



# Carbon Forestry: Who will benefit?

*Proceedings of Workshop on Carbon Sequestration  
and Sustainable Livelihoods*

*Editors*

**Daniel Murdiyarso**

**Hety Herawati**

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# Foreword

I am really interested in the theme of the workshop “Carbon Sequestration and Sustainable Livelihood,” due to its close relation to the present global issue on climate change.

We are aware that forest ecosystems is not only rich in biodiversity and genetic pools but also very important in watershed protection that regulate local hydrology and carbon pools that regulate global climate.

Forest use and management practices in the past, which were concentrated more on timber production than forest services, resulted in a number of environmental and social problems, such as, land degradation, biodiversity loss, greenhouse gas emissions, and reduced access for local people. That means the forest use and management during this period was more timber-oriented than resource-based. Thus, important ecological values in the form of forest environmental services like ecotourism, water use, biodiversity, carbon stocks, with excellent potential development, were regarded as of minor importance.

Forest use diversion that stresses forest functions must be seen as a wise perspective. Forest environmental services, either derived from conservation forests, protected forests or from production forests should be appropriately managed and appreciated so as to provide a sustainable source of income for local people. This means forest resources not only provide tangible products like timber, but also they produce intangible ones in the form of forest environmental services, while maintaining conservation values and promoting local people’s well-being.

With respect to the shifting paradigm of forest management from timber-oriented to resource-based management, it stands to reason that the spirit of using the forest environmental services must be practically actualized and that carbon trade forms one of the promising potentials that need to be explored. In relation to the United Nations Framework Convention on Climate Change (UNFCCC), the Ministry of Forestry takes part in mitigation and adaptation activities that facilitate the implementation of both afforestation and reforestation under the Clean Development Mechanism (CDM) projects in Indonesia, either through the Kyoto Protocol or through other means outside the Protocol. The mitigation activities involve principally forest-tree planting with the main purpose of increasing carbon sequestration.

Meanwhile, adaptation efforts are concentrated more on the establishment of databases and other programs related to levels of vulnerability, effects of increasing global warming (local climate change), as well as anticipated measures against climate

change. It is estimated that the adaptation activities may attract global concern in the future. It is one of the decisions COP10 is dealing with, not only, with the world strategy on the adaptation activities, but also how all nations can provide inputs for the program. Implementation of the Convention, as it relates to the adaptation and mitigation efforts of the Ministry, is embedded in the Ministry's middle-range planning in the form of a strategic plan from 2005 to 2009. This strategy will be executed on a five-year basis.

From the legal point of view, Indonesia has ratified the UNFCCC through Act No. 6/1994, the Kyoto Protocol through Act No. 17/2004, and established the Designated National Authority as declared by the Ministry of Environment of the Republic of Indonesia. Forestry Minister Regulation No. 14/2004 directs the mechanism for afforestation and reforestation of CDM projects, with the purpose of assisting project developers in completing project concept note and land verification as well as guiding them to ensure that projects contribute to sustainable forest management efforts. This condition implies that Indonesia is legally ready to execute CDM afforestation and reforestation projects.

Meanwhile, in terms of technical and financial matters, the Ministry has several tasks to accomplish, particularly in relation to capacity building. Five locations have been selected on a pilot basis to elucidate a number of matters, such as the progress of CDM afforestation and reforestation projects (both small and large scale), explaining Regulation No.14/2004, and developing project design documents and project concept notes. Investor guides, data and information compilation eligible for the Kyoto Protocol, and budget estimation are also included in the activities. In anticipating the carbon trade in the forestry sector, a number of things are expected:

- All stakeholders are expected to play a role and participate in facilitating and assisting in the implementation of CDM afforestation and reforestation projects for the first commitment period of 2008-2012.
- The use of the forest's environmental services through CDM afforestation and reforestation projects provides a synergy between hydrological protection and biodiversity conservation.
- It is expected that afforestation and reforestation activities will help achieve sustainable forest management through critical land rehabilitation while providing incentives to developers from sales transaction of Certified Emission Reduction (CER).
- All stakeholders need to pay attention to the preparation and implementation of small-scale afforestation reforestation projects so as to empower local people, generate local income and involve local people in CDM projects.
- It is expected to enhance collaboration and as well as improve access to funds for adaptation and climate change through the Global Environmental Facilities (GEF), bilateral donors like ODA, and multilateral bodies.

It is expected that during this workshop, communication and information sharing among stakeholders will take place, in particular, in terms of both small- and large-scale afforestation and reforestation CDM projects. Some policies and program activities in the forestry sector, either in relation to mitigation or adaptation activities, may be adopted as inputs for developing as well as strengthening community-based natural resources management systems.

I learned that there is a lot of progress that has been experienced by our colleagues in developed countries in this field of carbon sequestration and sustainable livelihoods. I hope we can learn from them in order to enhance our efforts here in Indonesia.

Finally, I hope that this workshop will bear a fruitful outcome for all of us, in particular, in relation to the participation of this country in the real implementation of CDM projects.

Thank you.

Bogor, 16 February 2005

**Koes Saparjadi**  
Director General,  
Forest Protection and Nature Conservation  
Ministry of Forestry of Indonesia



# Preface

The Center for International Forestry Research (CIFOR) is working in more than 30 developing countries. Millions of the population of these countries are forest-dependant and relatively poor. With its three programs dealing with forest governance, livelihoods, and environmental services and sustainable use of forests CIFOR is well placed to facilitate a multi-stakeholder process, where practitioners and policy-makers working in different natural and social systems could interact. The Canadian International Development Agency (CIDA), supported CIFOR to organize a workshop on *Carbon Sequestration and Sustainable Livelihoods* held in Bogor on 16-17 February 2005. The event was among those recognized by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat that marked the entry into force of the Kyoto Protocol on 16 February 2005.

The proceedings is a collection of the lessons learned from a number of case studies ranging from small to large scale projects, from community-based to corporate operations, and from development to conservation activities. Although most projects are still in their infancy stage and many more lessons to be learned it was generally agreed that bundling climate change and community development projects is a strategic approach to support sustainable livelihoods. Some emerging applied research and policy responses were identified and need further elaboration. CIFOR remains committed in this area in the years to come and long to see if carbon forestry will be benefited by rural and forest-dependent communities.

We would like to acknowledge the authors for the papers contributed in this proceeding. The comments and criticisms of the reviewers are also gratefully thanked and appreciated. Among them are Carol Colfer, Dede William, Esteve Corbera, and most authors of the contributed papers. Some of the works presented in the workshop were based on CIDA-funded activities under the Canadian Climate Change Development Fund (CCCDF).

We are also grateful for the active interaction of 70 participants who represented 20 nationalities and are based in 15 countries. The present of Indonesian and Canadian government officials and donor agencies based in Indonesia are also thanked and appreciated.

April 2005

Daniel Murdiyarto  
Hety Herawati

# Sustaining Local Livelihoods through Carbon Sequestration Activities: A search for practical and strategic approach

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## ***Abstract***

*In many parts of the developing world carbon sequestration projects have been implemented in association with community development. This is a practical way to demonstrate environmental as well as social benefits of the projects. To some extent the projects are in line with the dual objectives of the Kyoto Protocol's Clean Development Mechanism (CDM). Knowing the immaturity of CDM market and the dynamics of the negotiations in the Conferences of Parties (COPs) to the United Nations Framework Convention on Climate Change (UNFCCC), it is timely to explore strategic and long-term approaches.*

*This paper attempts to synthesize the lessons learned from Mexico, Colombia, Costa Rica, Philippines, Indonesia, and Timor-Leste presented and discussed in the workshop to mark the entry into force of the Kyoto Protocol. Most of the projects do not necessarily comply with the strict rules of CDM partly due to the fact that the current agreement only allows afforestation and reforestation activities. Conservation of carbon storage (e.g. in peatlands) is not eligible for funding under the existing rules. Strategic approaches, such as inclusion of deforestation avoidance in the next round of negotiations and subsequent commitment period, were critically reviewed. A number of loopholes that require scientifically sound justification were identified. In addition, issues related to methodologies to determine the baseline, monitor additionality, leakage and permanence remain challenging.*

*It is generally demonstrated that local participation is very strong in all of the projects examined. It was learned that large-scale plantation projects offer few benefits for the community, whereas small-scale projects that allow the community to participate offer the possibility to earn carbon credits as well as socio-economic and cultural benefits.*

*However, many of these projects are so small in size that they generate high transaction costs. Otherwise the projects could demonstrate financial additionality from the point of view of the hosts. It was strongly suggested that in order to sustain livelihoods the projects have to be recognized by and linked with donor and policy communities. In addition, engagement of the private sector has to be further explored.*

### **Introduction**

Carbon sequestration projects through land use, land-use change and forestry (LULUCF) activities could demonstrate a win-win situation from the point of view of climate change and sustainable development. Properly designed, these projects conserve and/or increase carbon stock and at the same time improve rural livelihoods. Project design is very crucial. This includes the use of methodologies to determine the baseline of carbon stocks, to monitor additionality and leakage, and to assess the broader environmental and socio-economic effects. In this way, one can measure the maintenance or increase in carbon stocks, and simultaneously increase involvement of low-income rural communities in sustainable forestry, agroforestry and other natural resource management activities.

Such projects have been developed and implemented in a number of countries with different ecosystems and social settings. They do not necessarily comply with the current legally binding carbon market under the mechanism of the Kyoto Protocol, Clean Development Mechanism (CDM). The experiences and empirical evidence, however, need to be shared and tested if the environmental and development benefits are to be identified and evaluated. This will eventually improve the understanding of the links between increasing carbon sinks and sustainable livelihoods in community-based natural resource management. Furthermore, it is timely to explore strategic ways to approach future mandatory as well as voluntary markets.

Most of the activities are project-based and within the scope of LULUCF activities, with a wide range of ecosystems and social settings. Thus, it was expected that the lessons learned would be rich enough to enable an exchange of the best practices that have arisen during the implementation of projects focusing on carbon sequestration and sustainable livelihoods. This is particularly important in order to anticipate future directions of payment mechanisms where carbon credits play an important role in initiating these mechanisms. Sectoral CDM, which means mandatory project implementation in full-fledged forestry practices, may be further explored. This will provide substantial room to consider activities such as rehabilitation of degraded forests and deforestation avoidance.

The strict CDM rules in the CDM project activities have been simplified for small-scale projects. It is very likely that most community-based forestry will fall under this category. Sharing lessons would facilitate discussions based on the following research and development questions:

- How successful have the projects been in establishing or strengthening community-based natural resource management that promotes climate change mitigation and improves livelihoods?

- How have the progress and results achieved been quantified, reported and communicated?
- What are the gaps in methodologies, tools and training materials that research and extension agencies should address to make projects more appropriate to the rural communities?
- How can these projects attract outside donors and potential investors through the sale of ecosystem services, including certified or verified emission reduction credits through mandatory or voluntary markets?
- What new or revised policies and programs are required at various government levels to encourage replication and expansion of this type of programming?

## Kyoto Protocol and beyond

### 1. Kyoto rules

The Clean Development Mechanism (CDM) is the only Kyoto mechanism that allows developed and developing countries to collaborate. There are a number of requirements to be met by project activities to ensure that they truly support “development” for the people living in the area, that they are “clean” and follow proper procedures. Technically, eligibility of lands for the implementation of CDM project activities has to comply with international rules and national regulations and priorities. In the first commitment period of the Kyoto Protocol, LULUCF activities under the CDM are limited to afforestation and reforestation or A/R CDM.

In this connection, the seventh session of the Conference of Parties (COP7) to the UNFCCC provided the definition of afforestation and reforestation under the provision of Decision 17/CP.7, where *afforestation* is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources. Whereas *reforestation* is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989. The implementation of A/R CDM will be guided by very strict rules concerning methodologies to determine the baseline, to monitor greenhouse gas removals and leakage, and the monitoring plan.

There is also a newly launched scheme for LULUCF activities called small-scale A/R CDM (Decision 14/CP.10). This scheme gives smallholder rural communities an opportunity to participate. Such projects should be able to sequester a maximum of 8 kt CO<sub>2</sub> per year. This could potentially involve an area of 500-800 ha depending on the species chosen and management of the project. Baseline and monitoring methodologies and approval procedures are very much simplified. This is to ensure that the transaction cost is low enough as compared with larger scale projects as guided by Decision 19/CP.9.

## **2. Deforestation avoidance**

One of the consequences of the COP7 decision is that avoiding deforestation and conservation activities are not eligible under CDM, at least in the first commitment period. In fact, tropical deforestation is the largest individual source of CO<sub>2</sub> emission not yet covered by the Kyoto Protocol. In many tropical ecosystems, forest carbon projects with conservation objectives and significant livelihood benefits are both possible and desirable. They may mitigate climate change through sequestration of atmospheric carbon as well as conservation of the existing terrestrial carbon stocks. The projects may be designed to meet high standards of atmospheric, environmental and social benefits, thereby generating credits to be traded in the voluntary markets but not necessarily complying with the current Kyoto rules.

In COP9 Brazil, the largest forest-rich country, proposed a scheme called compensated reduction of deforestation (Santili *et al.* 2003). In this proposal the baseline is derived from the average annual deforestation for the 1980s based on assessments from satellite imageries. Tropical countries that elect to reduce their national emissions from deforestation below the baseline during a commitment period and demonstrate success are authorized to issue a “carbon certificate.” These countries agree not to increase (or to further reduce) deforestation in subsequent commitment periods. It was also proposed that IPCC establish common criteria for baselines and equivalence between deforestation and carbon stocks. In order to maintain the Protocol’s integrity, the baseline may be revised after 20 years.

The advantage of having deforestation avoidance projects is that leakage is minimized and permanence is better addressed than temporary credits. Forest-rich developing countries may be interested in participating provided the supporting data are credible and well-documented. The participation of non-Annex I countries in deforestation avoidance projects could be voluntary, but the accounting should be mandatory. Such an approach could be considered as the meaningful participation of developing countries clearly stated in the convention and its protocol. If the A/R CDM is considered as a practical way to repair the degraded forest, avoiding (further) deforestation in protected areas in developing countries could potentially provide incentive for conservation projects on biological diversity, prevention of forest fragmentation, and watershed protection. These ecosystem services could provide their own financial benefits.

