

Item 6a. Facilitating Reforestation for Guangxi Watershed Management in Pearl River Basin Project

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BACKGROUND

In 2003, the Guangxi Government applied for a US\$100 million loan from the World Bank for implementing the Guangxi Integrated Forestry Development and Conservation Project (GIFDCP).

In order to achieve the multigoals concerning economic, social and environmental benefits, the project included 200 000 ha of timber plantation, the promotion of forest regeneration and vegetation rehabilitation in approximately 100 000 ha for multiple-use protection forests, the establishment of a biocarbon pilot project of approximately 4 000 ha for carbon sequestration. The latter is the so-called "Facilitating Reforestation for Guangxi Watershed Management in Pearl River Basin Project".

The project included activities to strengthening biodiversity conservation in five nature reserves with global significance, supported through a GEF grant of US\$5.25 million.

Facilitating reforestation for Guangxi Watershed Management in Pearl River Basin, is the first forestry project under the CDM of the Kyoto Protocol. A methodology on reforestation on degraded land based on this project is the first approved Afforestation/Reforestation (A/R) methodology validated by the CDM Executive Board.

OBJECTIVES

The main objectives of the project is to sequester CO₂ through forest restoration in small watershed areas, to enhance biodiversity conservation by increasing the connectivity of forests adjacent to nature reserves, to improve soil and water erosion control and to improve income generation of local communities.

ACTIVITIES

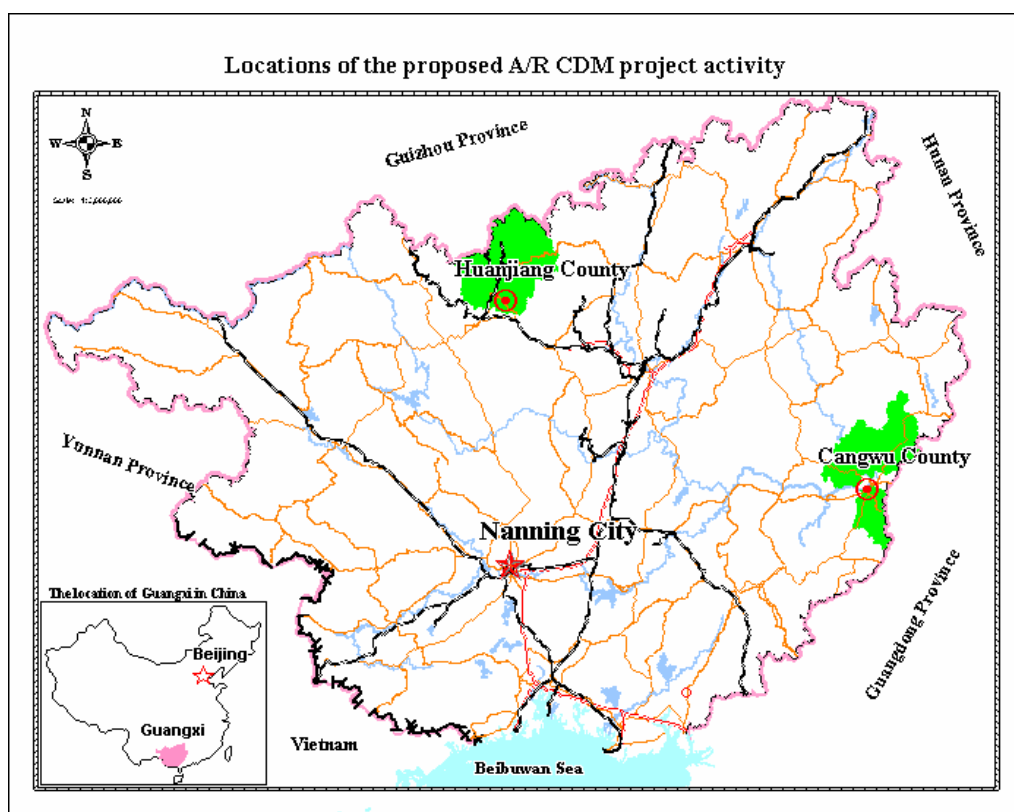
The project is located in Cangwu County, in the eastern part of map shown below, and Huanjiang County, in the northern part of map, of Guangxi Zhuang Autonomous Region, in southern China.

In Huanjiang County, 2 000 ha are distributed in 830 ha on sites neighboring Mulun National Nature Reserve and Jiuwanshan National Nature Reserve, and around 1 170 ha on sites between them.

The species selected are *Pinus massoniana* mixed with *Liquidambar formosana* (1 050 ha); *Cunninghamia lanceolata* mixed with *L. formosana* (450 ha) and *Eucalyptus* sp. (500 ha). The expected harvesting cycles are for *Eucalyptus*, 9 years; for *Liquidamba*, 17 years; and for *Cunninghamia*, *Pinus*, over 30 years.

In Cangwu County a 2 000 ha plantation has been established on sites where severe soil and water erosion are frequent. The selected species are *Pinus massoniana* mixed with *Quercus griffithii* (600 ha), *Pinus massoniana* mixed with *Schima superba* (900 ha) and *Eucalyptus* sp. (500 ha). The expected harvesting cycles are for *Quercus*, 7 years; for *Eucalyptus*, 9 years; for *Schima*, 17 years; and for *Pinus*, over 30 years.

For the species selection, the following factors were taken into consideration: farmers and communities interests (surveyed); company's interests (value of associated forest products); carbon sequestration rates, biodiversity enhancement, and water and soil erosion control. All species are native to the area except eucalyptus.



One of the main technologies to be applied under this project is reforestation through direct planting with environmental-friendly techniques on degraded lands. Good practice guidance and successful national and international technologies, as well as experiences gained from the World Bank financed forestry projects, will also be adopted. The national technical standard will be strictly followed.

Geographical Information System (GIS) and Geographical Positioning System (GPS) will be employed in the verification and monitoring of the implementation of the project activity. The local forestry agencies will provide technical support and guidance, including training courses, and conduct quality control to the preparation and implementation of the project activity.

Lands are owned by the local villages or communities and subcontracted to farmers for plantation establishment management. The farmers or communities and forest company manage 3 560 ha and the farmers group 440 ha.

