The Climate Convention and Forestry[1]

Pedro Moura-Costa[2]
EcoSecurities Ltd.
Delawarr House, 45 Raleigh Park Road, Oxford OX2 9AZ, UK
Phone: (44) 1865 202635, Fax: (44) 1865 251438, E-mail: forestry@ecosecurities.com

1 INTRODUCTION

Since the establishment of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, policy developments associated with the role of forests in mitigating greenhouse gases have been both rapid and complex. The Kyoto Protocol, with its binding commitments to reduce greenhouse gas emissions, outlines the ways in which afforestation, reforestation and deforestation, and other land use activities have potential in achieving the framework's aims. Included in the Protocol are three flexibility mechanisms designed to facilitate the realisation of emission reduction targets. The exact definition of how forestry can be included under the Protocol is not entirely clear and open to different interpretations. This is particularly true for the eligibility of land use based activities under the clean development mechanism.

Despite these uncertainties, an increasing number of forestry-based emission reduction projects have been established in parallel to the ongoing policy developments. To date, there are more than 40 forestry projects with the main objective of fixing carbon or preventing its release to the atmosphere. Although the market for forestry-based carbon offsets is still dependent on policy decisions, there is the potential for considerable infusion of capital into the forestry sector. For such investment, foresters need greater understanding of carbon markets and the mechanisms for credit transactions, and how this new commodity will affect management practices.

This paper reviews the evolution of the negotiation process and how it has affected the market for carbon offsets and greenhouse gas reductions.

2 POLICY BACKGROUND

2.1. The UNFCCC and the concept of Joint Implementation

In July 1992, representatives from 155 nations gathered in Rio de Janeiro for the United Nations Conference on Environment and Development (UNCED). Recognition that climate change was a reality led to the signature of the United Nations Framework Convention on Climate Change (UNFCCC), which resulted in a voluntary commitment by industrialised countries (Annex 1 countries) to reduce their emissions to the 1990 levels until the year 2000. Imbedded in the agreement was the concept of Joint Implementation (JI) with other countries to reduce greenhouse gases. Investors financing these projects would be allowed to claim credits for the reduction of carbon emissions or carbon sequestration. These credits should be equivalent to

---

[1] *Unasylva, 2001*

[2] *Dr Pedro Moura Costa is the Managing Director of EcoSecurities Ltd., a consulting firm specialised in the technical and financial aspects of forestry. EcoSecurities has been involved in the carbon sequestration sector since 1992, and has been engaged in a series of innovative environmental finance initiatives.*

the carbon sequestration derived from the investment, and investors would be allowed to use them to lower greenhouse gas related liabilities (e.g. carbon taxes, emission caps, etc.) in their home countries. The rationale of JI is that the marginal costs of emission reduction or CO_2 sequestration are generally lower in developing than developed countries.

2.2. The 'Activities Implemented Jointly' pilot phase

Dissatisfaction between G77 countries over the concept of JI led to a growth in opposition to this JI model. Perceived problems included that this was a mechanism for industrialised countries to avoid addressing the real issues of reducing emissions at source. It was also felt that developing countries might hand over all their cheap offset opportunities to industrialised countries in this initial phase while they had no commitments to greenhouse gas reductions.

In the first Conference of the Parties (CoP 1) to the UNFCCC held in 1994, this dissatisfaction was voiced as a formal refusal of JI. Instead, a compromise was accepted to have a pilot phase during which projects were called 'Activities Implemented Jointly' (AIJ). During the AIJ Pilot Phase, JI projects were conducted with the objective of establishing protocols and experiences, but without allowing actual transfer of carbon credits between developed and developing countries.

2.3. The Kyoto Protocol

In December 1997, the Kyoto Protocol was conceived during CoP 3 of the UNFCCC. The most important aspect of the Kyoto Protocol is the binding commitment by 39 developed countries and economies in transition (the, so called, Annex B countries) to reduce their greenhouse gas emissions by an average of 5.2% of 1990 levels by the commitment period in 2008-2012. The Protocol also approved the use of three 'flexibility mechanisms' for facilitating greenhouse gas emission reduction targets. These are QUELRO trading, Joint Implementation (JI) and the Clean Development Mechanism.