Policy responses backed up by scientifically sound methodologies should be addressed in the next round of negotiation. Special attention should be paid to the rules and then targets of emission reduction. Rules applied in developed countries under Joint Implementation (JI) may be adopted. There is a potential debate regarding the definitions of deforestation and degradation due to technical issues related to the determination of baseline and the monitoring methodologies.

## **3. Managing terrestrial carbon in peatlands**

Globally the extent of peatlands is approximately 400 million ha. They occur in arctic, boreal, temperate, sub-tropical, and tropical zones and cover over 120 countries. Peat comprises layer of partly decomposed plant materials deposited over 5-10,000 years.

Peatlands have a high water table and slow decomposition rate. They are extensively found in regions with high rainfall and or low temperatures. Therefore, peatlands play a critical role in water management.

Given their depth and extent, peatlands also play a significant role in carbon storage and sequestration. It is estimated that 25-30% of all terrestrial carbon is in peatlands. This is equivalent to 550,000 to 650,000 million tons of carbon dioxide (CO<sub>2</sub>) or 75% of carbon in the atmospheric carbon or 100 years of fossil fuel emissions. Therefore, peatlands helped to prevent global warming over the past 10,000 years by absorbing over 1,200 billion tons CO<sub>2</sub>.

As far as climate change is concerned, conservation and rehabilitation of degraded peatlands are both urgent and strategic. However, no market-based mechanisms have yet been envisaged to achieve this important objective. Consequently, limited public funding has to be stretched out to enhance the capacity of stakeholders and raise public awareness. No carbon benefits have been demonstrated in terms of additionality. However, local participation is very promising.

Peatlands management in Indonesia, home of some 20 million ha or 50% of tropical peatlands, has a significant role in maintaining biological diversity, including endangered species of *orangutan*. This includes the rehabilitation of degraded peatlands due to the ill-planned Mega Rice Project causing devastation of peat forests and hydrologic systems. Involving local communities in canal blocking and reforestation shows promising results in terms of environmental benefits and livelihoods. Fire risks are reduced as the water table is increased. Fish production is increased as the local practice of fish ponds called *tebat* is re-introduced. The blocking of canals also reduced the possibility of transporting logs illegally cut from conservation areas. Sustainable management of peatlands is highly desirable from both global and local perspectives.

Indonesian forest and land fires during 1997 and 1998 affected 2.12 million ha of peatlands (Tacconi 2002). The estimated carbon loss from peatland fires ranges between 0.81 and 2.57 Gt (Page *et al.* 2002). In addition, global annual CO<sub>2</sub> release due to peatland drainage or degradation ranges from 2 to 20 tC/ha (Maltby and Immerzy 1993). It is obvious that peat degradation causes substantial change in the global carbon cycle and hence climate change. However, most peatlands are vulnerable to climate change and variability. Prolonged and severe drought such as that during the *El-Nino* events could substantially have drained peatland ecosystems, with the lower water table making the peat prone to fires.

There are many common issues as well as solutions to be learned from different regions. Information exchange and networking will help promote further engagement of local stakeholders and integration of social values in community-based climate change projects. Local communities can act as key stewards of the resources, including above- and below-ground carbon stocks, biodiversity, water management and sustainable use of non-timber forest products. Assessment and monitoring of carbon stocks is complex but critical in order to make the link with livelihood options.

## Methodological issues

### 1. *LULUCF baseline methodologies: robust or complicated?*

Baseline is defined as the situation that would exist if the specific carbon project related to GHG emissions or removals wasn't started. In LULUCF projects the baseline may be estimated using the change of above-ground carbon stock over time using allometric equations. The equation is usually derived from direct measurements of harvested biomass, which is related to a growth indicator such as stem diameter. The baseline is compared with the increase in carbon stocks as a result of the project to determine the additionality, usually called "carbon benefits" or "climate benefits." Due to the slow increase of the stock, monitoring may be conducted every five years.

In the case of small-scale A/R CDM projects this approach may not be affordable. Therefore, the indicative baseline will be developed by the Executive Board for different project types, such as:

- (a) Grassland to forested land
- (b) Cropland to forested land
- (c) Wetland to forested land
- (d) Settlement to forested land

Monitoring of the baseline is not required. Further, the Executive Board will develop simplified monitoring methodologies based on appropriate statistical methods to estimate or measure the actual net greenhouse gas removals by sinks.

In full-scale CDM projects, participants or developers need to reference the methodology used, the justification for using the methodology, and the assumptions for the baseline scenario. To date there is no methodology approved by the CDM Executive Board. It is not clear whether the rule is too robust in order to demonstrate that the project could demonstrate additionality or the project development is so complicated that discourages potential developers.

### 2. *Below-ground carbon storage*

Estimate of below-ground carbon content in peatlands is very important as most carbon in this ecosystem is stored as decomposed organic materials. It may be calculated using the following formula:

$$CC = A \times B \times C \times D$$

where:

- CC = carbon content (ton)
- A = land area (m<sup>2</sup>)
- B = bulk density of peat soil (g cm<sup>-3</sup> or t m<sup>-3</sup>)
- C = organic-carbon content (%)
- D = peat thickness (m)

Tropical peat bulk density ranges between 0.1 and 0.3 g cm<sup>-3</sup> depending on the maturity. The organic carbon content ranges between 40 and 50 percent. It is obvious that peat thickness is a very important parameter and in most pristine tropical peatlands it could be as deep as 15 m.

The method was demonstrated in various places in Indonesia. Below-ground carbon loss per unit area could be 2-5 times higher compared with the above-ground carbon loss. However, it was not thoroughly tested if reduction of peat depth means emission of carbon. Methodological issues remain crucial for below-ground carbon estimates.

### **3. Measuring the impacts**

In order to comply with the rules, the impacts of CDM project should be demonstrated and measured against the dual CDM objectives: (i) to assist developed countries to meet their emission reduction target and (ii) to assist developing countries to meet their sustainable development objectives. However, non-CDM projects or voluntary carbon projects bundled with community development activities could employ multi-criteria analysis using criteria and indicators tailored for the specific purposes. There are a number of voluntary standards developed for multiple-benefit land use projects. Many of project development standards have gone through extensive field testing and review. However, voluntary project implementation and evaluation standard is still lacking.

Measuring project impacts may be based on the logic behind the existing development standards. The benefits of the projects from environmental as well as development objectives have to be measured against credible and tested criteria and indicators. Table 1 shows potential benefits of the projects presented in the workshop. The qualitative assessment is purely empirical and based on the presentation and the dynamics of the discussions.

Experiences in Mexico indicate that one should consider the project size and participants. Small-scale farmers may have difficulty providing carbon benefits, but real impacts on livelihoods can be demonstrated relatively easily. Whereas large-scale plantations in Riau, Indonesia could easily demonstrate carbon benefits but few impacts on livelihoods and poverty reduction.

Except in badly degraded ecosystems, the massive size of carbon stocks in peatlands offer excellent potential for environmental benefits with a range of development benefits, depending on the project design. These assets would be very attractive if the rules for deforestation avoidance were in place.

Successes with crop protection from over-grazing and the use of controlled fires have been demonstrated in Timor-Leste. However, it is hard to assess socio-economic benefits for the local community. Similar situations may be found in the Philippines, although the chance of improving local livelihoods supported by strong participation is higher.

The Colombian experience is exceptional due to a strong legal status combined with community-wide participation. The carbon asset is secured and more attractive to investors.



**Table 1.** Potential benefits for the global environment and local livelihoods of various project types implemented in Indonesia, Timor-Leste, Philippines, Colombia and Mexico.

Project type/activity	Location	Potential benefits (Additionality)	
		Environment	Development
Plantation Agroforestry Peatlands rehabilitation Peatlands rehabilitation Peatlands and <i>orangutan</i> conservation Peatland utilization Mainstreaming gender in forest management	<u>Indonesia</u>		
	Riau	High	Low
	Jambi, Lampung	High	Medium
	Jambi, South Sumatra	High	Medium
	Central Kalimantan	High	Medium
	Central Kalimantan	High	Low
	West Kalimantan	Low	Medium
	East Kalimantan	Medium	Medium
Community-based forestry	<u>Timor-Leste</u> Remexio Laclubar	Medium	Low
Watershed management and small-scale A/R CDM	<u>The Philippines</u> Laguna Lake	Medium	Medium
Community-based forestry	<u>Colombia</u> San Nicolas	High	High
Small-scale carbon forestry	<u>Mexico</u> Chiapas Oaxaca	Low	High

It is suggested that multi-criteria analysis using criteria and indicators may be implemented to assess the balance between carbon sequestration in terms of environment and development benefits. Such analysis should differentiate between large- and small-scale projects. Technical handicaps may be anticipated in small-scale projects, while impacts on livelihoods may be difficult to demonstrate in large-scale projects.

## Climate change with human face

### 1. Sustainable livelihoods

The central question around project development is how forest-dependent people could benefit from LULUCF projects either in protected or managed forests? In many protected areas human settlements are often seen as a threat to the projects, whereas in large-scale plantation projects their participation is often neglected.

At the onset of project development, human dimensions could initially be identified and introduced. The project design could involve a wide range of stakeholders, including local community members along with other existing

institutions. At the same time, project development standards could require such arrangements prior to certification for the promotion to potential investors.

The case study of a large-scale pulpwood plantation in Riau province, Indonesia indicates that the project has negative impacts on local livelihoods. The plantation project with its climate change component is not compatible with the local people's current practice of shifting cultivation. The value of the project is extraordinarily low for locals (less than \$0.5/ha/month). The project has reduced biodiversity and decreased agricultural productivity in nearby villages, and even resulted in farmers' land being expropriated. In short, involving local people in such a project is like a poverty trap.

Two contrasting experiences are found in Mexico, where small-scale family-led reforestation was compared with communally-led reforestation. It was demonstrated that reducing poverty is not alone a matter of increasing levels of income. People's participation, legitimacy and knowledge are key issues. In this case, the project's legitimacy was more contested in family-led communities because poor households are not well-represented and cannot participate in formal local institutions.

In order to secure rural livelihoods, it is important to identify a project's expected outputs starting with the feasibility studies. Rural organizations can play an effective role in building legitimacy but they are not always inclusive of all local people. Local political and resource dynamics need to be carefully observed. Enhancing communication and dialogue is crucial. It is also critical to develop effective arrangements with national institutions and complement carbon activities with other projects since carbon demand is low. Other collateral benefits, such as biodiversity conservation, watershed protection may also be identified.

## **2. Engendering climate change**

Gender refers to the socially constructed roles and responsibilities of women and men. The concept of gender also includes the expectations held about the characteristics, aptitudes and likely behaviors of both women and men (femininity and masculinity). The roles and expectations are learned, changeable over time, and vary within and between cultures. Gender analysis has increasingly revealed how women's subordination is socially constructed, and therefore able to change, as opposed to being biological and static.

Climate change is an issue that cuts across all aspects of sustainable development, and must be addressed within the context of sustainable development. International treaties, such as UNFCCC, cannot be implemented as stand-alone initiatives but must be part of an integrated strategy for sustainable development. Gender equity is one of the prerequisites for sustainable development. Climate change is not gender neutral since it will have a disproportionate impact on poor women. The majority of the 1.5 billion people living in poverty on one dollar a day or less are women. In addition, the gap between women and men caught in the cycle of poverty has continued to widen in the past decade, a phenomena commonly referred to as "the feminization of poverty. Worldwide, women earn on average slightly less than 50 % of what men earn.

Assessment was made in the Forest Resources Management for Carbon Sequestration (FORMACS) Project in East Kalimantan, Indonesia. Marriage at a very young age is considered a significant barrier to development and gender equality. Most, if not all underage marriages are arranged by parents and involve a large bride-price, which leads to domination of man over women. As a result, the “paid” price hinders the role of women in decision-making. At a community level, it was suggested that a gender analysis of all budget lines and financial instruments regarding Climate Change should be undertaken. Whereas at national level, gender-sensitive criteria and indicators should be developed and applied in the UNFCCC and Kyoto Protocol mechanisms and instruments, starting with instruments related to adaptation and vulnerability, as this is the area in which gender differences are most crucial and most visible.

### **3. Practical livelihood options**

Climate related disasters such as flooding, drought, and fire combined with poverty are real challenge to climate change projects implemented without strong commitment to livelihood issues. In many cases, climate change projects with a single objective to reduce greenhouse gas emissions by sources and sequestration by sinks are not an urgent development agenda for developing countries. Therefore, climate-related projects should one way or another be developed to have practical relevance for livelihoods with a broad range of options depending on the local needs.

Rehabilitation and conservation in the Philippines’ Laguna Lake watershed is an example of how watershed protection (involving riverbank stabilization, upland rehabilitation and river clogging avoidance to control flooding) has been designed in the framework of carbon sequestration and payments through market-based mechanisms. A combination of loan, grant and unilaterally arranged local funding has been explored with the community while strengthening their institutional arrangement. The expected total net carbon benefit during 2004-2014 would be 3,204 tC (11,759 tCO<sub>2</sub>-e) and 1,424 (5,230 tCO<sub>2</sub>-e) under the high and low scenarios respectively. This implies a total Emission Reduction Purchase Agreement (ERPA) value of US\$ 31,380 (low scenario) to US\$ 70,554 (high scenario) at a market price of US \$6/ton CO<sub>2</sub>.

Collaboration with local agencies on integrated spatial planning has shown promising results to enhance networking and stakeholders’ participation in peatland areas in Indonesia. Nothing like this was observed when the multi-billion dollar Mega Rice Project (later recognized as a disaster) was introduced in Central Kalimantan. Well-designed rehabilitation of degraded natural resources is an opportunity to enhance social capital. The restoration of hydrological regimes is one option to restore the ecosystem function. Canal blocking combined with fire breaks and the introduction of aquaculture are some practical solutions that enhance livelihoods while maintaining peatland carbon storage. Practical solutions related to micro-financing are needed to support ongoing economic activity until the ecosystem function is back to normal.