The project preparation started in 2004. Afforestation activities are completed and monitoring will start from 2009.

APPLICATION OF A METHODOLOGY

The methodology applied is "Reforestation of degraded land" (AR-AM0001), and it was derived from the project activity. The project activity complies with the conditions under which the chosen methodology applies in the following ways:

- The project activity will not lead to a shift of pre-project activities outside the project boundary.
- Lands to be reforested have been severely degrading over the last decades and are degrading.
- Unavailability of natural seed sources, and environmental conditions, do not permit the encroachment of natural forest vegetation.
- Lands will be reforested by direct planting in the project activity.
- The site preparation will not cause significant long-term net emissions from soil carbon.

- Plantation will be harvested with a minimum rotation of seven years and will be regenerated by direct planting or natural sprouting.
- Carbon stocks in soil organic matter, litter and deadwood will decrease more or increase less in the absence of the project activity, relative to the project scenario.
- Because of the degraded feature of the lands, economical unattractiveness, identifiable barriers and remote feature of the lands, investors or local communities are prevented from using the land for economic revenue. Without the proposed A/R CDM project activity, the lands to be reforested will continue to degrade. Therefore the baseline approach of the methodology is the most appropriate choice for determination of the baseline scenario.

As regards to the demonstration of the land eligibility and additionality of the project, the lands to be planted in the project activity have been non-forested lands since at least 1989. The forest definition complies with the UNFCCC definition, non-performance afforestation activity, land not likely to become forest.

Eligibility of land was proven by using land cover maps and interviews with land owners. The steps as outlined in the additionality tool are followed to demonstrate that the project activity is additional and not the baseline scenario. This includes identification of alternatives to the project activity, investment analysis, barrier analysis – including investment barriers, technological barriers, institutional barriers and market risks and impact of CDM registration.

MONITORING

Monitoring the overall performance of the project activity includes monitoring actual project boundary, monitoring the areas and quality of forest establishment to ensure the technical design and monitoring forest management.

Regarding the monitoring, the actual net greenhouse gas (GHG) removals by sinks data, permanent sampling plots are used for sampling over time to measure and monitor changes in carbon stocks of the relevant carbon pools. This is performed through systematic sampling with a random start position. The total sum of samples (n) is estimated as per criterion of Neyman of fixed levels of accuracy. The size of plots is 400 m² (20m×20m), while the growth of the diameter at breast height and height (DBH and H) of individual trees on plots shall be measured at each time interval of monitoring. The carbon stock changes in above- and below-ground biomass of living trees on each plot are estimated through the Biomass Expansion Factors (BEF) method.

Monitoring GHG emissions by sources as the results of the project activity includes decrease in carbon stock in living biomass of existing non-tree vegetation and N₂O emissions caused by nitrogen fertilization application.

Monitoring the leakage of GHGs generated by fossil fuel combustion from vehicles using for transporting seedling, labours, fertilizer, harvest products, etc., to and/or from project sites, as a result of the project activity, include a +/-10 percent error at 95 percent confidence level.

Quality Assurance and Quality Control (QA/QC) procedure will be implemented to ensure the net anthropogenic GHG removals by sinks to be measured and monitored precisely, credibly, verifiably and transparently.

ESTIMATION OF NET ANTHROPOGENIC GHG

The net anthropogenic GHG removals by sinks as a result of the proposed A/R CDM project activity is anticipated to be over 770 000 tons of CO₂ equivalent during the crediting period between 1 April 2006 and 31 March 2036. By the year 2017 it is estimated at 462 013 t CO₂-equivalent.

BENEFIT OF THE PROJECT

About 20 000 local farmers of 5 000 households will benefit from the project. The total income is estimated at US\$21.1 million within the crediting period, including US\$15.6 million from employment; US\$3.5 million from sales of wood and non-wood products US\$2.0 million from sales of CERs.

The project activity will create about 5 million person-days of temporary employment opportunities. It will also create 40 long-term job positions during the crediting period, sustainable fuelwood supply, strengthening social cohesion and provide technical training and demonstration opportunities.

The environmental benefits include enhancing biodiversity and ecosystem integrity, controlling soil erosion, regulating hydrological flows that in turn alleviates drought risk and reduces flooding risks, improving environmental services, building incentives to people to invest in sustainable land use, improving watershed management and contributing to the outside of the project boundary and the ecosystem improvement along the Pearl River, through demonstration and extension of the project experience to other areas.

As described above, the methodology used “Reforestation of degraded land” (AR-AM0001) can be found under http://cdm.unfccc.int/EB/Meetings/022/eb22_ and the project design document is under the UNFCCC website.

Item 6b. Obstacles and opportunities for afforestation and reforestation projects under the Clean Development Mechanism of the Kyoto Protocol

INTRODUCTION

For the first commitment period (2008–2012), the Kyoto Protocol targets measures to mitigate climate change only within developed countries. There is an important exception: the Clean Development Mechanism (CDM), one of the Protocol’s flexibility mechanisms that negotiators created to reduce costs of emissions reductions. Public or private entities may fulfil their obligations under the Protocol through investing in "Clean Development" projects in developing countries. While reducing emissions, CDM projects aim to promote sustainable development in the host country.

The mechanism is estimated to generate around two billion tons of carbon credits by the end of 2012, an amount that corresponds to the present annual emissions of Russia¹. Although more than 600 CDM projects are registered, those involving AR are proving slow to become operational. Project developers seem to have difficulties in presenting methodologies and project proposals acceptable to the Executive Board of the CDM. Only since last year has AR CDM actually passed the stage of methodology development. Subsequently, the first project was registered (Nov. 2006), and several other projects should be approved soon.

This paper provides an analysis of the current obstacles to and opportunities for successful development of AR CDM projects. Considering the progress made, the paper highlights the potential and opportunities for AR CDM. A summary of the first registered project (discussed above), "Facilitating Reforestation for Guangxi Watershed Management in Pearl River Basin, China," illustrates the possibilities.