Another important output of the agreement was the recognition of forestry activities or 'sinks' as valid options for reducing the net concentration of atmospheric greenhouse gases. This is mentioned in Articles 3.3 and 3.4 of the Protocol, which deal with "afforestation, reforestation and deforestation" and "additional human-induced activities related to … land use change and forestry", respectively. It is clear in the Protocol that Annex 1 countries are required to report on land use changes that have occurred since 1990, and are responsible for any changes in carbon stocks associated with these. It is less clear in the Protocol which forestry activities can be conducted as part of Article 12, the Clean Development Mechanism (see below).

The Kyoto Protocol was opened for ratification on March 16, 1998 and becomes legally-binding 90 days after the 55th government ratifies it, assuming that those 55 countries account for at least 55 percent of developed countries emissions in 1990. As of February 2001, 84 Parties had signed the Kyoto Protocol and 32 had ratified it.

2.4. Project-based mechanisms: the Clean Development Mechanism (CDM) and Joint Implementation (JI)

The Kyoto Protocol created two flexibility mechanisms related to project-based activities: the Clean Development Mechanism (CDM) and Joint Implementation (JI). In short, the CDM

involves investment by developed countries in carbon offset projects in developing countries. As defined by the Protocol, its purpose is twofold: firstly, to assist developing countries (non-Annex I Parties) in making progress towards sustainable development and contributing to the UNFCCC's objectives; and secondly, to assist developed countries and economies in transition (Annex I Parties) in achieving their emission reduction targets. Non-Annex I Parties are supposed to gain the economic, developmental and environmental benefits from implemented projects that generate Certified Emission Reductions (CERs) for export. An important facet of the CDM is that these CERs are supposed to be bankable from the inception of the CDM that was originally planned to start in 2000.

Other features of the CDM include:

- project activities must be additional to activities that would happen in a business-as-usual scenario;
- the CDM is open to participation by either private or public entities, or combinations of the two;
- projects must have the express approval of the host government;
- CDM projects must be independently certified;
- the CDM also has a mandate to use a portion of its proceeds to assist those countries, which are particularly vulnerable to climate change, to adapt to those changes.

The operational structure of the CDM is still under development.

Joint Implementation, on the other hand, is a parallel mechanism based on projects involving Annex I parties only. Article 6 of the Protocol defines JI as the creation, acquisition and transfer of emission reduction units (ERUs) between Annex I parties (developed countries and economies in transition), that result from projects aimed at reducing emissions at sources or enhancing greenhouse gas removals by sinks. Credits from JI will only start accruing from the beginning of the first commitment period in 2008-2012.

2.5. Are land use activities eligible under the Clean Development Mechanism

Although Article 3.3 of the Kyoto Protocol specifically mentions the role of afforestation, reforestation and deforestation (although not forest conservation) for reaching the targets agreed by Annex B countries, Article 12 on the CDM refers only to "emission reductions" with no mention of any specifically eligible activities. This vagueness of the Protocol has allowed a disturbingly broad scope for interpretation, and totally opposite views have been put forward.

Countries that want forestry included have argued that Article 12 implicitly refers to the activities listed in the main body of the Protocol text (Articles 3.3 and 3.4), while those that do not want forestry included argue that only fossil fuel based emission-reduction activities should be allowed. Even among those promoting forestry, a further point of contention is the types of forestry activities which should be allowed. Some countries propose only those activities listed in Article 3.3, afforestation, reforestation and deforestation, and others promote a much wider range of land use activities as in the spirit of Article 3.4 ("other activities").