The links with climate change objectives are immediately apparent: the total annual loss of carbon in around 500,000 ha of peatlands in Jambi, South Sumatra, and Central Kalimantan, Indonesia in the past 10 years is estimated as much as 40 million tons of CO<sub>2</sub>. This does not include emissions by fires in *El-Nino* years of 1983 and 1997. Further compilation of materials and experiences on peatland best management practices in Indonesia and elsewhere are needed. These could generate knowledge to produce manuals for the establishment of agriculture, silviculture, and aquaculture, in addition to water management, fire control manuals, which can be implemented in pilot sites. Simple methods to estimate carbon assets have been developed and tested in tropical peatland ecosystems while empowering local communities.

Another practical approach to secure carbon stocks and livelihoods is by reviving traditional law as demonstrated in Timor-Leste. *Tara bandu* is a form of traditional law that was originated during the pre-Portuguese colonial period. It has been proven to be an effective institutional tool in the protection of the forest, wild animals, water sources, sacred places and property rights of the people. An annual carbon loss due to deforestation of 400,000 t C in the past 30 years may be reduced if forest management practices could be put in place. Only a small portion of the biomass loss is in the form of harvested timber or wood. The majority is being decayed or burned on site. Reviving *Tara bandu*, which has to go through local institutional processes, could effectively control almost any project involving local leaders and communities. There is also potential to obtain benefits from other ecosystem services, such as improved water supply, improved fuelwood supply, grazing for domestic animals, and wildlife protection.

## Funding opportunities

### 1. Who are the resource stewards?

It was generally agreed that most projects have been developed recently and implementers are in the process of learning. They are relatively expensive and development assistance is greatly appreciated. To this end, a number of questions remain:

- Who should be rewarded and receive the benefits?
- How could the transaction costs be reduced so as to increase local benefits?
- How short or long should the project cycle be to attract private sector engagement?

In LULUCF projects finding beneficiaries is relatively easier because project participants are usually identified and involved in the planning stage. This is not the case for conservation activities. Rewards may go to the wrong target because the stewards or guardians may not necessarily be the owners or custodians of the resources. This may not meet the target of poverty alleviation. On the other hand, rewards may not be translated as payment. Smallholder farmers may have several options in addition to financial terms, including land tenure and acknowledgement of rights.

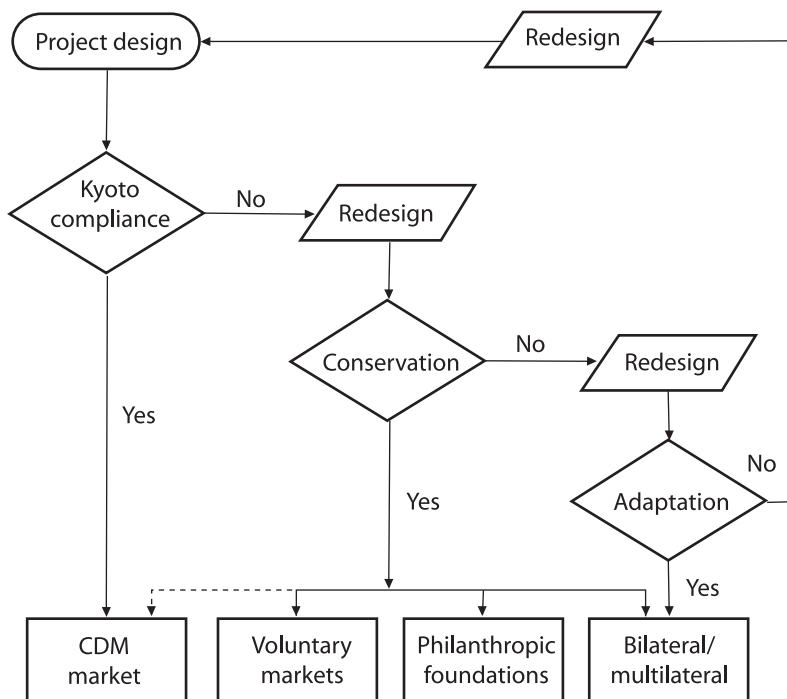
## 2. Public funding

Conservation activities are often under-funded. A funding gap is increasingly observed in most developing countries with a shortfall of resources generated locally. International (multilateral or bilateral) public funds such as official development assistance (ODA) may be used to increase local capacity and remove possible barriers. Research and development of new methods and technology could also be funded using this source. Identifying markets and finding a niche could be incorporated during capacity building exercises and a public awareness campaign.

Climate projects are new and experience is being gained. Consequently, transactions costs will be high. This is particularly true when dealing with a large number of small projects. Transaction costs may be borne by the public domain. Bundling a number of small projects could result in substantially reduced transaction costs. It is necessary to use public funding in transparent ways. Building the capacity of local stakeholders to monitor projects could even increase direct income.

## 3. Engaging private sector

The private sector may be engaged in CDM-like (voluntary mechanisms) as is widely the case in Europe and North America. These buyers usually want to see the environmental services such as carbon sequestration meeting certain criteria and indicators. As described above, such criteria and indicators have now been built into standards for project development, implementation and monitoring.



**Figure 1.** Possible pathways to access carbon markets through the Kyoto mechanisms, voluntary markets, and incremental mechanisms for conservation activities and adaptation measures (Source: Murdiyarso 2004).

In a smaller scale financial sector (domestic micro-financing) and bank services (e.g. Philippines) may be another avenue to explore. Furthermore, insurance is another financial instrument in which the buyers and sellers might have the confidence, especially in risky situations either from the biophysical or political perspective.

## **The way forward**

### **1. Policy responses**

Most national governments are well aware of the international treaties, especially those who are the parties to the agreements. Some pilot projects and feasibility studies have improved their capacity and strengthened existing institutions and human resources. However, a lot more needs to be done at lower levels such as provincial, district, and community level.

Regarding the regulatory framework and instruments, asynchrony between national and local (even traditional) laws, rules and values are often found. This has, to a large extent, hindered the expansion of successful projects from which a lot of good lessons could be learned.

Local-level capacity is relatively poor and a special effort is needed to address this issue. Participation of LULUCF activities in Southeast Asia is low due to:

- Lack of capacity at different levels of government.
- Low awareness of the national or local implications of the international agreement/ laws and low capacity to implement them.
- Lack of available expertise.

### **2. Integrated actions**

Integrating other environmental services such as biodiversity and watershed conservation may reduce transaction costs and elevate income for local people. They may be developed under different projects but share similar requirements, criteria and indicators. Integrated actions have to be supported by integrated approaches of institutions involved. While developing a project that removes carbon by sinks or establishment of forests, the project itself is also threatened or vulnerable to the changing climate. It is timely to integrate adaptation and mitigation strategies, especially in the most vulnerable forest ecosystems.

More pressure on forests will also result from the response of human societies to climate change. Historically, the social consequences of shortages in food production and water stresses have often been buffered at the cost of forests. Climate change can exacerbate such processes, but government, civil society and resource managers should explore the adoption of appropriate and cost-effective adaptation measures. Gender issues should be integrated into all mechanisms, policies and measures.

## Conclusions

Climate project development will lead to enhanced environmental resilience and alleviated of rural poverty. Although the lessons learned are limited and experiences are sometimes not replicable, there are a number of success stories as well as failures that are worth taking into account.

Some emerging technical/methodological issues need further elaboration. The roles of research organizations and universities who are well aware of the needs of decision-making communities are crucial. Support from policy communities at all levels is desired.

Funding opportunities are still widely open but asking the right questions would address strategic as well as practical solutions.

With mitigation measures being the entry point, linking them with adaptation strategies and measures is critical, especially for ecosystems and communities that are vulnerable to climate change.

## References

- Anshari, G.Z. and Armiyarsih 2005 Carbon decline from peatlands and its implications on livelihood security of local communities. *In*: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods. CIFOR, Bogor.
- Arifin, B. 2005 Institutional perspectives of lifescape co-management: Lessons learned from RUPES sites in Indonesia. *In*: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods. CIFOR, Bogor.
- Bratasida, L. 2005 Multilateral environmental agreements: Indonesian preparedness on climate change convention. Paper to the Workshop on Carbon Sequestration and Sustainable Livelihoods. Bogor, Indonesia, 16-17 February 2005.
- Cardinoza, M. 2005 Reviving traditional NRM regulations (Tara Bandu) as a community-based approach of protecting carbon stocks and securing livelihood. *In*: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods. CIFOR, Bogor.
- Corbera, E. 2005 Bringing development into carbon forestry markets: Challenges and outcomes of small-scale carbon forestry activities in Mexico. *In*: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods. CIFOR, Bogor.
- Forner, C. 2005 Forestry projects and the CDM: An international perspective. *In*: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods. CIFOR, Bogor.
- Gupta, A. 2005 Some CIDA Perspectives on Asian LULUCF Issues: Past, Present, and Future. Paper to the Workshop on Carbon Sequestration and Sustainable Livelihoods. Bogor, Indonesia 16-17 February 2005.
- Immirzi, C.P. and Maltby, E. 1992 The global status of peatlands and their role in the carbon cycle. Wetlands Ecosystems Research Group, Report 11, Department of Geography, University of Exeter, UK. 118 p.

- Locatelli, B. and Rojas, V. 2005 The PES (Payment for Environmental Services) to forest plantations in Costa Rica: Impacts on livelihoods. *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.
- Murdiyarso, D., Widodo, M and Suyamto, D. 2002 Fire risks in forest carbon project in Indonesia. *Journal of Science in China* 45 Supp.:65-74.
- Murdiyarso, D. 2004 Implications of the Kyoto Protocol: Indonesian perspectives. *International Review for Environmental Strategies* 5:145-156.
- Murdiyarso, D., Suryadiputra, I.N. and Wahyunto. 2004 Tropical peatlands management and climate change: A case study in Sumatra. *In: Palvanen, J. (ed.) Proceedings 12<sup>th</sup> International Peatland Congress.* International Peat Society, Tampere, Finland.
- Noor, Y. R. 2005 Community-based approach to peatland management in Jambi and South Sumatra, as implemented on the Climate Change, Forests and Peatlands in Indonesia (CCFPI) Initiative. *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.
- Page, S.E., Siegert, F., Rieley, J.O., Boehm, H.D. and Jaya, A. 2002 The amount of carbon released from peat and forest fires in Indonesia during 1997. *Nature* 420:61-65.
- Parish, F. 2005 Integrated management of peatlands for biodiversity and climate change. Paper to the Workshop on Carbon Sequestration and Sustainable Livelihoods. Bogor, Indonesia, 16-17 February 2005.
- Pirard, R. 2005 Commercial tree plantations for Clean Development Mechanism: Additionality assessment and livelihoods. *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.
- Quinceo, A.R. 2005 Alternative financial model for the sustainable management in the San Nicolas Forests. *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.
- Santilli, M., Moutinho, P., Schwartzman, S., Nepstad, D., Curran, L. and Nobre, C. 2003 Tropical Deforestation and the Kyoto Protocol: a new proposal. Paper to COP-9. Milan, Italy, 1–12 December 2003. (<http://www.ipam.org.br/eventos/cop9/Tropical%20Deforestation%20and%20Kyoto%20Protocol%20COP9.pdf>).
- Santos-Borja, A.C. and Lasco, R. 2005 Microwatershed enhancement through community participation: A pilot approach to carbon finance. *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.
- Schlamadinger, B., Ciccarese, K., Dutschke, M., Fearnside, P.M., Brown, S., Murdiyarso, D. 2005 Should we include avoidance of deforestation in the international response to climate change? *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.



- Shea, G., Fransisca, I. and Andaryati, A. 2005 Gender and climate change in Indonesia - A case study based on FORMACS project. *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.
- Smits, W. 2005. Orangutans, carbon poverty Alleviation: Mawas. Paper to the Workshop on Carbon Sequestration and Sustainable Livelihoods. Bogor, Indonesia, 16-17 February 2005.
- Suryadiputra, I.N., Wasrin, U.R., and Rahayu, S. 2005. Interventions and carbon changes in CCFPI's pilot peatland project sites in Sumatera and Central Kalimantan. Paper to the Workshop on Carbon Sequestration and Sustainable Livelihoods. CIFOR, Bogor.
- Tacconi, L. 2003 Fires in Indonesia: Causes, costs and policy implications. CIFOR Occasional Paper No. 38. CIFOR, Bogor.
- Tomich, T.P., van Noordwijk, M., Budisudarsono, S., Gillison, A., Kusumanto, T., Murdiyarso, D., Stolle, F. and Fagi, A.M. 2001 Agricultural intensification, deforestation and the environment: Assessing tradeoffs in Sumatra, Indonesia. In: Lee, D.R., and Barrett, C.B. (eds.) Tradeoffs or synergy? Agricultural Intensification, Economic Development and the Environment, 221-244. CABI Publishing, New York.
- Van Noordwijk, M., Widayati, A., Lusiana, B., Hairiah, K., Arifin, B. 2005. What can a clean development mechanism do to enhance trees in the landscape? Experience with rubber and coffee-based agroforestry systems in Indonesia. *In: Murdiyarso, D. and Herawati, H. (eds.) Proceedings of Workshop on Carbon Sequestration and Sustainable Livelihoods.* CIFOR, Bogor.

# A Short Note on the Social Side of the Modalities and Procedures for Afforestation and Reforestation Projects under the CDM

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## Abstract

*The tenth session of the Conference of the Parties (CoP) 10 to the United Nations Framework Convention on Climate Change (UNFCCC) marked the completion of the policymaking process for the Kyoto Protocol. In the particular case of the Clean Development Mechanism (CDM), rules for this instrument itself and for reforestation and afforestation activities, including simplified rules for small-scale ones, have paved the road for the implementation of forestry-related projects that contribute to climate change and to sustainable development. This note will provide a short summary of the state of the instrument, in particular, on social issues that have been taken into account by the international rules. It will finalize with the opportunities offered for the implementation of small-scale afforestation or reforestation projects.*

## Introduction

The CDM is a market-based instrument under the Kyoto Protocol to the UNFCCC consisting of the implementation of projects that either reduce emissions of greenhouse gases (for example, renewable energy) or enhance removals of CO<sub>2</sub> (specifically afforestation and reforestation projects). The CDM has the double objective of assisting developing countries to achieve sustainable development and to help developed countries with meeting their emission reduction obligations under the protocol.

