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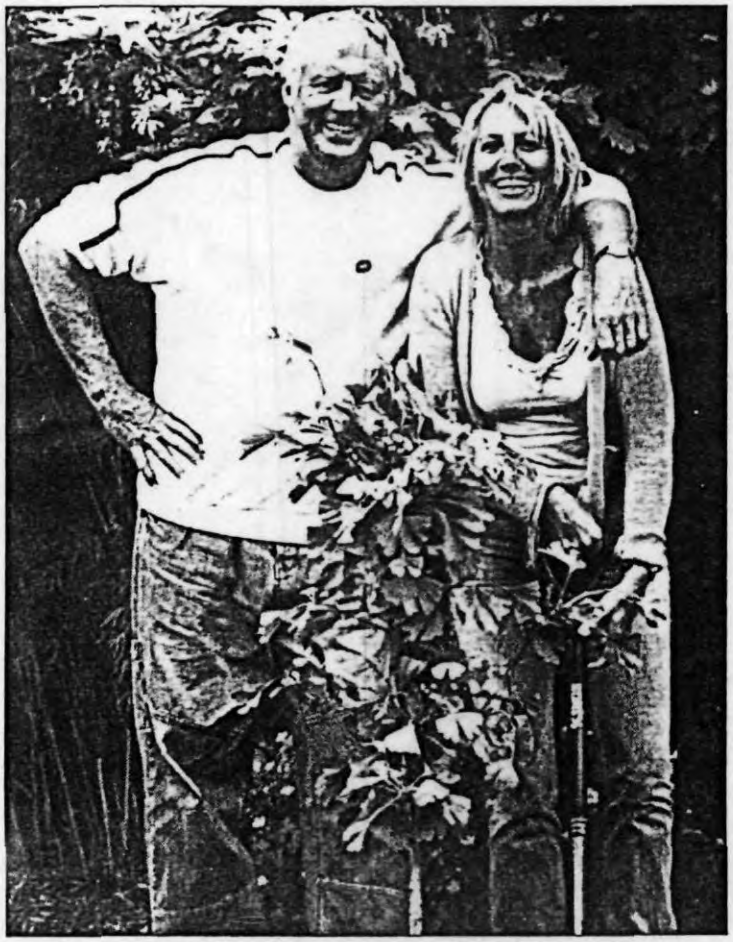
Eco-friendly NR plantations can tap vast global funding

If India argues and wins at the Conference of Parties for inclusion of the eco-friendly rubber cultivation for aid under the Clean Development Mechanism of Kyoto Protocol, NR plantations can avail themselves of the benefit of vast global funding



In the thick of climate clean-up drive: TV/Radio presenter Chris Tarrant and his wife Ingrid

Climate change is considered one of the most serious threats to the global environment. Increasing concentrations in the atmosphere of green houses gases (GHGs) such as methane, nitrous oxide, hydrofluorocarbons, per-fluorocarbons, sulphur hexafluoride and most importantly, carbon dioxide have been implicated to be the primary reason for global climate change. International concern about this problem led to the establishment of the Inter-governmental Panel on Climate Change (IPCC) in 1988.

Major concerns

According to the IPCC, human activities have increased GHGs and caused climate change. The adverse effects of climate change on water and other natural resources, food security, human health and economic activities have already started to appear. While some degree of variation in the global climate occurs naturally, scientific investigations show that the unprecedented changes observed in the recent years are due to

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rising concentrations of anthropogenically emitted green house gases (GHGs) in the atmosphere. Scientists and policy makers now believe that prompt and effective steps are necessary to avoid or restrict the emission of GHGs into the atmosphere and to remove them from the atmosphere and thus prevent their dangerous interference with the world's climate system.

Reflecting the concerns of the international community, three major conventions were held in the 1980 (in Vienna, Basel and Montreal) that addressed environmental issues such as ozone depletion, pollution, loss of forests and biodiversity etc. The international response to climate change was formalised in 1992 with the adoption of the UN Framework Convention on Climate Change (UNFCCC) at the Rio Summit which demonstrated the commitment of the international community to protecting our planet from dangerous changes happening to its climate system.