Contention over the inclusion of forestry in the CDM led delegates at the CoP 4 meeting in Buenos Aires in November 1998 to defer any decision until CoP 6. This has been a central issue

during the CoP 6, leading to the breaking of the talks in November 2000. This issue will need to be revisited during the next rounds of the negotiation process. In the meantime, an international collaborative research network of forest scientists under the auspices of the IPCC (Intergovernmental Panel on Climate Change) was commissioned to prepare a special report on land use, land use change and forestry (IPCC, 2000). The objective was to provide policy makers with the necessary information to allow the implementation of the forestry aspects of the Kyoto Protocol, by reviewing the requirements and outcomes of different policy options. Chapter 5 of the special report deals with forestry projects, and is generally positive about the potential and feasibility of using this greenhouse gas mitigation option.

3 SCIENTIFIC CONCEPTS

Carbon sequestration through forestry is based on two premises. First, carbon dioxide is an atmospheric gas that circulates globally and, consequently, efforts to remove greenhouse gases from the atmosphere will be equally effective whether they are based next door to the source or on the other side of the globe. Second, green plants take carbon dioxide gas out of the atmosphere in the process of photosynthesis and use it to make sugars and other organic compounds used for growth and metabolism. Long-lived woody plants store carbon in wood and other tissues until they die and decompose at which time the carbon in their wood may be released to the atmosphere as carbon dioxide, carbon monoxide, or methane, or it may be incorporated into the soil as organic matter.

Plant tissues vary in their carbon content. Stems and fruits have more carbon per gram dry weight than do leaves, but because plants generally have some carbon-rich tissues and some carbon-poor tissues, an average concentration of 45-50 percent carbon is generally accepted (Chan 1982). Therefore, the amount of carbon stored in trees in a forest can be calculated if the amount of biomass or living plant tissue in the forest is known and a conversion factor is applied.

Carbon fixation through forestry is a function of biomass accumulation and storage. Therefore, any activity or management practice that changes the biomass in an area has an effect on its capacity to store or sequester carbon. A variety of forest management practices can be used to reduce the accumulation of greenhouse gases in the atmosphere, through different approaches. One is by actively increasing the amount or rate of accumulation of carbon (i.e., “sink” creation or enhancement). The second is by preventing or reducing the rate of release of carbon already fixed in an existing carbon “pool”. For forest plantations the first mechanism is important.

New tree planting results in the creation of new carbon sinks, i.e., carbon fixation during tree growth in afforestation, reforestation, forest rehabilitation, or agroforestry schemes. In the context of the Kyoto Protocol, these activities conform to the concept of Article 3.3. Although carbon sequestration is often discussed in the context of the establishment of new forests, carbon fixation can also be achieved by improving the growth rates of existing forests. This can be achieved through silvicultural treatments such as thinning, liberation treatments, weeding or fertilization. Since substantial amounts of carbon are stored in soils management practices that promote an increase in soil organic matter can also have a positive effect. These activities fit into the spirit of Article 3.4 of the Protocol.

When considering carbon storage, not all forests are equal. Generally, longer-lived trees with high density wood store more carbon per volume than short-lived, low density, fast-growing

trees. However, this does not mean that carbon offsets which involve big, slow-growing trees are necessarily better than those involving plantations of fast-growing trees and *vice versa* (Moura-Costa 1996a and b).

4 MARKET EVOLUTION

During the last ten years, forestry-based carbon offsets have evolved from a theoretical idea to a market mechanism for accomplishing global environmental objectives. To date more than 40 forestry projects have been established with the main objective of fixing carbon or preventing its release to the atmosphere (Moura-Costa and Stuart 1998) (Table 1).

The first forestry project designed with the primary purpose of sequestering carbon was developed by Face (Forests Absorbing Carbon-dioxide Emissions) Foundation, an organisation created by the Dutch Electricity Board. The mandate of the Face Foundation was to promote the planting of enough forests to absorb an amount of CO_2 equivalent to the emissions of a medium-sized coal-fired power plant (400 MW) during its 40-year life time (Face Foundation 1994; Dijk *et al*., 1994). Its first project was a 25,000 ha enrichment planting initiative in Malaysia (Moura-Costa *et al*. 1996). This was followed by four other projects involving the reforestation of degraded pasture land by small farmers in Ecuador (1992), rehabilitation of an acid-rain degraded park in the Czech Republic (1992), urban forestry in the Netherlands (1993), and rainforest rehabilitation in Uganda (1994). Another American utility, SAP, initiated a reforestation project in Russia.