The process of developing the CDM rules started shortly after the Kyoto Protocol was adopted in 1997. Since then, delegates from all countries have made a big effort to agree on “modalities and procedures” (M&P) for this instrument, which are intended to ensure the credibility of the CDM as well as the quality of the projects in terms of the “real” emissions and removals achieved through their implementation.

With sustainable development explicitly stated in the objective of the CDM, the link to social issues of this instrument is evident. However, the policymaking process has a dichotomy in the treatment of the two objectives of the CDM. While sustainable development concerns are regarded as a national issue that is not be assessed at the international level, the accounting of emission reductions and removals is subject to a stringent international process of assessment (see section 2).

In practice, the CDM consists of the design and implementation of projects that should provide sound methodologies to calculate its environmental benefit in terms of the real reductions in greenhouse gases (GHG) emissions or enhancement of CO<sub>2</sub> removals. These environmental benefits result in tradable permits that can be sold in the international market, where main buyers will be either governments or private companies from developed countries.

To this end, and aside from incentives relating to sustainable development (e.g. provision of clean energy or collateral benefits from reforestation such as water conservation and others), the main incentive for project proponents to implement CDM projects will be the revenue from selling the above-mentioned permits. The ability to participate in the market as well as the size of the revenue will depend on the costs at which the environmental benefits are produced: the more costly emission reductions or removals are the less revenue project participants may obtain. In other words, those projects with lower costs will have a better comparative advantage in the market as prices for permits fluctuate.

## Policy structure of the CDM

The CDM is comprised of a set of decisions that regulate this instrument by creating several institutions (see Table 1) and by providing clear guidance on how projects should be implemented and assessed. As stated in the introduction, the policy skeleton for the CDM has been finalized and further related decisions will only provide clarifications or elaboration on specific aspects that may require such work. In fact, what is most relevant for forestry-related projects is the adoption of three decisions that constitute the CDM policy package (see Figure 1).

The first of these decisions is the modalities and procedures (M&P) for the CDM, which were adopted through decision 17/CP.7<sup>1</sup>. The M&P set the fundamental rules for the implementation of the CDM, which include the establishment of several institutions (see below), introduce basic concepts for the implementation of CDM projects (see Box 1) and outline the CDM project cycle (see Figure 2). It is important to note that, despite the fact that the CDM was introduced by Article 12 of the Kyoto Protocol, the modalities and procedures are a decision of the Conference of the Parties and, hence, it was already operational before the Protocol entered into force.

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<sup>1</sup> See <http://unfccc.int/resource/docs/cop7/13a02.pdf>, page 20.

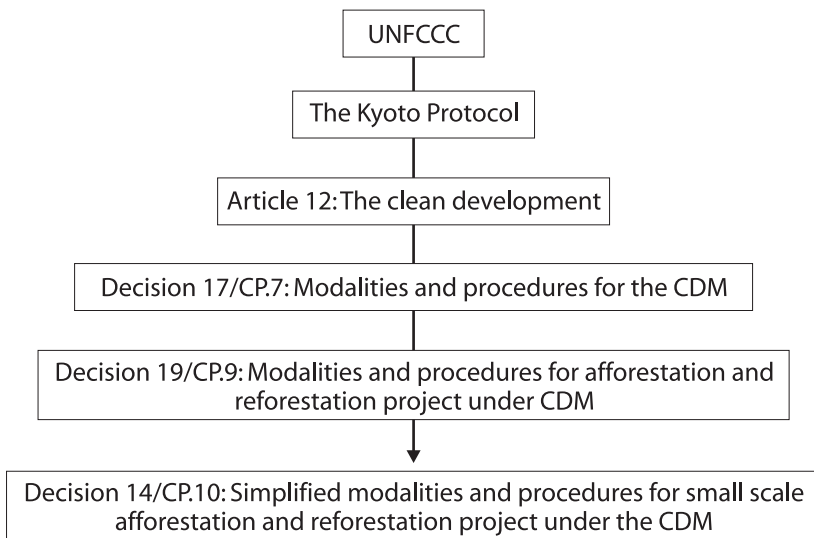
On the institutional side, the M&P have introduced public and private institutions that have responsibilities related to national and international issues of implementing projects (see Table 1). The following paragraphs provide a short description of the roles of each institution.

**Table 1.** Institutional arrangements of the CDM.

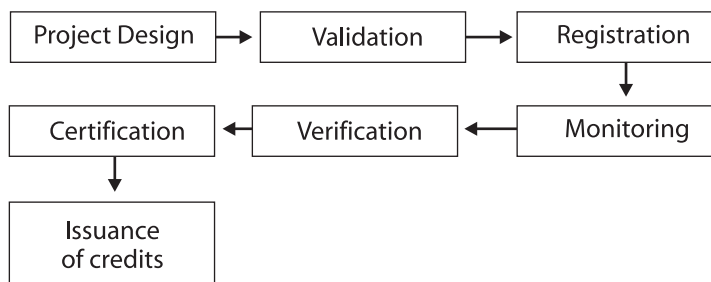
	National	International
Private	(Project proponents*)	Designated operational entities (project proponents*)
Public	Designated national authority	COP** COP/MOP** CDM executive board

\* Not an institution in the strict sense of the word

\*\* Not introduced by the M&P; the M&P state that the main authority of the CDM is the COP/MOP<sup>2</sup>.



**Figure 1.** The policy structure of the CDM.



**Figure 2.** The CDM project cycle.

<sup>2</sup> The COP/MOP is the conference of the parties acting as the meeting of the parties to the Kyoto protocol, the main body in charge of taking decision relating to this protocol.

**Box 1. Basic CDM concepts**

Additionality: refers to the requirement that removals would not have occurred in the absence of the project. The proof of additionality is required to demonstrate that “business as usual” activities are not credited in order not to undermine the objectives of the Kyoto Protocol.

Baselines: is the scenario that represents the removals in the absence of the project. The baseline is the estimation of the changes in carbon stocks that would have happened in the land if the projects was not implemented. Its calculation is necessary to estimate the removals of the project that are “additional”.

Leakage: refers to any emission outside the project boundary that is a consequence of the project. These emissions have to be discounted from the accounts of the project.

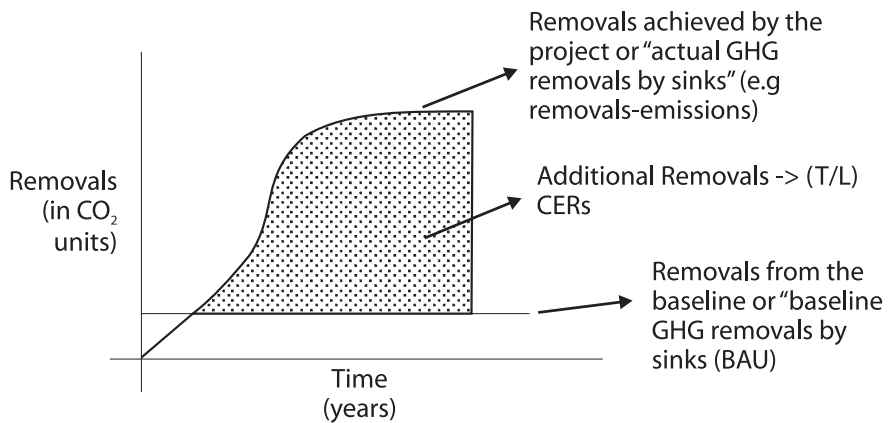
The CDM executive board supervises the CDM. In addition, the present note highlights the following roles: (i) it should recommend new modalities to COP/MOP; (ii) it accredits designated operational entities; (iii) it supervises the validation, registration and monitoring of projects and the issuance of Certified Emission Reductions (CERs), tCERs and ICERs; and (iv) it approves baseline and monitoring methodologies. For all these tasks, the executive board can establish panels or working groups to get assistance with, for example, technical and scientific issues on baseline assessments.

**Designated National Authorities**, or DNAs, are the main institution of the CDM at the national level. DNAs are in charge of giving the green light to the implementation of projects by stating that they are in accordance with national regulations and that they contribute to sustainable development. In practice, DNAs play a substantial role in giving certainty to the CDM system by establishing clear national rules for the processing of projects, as well as by establishing a link with the international level. In addition, their role in promoting the CDM at the national and local level as well as in capacity building activities could further ensure the success of the CDM in the country they operate.

**Designated Operational Entities** (or DOEs) are independent organizations that serve as intermediaries between project participants and the CDM executive board to make sure that projects are in accordance with the modalities and procedures for the CDM. DOEs can be thought of as independent certifying entities (auditing) that receive documentation from project participants, assess it and send all the completed documentation to the board. This assessment is undertaken at two different stages:

- At the validation stage, where DOEs should receive documentation from project proponents on the design of a proposed project. DOEs should also revise new monitoring and baseline methodologies for those projects that are submitted with one.
- At the monitoring stage, where DOEs verify information on emission reductions or enhancement of removals from a project and certify them so the executive board proceeds with the issuance of tCERs or ICERs.

Before stepping into the next decisions, it is important to highlight the concept of additionality, which has been brought into the CDM in order to safeguard the integrity of this instrument. Requirements in relation to additionality derive from the need to avoid the crediting of business-as-usual activities. A certified emission reduction is somehow a permit for a developed country to emit an equivalent quantity of greenhouse gases within its boundaries. The CDM allows this to happen because such emission is reduced somewhere else (e.g. by a project). However, when reductions of greenhouse gases or removals of CO<sub>2</sub> would have occurred with or without the project, then the climate benefit of a project is not real and the CDM loses its own purpose. For this reason, any tests on additionality are requested to ensure that the CDM is contributing effectively to the reduction of greenhouse gas concentrations in the atmosphere. Likewise, removals from what would have constituted the baseline of the project have to be discounted from the project in order to arrive at the true emissions that are achieved by a project (see Figure 3).



**Figure 3.** Additional removals achieved by an afforestation or reforestation project

Decision 17/CP.7 does not deal with the specific case of forestry projects but sets its basis by affirming that afforestation and reforestation would be eligible under the CDM with a cap of 1% of the base year of each Party. This decision requested the elaboration of specific M&P for forestry-related projects, taking into account specific concerns like the non-permanence of the carbon stored in forests<sup>3</sup>, uncertainties of measurements and, more important in the context of this paper, socio-economic and environmental impacts. This last point highlights the concern that Parties to the Convention had in relation to any negative effect that an afforestation or reforestation project could generate in an area.

<sup>3</sup> Non permanence refers to the continuous risk that the removals stored in biomass will be emitted back to the atmosphere as a consequence of a fire, pest or other event. The emission would imply that the environmental benefit of the removal would be lost. In contrast, in energy related projects, when an emission reduction is achieved, this reduction is permanent.

Following from the adoption of Decision 17/CP.7, the COP adopted M&P for afforestation and reforestation under the CDM; these are contained in Decision 19/CP.9<sup>4</sup>. As requested by the COP, this decision specifies the additional policy elements needed for the implementation of forestry projects, such as the use of temporary and long-term certified emission reductions (which solve the problem of non-permanence), definitions for the accounting of removals (instead of emission reductions), specific aspects of baselines, additionality and leakage, and, finally, specific requirements for addressing social and environmental impacts.

At the time Decision 19/CP.9 was adopted, some Parties had the concern that small projects would be disadvantaged in relation to large-scale projects due to the high costs that the M&P imply. For this reason, and following what was also done for energy projects, simplified modalities and procedures for small projects were commanded by Decision 19/CP.9. The main interest was to raise the competitive advantage of community projects with the view that these could be important from the standpoint of sustainable development. This process, likewise, led to the adoption of a decision on simplified M&P for small scale afforestation and reforestation projects (Decision 14/CP.10), which constituted the completion of the policy package for the CDM (see Small-scale projects section).

## Social issues and the CDM

The development of the M&P has aimed at elaborating political guidance relevant for the objectives of the CDM. This process has faced the dichotomy between those aspects of CDM projects that are international (mainly the aspects of the CDM dealing with the reduction of emissions and enhancement of sinks as well as the related institutions and rules) and those that are national (mainly those relating to sustainable development). Although the policymaking process has tackled both, most of the guidance provided in the M&P focuses on international issues, leaving to each Party the decisions and implementation of the national ones. The present section summarizes the guidance explicitly stated in the M&P that are related to social issues.

As stated in the introduction, one of the two objectives of the CDM is that projects contribute to sustainable development. In practice, this implies the need to establish a mechanism by which the contribution to sustainable development can be judged for any project to be a “CDM project”. However, because “sustainable development” was seen from the very beginning as an issue of national sovereignty, the M&P themselves do not specify criteria or any other mechanism to assist in this determination. The M&P do recognize that it is the responsibility of the host Party, through its designated national authority, to assess whether a project is in line with the national treatment of “sustainable development”. The M&P do require projects to present a letter from the DOA in which it is stated that the project has been

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<sup>4</sup> See <http://unfccc.int/resource/docs/cop9/06a02.pdf>, page 13

considered by the national government and that is in accordance with the national procedures that deal with sustainable development.

In relation to social and environmental impacts, the M&P state, at the general level, that project participants should submit documentation relating to these impacts, and, if these are considered to be significant, an environmental impact assessment in line with national requirements should be undertaken. The regulation also specifies that “significant” is a value judgement performed by both project participants and the designated national authority. It should be highlighted that the role of the designated operational entity both with regards to sustainable development and to social and environmental impacts is limited to verify whether related information has been submitted but should not perform an assessment of this information. Additional elements that caught the interest of policymakers were the legal aspects in relation to land title and access to carbon pools (e.g. wood harvesting), which may have an impact on the permanence of the carbon stored during the project lifetime. For this reason, the M&P, although not requesting any specific status nor limitations to these legal aspects, do require that transparent information is included on any possible changes that may occur while the project is operational. The monitoring plan should also consider the circumstances that may change either the legal title of the land or the rights of access to the carbon pools.

The M&P also specify where these elements should be incorporated in the documentation of the project. In particular, appendix B outlines the contents of the project design document (or PDD), which includes information on the baseline and monitoring methodologies and on the physical, geographical, social, economic and environmental conditions of the area. Specific information that should accompany the documentation of a project includes:

- Description of the legal title of the land and the rights of access to carbon pools.
- Documentation on the analysis of the environmental impacts. This analysis should include, where applicable, information on aspects such as hydrology, soils, risk of fires, pests and diseases.
- Documentation on the analysis of the socio-economic impacts. This analysis should include, where applicable, information on aspects such as local communities, indigenous peoples, land tenure, local employment, food production, cultural and religious sites, and access to fuelwood and other forest products.
- A description of planned monitoring and remedial measures to address significant social and/or environmental impacts.