The UNFCCC aims to reduce and stabilize the concentration of GHGs in the atmosphere at levels that would prevent dangerous interference with the climate system. While some scientific uncertainty still exists as far as the degree and extent of global climate change are concerned, the UNFCCC prudently observes that "where there are threats of serious or irreversible damage (to world climate), lack of full scientific certainty should not be used as a reason for postponing such measures to reduce the concentrations of GHGs in the atmosphere".

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The UNFCCC came into force on 21 March, 1994. It has now 188 countries as signatories, including India. Although the Annex I parties to the UNFCCC — 41 industrialized countries and economies in transition (EIT) to the open market — agreed to the non-legally binding aim of reducing their respective GHG emissions to 1990 levels by 2000, which was the primary objective of UNFCCC, this has not really happened in the case of most countries, including the US. The US emits the maximum amount of carbon dioxide into the atmosphere.

The concentration of GHGs in the atmosphere has continued to increase and more convincing scientific evidence has emerged indicating their significant association with global climate change. Following intense negotiations at the 3rd Conference of Parties (COP-3) to the UNFCCC held in Kyoto, Japan in December 1997, a Protocol to the UNFCCC (known as the Kyoto Protocol) was adopted to achieve quantified emission reduction targets.

Cold response by the US

The Kyoto Protocol will enter into force only when it has been ratified, accepted, approved or acceded by 55 Annex I governments representing 55% of the total Annex I carbon dioxide emissions as of 1990. According to the latest update available for November 2003, a total of 120 countries representing 44.2% carbon dioxide emission have ratified, accepted, approved or acceded to the Protocol. But neither the US nor Russia has ratified it. The US alone accounts for about 36% of world carbon dioxide emissions and is the single largest carbon dioxide emitter in the world. Unless one of the above two large GHG emitting countries ratifies, the Kyoto Protocol will not survive. Although it was expected that the Protocol will enter into force with the anticipated ratification by Russia in 2003, indications that came out at the recently held COP 9 (December 2003, Milan) were not encouraging. Even if the Protocol survives in some form without these two big players, the carbon market size will remain small.

Being the single largest carbon dioxide emitter in the world, the US has a crucial role to play. The Clinton administration negotiated the Kyoto Protocol, but the present administration of President Bush has declined to ratify it. The US now considers the Kyoto Protocol "fatally flawed". President Bush has gone on public, criticizing the very essence of the Protocol and the scientific evidence supporting it. He has stated that the emission targets established by the Kyoto Protocol "were arbitrary and not based on science" and that "no one can say with any certainty

The Kyoto protocol

The Kyoto Protocol commits the 18 developed countries plus the European Union (listed in Annex B to the Kyoto Protocol called Annex B Parties) to achieve quantified emission reduction targets for GHGs. But the developing and least developed countries (called non-Annex B countries) are not bound by any emission restriction. The Annex B countries are required to reduce the collective emissions of the six GHGs to a level 5% below their 1990 emission levels by the first commitment period of 2008-2012. The Protocol also calls for establishing policies and mechanisms to reduce GHG emissions, including phasing out subsidies for energy-intensive technologies, encouraging adoption of alternative environment-friendly technologies, taxing emissions etc.

There is considerable cost in meeting the emission reduction targets by the Annex B parties and the Kyoto Protocol allows them do so cost effectively. The Protocol has established three major market mechanisms to help them to meet their emission reductions cost effectively. These are International Emission Trading (IET), Joint Implementation (JI) of the emission reduction projects among Annex B Parties and the Clean Development Mechanism (CDM) that encourages projects by Annex B Parties (i.e. developed countries) in non-Annex B countries (i.e. developing countries) that do not have emission restrictions.

CDM is intended to be a vehicle to harness funding for clean development projects in the tropics and subtropics in exchange of Certifiable Emission Reductions (CER) credits for Annex B countries. In principle, Annex B parties can receive credits for implementing projects that reduce emissions or remove carbon from the atmosphere in other countries and they can trade the credits with others subject to certain conditions.

what constitutes a dangerous level of warming and therefore what level must be avoided".