MODALITIES AND PROCEDURES OF FORESTRY CDM

The AR CDM is a mechanism to credit carbon sequestration by forests. Within the negotiated modalities and procedures, the options for project developers are varied: the established forests may be

¹ UNFCCC website > CDM > CDM statistics; UNFCCC website > GHG emission data

managed, harvested and used for agroforestry, bio-energy, timber production or even urban forestry². Objectives such as environmental protection and poverty alleviation give support to the claim of sustainable development.

RATIONALE

The rationale of CDM projects and methodologies is generally based on two scenarios: The *baseline scenario* describes the development of carbon stocks without the CDM project. Project developers may choose between several approaches to characterize the baseline scenario: most commonly described through the existing or historical changes in carbon stocks in the vegetation. The *project scenario* estimates the effect of forest establishment, i.e. the increase in carbon stocks.

The difference between the baseline and the project scenario indicates the carbon sequestration achieved through the reforestation activity and the resulting amount of tradable carbon credits. CDM project design also includes an approach for periodic monitoring of carbon stocks to verify the achieved emissions reductions.

Emission caused by the implementation of the project (e.g. from vehicles used for transport of seedlings), or shifts of emissions to outside the project boundary ("leakage", e.g. because of the displacement of grazing animals) have to be monitored and subtracted.

When considering the development of A/R CDM projects, the project developer may want to check the following **PREREQUISITES**:

Additionality. The project has to be additional to what would have happened without the CDM: To prove this, project developers have to show that *either* the project is not the most economically or financially attractive option, *or* without the income of carbon credits it would not be able to overcome legal, technological or ecological barriers.

Institutional prerequisites. To serve as a host for CDM projects, countries must have ratified the Kyoto Protocol, established a *Designated National Authority* and determined criteria for sustainable development.

Land eligibility. Land is eligible (1) for *reforestation* activities, if there has been no forest since 31/12/1989 or (2) for *afforestation* activities if there has been no forest for at least 50 years. The forest land may not be temporarily unstocked as a result of human intervention such as harvesting, nor have the potential to revert to forest without human intervention.

Forest definition. Under the CDM, forest consists of trees with at least a height of 2–5 metres, crown density between 10 and 30 percent, and area of 0.05–1 hectare. Countries choose values for these parameters³.

PROJECT CYCLE AND ACTORS

To qualify under the CDM, afforestation and reforestation activities must be in accordance with the CDM project cycle (see Figure below) and apply an approved methodology. Achieved carbon removals are then issued as carbon credits so they can enter the carbon market for compliance with reduction targets.

The Executive Board acts as a supervisor for the mechanism and decides about the registration of projects and carbon credits. The Designated National Authority (DNA), often an agency within the relevant ministries, acts on behalf of the host country. The Designated Operational Entities (DOE) are the intermediaries in the project cycle.

² Neff *et al.* 2006

³ Neff *et al.* 2006

After screening basic requirements, the next step is to complete the Project Design Document (PDD), which includes information on the expected emissions reductions, objectives of the project activity, as well as on the approaches for baseline and project scenario. The form requires a description of environmental and socio-economic impacts, and the considerations of a local stakeholder consultation. In the event the available methodologies don't capture the project situation, a new methodology can be proposed to the Executive Board.

A DOE will independently validate project design against CDM requirements. If the host country (i.e. its DNA) approves, the project can be registered through formal acceptance by the Executive Board. The monitored emissions reductions are subject to verification, i.e. independent review and retrospective determination, by the DOE. A different DOE will certify the achieved emissions reductions, so the Executive Board can issue them as carbon credits.

The credits may then enter the carbon market to be bought by governments or funds. Private sector companies may also seek to buy credits, either to comply with emissions reductions obligations or for voluntary reasons. Several brokers/traders help to facilitate the demand and supply chain.

Because the established forest will eventually release the once sequestered carbon through forest decay or harvest, A/R projects only result in so-called *temporary or long-term Certified Emissions Reductions* (tCERs and lCERs). These carbon credits expire after a certain period, which means they will have to be replaced by other credits in the future.

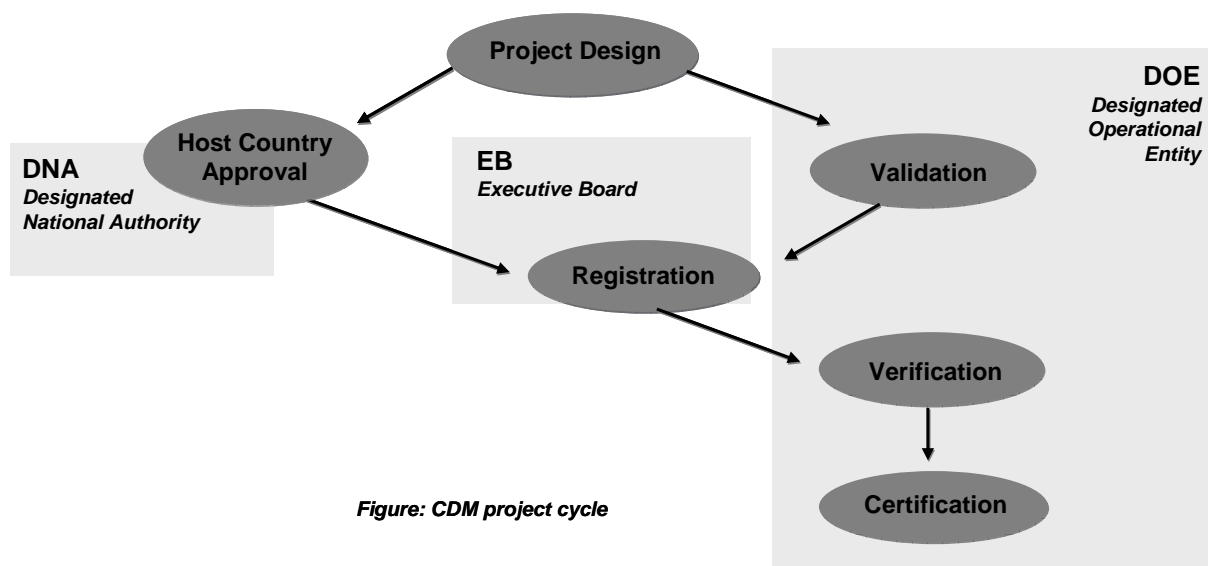


Figure: CDM project cycle

The *BioCarbon Fund*, as one existing example, administered by the World Bank, purchases carbon credits from CDM projects, and finances demonstration projects for carbon sequestration and conservation in forest and agro-ecosystems outside the Kyoto market. The main contributors to this public/private partnership are governments, such as Canada and Italy, and companies, e.g. Japanese power companies. Projects that seek qualification under the BioCarbon Fund, apply the Fund's own procedures, including the submission of a Project Idea Note and a subsequent detailed Carbon Finance Document. The fund's goals are more specific than the CDM: cost-effectiveness of emissions reductions while promoting biodiversity and poverty alleviation⁴.