Finally, it is worth mentioning that the CDM has established a process by which public comments can be made for every single piece of policy, including the consideration of methodologies and projects themselves. For example, the general public, NGOs or other stakeholders are allowed to send their views, which are normally considered either by the respective panel or the executive board itself when considering a decision on the approval of a project. In practice, a call for comments is announced via email to people who have subscribed to the distribution list. All public comments and documentation are made available in the CDM website.



## Small-scale projects

To finalize this short note, the present paper highlights the fact that simplified M&P have been made available in order to incentive the development of CDM projects by small holders and communities who, given the general M&P, may not be able to compete due to high costs of developing methodologies, dealing with DOAs and others.

Small-scale afforestation or reforestation projects were defined by Decision 19/CP.9 as those that are expected to result in net anthropogenic greenhouse gas removals by sinks of less than 8 kilotonnes of CO<sub>2</sub> per year; in other words, small-scale projects should not remove carbon under the mentioned values, thus having a limit of how many tCERs or ICERs can be generated by project per year. A second characteristic of these projects is that they have to be developed by low-income communities or individuals as defined by the host Party. Again, the dichotomy between national and international issues is reflected here by the fact that the definition of “low-income”, which is related to poverty and indexes of development, is left to the host Party, while the definition of the maximum absorbed carbon has been established at the international level. In practice, to prove that the project will indeed be implemented by low-income communities, project participants will need to include a letter from the host government (e.g. the DNA), which affirms this is the case. Depending on how countries decide to design their procedures, this may imply that the country needs to establish criteria on what are “low-income” communities and individuals.

If a project meets both sides of the definition for small-scale, it will be entitled to use simplified modalities and procedures, which are summarized as follows:

- Project activities can be bundled (e.g. several projects can be joined).
- Projects are exempt from the share of proceeds and will be subject to reduced administrative fees.
- Documentation has been simplified.
- Projects may use simplified methodologies that are to be developed by the executive board.
- The same DOE can perform registration and verification.

It is worth highlighting the fact that the development of methodologies will be undertaken by the board, which means that small projects will not need to invest in their development nor in the process of approval. The procedures for selecting a methodology are explained in Appendix B. Some of the following are:

- The baseline can be assumed constant if project proponents demonstrate that no significant changes are expected to occur within the project boundary in the absence of a project.
- If significant changes are expected, they will be allowed to apply a simplified methodology for baselines.
- No monitoring of the baseline is required and, for the monitoring of other variables, project participants may also use simplified methodologies.
- Finally, a leakage estimation will not be required if information provided by project participants shows that a displacement of activities or people that increases emissions outside the project boundary will not occur.

## References

- United Nations Framework Convention on Climate Change (UNFCCC) The Kyoto Protocol. [http://unfccc.int/essential\\_background/kyoto\\_protocol/background/items/1351.php](http://unfccc.int/essential_background/kyoto_protocol/background/items/1351.php)
- United Nations Framework Convention on Climate Change (UNFCCC) Report of the Conference of the Parties on its seventh session, held at Marrakech from 29 October to 10 November 2001. Decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in Article 12 of the Kyoto Protocol. <http://unfccc.int/resource/docs/cop7/13a02.pdf#page=20>
- United Nations Framework Convention on Climate Change (UNFCCC) Report of the Conference of the Parties on its ninth session, held at Milan from 1 to 12 December 2003. Decision 19/CP.9: Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol. <http://unfccc.int/resource/docs/cop9/06a02.pdf#page=13>
- United Nations Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice (SBSTA), Eighteenth session, Bonn, 2–13 June 2003. Land use, land-use change and forestry: definitions and modalities for including afforestation and reforestation activities under article 12 of the Kyoto Protocol in the first commitment period. <http://unfccc.int/resource/docs/2003/sbsta/05.pdf>
- United Nations Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice (SBSTA), Eighteenth session, Bonn, 2–13 June 2003. Land use, land-use change and forestry: definitions and modalities for including afforestation and reforestation activities under article 12 of the Kyoto Protocol in the first commitment period. Options paper on modalities for addressing baselines, additionality and leakage. <http://unfccc.int/resource/docs/2003/sbsta/06.pdf>
- United Nations Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice (SBSTA), Eighteenth session, Bonn, 2–13 June 2003. Land use, land-use change and forestry: definitions and modalities for including afforestation and reforestation activities under article 12 of the Kyoto Protocol in the first commitment period. Options paper on modalities for addressing socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems. <http://unfccc.int/resource/docs/2003/sbsta/07.pdf>
- United Nations Framework Convention on Climate Change (UNFCCC) Subsidiary Body for Scientific and Technological Advice (SBSTA), Twenty-first session, Buenos Aires, 6–14 December 2004. Proposal for a draft decision on simplified modalities and procedures for small-scale afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol and measures to facilitate their implementation. <http://unfccc.int/resource/docs/2004/sbsta/l20a01.pdf>

# Should We Include Avoidance of Deforestation in the International Response to Climate Change?

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## Abstract

*Global deforestation and forest degradation rates have a significant impact on the accumulation of greenhouse gases (GHG) in the atmosphere. The Food and Agriculture Organization estimated that during the 1990s 16.1 million hectares per year were affected by deforestation, most of them in the tropics. The Intergovernmental Panel on Climate Change (IPCC) calculated that, for the same period, the contribution of land use changes to GHG accumulation into the atmosphere was  $1.6 \pm 0.8$  Gigatonnes of carbon per year, a quantity that corresponds to 25% of the total annual global emissions of greenhouse gases.*

*Under the Kyoto Protocol (KP), industrialized countries can use land-based activities, such as reducing deforestation, establishing new forests (afforestation and reforestation) and other vegetation types, managing agricultural and forestlands in a way that the “carbon sink” is maximized. Annex I countries may also claim credit for carbon sequestration in developing countries by afforestation and reforestation (AR) through the Clean Development Mechanism (CDM), one of the Kyoto Mechanisms that allow countries to achieve reductions where it is economically efficient to do so. For the period 2008-12, forestry activities under the CDM have been restricted to afforestation and reforestation on areas that were not forested in 1990.*

*In contrast, activities aimed at reversing or slowing deforestation in developing countries are excluded for the first commitment period of the KP (2008-2012). Recently, a new proposal to include deforestation avoidance in tropical countries, labelled “compensated reduction,” has been presented by researchers from Brazil. This paper discusses the pros and cons of the approach, and provides an assessment of the approach with respect to leakage, non-permanence, forest degradation, uncertainties of baseline estimates, incentives to improve land use, and scale of credits. The paper also presents some suggested refinements and addresses monitoring needs.*

*According to the community, climate change is not a special phenomenon and they are not aware of it. Climate change is therefore explained by linking it to their environment, such as fish that are becoming more rare, the fact that they have further to go to get timber, changes in agriculture crop planting season, and similar things.*

*The constraints arise perhaps because community education levels are quite low, the project has different interests than some community groups (such as the illegal loggers) and the project timeframe is too short. Some of the challenges that need to be addressed in order to achieve effective project implementation include: the need to have a multistakeholders collaboration; development should be integrated and sustainable; and field staff need to have a permanent commitment to the community regardless of the project period.*

## **Introduction**

Global deforestation and forest degradation rates have a significant impact on the accumulation of greenhouse gases (GHGs) in the atmosphere (Achar *et al.* 2002; Houghton 2003; Fearnside and Laurance 2004). The Food and Agriculture Organization (FAO 2001) estimated that during the 1990s 16.1 million ha per year were affected by deforestation, most of them in the tropics. The Intergovernmental Panel on Climate Change (IPCC) calculated that for the same period the contribution of land-use changes to GHG accumulation into the atmosphere was  $1.6 \pm 0.8$  Giga ( $1 \text{ G} = 10^9$ ) tonnes of carbon per year (Prentice *et al.* 2001), a quantity that corresponds to 25% of the total annual global emissions of GHGs.

The United Nations Framework Convention on Climate Change (UNFCCC), in recognizing climate change as a serious threat, urged countries to take up measures to enhance and conserve ecosystems such as forests that act as reservoirs and sinks of GHGs. The Kyoto Protocol (KP), adopted in 1997, complements the UNFCCC by providing an enforceable agreement with quantitative targets for reducing GHG emissions.

To fulfill their emission-limitation commitments under the KP, industrialized countries (listed in the KP’s Annex I) can use land-based activities, such as reducing deforestation, establishing new forests (afforestation and reforestation) and other vegetation types, managing agricultural and forestlands in a way that the “carbon sink” is maximized.

Annex I countries may also claim credit for carbon sequestration in developing countries by afforestation and reforestation (AR) through the Clean Development Mechanism (CDM), one of the Kyoto mechanisms that allow countries to achieve

reductions where it is economically efficient to do so. For the period 2008-12, forestry activities under the CDM have been restricted to afforestation and reforestation on areas that were not forested in 1990. In addition, CDM projects must lead to emission reductions or net carbon uptake additional to what would have occurred without the CDM funding. Annex I Parties can only use credits from AR CDM up to an annual 1% of their base-year emission, or 5% during the entire Kyoto commitment period.

In December 2003, the ninth session to the Conference of the Parties (COP9) to the UNFCCC took a decision addressing the contentious issue of non-permanence—as well as additionality, leakage, uncertainties, and socioeconomic and environmental impacts—associated with AR project activities under the CDM (UNFCCC 2003). Only expiring carbon credits will be issued from AR CDM projects (“temporary” or “long-term” Certified Emission Reductions (CERs) alternatively), so that credits expire before termination of the project, or when the carbon is released back to the atmosphere prematurely. In both cases, the investor that used the credits to get into compliance will be debited accordingly. The decision also acknowledges that is up to host Parties to evaluate risks associated with AR projects, such as the use of invasive alien species and genetically modified organisms, according to their national laws. The text of the decision also invites Parties’ submissions on simplified modalities and procedures for small-scale projects and their implementation.

In contrast, activities aimed at reversing or slowing deforestation in developing countries are excluded for the first commitment period of the KP (2008-2012). Arguments against allowing deforestation avoidance activities were high uncertainties of GHG-reduction estimates, the potentially large scale of credits, non-permanence, and leakage concerns (Bonnie *et al.* 2000; Marland *et al.* 2001).

## The compensated reduction proposal

At a COP9 side event, Santilli *et al.* (2003a) presented a new proposal to include deforestation avoidance in tropical countries under the KP. The proposal labelled “compensated reduction” includes as its main element a voluntary national deforestation stabilization and reduction target for non-Annex I countries such as Brazil or Indonesia. Its objective is to encourage conservation policies. If these policies prove successful by the end of the first commitment period, the respective carbon dioxide (CO<sub>2</sub>) reductions, once monitored and verified, can be sold to industrialized countries after the end of the first commitment period at the carbon market prices prevailing at that time (Santilli *et al.* 2003b). The proposed baseline for Brazil would be the average emissions from deforestation during the 1980s (Santilli *et al.*, 2003a), or the 1990s (Santilli *et al.* 2003b). For other countries, other baseline periods might be adequate.

Who would be the buyers of these credits? While one paper talks of “governments or private investors” (Santilli *et al.* 2003b), the other one stresses that “...this would not be a market mechanism like the CDM [...], but an agreement between governments” (Santilli *et al.* 2003b). Even in this latter case, the authors see these credits as being transferred through international emissions trading markets.

Voluntary markets are emerging and other ecosystem services such as biodiversity values may be bundled. Emission credits may not be the primary objective as private sectors are also eager to build their image to society. In addition, public funding, although relatively small has yet to be mobilized. No substantial efforts have been made regarding the Special Climate Change Fund and the Adaptation Fund under the UNFCCC managed by the Global Environment Facility.

The host country would adhere to a binding, sectoral emission-limitation target by agreeing not to increase or further reduce deforestation-related emissions in the future. Obviously any increase in GHG emissions above the target would reverse credits already sold to Annex I countries, and thus result in non-compliance with this voluntary, but once agreed, binding emission-limitation target.

The proposal was cautiously supported by representatives of the Brazilian Ministry of the Environment at the COP9 side event, which is significant because Brazil had opposed the inclusion of deforestation avoidance in previous negotiating sessions. The proposal re-opened the debate about the inclusion of deforestation avoidance among the possible measures for reaching KP targets by Annex I countries. The “compensated reduction proposal” is similar to the way deforestation is addressed in the case of Australia (an Annex I country) under Articles 3.3 and 3.7 of the Protocol, based on “net-net accounting.” In this approach, the emissions from deforestation in the commitment period are compared to those in 1990, and any reduction in deforestation emissions will bring the country closer to compliance with its Kyoto targets.

## Pros and cons of the proposal

It may be argued that the proposal might lead to inclusion of “hot air” in the Kyoto system, to the extent that actual emissions—even without efforts to reduce them—may be less than the base-year emissions or a baseline calculated in other ways. We believe that such hot air, to a limited extent, is inevitable, and occurs in many situations under the KP. What is essential is that the proposal provides a real incentive, at the margin of the no-interference situation, to reduce deforestation. Nevertheless, efforts should be taken to calculate the baseline such that it minimizes hot air to the extent possible, while not creating too much risk of “non-compliance” of the countries concerned. Moreover, deforestation avoidance is already accounted for in the KP inventories of Annex I countries. Incentives to reduce deforestation at the margin of the current rate are not present in all cases (there is no incentive in some cases where special accounting rules have been introduced for other reasons). However, a point can be made that deforestation avoidance in developing countries would be a much more powerful strategy to reduce global CO<sub>2</sub> emissions, because the magnitude of emissions is so much more significant than in Annex I countries.