These statements by the President of the richest country (which is also the largest carbon dioxide emitter in the world) go contrary to the wisdom and very essence of the UNFCCC and the Kyoto Protocol. President Bush is also dissatisfied with the division of responsibility among the developed and the developing countries. Accusations among the developed and the developing countries as to who has contributed more towards the present state of global climate and environment and who should pay more, still continue.

The US alone accounts for about 36% of world carbon dioxide emissions and is the single largest carbon dioxide emitter in the world.

Nevertheless, the Bush administration is keen to project a green image for its own good reputation. It has unilaterally proposed a voluntary programme of reducing the GHG Intensity (GHGI, defined as the ratio of energy consumption to economic output, either, GDP or GNP) by 18% by 2012. But it should be noted that even if the GHGI declines, the total GHG emission would increase unless their absolute emission rates are cut down. In any case, the GHGI has been steadily falling in the US since 1980 as a result of better energy-efficient technology and growth in the US economy.

Contrary to this the GHGI has gone up in certain European countries in spite of reductions in their GHG emissions, for the simple reason that their economies were not doing very well. Therefore, the Bush administration's proposed policy on GHGI does not hold much water and will not help in reducing or stabilizing the concentrations of GHGs in the atmosphere. Even if the GHGI is reduced, the absolute levels of GHGs will go up in the air unless GHGI is increased by keeping the GDP constant.

There have been other appealing green proposals from the Bush administration such as tax incentives for renewable energy, improving energy use efficiency

in transportation and manufacturing sectors etc. Some American business organizations have already developed their own voluntary initiatives to reduce GHG emissions and several States have also taken similar steps. But given the present administration's failure to adopt binding emission limits under the Kyoto regime and the uncertainty prevailing over the future US GHG policy, there is less enthusiasm in the US domestic carbon market. Besides as a non-party to the Kyoto Protocol, the US and its agencies cannot participate in the Kyoto market mechanisms.

Carbon "sinks"

Articles 3.3 and 3.4 of the Kyoto Protocol refer to "sinks" of atmospheric carbon, referring to the stock of organic carbon in terrestrial vegetation and soil. Article 3.3 of the Kyoto Protocol allows Annex B Parties to count net removal of atmospheric carbon (i.e. net removal by sinks) through "land use, land use change and forestry" (LULUCF) activities including "afforestation, reforestation and deforestation" initiated since 1990 and are "direct human-induced".

The rubber plantations in India alone have a potential market value of US$105 to 120 per ha per year in the Kyoto carbon market

Since the Kyoto Protocol of 1997 (COP-3), parties have spent several years negotiating many of the rules and operational details determining how the countries will meet emission reduction under the Protocol. Issues related to giving credits to carbon sinks from LULUCF, including agriculture, were negotiated and guidelines for carbon sequestration were agreed to in the Marrakesh accord in 2001. Accordingly, any land use change activity that results in additional carbon sequestration from the 1990 level is eligible to be considered for carbon crediting.

However, it should be noted that unlike in the energy, transportation or manufacturing sectors, it is much more difficult in the case of LULUCF sinks for effectively monitoring and verifying the amount of carbon sequestered. Several issues such as carbon leakage, non-permanence of the sequestrated carbon, compatibility problems between C sink projects and local sustainability needs, potential land use conflicts, issues related to biodiversity etc. need to be addressed while considering LULUCF activities for CDM funding.

Although IPCC recommended inclusion of carbon sinks from LULUCF activities under the CDM mechanism, a clear decision was never taken for several years. COP-8 held in New Delhi from 23 October to 1 November, 2002 adopted several decisions including rules and procedures for CDM, but there have been no major decisions pertaining to carbon sinks. However, COP 9 held in Milan during December 2003 addressed issues including the definitions and modalities of including carbon sinks from LULUCF activities under the CDM of the Kyoto Protocol. COP 9 has now agreed on the rules and modalities to include afforestation and reforestation activities into the sink and the CDM Executive Board has been asked by the UNFCCC to elaborate further on the same.