Several similar funds exist: the World Bank initiated the *Community Development Carbon Fund* that buys carbon credits from forestry projects with a special focus on poverty alleviation and the involvement of local communities⁵.

⁴ Website of the World Bank Carbon Finance Unit > Carbon Funds > BioCarbon Fund

⁵ Website of the World Bank Carbon Finance Unit > Carbon Funds > Community Development Carbon Fund

SMALL-SCALE PROJECTS

The purpose of small-scale AR CDM is to enable the participation of low income communities and individuals. To make these activities viable, simplified modalities and procedures were designed, which are expected to reduce the high transaction costs usually associated with A/R CDM.

To qualify as small scale, projects have to comply with the following conditions:

- Projects may be carried out only by low income individuals or communities, as defined by the host country.
- If carbon removals exceed an annual limit of 8 000 tons of CO₂, these are not eligible as certified emissions reductions. This limit implies a maximum area ranging from several hundred hectares for plantations, to several thousand hectares for agroforestry or forest restoration projects⁶.
- Projects must not be a de-bundled larger-scale activity. To register a set of small-scale A/R CDM project activities, these have to be at least one kilometre apart.

CHALLENGES AND OBSTACLES

POLITICAL BACKGROUND⁷

The inclusion of forest sinks in mitigation activities has been one of the most controversial issues in climate change negotiations: Accounting for forest sinks was frequently viewed as a "loophole" policy to sidestep serious measures for emissions reduction. Several parties stressed the potential risks of forestry projects: Carbon removals by forests are considered to be only temporary. Moreover, the establishment of plantations could contribute to deforestation, loss of biodiversity and harmful impacts on local livelihoods. These risks and related scepticism have, to a certain degree, impaired the political process as well as the potential of forestry CDM.

Because of the resulting methodological and technical uncertainties, negotiators had great difficulty in agreeing on a scheme to account for carbon sequestration by forests. Only AF activities were identified as qualifying for the CDM. The negotiation of modalities and procedures for forestry CDM took two years longer than for other CDM sectors (e.g. energy), which also caused some delay in investment in this sector. The temporary nature of carbon sequestration by forests was taken into account by special types of expiring carbon credits. To address the "loophole" risk, negotiators limited the amount of allowable emissions reductions through forestry to 1 percent of countries' 1990 emissions for the first commitment period of the Kyoto Protocol.

MARKET FOR FORESTRY CREDITS

Compared to regular carbon credits, the market for temporary credits from forestry is limited. One major obstacle for AR CDM is the European Union's (EU's) decision to exclude forestry credits from the EU Emissions Trading Scheme, which currently holds the majority of the overall carbon market. The legal directive gives as the reason for exclusion the Community's differing priorities for climate policy, as well as the above-mentioned risks of forest sinks⁸. Because the trading scheme covers much of the European private sector, this EU policy keeps forestry credits out of reach of one of the major demand groups.

Governments, including the EU members, may still achieve part of their obligations through forestry credits. The 1 percent-cap of the Kyoto Protocol is actually not a quantitative obstacle: So far, transactions cover only 6 percent of tradable credits under the allowable 1 percent-cap⁹. This limitation might, however, alienate investors and credit buyers – as supposedly does the EU policy. Similarly, as

⁶ Robledo and Tippmann, 2004

⁷ Hunter *et al.* 2002, Streck and Scholz, 2006

⁸ Commission of the European Communities, 2003

⁹ World Bank, 2007

a recent survey¹⁰ shows, the temporary nature of credits and the risks attached to forestry credits are seen as reasons not to buy them.

Despite the resulting competitive disadvantage for AR CDM, there is significant demand for forestry credits, even if at relatively low value. Given that the first commitment period in 2008 is imminent and that governments need to comply with their reduction targets, the demand for carbon credits, including temporary credits from forestry, is apparently increasing. Several governments, for instance Japan, Italy and Spain, are likely to engage in AR CDM projects¹¹.

To date, most forestry credits (several million) have been put forward and purchased by the BioCarbon Fund: Emissions Reduction Purchase Agreements (ERPAs) for more than a dozen of projects are already signed and more await approval in the second phase project pipeline. The price paid by the BioCarbon Fund may be taken as a first signal to estimate the value of temporary credits (tCERs): around US\$4 per ton CO₂.¹²

INVESTMENT, TRANSACTION COSTS AND RISKS

AR CDM implies a typical long-term investment in a forestry project: Requiring high rates of financing at the beginning, forests take some time to deliver revenues and benefits. Likewise, the delivery of carbon revenues can occur only according to CDM procedures and after fulfilling the project cycle. As a result, investors face high initial costs and delayed returns, which demands the availability of initial investment capital and the ability to wait for revenues.

In any case, projects need some sort of upfront financing to bear transaction costs for AR CDM, very roughly estimated at around US\$150 000¹³. Apart from payment of fees or the 2 percent contribution of carbon credits to fund climate change adaptation in developing countries, the expenses depend on various factors: local circumstances, complexity of the project idea, consultant input as well as the costs for services by the DOE, etc. Projects can be designed and managed so the established forest provides early (and continuous) income, e.g. through diversification of forest uses and mixture of tree species.

Because transaction costs depend very much on the scale of the project activity, simplified modalities and procedures were created for small-scale projects. However, many experts stress that the carbon credits available under the small-scale limit of 8 000 tons CO₂ are barely enough to make a project viable. This is a disadvantage for those regions where small-scale approaches would be particularly appropriate for poverty alleviation, because there project developers usually lack financial capacity.