The proposal shows refreshing new thought. It goes into the direction of a sectoral CDM (Michaelowa *et al.* 2003), where policies and measures are explicitly allowed for crediting, as long as they produce measurable and verifiable results. Degradation and conversion of tropical (and non-tropical) forests to other land uses are major cause of GHG emissions, and therefore addressing them should be an integral part of the efforts to reduce global GHG emissions. After all, AR in the CDM can be seen as an effort to

“fix the damage after it has occurred” in an “end-of-pipe” manner, whereas avoidance of deforestation prevents the damage in the first place.

In addition, deforestation avoidance may provide other benefits such as conservation of ecosystem biological diversity, prevention of forest fragmentation, protection of watersheds, improvement of local livelihoods, and provision of additional income for developing countries. It could promote sustainable forest management in non-Annex-I countries' forests and reduce illegal logging and associated trading of timber.

Incentives to reduce deforestation can also help to reduce leakage from AR efforts both in Annex I countries and in CDM host countries. Furthermore, the newly-established forests in the CDM, due to low early growth rates and because areas do not come into the program immediately, but over time, may not be effective in generating carbon credits in the first or even the second commitment period of the KP. On the other hand, policies and measures to reduce deforestation can have much more immediate benefits for the carbon balance.

Limiting emissions from deforestation could be a first step in the direction of “meaningful participation” of developing countries in the climate regime. It is further compatible with the proposal made by the German Advisory Council on Global Environmental Change to introduce an additional protocol on the preservation of carbon stocks, which includes the goal of “full carbon accounting” for all land uses (Graßl *et al.* 2003) for the second and subsequent commitment periods.

However, a quantitative target in terms of absolute emissions caused by deforestation must be based on a transparent and credible baseline. It is essential that the “baseline” path of deforestation be accounted for appropriately when setting the emission limitation targets for the forest sector. For example, rather than using an absolute amount of deforestation emissions as the baseline, one could use a percentage of the “remaining forest” as a start for calculating the baseline emissions, thus reducing the baseline emissions over time as the area of remaining forest declines.

Although early proposals have called for national level baseline of deforestation emissions as reported in national communications, these estimates are often poorly done because of lack of reliable information on rates of deforestation and the corresponding carbon stocks. Also, Brown *et al.* (2005) have shown that depending on the method or model used to estimate rates of deforestation, baseline emissions can vary greatly from region to region within a country.

In tropical countries affected by deforestation or forest degradation and where forest governance has been largely decentralized, it could make more sense to promote a regional baseline from which the region that wishes to promote integrated ecosystem services could champion and benefit from the compensation.

## **Why has deforestation avoidance been excluded to date?**

The Marrakech Accords exclude deforestation avoidance projects under the CDM because of concerns by several parties related to:

- leakage, which refers to indirect effects of the mitigation project on GHG emissions outside the project or even country boundaries;

- non-permanence, which occurs when carbon sequestered in a forest restoration project, or carbon “protected” through deforestation avoidance, is released to the atmosphere at a future date due to natural or anthropogenic disturbance;
- uncertainties of estimates of how much deforestation has actually been avoided, compared to a business-as-usual baseline;
- scale of possible emission reductions, resulting in industrialized countries putting less effort into emission reductions from burning of fossil fuels.

Santilli *et al.* point out that their proposal would address **leakage** and **non-permanence**. We largely agree with this assessment, but there are a few caveats.

First, if deforestation emissions increase above the target level at a certain point in the future, would the host country then have to foot the bill for making up for these emissions as implied by Santilli *et al.* (“Once having received compensation, countries would agree not to increase, or to further reduce, deforestation in future commitment periods”)? Or who else would be held liable, if not the host country? **Non-permanence** is an issue specific to land-based activities because carbon sequestration at one point can lead to greater carbon emissions at a later time and because protection of carbon stocks now can lead to greater emissions from these carbon stocks in the future. Non-permanence can be addressed in at least two ways:

- The country where the land-use activity takes place assumes full responsibility for managing the carbon stocks in the future, and is liable for any enhanced emissions in the future. This is the approach used for Annex I countries under the KP. For this approach to be successful, it is essential that the commitment periods be contiguous (no gap between commitment periods), and that land areas, once accounted for, remain in the accounting system over time.
- The country where the land-use activity takes place is not liable for any re-emission. This is the case in CDM AR projects, because the developing countries do not actually have a national cap on their GHG emissions. In this case, non-permanence has been addressed by means of temporary or long-term CERs, meaning that the investor company or country is liable for any re-emission of the carbon that has been credited as net sequestration at an earlier time (UNFCCC, 2003).

The second approach makes sense only at the level of individual projects, but not at the level of national accounting of GHG emissions and removals. Otherwise, the investor would be held liable for the possible failure of policies and measures introduced by the host countries. Therefore, to deal with non-permanence in the context of the compensated reduction proposal, it is a prerequisite that the host country assumes full liability for the carbon stocks, not only in the commitment period during which the credits are issued, but also in future commitment periods, and for all the lands that were monitored and accounted for from the outset. That is, the initial decision to participate in the regime is voluntary, but the subsequent rules and liabilities would need to be made mandatory. Slight modifications of this regime could apply in countries with decentralized governance over their forests.

There may be cases where deforestation avoidance (interpreted in a narrow way, based on the downward crossing of a crown cover threshold between 10% and 30%



as defined under the KP (UNFCCC 2002a; UNFCCC 2003) leads to increased **forest degradation** through harvesting of the largest trees or other land management such as partial grazing. In these areas, the emission balance improvement may not be as great as estimated and degradation in a given year might lead to increased deforestation in future years as suggested by Nepstad *et al.* (1999). A possible solution might be a “deforestation and degradation avoidance” policy, rather than focusing on deforestation only. In fact, the issue of degradation in the context of climate change has already been subject to methodological work by the IPCC in its report on Definitions and Methodological Options to *Inventory Emissions from Direct Human-Induced Degradation of Forests and Devegetation of Other Vegetation Types* (Penman *et al.* 2003). The report contains definitions for direct human-induced degradation of forests and devegetation of other vegetation types, methodological options for accounting of emissions from degradation and devegetation, methods for reporting and documentation, and discussion of implications of methodological and definitional options for inclusion under the KP’s Article 3.

**Uncertainties** of baseline estimates: The proposal replaces the contested project-related baselines by a national baseline that assumes a continuation of past emissions. Monitoring deforestation at the national level is often assumed to be less uncertain than at the project level. However, in many developing countries, national data on rates of deforestation and corresponding carbon stocks are poorly known. Thus, it probably makes more sense to develop regional baselines, such as at subnational, administrative levels. Finally, the **scale** issue can be addressed through caps or discounts applied to the total amount of credits from deforestation avoidance either at the host-country level or at the investor-country level, or both. Also the scale issue should be seen in relation to the total demand for credits, which is highly dependent on the participation of industrialized countries in the regime.

There is, however, a valid concern that, with in any particular set up under the KP, the addition of deforestation avoidance at unchanged emission limitation targets will lead to lower emission reductions from combustion of fossil fuels. Santilli *et al.* state “continued deforestation at current annual rates from Brazil and Indonesia alone would equal four fifths of the emissions reductions gained by implementing the KP in its first commitment period” and “conversely, were the KP to include incentives for addressing deforestation, countries such as Brazil and Indonesia might lower their substantial current emissions from tropical deforestation”. These statements seem to imply that both the currently expected Kyoto emission reductions and the emission reductions from reducing deforestation could be achieved simultaneously. This is, of course, only possible if the overall targets of Annex I countries were strengthened. The authors seem to be conscious of this problem; in the Portuguese version of the proposal (Santilli *et al.* 2003b), they suggest using the credits not in the commitment period they were generated, but at least one commitment period later. However, this may introduce further constraints on financing the deforestation avoidance programs.

Overall, the new proposal is interesting, but further refinements are needed to improve the incentive structure for countries to sign on to this voluntary approach. Firstly, at the international level, it must be ensured that up-front financing is

possible. Secondly, the design of national policies and measures must adequately address the underlying causes of deforestation and provide real incentives (or other consequences) that stand a chance of changing the course of events on the ground. Finally, in the design of such programs, much can be learned by evaluating past development assistance programs aimed at reducing deforestation, many of which addressed the problem inadequately and were not very successful.

## Possible refinements

The proposal as currently drafted assumes sale of credits after the emission reduction has been achieved. While this leads to maximum “environmental integrity” because only emission reductions that have already been verified are sold, it might bring about problems in practice. National programs to address deforestation might prove quite costly, and up-front financing might be essential. Therefore, it is proposed that the host government could sell options to the carbon credits at a fixed price, with revenues being used for program implementation. Provided the program is successful, investor-country governments or companies could then elect to buy the actual credits at a guaranteed strike price. In order to reduce the risk of promising emission reductions that may then not materialize, the host country could limit the sale of options to a certain fraction of the emission savings that the program is expected to achieve. Revenues from the actual sale of credits could then be dedicated to further emission reduction. A “revolving fund” would thereby be established and would help to solve the “chicken and egg” problem.

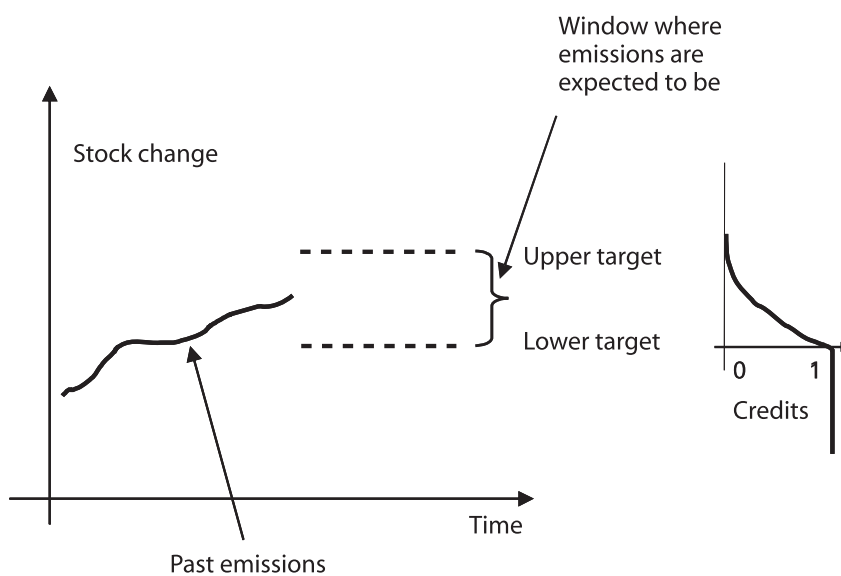
The guaranteed price of exercising the option would also pose a “price cap” for the investor government for credits to be acquired under the KP. A price cap, in the context of deforestation avoidance, has also been proposed by Schlamadinger *et al.* (2001). The option price could be seen as an “insurance premium” for governments and companies against possible non-compliance.

Another alternative to ex-post crediting after the end of the commitment period would be to allow the host country to sell credits immediately after the monitoring of deforestation has been completed for the first year of a commitment period. It would be up to the host country to determine whether the reduced deforestation is the outcome of successful implementation of policies and measures, or is an outlier due to inter-annual variability in the deforestation rate. In any event, overselling would have to be minimized, perhaps through a mechanism similar to the one already established under the KP for Annex-I countries (UNFCCC 2002a).

Particular attention will have to be paid to the setting of the level against which future emissions are assessed. If targets are too weak, e.g. by grandfathering high emissions levels from the past, then lots of credits could be generated without necessarily having reduced deforestation against a business-as-usual case. If, on the other hand, targets are very ambitious, then it might happen that they cannot be reached by the country, which leads to the next question: should non-achievement of targets lead to penalties? This could deter many countries from participating in the system. Without penalties, there is still the risk that a country might move so far above the target that it may become unrealistic to still reach the target (“run-away

non compliance”) so that there is no incentive to even start reducing emissions.

As a solution to these issues, it is proposed here to define a band within which a country’s emissions are most likely to be in the target period. The lower bound would be the threshold below which the country could claim a full credit for each incremental ton reduced. The upper bound would be set so high that the possibility of emissions exceeding that amount is minimal. In order to minimize the problem of scale and “anyway tons”, credits for emissions below the upper bound would be heavily discounted, with the discount rate decreasing as emissions levels are closer to the lower bound. This proposal is illustrated in Figure 1. As an extra incentive for countries to participate and to help fund the up-front costs of getting the emission reduction program going (including establishment of monitoring systems), countries could receive a fixed grant through a program such as GEF that is separate from the international carbon market. This fixed payment would also partly offset the fact that emission reductions below the upper boundary are discounted.



**Figure 1.** Emissions (changes in carbon stocks) over time.

The solid line (—) shows historical emissions, the dashed lines (---) define a band within which future emissions are expected to be in a business-as-usual scenario. The graph to the right shows the fraction of each ton avoided, at that emissions level, that can be sold as a credit. For emission reductions below the lower bound, a full credit can be sold. For emission reductions occurring between upper and lower bound, a fraction between zero and one can be sold, depending on whether emissions are closer to the lower or to the upper bound. A mathematical model for quantifying credits as a function of future actual emissions paths has been developed to test this approach further. Results will be made available in the near future.

Another issue requiring further analysis concerns the necessary incentives to landowners within the host country. Santilli *et al.* (2003a) provide an estimate of the income that a country could accrue for each hectare of forest saved from deforestation, and compare this with the opportunity cost of using the land for agricultural purposes. However, such a comparison is rather theoretical as it 1) assumes that the landowner and not only the government will benefit from carbon-related funds; and 2) calculates the benefits for each hectare of forest actually saved from deforestation, and not all forests that are candidates for being deforested (which would be more appropriate as explained in item b) below).