Implications on NR plantations

The above decision by COP 9 has profound implications for the natural rubber (NR) plantation sector. COP 9 decision speaks about including afforestation and reforestation activities into the CDM of the Kyoto Protocol, but there has been no specific mention about plantations. Although plantation activities have not been directly mentioned in the decisions of COP 9, they are eligible for CDM funding if they meet the general requirements as applicable to afforestation and reforestation and other conditions stipulated for CDM.

Studies show that the carbon sequestration potential of natural rubber trees is much greater than most tree species commonly used in afforestation/ reforestation programmes. Studies at the Rubber Research Institute of India (RRII) and elsewhere have established the excellent carbon sequestration capacity of natural rubber plantations, which is roughly in the range of 7-9t C per ha per year or more. From a total area of about 0.5 m ha of natural rubber in India, we have about 3.5 to 4 mt C for sale in the Kyoto market every year which is 7 to 8 per cent of the combined demand for carbon credit by Japan and the European Union (50 mt C per year).

It is generally considered that the cost of sequestering C in developing countries is about US$15 per tonne C (which will vary depending on the demand in the carbon market). At this rate, the rubber plantations in India alone have a potential market value of US$105 to 120 per ha per year in the Kyoto carbon market. But this market can be tapped only if natural rubber

NR plantation has higher carbon sequestration capacity

Any agricultural activity leads to removal of CO_2 from the atmosphere through photosynthesis and generation of carbohydrate within the plant. In the case of tree plantations, including rubber, a major part of the carbohydrate thus produced is converted into biomass.

In the rubber tree, part of the CO_2 is converted into rubber as well. Both rubber and rubber-wood thus store atmospheric CO_2 in products, which remain stable for long periods of time.

Thus, removal of CO_2 from the atmosphere by the rubber tree has long-term implications on the total carbon balance and this aspect can be projected well to argue the case for inclusion of rubber cultivation as an eligible activity for funding under CDM.

It is also clear from available data that the carbon assimilation or sequestration capacity of rubber plantation is much higher than most other similar terrestrial eco-systems. It is even more than that of most evergreen forests, mainly because of the fact that considerable vegetative growth takes place in the case of rubber compared with virgin forests that are several decades or even centuries old and are not growing at a fast rate. The data provided in the table substantiate this.

C sequestration capacity (t C/ ha/yr) of various terrestrial ecosystems.

Ecosystem	T C/ha/yr	Reference
Tropical South America Rainforest	0.71±0.3	Phillips *et al.* 1998
Pine forest (USA)	3.78±0.16	Oren *et al.* 2001
Successional temperate decideous forest (USA)	3.7±0.3	Wofsy *et al.* 1993
Various temperate forests	2.5	Houghton *et al.* 1983
Tundras	0.1 to 0.3	Oechel *et al.* 1993
US Forests & Woodlands	1.4	Houghton *et al.* 1999
European forests	0.4 to 0.6	Dixon *et al.* 1994
Amazon (Rondonia)	1.02 ±0.24	Grace *et al.* 1995.
Natural rubber plantation	7.82	Jacob, J. 2003

$ Equivalent of C sequestered by NR plantation

NATURAL RUBBER – THE CARBON PLANTATION CONCEPT

Total C sequestered during the whole growing period = 67 t C/acre (under Kerala conditions, for a 21 year period).

This is equivalent to US$1005/acre

Or

US$ 47.9 /acre/year

(based on the cost of sequestering C in non-annex B countries i.e. developing countries) @ US$15/ t C (Articles 3.3 and 3.4 of the Kyoto Protocol 1997).

plantation is explicitly included for carbon crediting under the Kyoto Protocol which is now theoretically possible with the decision of COP 9 to include carbon sink from afforestation and reforestation activities under the CDM. Given the fact that rubber plantations are very efficient in sequestering atmospheric carbon dioxide, there is no reason why rubber plantations should be left outside the purview of the CDM mechanism.