With the establishment of the AIJ pilot phase in 1994, there was a reduction in the level of interest in carbon offset projects. Only four new tree planting projects were initiated between 1996 and 1997, including: a 6,000 hectare reforestation project with klinky trees in Costa Rica; a 13,000 hectare community forestry project in Mexico, financed by the International Automobile Association; and a community forestry project for fuel wood production in Burkina Faso, financed by the Government of Norway through the World Bank.

In December 1997, 170 countries signed the Kyoto Protocol during the CoP 3 of the UNFCCC. The establishment of binding commitments has led to more demand for offsets. According to a study of the MIT/World Bank (Ellermann *et al*., 1998), if these targets were accomplished through greenhouse gas emissions trading, this would generate a demand for Emission Reduction Units (ERUs) in the order of US$20 billion a year. This is a substantial change from the previously semi-voluntary phase.

An important initiative launched in the post-Kyoto phase was the Costa Rican national programme, the first producer-led carbon offset initiative in the world, and the first one to utilise independent certification and insurance. The program attracted funding from the Government of Norway. This project was followed in 1988 by the New South Wales State Forests, a state organisation, which sold the carbon sequestration services of some of its plantations to Australian and Japanese power companies. Other forestry companies also realised that they had the capacity to attract carbon funding, with important implications for the financing of their operations, as illustrated by the prospectus-based forestry investment funds in Australia. At the same time, the World Bank launched its Prototype Carbon Fund, with an initial capitalisation of US$150 million, which intends to include some forestry projects.

5 WAYS FORWARD

To date, greenhouse gas mitigation funding covers a cumulative 4 million hectares of forests worldwide. According to the IPCC (Brown *et al*., 1996), forestry has the potential for offsetting approximately 15% of the world's greenhouse gas emissions, a partial solution to the overall problem. If this investment trend continues, we may see a huge infusion of new capital into the forestry sector, which will have enormous implications for forestry, sustainability and conservation.

The potential size of the forestry-based offset market is still very dependent on policy decisions; on how they will be accounted for and which forestry activities will be accepted under the CDM and JI mechanisms. As mentioned in Section 2.5, the IPCC has prepared a special report (IPCC 2000), which will assist policy makers on deciding on these issues. It is generally positive about the feasibility of this greenhouse gas mitigation option. It has been estimated that, if unconstrained by policy regulations, the forestry-based carbon offset projects could attract billions of dollars of carbon funding, which in turn could leverage much higher levels of investment in the forestry sector as a whole.

In order for investment to be directed, however, markets have to be developed. Suppliers will have to learn about this new commodity or environmental service generated by their enterprises. A new production possibilities now exists, involving the relative values of traditional forest products and of this new environmental value of carbon sequestration, and forest managers have to become aware of it in order to maximise forest output.

Investors will need to identify the full extent of their environmental liabilities and utilise market mechanisms to lower them through the purchase of credits or options. For the environment this may mean a huge infusion of new capital into forestry activities world-wide enabling some global environmental targets to be met more cheaply.

REFERENCES

Brown, S.; Cannell, M.; Heuveldop, J.; Kauppi, P.; Sathaye, J.; Singh, N.; Weyers, S.; Dixon, R.; Grainger, A.; Leemans, R.; Moura-Costa, P.H.; Nilsson, S.; Pinard, M.; Schopfhauser, W.; Sedjo, R.& Trexler, M. 1996. Chapter III.F. Establishment and management of forests for mitigation of greenhouse gas emissions. In*: Working group II, Intergovernmental Panel on Climate Change, 1995* Assessment for the Framework Convention On Climate Change. Pp 773-799.

Chan, Y.H. 1982. Storage and release of organic carbon in Peninsular Malaysia. *International Journal of Environmental Studies* 18, 211-222.

Dijk, D.; van der Kooij, J.; Lubbers, F. & van der Bos, J. 1994. Response strategies of the Dutch electricity generating companies towards global warming. *Energietechniek* 5:304-308.