A vast literature exists on drivers of deforestation (e.g., Barbier and Burgess 2001; Geist and Lambin 2001; Tomich *et al.* 2001; Brown *et al.* 2005). These drivers act differently in different countries and regions. To a certain degree, deforestation risks can be predicted. The deforestation pressure is determined by the balance of opportunity costs and benefits from protection, carbon payments being only one of the possible elements of the latter. In a national program such as the one proposed by Santilli *et al.*, this balance will strongly depend on the incentives that are provided at the national level to reduce deforestation. There are several options for doing this:

- a) A “carbon tax” on deforestation that landowners will have to pay for conversion of forests to other lands. However, in areas where deforestation is already illegal but occurs anyway this is unlikely to be successful. Enforcement is a critical issue.
- b) Payments (annual or one-off) for “avoidance of deforestation”. This would address the problems under option a), but could lead to significant free-riding. Essentially it would become a project-based mechanism on the domestic level. For example, assume 10,000 ha of forest in a region are to be protected, but only 100 ha would actually be subject to deforestation. Assuming perfect foresight, and if the owners of these 100 ha were rewarded, then the outcome could be that 100 ha would be lost elsewhere within this area. Therefore, even a national incentives program could produce significant leakage, which would, however, be detected via nationwide monitoring. If, on the other hand, the owners of all 10,000 ha of land were to receive an incentive not to deforest, the incentive per hectare of land would be much smaller, possibly too small to make any difference. Therefore, the marginal incentive per hectare of land may not be as high as suggested in the Santilli *et al.* paper (US\$500).

In order to avoid free-riding, special target areas could be defined, where deforestation is felt to be imminent. The use of spatial modeling applied to past patterns of deforestation and a variety of other relevant data bases can result in probability scores on the likelihood of imminent deforestation (Brown *et al.* 2005). Taking as an example the Brazilian case, deforestation expectation is highest alongside the roads that are currently being paved. Highway concessions could therefore include an area along both sides of these roads and be awarded an annual fee for forest protection. In this way, subsidies would be concentrated where they are most needed, and the concession owners would have the incentive to find the most efficient way of keeping deforestation under control. Similar payments could secure the boundaries of national parks.

- c) Other land-use policies. Santilli *et al.* (2003) mention “programs designed to enforce environmental legislation, support for economic alternatives to extensive forest clearing (including carbon crediting), and building institutional capacity in remote forest regions”. Again, the estimated US\$500 per ha would then not be an incentive to the landowner, but only to the government to fund such programs. Therefore, more research should go into designing incentives and policies that would directly influence landowner decisions. Funds and programs may also have to be directed towards the improvement of agricultural and other land uses, so that not only is deforestation repressed, but its underlying causes such as demand for cropland and grazing lands or other land-use types are also addressed.

## Policy scenarios

It is instructive to interpret the Santilli *et al.* proposal from the view of a range of possible scenarios regarding the KP and participation by countries. The proposal could be applied to a regime beyond 2012, or it could be implemented as part of the first commitment period (2008-2012).

For inclusion in the first commitment period, amendments to the Marrakech Accords decisions related to LULUCF activities would be needed for this proposal to take effect. This would require at least a three-fourths majority among Parties that have ratified the KP.

However, Annex I Parties that are suppliers of forest management credits (notably Russia) are likely to oppose the inclusion of deforestation avoidance in the CDM.

With respect to other international measures being put into place to manage national GHG emissions, one of the most significant is the EU Directive 2003/87 (European Communities, 2003). The Emissions Trading Scheme (ETS) Directive establishes a system for GHG emission allowance trading within the EU. Under the scheme, running from 2005 to 2007—and the second phase from 2008 to 2012—EU member states will set limits on their GHGs by allocating “emissions allowances” to more than 12,000 energy-producing and energy-intensive plants.

Under the ETS, the use of sink credits is not allowed to meet emission targets, mostly because of reporting and accounting uncertainties surrounding sinks. However, the EU ETS leaves open the possibility of using LULUCF credits from 2008 onwards. In September 2004, the EU approved a new Directive that sets out ground rules for linking Joint Implementation and CDM projects to the EU ETS. The “Linking” Directive, that gives firms direct access to credits from CDM and JI for meeting their emission caps, also excludes LULUCF projects until 2008. Then again, the Directive makes explicit references to reviewing this in line with international developments on scientific and environmental uncertainties surrounding sinks (particularly non-permanence, social and environmental impacts, monitoring). A review of this Directive is due in 2006.

## Monitoring needs

The Santilli *et al.* proposal simply mentions that the baseline for accounting for GHG reductions is “the average annual deforestation for the 1980’s, measured with robust satellite imagery techniques”. However, besides monitoring the area subject to deforestation (and possibly degradation), stock changes and non-CO<sub>2</sub> GHG emissions on these lands also need to be monitored. This must be done both for the base period and the commitment period (net-net accounting). What would be an appropriate base period for which adequate data are available? It seems essential to use longer base periods (for example, five years) to minimize both the impacts of inter-annual variation in deforestation rates and the difficulties of remote sensing due to cloud cover. A first basis for methodologies of monitoring deforestation can be found in chapter 4.2.6 of the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (Schlamadinger *et al.* 2003).

Satellite-based remote-sensing imagery can be used for mapping deforestation activity by interpretation of images from different acquisition dates. Appropriate remote-sensing images with high spatial resolution are available on an operational basis since the 1990s, e.g. from Landsat and Spot satellite-borne sensors. In areas with frequent cloud cover, regular mapping at defined time-intervals is not possible with these optical data for the whole area, but sample-based approaches can be applied. In areas with frequent cloud cover, radar remote sensing, which penetrates clouds, can be used. Remote-sensing methods are therefore suitable for mapping the aerial extent of deforestation activities back to the 1990s (compare e.g. INPE 2002; Achard *et al.* 2002). A good overview of ongoing activities and capabilities of current remote sensing technology is provided by JRC (European Commission 2003). A key question related to this mapping effort is who pays for this. Many tropical countries do not have the resources or the capacity to perform such analyzes. Decisions about such task need serious consideration before deforestation avoidance credits could be considered. Brazil is one of the very few countries that routinely uses remote sensing imagery to monitor their forests, but they are the exception rather than the rule.

More difficult is the measurement of carbon stocks and their changes. Appropriate methods that combine satellite remote-sensing imagery with field data, e.g. by stratification, are currently under development (e.g., Brown 2002; CarboInvent 2003). However, such methods require data from national forest inventories that are often not available. This limits the applicability of these combined field-remote sensing methods, especially when carbon-stock changes should be estimated back to the 1990s. Alternatively, pre-deforestation carbon stocks can be estimated from comparison with adjacent remaining forests or can be reconstructed from stumps where these remain on the site (Schlamadinger *et al.* 2003).

At present, appropriate land-cover inventory systems in most tropical countries are not operational to accurately track changes in land cover and biophysical variables. Considerable effort should be put into the development of such systems. Combined field and remote sensing methods allow cost-effective monitoring of deforestation and associated carbon-stock changes and can help meet other forest-monitoring objectives.

## Conclusions

The proposal made by Santilli *et al.* at COP9 has brought refreshing new impetus to the issue of tropical deforestation, the largest source of GHG emissions that is still unaccounted for under the KP. While the proposal as published has a few shortcomings, we demonstrate here that ways could be found of addressing them and making this a workable solution.

Further research is recommended especially concerning:

- How much emission reduction would be achievable from a realistic deforestation avoidance strategy in tropical countries?
- What is the timing of emissions from deforestation? Usually, when a forest stand is removed permanently, not all of the emissions occur in one year because the continued decomposition of dead wood, litter and decreases in soil carbon may last for several years if not decades. This poses a monitoring challenge and can lead to some delay until the impacts of measures to reduce deforestation can be “seen.” However, as the carbon ultimately ends up in the atmosphere, simple accounting rules could be applied.
- What are the drivers of deforestation in some specific countries, and what national policies and measures (incentives) might best address these?
- How can the issue of degradation, followed by subsequent deforestation, be addressed better?<sup>1</sup>,
- How should the process of conversion of natural forests into second-growth forests (harvest followed by regeneration) be dealt with?
- How could the concept of “compensated reduction” be built into the Kyoto framework (or any subsequent framework that may replace it)?

The proposal as presented by Santilli *et al.*, with refinements as suggested here, will be especially relevant as Parties to the UNFCCC are about to initiate negotiations towards an international agreement that covers post-2012 period after the KP’s first commitment period.

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<sup>1</sup> For example, as a first step, one could focus on deforestation avoidance, as base-period estimates for this can be made available using remote sensing. In a second step, the regime could be broadened to include all managed forests (and thus also forest degradation). However, in many tropical regions base-year estimates are not yet readily available that allow estimates of carbon losses from degradation. It is therefore recommended that work begin to design an inventory-based monitoring system that will allow estimation of stock changes in forests subject to management and possibly degradation. Such a system could eventually be used for estimating base-year emissions under step 2 above.

## References

- Achard, F., Eva, H.D., Stibig, H.J., Mayaux, P., Galleo, J., Richards, T. and Malingreau, J.P. 2002 Determination of deforestation rates of the world's humid tropical forests. *Science* 297: 999-1002.
- Barbier, E.B. and Burgess, J.C. 2001 The Economics of Tropical Deforestation. *Journal of Economic Surveys* 15(3): 414-433.
- Bonnie, R. and Schwartzman, S. 2003 Tropical Reforestation and Deforestation and the Kyoto Protocol. *Conservation Biology* 17(1): 4-5.
- Bonnie, R., Schwartzman, S., Oppenheimer, M. and Bloomfield, J. 2000 Counting the cost of deforestation, *Science* 288, 1763-1764.
- Brown, S. 2002 Measuring, monitoring, and verification of carbon benefits for forest-based projects. *Phil. Trans R. Soc. Lond A360*: 1669-1683.
- Brown, S., Hall, M., Andrasko, K., Ruiz, F., Marzoli, W., Guerrero, G., Masera, O., Dushku, A., DeJong, B. and Cornell, J. In press. Baselines for deforestation in the tropics. *Adaptation and Mitigation Strategies*.
- CarboInvent. [www.joanneum.at/carboinvent/carboinvent/brochure.pdf](http://www.joanneum.at/carboinvent/carboinvent/brochure.pdf) (2003).
- European Commission 2003 Joint Research Centre: Land use change monitoring in the framework of the UNFCCC and its Kyoto Protocol. Report on current capabilities of satellite remote sensing technology, Paper to the 9<sup>th</sup> Conference of the Parties to the UNFCCC. Milan, Italy, 3 December 2003.
- European Communities. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003. Establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC. *Official Journal of the European Union* of 25.10.2003. L 275/32- L 275/46 (2003). [http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l\\_275/l\\_27520031025en00320046.pdf](http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_275/l_27520031025en00320046.pdf)
- Fearnside P.M. and Laurance, W.F. 2004 Tropical Deforestation and Greenhouse Gas Emissions. *Ecological Applications* 14(4): 982-986.
- Food and Agriculture Organization (FAO). Global Forest Resources Assessment 2000. Summary Report. <http://www.fao.org/forestry/fo/fra/index.jsp> (2001)
- Geist, H.J. and Lambin, E.F. 2001 What Drives Tropical Deforestation? A meta-analysis of proximate and underlying causes of deforestation based on subnational case study evidence. Louvain-la-Neuve, LUCC International Project Office, University of Louvain.
- Graßl, H., Kokott, J., Kulesa, M., Luther, J., Nuscheler, F., Sauerborn, R., Schellnhuber, H.J., Schubert R. and Schulze, E.D. 2003 Über Kioto hinaus denken - Klimaschutzstrategien für das 21. Jahrhundert. Berlin, WBGU - Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen.
- Houghton R.A. 2003 Revised estimates of the annual net flux of carbon to the atmosphere from changes in land use and land management 1850-2000, *Tellus* 55(2): 378-390.
- Marland G., Fruit, K. and Sedjo, R. 2001 Accounting for sequestered carbon: the question of permanence. *Environmental Science and Policy* 4: 259-268.



- Michaelowa, A., Butzengeiger, S., Jung M. and Dutschke, M. 2003 Beyond 2012. Evolution of the Kyoto Protocol. WBGU - Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen, Berlin.
- Nepstad D.C. *et al.* 1999 Large-scale impoverishment of Amazonian forests by logging and fire. *Nature* 398: 505-508.
- Penman J. *et al.* 2003 Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types. The Institute for Global Environmental Strategies for the IPCC and The Intergovernmental Panel on Climate Change. Hayama, Kanagawa. 32 p. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf.htm>
- Prentice, I.C., Farquhar, G., Fashm, M., Goulden, M., Heimann, M., Jaramillo, V., Kheshgi, H., Le Quéré, C. and Scholes, R.J. 2001 The carbon cycle and atmospheric carbon dioxide. *In: Houghton, J.T., Ding, Y., Griggs, D.J., Noguer, M., van der Linden, P.J., Dai, X., Maskell, K. and Johnson, C.A. (eds.) Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change, 183-237. Cambridge University Press, Cambridge.*
- Santilli M., Moutinho, P., Schwartzman, S., Nepstad, D., Curran, L. and Nobre, C. 2003a Tropical Deforestation and the Kyoto Protocol: a new proposal. Paper to COP-9. Milan, Italy, 1– 12 December 2003. 6 p. <http://www.ipam.org.br/eventos/cop9/Tropical%20Deforestation%20and%20Kyoto%20Protocol%20COP9.pdf>.
- Santilli, M., *et al.*, 2003b Florestas Tropicais e o Protocolo de Quioto: uma nova proposta. *Clima em Revista: Informe sobre Mudanças Climáticas* 3: 1-2.
- Schlamadinger, B., Boonpragod, K., Janzen, H., Kurtz, W., Lasco, R. and Smith, P. 2003 Supplementary methods and good practice guidance arising from the Kyoto Protocol. *In: Penman, J., et al. (eds.) Good Practice Guidance for Land Use, Land-Use Change and Forestry. The Institute for Global Environmental Strategies for the IPCC and The Intergovernmental Panel on Climate Change. Hayama, Kanagawa. [http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf\\_files/Chp4/](http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf_files/Chp4/)*
- Schlamadinger, B., *et al.* 2001 Capping the cost of compliance with the Kyoto Protocol and recycling revenues into land-use projects. *The Scientific World* 1: 271–280.
- Tomich, T.P., van Noordwijk, M., Budisudarsono, S., Gillison, A., Kusumanto, T., Murdiyarso, D., Stolle, F. and Fagi, A.M. 2001 Agricultural intensification, deforestation and the environment: Assessing tradeoffs in Sumatra, Indonesia. *In: Lee, D.R. and Barrett, C.B. (eds.) Tradeoffs or Synergy? Agricultural Intensification, Economic Development and the Environment, 221-244. CABI Publishing, New York.*
- United Nations Framework Convention on Climate Change (UNFCCC) 2002a Decision 14/CP.7. Pp. 54-67. *In: FCCC/CP/2001/13/Add.1. Conference of the Parties. Report of the Conference of the Parties on its Seventh Session, held at Marrakech from 29 October to 10 November 2001. Addendum. Part two: Action taken by the Conference of the Parties. United Nations Office, Geneva. 69 p.*

United Nations Framework Convention on Climate Change (UNFCCC) 2002b  
Decision 18/CP.7 Modalities, rules and guidelines for emissions trading under  
Article 17 of the Kyoto Protocol. *In*: FCCC/CP/2001/13/Add.2. Report of  
the Conference of the Parties on its Seventh Session, held at Marrakech from  
29 October to 10 November 2001 Addendum Part Two: Action taken by the  
Conference of the Parties, 50-54. Bonn.