Activities related to NR processing also qualify for further funding under the CDM. The effluents produced during NR processing are now used to generate biogas which is used for domestic cooking purposes as well as for drying rubber. Use of biomass gasifiers and the possible use of solar thermal systems for drying rubber are examples of the use of non-conventional energy in the NR processing sector. The use of non-conventional energy in the NR processing sector helps in "displacing" fossil based fuels which amounts to "indirect sequestration of carbon" and

therefore qualify for CDM funding.

Rubber wood is increasingly used as a good quality non-forest timber in the construction and furniture industries. The left over rubber wood, which is of an inferior quality, is being used for making particle boards etc. or as a domestic or industrial firewood. Thus rubber wood helps to reduce the pressure on forests for timber and firewood and thus leads to "indirect sequestration of carbon".

There are over a million households in India that are directly dependent on natural rubber plantations for their livelihood. Much more is the number of people dependent on natural rubber processing and product making sectors in the country. In the North Eastern States of India, natural rubber cultivation has greatly helped to reclaim ecosystems that were severely degraded due to intensive shifting cultivation practised by the native tribes. Community-based natural rubber cultivation has helped these people to improve their standard of living and integrate with the main stream society.

Projects implemented under the CDM of the Kyoto Protocol offer opportunity for investors (eg. Annex B countries) seeking certified emissions reduction (in order to offset their own GHG emissions) to invest in developing countries for the dual objectives of reducing GHGs and contributing to sustainable development. Natural rubber sector is an ideal case for funding under the CDM of the Kyoto Protocol as part of the LULUCF activities. A future incentive-based carbon abatement project for natural rubber plantations under the CDM will be compatible with the socio-economic and ecological criteria set out under the CDM for sustainable development.

What Next?

We have been talking about the eco-friendly credentials and carbon sequestration potential of natural rubber plantations, mostly in our own forums, for several years now. But little has been done until now to market the green image of natural rubber for tangible financial gains. With the adoption of afforestation and reforestation sinks for CDM funding under the Kyoto Protocol, there is an opportunity to bring international funding into the natural plantation sector. As shown above, the magnitude of CDM funding that a natural rubber plantation is theoretically eligible for is far greater than the financial assistance that is available today through the Rubber Board.

It will be in the best interest of both the rubber processors/manufacturers and the rubber planters to attract CDM funding for natural rubber plantations. Agencies interested in the rubber plantation sector need necessarily be represented in future COP negotiations to present the case of natural rubber plantation appropriately and to ensure that the natural rubber plantations come under the CDM of the Kyoto Protocol. The International Rubber Research and Development Board has already realized the importance of the issue and initiated action to seize the opportunity.

The following specific course of action is proposed for bringing natural rubber plantations under the CDM of the Kyoto Protocol.

1. Sensitise all the stake holders, both governmental and non-governmental agencies on the importance and implications of natural rubber plantations coming under the CDM of the Kyoto Protocol.

2. Ensure that interests of natural rubber plantations are well represented in all future climate change negotiations under the UNFCCC.

3. Take up the issue of natural rubber plantations with international agencies such as IRRDB, IRSG and with the NGOs who are interested in carbon sequestration issues and make use of their help in future COP negotiations.

4. There are other parties inside India (eg. mango and orange plantations) and in other countries (eg. teak plantations in Brazil) that are equally interested in getting CDM credits for their plantations. We should have better coordination with them to achieve the common goal of bringing plantations under the CDM.

5. Explore for potential buyers for carbon credit from natural rubber plantations in the emerging Kyoto market on a bilateral basis.

6. Develop suitable agro-management techniques that will increase the carbon sequestration by natural rubber plantations, both in the biomass and in the soil.

7. Strengthen research efforts in estimating carbon sequestration by natural rubber plantations by refining the methodology by adopting world class techniques, which will stand strict scrutiny during any future verification for certifiable emission credits. ■