Ellermann, A. D.; Jacoby, H. D. and Decaux, A. 1998. *The effects on developing countries of the Kyoto Protocol and carbon dioxide emissions trading.* Policy Research Working Paper 2019. The World Bank. 45 pp.

Face Foundation 1994. *The Face Foundation in practice.* Face Foundation, Arnhem. 36 pp.

IPCC 2000. *Intergovernmental Panel on Climate Change Special Report on Land Use, Land Use Change and Forestry*. Cambridge University Press.

Moura-Costa, P. 1996a. Tropical forestry practices for carbon sequestration: A review and case study from Southeast Asia. *Ambio* 25:279-283.

Moura-Costa, P. 1996b. Tropical forestry practices for carbon sequestration. In*: Dipterocarp Forest Ecosystems - Towards sustainable management.* Schulte, A. and Schone, D. (Eds). World Scientific, Singapore. Pp. 308-334.

Moura-Costa, P.H. & Stuart, M.D. 1998. Forestry-based greenhouse gas mitigation: a short story of market evolution. *Commonwealth Forestry Review* 77: 191-202.

Moura-Costa, P.H., Yap, S.W., Ong, C.L., Ganing, A., Nussbaum, R. & Mojiun, T. 1996. Large scale enrichment planting with dipterocarps as an alternative for carbon offset - methods and preliminary results. In: *Proceedings of the 5th Round Table Conference on Dipterocarps. Chiang Mai, Thailand, November 1994*. Appanah, S. and Khoo, K.C. (Eds.). FRIM, Kepong. Pp. 386-396.

Table 1: Forestry-based carbon offset projects implemented until 1997. The list is comprehensive until 1997, but a series of initiatives have been conducted since then which have not necessarily been registered with official Activities Implemented Jointly registration bodies.

Project name	Date proposed/ initiated	Carbon offset (1000 t C)	Area (ha)	Host Country	Investor country	Project description
Face Malaysia	1992	4,250	25,000	Malaysia	Netherlands	Enrichment planting
Face-Kroknose	1992	3,080	16,000	Czeck R.	Netherlands	Park rehabilitation
Face Netherlands	1992	885	5,000	Netherl.	Netherlands	Urban forestry
ICSB-NEP 1	1992	56	1,400	Malaysia	USA	Reduced Impact Logging
AES – Oxfam – Coica	1992	15,000	1,500,000	South America	USA	Forest protection
AES – Nature Conservancy	1992	280	56,700	Paraguay	USA	Forest protection
Face-Profafor	1993	9,660	75,000	Ecuador	Netherlands	Small farmers plantation forestry
RUSAFOR-SAP	1993	79	450	Russia	USA	Plantation forestry
Face Uganda	1994	6,750	27,000	Uganda	Netherlands	Forest rehabilitation
Rio Bravo	1994	1,300	6,000	Belize	USA	Forest protection and management
Carfix	1994	2,000	91,000	Costa Rica	USA	Forest protection, and management
Ecoland/Tenaska	1995	350	2,500	Costa Rica	USA	Forest conservation
ICSB-NEP 2	1996	360	9,000	Malaysia	USA	Reduced Impact Logging
Noel Kempff M.	1996	14,000	1,000,000	Bolivia	UK/USA	Forest conservation and management
Klinki forestry	1997	1,600	6,000	Costa Rica	USA	Reforestation with klinki
Burkina Faso	1997	67	300,000	Burkina Faso	Denmark	Fire wood community forestry
Scolel Te	1997	15	13,000	Mexico	UK/France	Community forestry
PAP OCIC	1997	18,000	570,000	Costa Rica	Norway, USA	Forest conservation
Norway-Costa Rica	1997	230	4,000	Costa Rica	Norway	Forest rehabilitation and conservation
AES - Ilha Bananal	1998	n.a.	n.a.	Brazil	USA	Forest rehabilitation
NSW + Pacific Power	1998	69	1,041	Australia	Australia	Reforestation