Aside from the risks typically associated with forestry projects (e.g. natural hazards), investment in AR CDM is also perceived as uncertain because only one project proposal was approved. This risk lowers the price paid by the carbon market depending on the stage of project development. Similarly, future developments of the climate regime ("post-2012") and value for temporary credits are difficult to estimate, even if promising.

Some brokers create portfolios of projects and carbon credits, which can help to mitigate some of the risks perceived by credit buyers. Several insurance companies offer schemes for forestry risks, non-approval under the CDM, and the delivery of carbon credits. Standards, e.g. the "Climate, Community & Biodiversity Standard", can increase the value of credits at an earlier stage of project development, minimize the risk of non-approval as a CDM project, and certify contributions to sustainable development¹⁴. Forest certification (e.g. Forest Stewardship Council) enhances credibility of AR projects in terms of sustainable forest management.

¹⁰ EcoSecurities, 2006

¹¹ Neeff and Henders, 2007

¹² Website of the World Bank Carbon finance Unit > Carbon Funds > BioCarbon Fund

¹³ estimate based on Neeff and Henders, 2007

¹⁴ Neeff and Henders, 2007

METHODOLOGICAL AND PROCEDURAL ISSUES

More than other CDM sectors, AR has been technically challenging to formulation of methodologies acceptable to the Executive Board. The effort to develop a new methodology seems considerable, as approved methodologies often cover more than one hundred pages. Methodologies might not be applicable or adaptable to specific local situations, which would sometimes appear only during the course of project implementation.

The project cycle for AR CDM is described as very challenging¹⁵ and requires input by CDM experts and foresters. In particular, the handling and writing of technical documentations demands qualified consultants. Compared to other CDM sectors, AR projects are involved in features unique to forest or land management: e.g. biodiversity, hydrology or land ownership. The procedures require a data background (e.g. proof of land eligibility) that might be costly to obtain under some circumstances¹⁶.

At first glance, the additionality concept seems to impair forestry CDM. Additionality and its proof are certainly a difficult issue for the CDM and not only for forestry projects. However, this ensures that the project delivers real benefits for climate change mitigation. In practice, it means that commercial large-scale plantations that would be economically viable and don't face any other barrier or laws stipulating other land uses, are not eligible under the CDM. A project might be considered additional if it comprises a mix of activities with low financial indices that would not be possible without carbon finance, e.g. a combination of agroforestry, community forestry and conservation¹⁷.

SOCIAL AND LEGAL ISSUES

Forestry projects often involve a strong social and participatory component, which becomes even more important in view of the development objectives of the CDM. The legal background is a crucial element to ensure equitable benefit sharing and to avoid social conflicts¹⁸, which could impair the permanence of carbon sequestration. Contractual agreements for joint-management and shared benefits can build the legal back-up. For this reason, it is essential to consider all local interests and rights during the planning process, although it can be expensive and has conflict-potential. Some experiences report the integration of local people in monitoring procedures as highly beneficial¹⁹.

Tenureship has to be clear and structured for the implementation of a CDM project. One of the underlying problems is the conflict between customary and official law, where several users may have different rights for different types of land use²⁰. Another source of conflict is the displacement of pre-project land uses and in some cases also land users. Restriction of access and rights might not be effective and leads to conflicts.

PROGRESS

There has been considerable progress during the last year, as methodologies have been developed to fulfil the AR-specific criteria and procedures. One project, using the first approved methodology, was registered in November 2006. Seven other proposals are currently in the process of validation, proposing emissions reductions of around 0.8 Megatons of CO₂.

SCOPE OF APPROVED METHODOLOGIES

Since the first large-scale methodology was accepted in November 2006, some basic issues have been overcome and the process has gathered speed. Methodologies have evolved through a learning-by-doing process, where project developers submit proposals to the Executive Board. The key questions are addressed by improving and building on previously submitted methodologies. With several proposals still pending, up to now (May 2007) seven, out of more than 30 submitted, large-scale methodologies for AR CDM have been accepted. The Executive Board has also developed a methodology for small-scale projects.

¹⁵ World Bank, 2007 *inter alia*

¹⁶ Fadda 2006, presentation

¹⁷ Streck *et al.*, 2006b

¹⁸ Jindal, 2006

¹⁹ Skutsch and Murdiyarso, 2006

²⁰ Jindal, 2006

Though the project developer cannot combine these features as may be necessary, the approved methodologies offer a broad scope of possible baseline and project scenarios (see Appendix for details). Methodologies currently allow pre-project land uses, such as pasture, agriculture, grazing and fuelwood collection, or just abandoned land. Forests are established by planting or by natural regeneration. One methodology also foresees control of grazing and fuelwood collection. Another targets establishment of commercial and industrial plantations (reference number AR-AM0005); yet another (AR-AM0006) allows agricultural intercropping and forage production for feedstock. Project emissions and leakage are accounted for: fossil fuel consumption because of the project implementation, displacement of grazing and fuelwood collection, displacement of agriculture, burning of biomass, or farming and pastoral activities undertaken by displaced people.

Facilitating Reforestation for Guangxi Watershed Management in the Pearl River Basin, South China

Objectives and project description. The 4 000 ha of multifunctional forest established by this project will act as buffer and corridor for protected areas, and contribute to erosion control. Commercial forestry and carbon credits provide income to local farmers, including both temporary and permanent employment opportunities. The reforestation aims to promote management models for watersheds and erosion control. The project will deliver around 25 795 tons of CO₂ per year, valued by the BioCarbon Fund at US\$3 per sequestered ton.

Tree species selection was based on several criteria depending on risks, delivery of income and other environmental functions. Reforestation mainly relies on native tree species, such as *Pinus massoniana* or *Quercus griffithii*. Part of the reforestation will use *Eucalyptus*, which requires the application of fertilizers, but provides early income for farmers.

Contractual arrangement. In accordance with the results of participatory processes, the legal arrangement is mostly based on shareholding agreements between local farmers/communities and the forest company: Farmers and communities contribute land and labour. The forest company invests in planting activities, provides technical inputs, manages the plantations during the crediting period, and bears the natural and investment risks. While farmers will be paid for their labour, income from forest products will be shared in proportion to performed input. Carbon revenues will be distributed more than proportionally to the farmers. A small part of the project will be managed by so-called farmer groups: Contracting the land owned by communities, farmers independently manage the reforestation, while local forestry agencies provide assistance. Only the farmers will own income from carbon credits as well as from forestry activities.

