *Ex-ante* quantification of expected offsets

Project developers may require third-party verification of the estimates of offsets expected to be generated by the project. This provides better assurance to potential investors and regulators, increasing the chances of attracting finance and obtaining regulatory approval. This *ex ante* analysis consists of three steps. Firstly, the output of the proposed project is estimated using the quantification methodology proposed by the project and average data defaults for similar types of forestry activities in similar regions. Secondly, the levels of uncertainty associated with the project are estimated (see next section) and deducted from the amount of offsets the project is expected to generate. Thirdly, the risks associated with the implementation of the project are calculated (see next section), and the project's risk management and mitigation procedures are evaluated.

In the case of the SGS Carbon Offset Verification Service, this analysis results in the issue of a certified Schedule of Projected Emission Reduction Units. In effect, this analysis provides project developers and potential investors with an independent view of the expected outputs and likelihood of success of a project, somewhat similar to the service of a credit rating agency. It is important to note that this analysis does not result in certified carbon offsets, which are only achieved after an *ex post* certification of project achievements.

6. Risk analysis and treatment of uncertainty

Following the *ex-ante* analysis of scientific methodology and quantification of expected carbon benefits of a project, it is also necessary to estimate the uncertainties and risks affecting such estimates. In the context of carbon offset projects, uncertainty can be classified as mensuration error and counterfactual uncertainty.

Mensuration error relates to the degree of uncertainty attached to a measurement, expressed as a standard error, or standard deviation of means. Mensuration error is a function of data availability and quality. It is related to the costs of data collection of an internal monitoring program, which may choose to gather its own data, use regional or national defaults, and the intensity of data collection. In the case of *ex ante* analyses, estimation of mensuration error could be conducted using sensitivity analysis, using reliable minimum (or maximum) estimates of key parameters, which combine to give conservative estimates of expected benefits. In the case of *ex-post* analyses, based on actual project data, mensuration error is calculated using standard statistical techniques.

Counterfactual uncertainty relates to factors that cannot be statistically quantified, which is often the case of estimation of baselines. At the outset of the project, counterfactual uncertainty must be addressed through the estimation of the effect of uncertainty assumptions on the baseline during project implementation, although this practice introduces an additional level of uncertainty to project developers and investors. Methods to reduce counterfactual uncertainty include permanent monitoring of baselines and use of control plots; the use of dynamic baselines; and re-evaluation and adjustments of baselines.

Risk differs from the uncertainties described above because it relates to project implementation rather than the uncertainties associated with the quantification of project benefits. Risk relates to the likelihood and significance of particular events that may or may not happen, such as natural catastrophes (e.g., fire, floods, droughts, pests and diseases); anthropogenic interventions (e.g., encroachment, theft, fire); socio-political, economic, financial, and market problems risks (e.g., non-enforcement of contracts, non-compliance with guarantees, expropriation, uncertain property rights, changes in costs and prices, etc.).

The Carbon Offset Verification System of SGS is usually combined with a risk analysis procedure that assesses the likelihood and significance of events occurring and the countermeasures developed and implemented to reduce the likelihood and or significance of those events occurring. The outcome of the risk assessment is used to create a carbon offset reserve, that is kept for self-insurance purposes during the project implementation phase. Additionally, project's benefits are also adjusted deducting the mensuration error and the estimated uncertainty associated with baseline determination. This approach was first used in the certification of the national program of the Costa Rican Office for Joint Implementation, which placed 40% of the project's offsets in a self-insurance buffer reserve (SGS, 1998).

Another way to reduce risks of reversal of GHG benefits is to only allow crediting after a certain pre-determined period of storage, or to provide credits yearly according to a ton-year factor (Moura-Costa and Wilson, 1999). The advantages of using a ton-year approach are that it allows for carbon storage to be credited according to the time frame over which this service is provided, and it reduces the need for long-term guarantees and hence the risks associated with long timeframes. If the project's forests are damaged, carbon credits can be cancelled and/or the amount of credits lost can be more easily calculated.

7. Ex-post verification and certification of carbon offsets

This is the final stage of the certification process and results in the issue of certified carbon offsets, but it cannot take place until project activities have been implemented, and even then, certificates can only be issued for the changes in carbon stocks that have taken place until that point in time. It is not possible to certify something that has not yet occurred.

The certificates are issued after a surveillance visit. The frequency of such visits can vary, and should be determined by the needs of the project developers or investors. During the surveillance visits, certifiers carry out the following activities:

a) Check if the assumptions adopted for the project baseline remain valid, as political, social, economic or environmental situations may change. In some cases, a means of facilitating the verification of the baseline is through the establishment of parallel plots where the intervention is not implemented and business continues as usual;
b) Verify the actual project activities (e.g. area planted). This can be achieved using tools such as satellite imagery, aerial photography, or field visits, depending on the scale of the project;
c) Verify the project's monitoring activities. While quantification itself is not part of the certification process, certifiers must verify that the project's internal monitoring program consistently utilize appropriate data collection and quantification methodologies. While methodologies may vary depending on data availability, project circumstance and design, and technology used, some key elements must be addressed, as described elsewhere (e.g., MacDicken, 1996; IPCC, 1995; Greenhouse Challenge Office, 1998). Verification should ensure that the data used for quantification is consistent with the project's data records, and that the records match observations in the field. The data collected by the project staff needs to be verified by book inspections and field sampling;
d) Check the quantification methodologies;
e) Adjust results to take account of uncertainty and mensuration error;
f) Issue a certificate stating the amount of certified carbon offsets achieved by the project to date.

8. Conclusions and recommendations

A wide range of methods, approaches and criteria have been developed and field tested for the evaluation and quantification of the carbon offset benefits of forestry projects. In spite of this, current lack of policy related to methods and guidelines to be used for certification of carbon offsets has resulted in large discrepancies between the claims of different projects. This, in turn, leads to uncertainty, discrediting forestry as a greenhouse gas mitigation option. There is an urgent need, therefore, for standardized procedures for project analysis to ensure consistent results and comparability between projects. In particular, agreement is needed in relation to protocols used for determination of baselines and additionality, precision levels required for quantification, the treatment of uncertainty and mensuration error, methods for calculation of project benefits, and the timeframe used for project analysis.

Certification is a tool to increase credibility and transparency of project claims. As in any trading system, independent certification facilitates transactions by removing a layer of uncertainty and risk for a relatively small fraction of the overall transaction costs. In the case of carbon offset projects, it could lead to an improvement in the legitimacy of the projects, and to an increase in the comfort level of regulatory bodies, investors, and other interested parties.

For certification to succeed, however, some components must be put in place. Firstly, an internationally-accepted standard must be adopted by the UNFCCC. Secondly, clear and objective guidelines for project analysis and quantification of project benefits must be defined. Finally, the UNFCCC must elect an accreditation body to certify and oversee the activities of the certifiers, adding an extra layer of transparency, credibility and legitimacy to the system.

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