Umbrella project. The reforestation project is part of a larger World Bank project entitled, Guangxi Integrated Forestry Development and Conservation Project, which has four components to: expand timber plantations to reduce pressure on natural forests, increase forest cover in watershed areas, strengthen management of nature reserves, and enhance institutional and management capacity for the forestry sector.

Approval process. The process from project idea to registration in November 2006, including the submission of a new methodology (the first approved methodology AR-AM0001), took little less than two years. The project is part of the BioCarbon Fund portfolio, i.e. the project is approved under the fund's own project cycle and the World Bank is the main buyer of generated credits.

Methodological and procedural approaches. Additionality could be proved because the project site is a remote and degraded area, where any land use change for commercial motivations or natural regeneration to forests is very unlikely. Neither the World Bank nor relevant governmental programmes have funded reforestation activities in the region. The methodology accounts for project emissions due to the loss of non-tree biomass (e.g., the shrubs that were displaced by the planted tree), vehicle use and fertilizer application for the planting of *Eucalyptus*. It does not account for leakage, i.e. the shift of agriculture or grazing to other places due to the reforestation on the project site. Monitoring is based on stratified permanent sample plots measuring diameter and height. National default factors are used to calculate the biomass volume, in order to estimate the carbon removed from the atmosphere.

THE FIRST REGISTERED PROJECT:

First of all, the project presented the first methodology acceptable to the Executive Board. Some other factors leading to the success for the Guangxi project are:

- strong combination of objectives, all promoting sustainable development: biodiversity enhancement, erosion control and poverty alleviation;
- participatory approaches for project design and management;
- clear contractual arrangements and legal structure prior to project design;
- support and sponsorship by the World Bank, also through the umbrella project.

PROMOTING EQUAL REGIONAL REPRESENTATION OF THE CDM: THE NAIROBI FRAMEWORK

The CDM appears unevenly distributed not only among sectors but also regions. Natural resources typically present one of the main economic opportunities for less developed countries, whereas the potential to reduce emissions in the energy sector is quite low. Therefore, less developed countries are disproportionately affected by the relative complexity of AR CDM. Unfavourable investment climate and the higher risks prevailing in less developed countries aggravate the obstacles for CDM. Aside from barely functional institutional pre-requisites, the lack of capacity at all levels – the lack of resources to even become aware of the process – is assumed to be one of the main reasons for Africa's under-representation in the CDM market.

To enhance CDM participation of least developed countries, especially Africa and Small Island Developing States, the former UN Secretary-General announced the *Nairobi Framework*: a UN-led partnership linking government action to the private sector. The objectives of this capacity building initiative include:

- capacity building for host country institutions and for project development;
- information exchange and compilation, e.g. a web-based CDM Bazaar;
- promotion of investment opportunities;
- coordinated work of different UN agencies.

Lessons learned: developing AR CDM in Central Asia

Based on field experience in developing AR CDM projects in Central Asia, the following recommendations can be given from FAO's perspective:

- Collaborate with committed implementing organizations and individuals that understand the legal implications of carbon finance. The particular nature of the CDM, which has to generate and deliver carbon credits as a new commodity in order to enable project revenues, needs to be understood.
- Look for situations where a need for reforestation is expressed, but barriers (e.g. ecological, financial, investment related) prevent implementation.
- Tree growth in planted forests translates directly into carbon sequestration rates and accordingly to carbon revenues. For example, in areas with low growth rates (e.g. drylands, mountainous sites) carbon revenues are less, but environmental and socio-economic objectives may become very important.
- Availability of forest growth data, forest inventory data and aerial images facilitates project documentation.
- Carbon finance can add about 20 percent additional revenues to the cash flow table of a project.
- Identify carbon buyers prior to, or at a very early stage of project development. Institutional buyers tend to pay less for carbon credits, but represent low risks.

The last UNFCCC conference encouraged countries to give financial support for identification and development of projects. This includes indirect financial support through intergovernmental and non-governmental organizations such as FAO.

FAO INVOLVEMENT IN AR CDM

According to CDM modalities, carbon credits should not be financed by money that would otherwise fund official development assistance. The role of international organizations and donors is therefore restricted to facilitating and financing projects up to the stage of registration. FAO has been engaged in a range of different activities:

- **Regional workshops on AR CDM**
- **Capacity building seminars** on the rules and modalities for AR CDM, intensive and over several days (e.g. Ecuador, Nov. 2005)
- **Facilitation of AR CDM projects:** technical assistance, formulation of projects, investor linkages, advice to project developers and governments
- **Support to small-scale AR CDM** and pilot project activities
- **Methodological guidance and information dissemination**

OPPORTUNITIES

CDM claims a contribution to sustainable development, where in particular forestry activities have huge potential: Reforestation can have various and far-reaching benefits for local people and their environment, which are in many instances not monetarily evaluated. It has the potential to enhance the supply of forest resources for subsistence, regular markets and energy needs. As illustrated by the Guangxi River project, AR CDM can contribute to the exchange of better practices for forestry and environmental management.

The potential of forestry CDM is even more important in face of climate change related events such as droughts, heat waves and floods. Therefore, the development dividend and carbon finance are especially appropriate where poverty alleviation and environmental protection suggest themselves as priorities of the forestry sector. As a project-based mechanism the CDM can specifically target local circumstances and needs.

On the one hand, CDM adds its own procedures to verify carbon removals and development benefits; on the other hand it can make investments profitable. The question is if carbon revenues and social or environmental achievements can balance the procedural effort.

At first, the lengthy decision-making process, restrictions and complex procedures have alienated potential project developers and investors. Considering the scope of AR methodologies and the progress in the project pipeline, AR CDM seems to have passed this pilot phase. As intended, the Guangxi Reforestation project demonstrates that AR CDM can generate "high-quality emissions reductions in greenhouse gases that can be measured, monitored and verified".. Initial challenges, such as methodological, technical and procedural complexity, can be overcome by routine and lessons learned through first experiences. Thus, transaction costs for forestry CDM will further decrease.

The successful pilot project and the proposals still awaiting approval attach great importance to development objectives as well as the social dimensions of reforestation activities. Apparently, AR CDM does not reward mere carbon sequestration by forest establishment. It is not necessarily a business opportunity in itself but specifically targets those investments that would not happen without carbon finance, i.e., where carbon finance can tip the balance by making forestry projects economically viable. In accordance with the objectives of the BioCarbon Fund and similar schemes, the social and environmental benefits seem to be essential criteria for project approval.

Seen in this light, AR CDM presents an opportunity for the forest industry, because carbon credits within the Kyoto framework can act as financial incentive to enhance the social and sustainable development component of forestry activities. Drawing on its own experience with such typical forestry issues, AR CDM is justified and highly suitable for public relation purposes of the forestry sector. Investments can be linked with other objectives and relevant efforts, for instance good-practice codes and poverty alleviation.

Finally it should be mentioned that besides the sequestration activities, i.e. afforestation and reforestation, bio-energy options in the forestry sector are also currently eligible under the CDM, including the use of wood residues and energy plantations for the production of energy feedstock.

SWOT ANALYSIS OF FORESTRY PROJECTS UNDER THE CDM

The synoptical table shows the strengths, weaknesses, opportunities and threats (SWOT) of afforestation and reforestation projects under the CDM. Strengths and weaknesses are internal factors, opportunities and threats external factors.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Projects have multiple benefits for local people and their environment. • Sound and verifiable monitoring approaches ensure transparency. • Pilot projects demonstrate feasibility, credibility and benefits. • Routine and experiences increasingly facilitate project development. • Carbon finance can enhance sustainable development components of forestry. • Approved methodologies present broad scope of possible project types (e.g. timber, bioenergy, agro-forestry). 	<ul style="list-style-type: none"> • First generation CDM methodologies and procedures are still complex and time-consuming. • If marginalized, social issues may threaten project success. • High upfront financing and late returns. • Projects bear risks of non-approval under the CDM, forestry and non-permanence risks.
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Demand for carbon credits by governments (including EU members) is increasing. • Certification schemes enhance value of carbon credits and credibility of environmental and socio-economic benefits. • Under the 1 percent-cap of the Kyoto Protocol, 94 +percent of transactions are still tradable. • Insurance schemes can address risks. • Brokers facilitate demand and supply of credits and institutionalized carbon funds finance dozens of pilot projects. • Political commitment to mitigate climate change and increasing public awareness of forests' crucial roles in it. 	<ul style="list-style-type: none"> • Temporary credits face competitive disadvantage and relatively low value. • EU Emissions Trading Scheme excludes forestry credits (valid for European private sector). • Kyoto Protocol imposes 1 percent-cap on transactions creditable from forestry activities. • Future CDM regime (post-2012) still remains uncertain. • If poorly designed, plantations can cause harmful environmental and socio-economic impacts (e.g. through large-scale monoculture plantations, exclusion of local stakeholders).

OUTLOOK: INVESTMENT WITH A VIEW TO THE FUTURE

Currently negotiations for a subsequent commitment period of the Kyoto protocol are underway. Although it can be expected that the CDM will continue beyond 2012, the exact modalities and procedures could change, as well as the list of eligible activities.

Some major institutional credit buyers already purchase forestry credits for the period post-2012. However, it might be an option to develop pilot projects in the following areas:

- Reducing emissions through avoided deforestation in developing countries
- Combined bioenergy and afforestation and reforestation projects
- Soil carbon management in crop- and grasslands
- Harvested wood product management
- Revegetation and forest management
- Energy efficiency projects leading to less deforestation and forest degradation

Developing such projects entails the risk of non-eligibility, but could lead to valuable experience in terms of emissions reductions and sequestration potential, cost efficiency and methodology development. In its latest assessment report, the IPCC (2007) softens possible future concerns by reconfirming that forest related mitigation activities can considerably reduce emissions from sources and increase CO₂ removals by sinks at low costs. Depending on model parameters and level of emissions reduction targets, the same report states that prices for carbon credits might rise to US\$20 to US\$80 /tCO₂ and US\$30 to US\$155 /tCO₂ in order to attract investment in mitigation projects.

PROGRAMMES AND POLICIES UNDER THE CDM

According to UNFCCC, a public sector measure, such as a failed national reforestation programme or a private initiative, might be eligible under the CDM. In the forest sector such activities are characterized by various and dispersed reforestation sites, which are not necessarily planted at the same time or location. The submission of such activities occurs jointly through one single PDD. It is assumed that the types and sizes of activities may not be known at the time of project registration, though must be identifiable *ex-ante* of the expected activities. This *sectoral approach* to CDM has major implications: Potential carbon revenues present an incentive to develop new and to implement existing policies or programs in the forest sector. Sectoral CDM would lead to lower transaction costs, baseline setting on national level, and large-scale monitoring and verification. However, specific guidance and decisions by the CDM Executive Board are not issued yet.

Appendix

APPROVED METHODOLOGIES

Reference number	Overview: http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html
AR-AM0001	Reforestation of degraded land – Version 2
AR-AM0002	Restoration of degraded lands through afforestation/reforestation
AR-AM0003	Afforestation and reforestation of degraded land through tree planting, assisted natural regeneration and control of animal grazing – Version 2
AR-AM0004	Reforestation or afforestation of land currently under agricultural use
AR-AM0005	Afforestation and reforestation project activities implemented for industrial and/or commercial uses
AR-AM0006	Afforestation/Reforestation with Trees Supported by Shrubs on Degraded Lands
AR-AM0007	Afforestation and Reforestation of Land Currently Under Agricultural or Pastoral Use
AR-AMS0001	<i>Simplified baseline and monitoring methodologies for selected small-scale afforestation and reforestation project activities</i>

SCOPE OF APPROVED METHODOLOGIES

	<i>Baseline scenario</i>	<i>Project scenario/ Forest plantation type</i>
1	Degraded and degrading land below forest threshold	Harvesting in short or long rotation, with regeneration through natural sprouting No grazing
2	Degraded and degrading land	No grazing
3	Degraded and degrading land includes grazing and fuelwood collection	May be established through assisted natural regeneration or the control of grazing and fuelwood collection
4	Degraded and degrading land includes grazing and fuelwood collection	
5	Grasslands, unmanaged or extensively managed	For commercial or industrial use
6	Degraded or degrading land below forest threshold	Agricultural intercropping forage production to feedstock
7	Abandoned, pastoral or agricultural land	Harvesting in short or long rotation, with regeneration through planting, sowing, coppicing or assisted natural regeneration

PROJECT PROPOSALS IN THE PROCESS OF VALIDATION(small-scale proposals in *italic*)

Project title	Host	Methodology	Amount of estimated reductions (CERs)
Reforestation of severely degraded landmass in Khammam District of Andhra Pradesh, India, under ITC Social Forestry Project	India	AR-AM0001 version 1	49 484
Bagepalli CDM Reforestation Programme India	India	AR-AM0001 version 2	346 701
<i>Small-scale Reforestation for Landscape Restoration</i>	<i>China</i>	<i>AR-AMS0001 version 2</i>	<i>5 966</i>
Moldova Soil Conservation Project	Republic of Moldova	AR-AM0002	181 592
<i>Uganda Nile Basin Reforestation Project No.3</i>	<i>Uganda</i>	<i>AR-AMS0001 version 2</i>	<i>5 579</i>
<i>Small-scale Reforestation for Landscape Restoration</i>	<i>China</i>	<i>AR-AMS0001 version 3</i>	<i>5 585</i>
PROCUENCA: Forestry Project to Restore the Watershed of the Chinchiná River, an Environmental and Productive Alternative for the City of Manizales and the Surrounding Region	Colombia	AR-AM0004	221 251

CER: Certified Emissions Reduction

REFERENCES

- Website of the United Nations Framework Convention on Climate Change (UNFCCC)
<http://unfccc.int>
- Website of the World Bank Carbon Finance Unit: <http://carbonfinance.org>
- All *CDM-related decisions* taken by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP). UNFCCC website. Reference <http://cdm.unfccc.int/Reference/COPMOP/index.html>
- Commission of the European Communities.** 2003. *2003/0173 Proposal for a Directive establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanism.* Brussels.
- EcoSecurities.** 2006. *Should Temporary CERs be Included in the EU ETS Linking Directive? and other questions concerning the potential demand for CDM Forestry CERs.* Results of a survey of demand-side actors by EcoSecurities Consult. Oxford.
- Fadda, M.** 2006. *AR CDM Projects – Expectations from a DOE Perspective.* Presentation. International workshop on AR CDM. Valdivia, January 2006.
- FAO.** 2003. *Forestry Outlook Study for Africa: Regional Report – opportunities and challenges towards 2020.* FAO Forestry Paper 141. Rome.
- FAO.** 2005. *Forestry Projects under the CDM – Procedures, Experiences and Lessons Learned,* by W. Kägi & D. Schöne. Forests and Climate Change, Working Paper No. 3. Rome.
- FAO.** 2006. *Choosing a forest definition for the Clean Development Mechanism,* by T. Neeff, von Lüpke & D. Schöne. Forests and climate change, Working paper No. 4. Rome.
- Hunter, D., Salzman, J. & Zaelke, D.** 2002. *International Environmental Law and Policy.* Second Edition. University Casebook Series, Foundation Press. p. 588 *et seq.* New York.
- IPCC.** 2007. *Climate Change 2007: Mitigation of Climate Change. Fourth Assessment Report, Summary for Policymakers.* Geneva.
- Jindal, R.** 2006. *Carbon Sequestration Projects in Africa: Potential Benefits and Challenges to Scaling Up.* World Resources Institute. Earth Trends Environmental Essay Competition Winner. 2006.
- Neeff, T. & Henders, S.** 2007. *Guidebook to markets and commercialization of forestry CDM projects.* FORMA Project. Tropical Agricultural Research and Higher Education Center (CATIE).
- Robledo, C. & Tippmann, R.** 2004. *Opportunities and challenges for the timber industry to participate in CDM activities.* prepared for the 45th Session of the ACPWP.
- Robledo, C.** 2006. *Forestry Options for Developing Countries within the United Nations Framework Convention on Climate Change - Mitigation and Adaptation as a means for Sustainable Development.* Swiss Intercooperation. Prepared for the Workshop: AR CDM Opportunities and Challenges for Africa. Ghana, 2006.
- Schlamadinger, B.** 2007. *Post-2012 Eligibility of Land-use and Bioenergy Activities in the CDM.* Presentation. Annex I Expert Group Seminar with Developing Countries: “Working Together to Respond to Climate Change”. Paris.
- Skutsch, M. & Murdiyarto, D.** (eds.) 2006. *Lessons learned. in: Community forest management as a carbon mitigation option: Case studies.* Bogor, Indonesia: Center for International Forestry Research (CIFOR).
- Streck, C., Bosquet, B. & Schlamadinger, B.** 2006a. *Policy Brief: Inclusion of Temporary Credits from CDM Forestry Projects into the EU Emission Trading Scheme.* Technical Workshop on the Role of Forests in the Carbon Market, Focusing on the EU ETS: Brussels, 2006.

- Streck, C., Janson-Smith, T. & Schnurr, J.** 2006b. *Key Technical Issues Relevant to CDM Forestry Projects*. Technical Workshop on the Role of Forests in the Carbon Market, Focusing on the EU ETS: Brussels, March 2006.
- Streck, C. & Scholz, S.** 2006. *The role of forests in global climate change: whence we come and where we go*. *International Affairs* 82: 5 (2006) 861–879.
- The World Bank: Capoor, K. & Ambrosi, P.** 2007. *State and Trends of the Carbon Market 2007*.
- Zhang, Z., Schlamadinger, B. & Bird, N.** 2006. *Case-Study from Asia-Pacific. Facilitating Reforestation for Guangxi Watershed Management in Pearl River Basin*. Presentation for International Workshop on CDM – Opportunities and Challenges for the Forest Industry Sector in Sub-Saharan Africa, Ghana, 2006.