United Nations Framework Convention on Climate Change (UNFCCC) 2003  
Decision 19/CP.9 Modalities and procedures for afforestation and reforestation  
project activities under the clean development mechanism in the first commitment  
period of the Kyoto Protocol. *In*: FCCC/CP/2003/6/Add.2. Report of the  
Conference of the Parties on its Ninth Session, held at Milan from 1 to 12  
December 2003. Addendum Part Two: Action Taken by the Conference of The  
Parties at its Ninth Session, 13-31. Bonn.

# Bringing Development into Carbon Forestry Markets: Challenges and outcomes of small-scale carbon forestry activities in Mexico

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## Abstract

*Markets for ecosystem services have emerged in recent years either in the form of national incentive schemes or international project-based initiatives. Carbon forestry activities have received considerable attention due to their potential to mitigate climate change, enhance forest conservation and foster local development. This has led to a steady increase in the number of projects implemented across the developing world under the United Nations Framework Convention on Climate Change or under voluntary markets. It is timely to provide empirical evidence from ongoing carbon forestry activities in order to examine their potential to achieve environmental and development outcomes. This paper draws on the experience of the Fondo Bioclimatico carbon forestry project in the state of Chiapas, Mexico. It examines the development of institutional arrangements at project management and community levels and highlights the equity and legitimacy implications of these arrangements. Findings indicate that the project has contributed to strengthening local capacities and leadership and to reinforcing community-based natural resource management across the region. However, it still fails to achieve more favorable environmental and equitable outcomes due to the lack of the economic and human resources necessary to create more inclusionary institutional arrangements, which can better account for the social and productive dynamics of local resource use. In conclusion, this paper casts doubt on the ability of carbon forestry activities to live up to their promises but it also presents constructive lessons for future practitioners and policymakers.*

## Introduction

In past decades there has been growing awareness about the important role played by natural ecosystems in sustaining human life (Daily 1997). Ecosystems provide humans with direct goods for consumption, which include seafood, forage, biomass fuels, timber, medicinal plants, organic soil, and wildlife, among others. Ecosystems also provide critical services for the functioning of natural and human systems, referring those to processes of cleansing, recycling, and renewal of biological resources. They can also play aesthetic and recreational functions and they might be of significant importance to some populations for cultural and spiritual reasons (Costanza *et al.* 1997; Daily 1997; Goulder and Kennedy 1997).

Many economists argue that because the benefits provided by ecosystem services are positive externalities or public goods, their public benefits are not captured in prices and this leads to their undervaluation and environmental degradation. The cost of their degradation is not accounted by the economic actors and thus no economic incentives exist for their conservation. Therefore, incentive systems or markets for ecosystem services have been suggested as effective strategies to expand the economic opportunities available to resource managers while enhancing resource conservation and reducing rural poverty. Markets for ecosystem services aim to become more economically efficient and environmentally effective than previous government-led conservation strategies, and are expected to provide an equitable distribution of their economic and social benefits (Bawa and Gadgil 1997; Pagiola *et al.* 2002).

In the last decade, carbon dioxide fixation by forest ecosystems has received considerable attention in policy and practice. The importance of such ecosystem service in regulating the global carbon cycle has been recognized under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, which have introduced a series of mechanisms<sup>1</sup> allowing for the development of carbon forestry activities in the developing world as means to mitigate climate change and promote sustainable development. The interest of international investors, national governments and civil society groups has led to the establishment of 20 pilot projects under the UNFCCC (UNFCCC 2002) and the development of a new multilateral investment fund under the auspices of the World Bank, which has recently received 131 project proposals<sup>2</sup>. In addition, several developing countries have designed national frameworks promoting this type of activities (Rosa *et al.* 2003; Pagiola *et al.* 2005).

It is thus timely to provide empirical evidence from ongoing carbon forestry activities in order to examine their potential to achieve environmental and development outcomes. One can then highlight the possibilities of achieving both types of outcomes, devise potential ways in which carbon forestry activities can be improved and inform the development of forthcoming activities. This paper examines the institutional arrangements promoted by these activities and highlights the implications of such arrangements for equity and legitimacy.

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<sup>1</sup> These mechanisms include the early UNFCCC concept of Joint Implementation and the Kyoto Protocol's Clean Development Mechanism.

<sup>2</sup> See <http://carbonfinance.org/biocarbon/home.cfm>

## Understanding institutions, equity and legitimacy

The importance of paying attention to institutional arrangements when evaluating the effectiveness of interventions for resource conservation and development has been highlighted by several scholars and practitioners (Ostrom 1990; Barrett *et al.* 2005). Institutions govern individual and collective behavior and they can be formal—legal systems, property rights, enforcement mechanisms—or informal—customs, traditions. They have been defined as “the way things are done in society, or standardized modes of behavior; they can be conceived of as the sets of rules that structure every-day action, including decision-making and habitual behavior. They strongly influence who can make what decisions, and how those decisions are constrained, prohibited, or required” (Biot *et al.* 1995). The concept of institutions also encompasses the concept of organization, albeit these terms are sometimes confused or used without distinction. Organizations are defined by institutions that characterise the organization *vis-à-vis* the larger society and within itself. The sets of rules, rights and obligations, through which institutions and organizations organize, govern and operate themselves are known as institutional arrangements, and these may result dynamic and change over time, as institutions themselves (Bromley 1989; Department for International Development 2003).

This paper conceptualizes carbon forestry activities as a product of the globalization of environmental policymaking and the increasing interconnectedness of actors that have vested interests in the management and conservation of forest resources. Carbon forestry encompasses a constellation of actors who adopt a set of informal and formal relations among them and acquire new rights and obligations that impact upon the actors’ organizations and upon their economic and social lives. These actors include rural communities and farmer groups, project managers, auditing entities, non-governmental organizations, national governments, consultants and investors, who can all be attributed a position in the scales of environmental governance although most of them factually operate across these scales. Carbon forestry activities modify local rules for resource management by establishing or modifying tree planting schemes, and introducing monitoring systems along with capacity building programs, among other potential activities.

However, rural communities are a product of their historical, social, political and cultural development, which has often led to the establishment of complex and dynamic layers of rights over environmental resources (Ostrom and Schlager 1996). These layers may in turn determine who controls access to environmental resources, who benefits from such access and how. Intuitively then, the development of carbon forestry may require flexible and adaptive institutional arrangements that incorporate local ecological and social realities, and promote equitable and legitimate decision-making processes and outcomes, as these can critically determine the distribution of environmental and development outcomes (Adger *et al.* 2001; Brown and Corbera 2003). This means that carbon forestry activities, in addition to diversifying household production for increased well-being, and ensuring that economic gains are re-invested in natural resource management and incorporate native species that meet communities’ productive and commercial needs, should also include individuals and marginalized groups in decision-making, and distribute project outcomes in a way that is accepted by all participants and community members.

The section that follows offers a synopsis of the case study analyzed in this paper. Attention is then paid to the development of institutional arrangements at project management levels, highlights power distribution issues in decision-making and identifies critical arrangements for the realization of environmental outcomes. Thirdly, the paper focuses on the institutional arrangements between project managers and local communities and the dynamics by which the project's legitimacy is contested and equitable outcomes distributed at local level. A final section discusses the importance of research findings for the future development of Fondo Bioclimatico and the implementation of carbon activities in other contexts.

## The Fondo Bioclimatico carbon project

The Fondo Bioclimatico project is one of the earliest pilot carbon forestry projects in the world. It is located in the state of Chiapas, Mexico, and involves subsistence and semi-subsistence farmers in small-scale forestry activities. In 1994, researchers from the Edinburgh Centre for Carbon Management (ECCM), El Colegio de la Frontera Sur (ECOSUR) and technicians from the local credit union *Pajal Ya kac'ic* (PAJAL) conducted economic and social feasibility studies in eight communities of the Chiapas central highlands. Through participatory workshops and interviews, the interest of producers affiliated with the Union in a project that would provide technical assistance and financial incentives to shift from agriculture to agroforestry, convert pastures to plantations, restore degraded forest, and manage natural forests was explored. The carbon sequestration potential of the agroforestry activities preferred by local farmers, and the potential to sell carbon was also investigated (de Jong and Montoya 1994; de Jong *et al.* 1995; de Jong *et al.* 2000). The National Ecology Institute (INE) of the Mexican government and the former Overseas Development Administration Forestry Research Programme of the British government funded these early studies.

The project was registered under the United States Initiative for Joint Implementation (USIJI) in 1997. The leading carbon purchaser is the International Automobile Federation (IAF), which to date has purchased 5,500 tons of carbon per year at an average price of US\$11 per ton of carbon. The second largest project investor is the U.K.-based organization Future Forests, which has purchased different carbon quantities since 2000. More recently, the project has also received financial support from the World Bank. The carbon price aims to cover the costs incurred by producers and to generate funds for project management. The price varies according to whether the carbon sequestered derives from agroforestry-reforestation activities (higher price) or conservation and management of existing forest stocks (lower price). In order to manage and administer carbon investments, a trust fund named Fondo Bioclimatico was created in 1997. In 1998, a technical unit named AMBIO was created to promote the project across the region, train community technicians, deal with the administrative and monitoring procedures of the fund and develop new forestry and development-oriented projects<sup>3</sup>.

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<sup>3</sup> Two members of AMBIO allocate full time work to Fondo Bioclimatico and five other members have become progressively involved in new forestry-related and development oriented projects.

All participants are subsistence and semi-subsistence farmers relying on maize and bean cultivation, sometimes coffee and cattle commercialization. Every farmer and community involved has their own forest-management strategy called “Plan Vivo.” This plan defines a number of agroforestry, reforestation or conservation activities to be carried out in either individual or communal land holdings, and designed according to the specific geographical, physical and ecological conditions of the area (Soto-Pinto *et al.* 2001; Tipper 2002). Farmers’ participation in the project differs according to the rural organization they belong to and their community’s history of land tenure and social organization. Where the majority of community members are involved in the organization participating in the project, or the community shows social cohesion independently from any organizational affiliation, then developing management plans in their communal forest land has been possible. However, the majority of farmers are involved on an individual basis, developing carbon activities on their family plots.

Once the Plan Vivo is established and approved by project developers, the total amount of carbon expected to accrue from the individual or community management plan for the next 20 to 30 years is estimated<sup>4</sup>. From this amount, only 90% is contemplated for sale and the rest is safeguarded by AMBIO in a contingency fund. Furthermore, only 80% out of the 90% of carbon sequestered by each farmer or community is traded, therefore accounting for a 72% of the total carbon estimated in each Plan Vivo. In doing so, the project compensates future potential leakage. In their first year of participation, farmers receive an up-front payment equivalent to 20% of the 72 % of total carbon sequestered as a source of initial working capital. After that, three other equivalent payments accrue in years two, three and five. A final payment of the remaining 20% accrues in year 10. After that, trees are supposed to have grown enough for the farmer or the community to develop other productive activities in the areas where trees have been planted, including cattle grazing and agroforestry systems. The resulting income during this 10-year period—for a 20- or 30-year project—can vary according to the characteristics of the management area, as some ecosystems sequester more carbon than others. The maximum income gain has been estimated at around US\$700 per hectare over 10 years (Tipper 2002).

## Analyzing institutional arrangements

### 1. Project management level

During the feasibility studies, the project was presented to local communities as a project that could promote a range of local development activities. Decision-making was shared between ECCM and ECOSUR researchers, PAJAL technicians, leaders and four communities’ representatives, who played a relevant role in deciding which community groups could be more successfully involved in the research studies. When international carbon funding was secured in 1997 and Fondo Bioclimatico

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<sup>4</sup> The total duration of the project for each group and community depends on the forestry system to be developed and the ecological conditions of the region.

was created, tensions between the broker and the union leaders arose. Union leaders disagreed with the project broker on the best way to administer project funds. Conflicts became also apparent between project technicians, who were being paid by Fondo Bioclimatico, and other members of the union's staff, who were not receiving equal salaries. During 1997 and 1998, PAJAL technicians focused on developing Plan Vivo systems in the early-surveyed communities and prepared for the delivery of a first round of carbon payments. The rules to deliver such payments were unclear and, as a result, some farmers received all the revenue expected from the system in just two or three payments. Such a fast delivery was not a common practice but it was occasionally used to gain trust from early participants and show them that their efforts to draw and implement the Plan Vivo system would be effectively rewarded.

AMBIO's establishment in 1998 represented a turning point in the project management's institutional arrangements. This was the phase of project consolidation. Project technicians became independent from PAJAL and decision-making was centralized in the project's international broker, who unilaterally decided which direction the project had to take. Staff employed by Fondo Bioclimatico focused on developing more effective and reliable carbon accounting and monitoring procedures. In relation to this transition, the earlier held view of the carbon project as a vehicle for community well-being and sound environmental practices was transformed into a view of a contract-based project in which farmers could contract to deposit carbon and withdraw payments (Nelson and de Jong 2003). These changes eroded the legitimacy of the project within PAJAL and most of its affiliated participants.

Since then, carbon demand has steadily increased and, as a result, the number of participating groups and communities required to accommodate such demand has grown from six communities, including 42 farmers, to 33 communities, including 650 farmers (see Table 1). This evolution certainly shows the substantial degree of legitimacy that the project has gained across the region. New participant groups and communities receive clear guidance about their obligations and rights under Fondo Bioclimatico and no false expectations are created. Farmers sign a letter of agreement with the carbon fund but not a legal contract, which provides them with the certainty that they remain in control of the situation. As the number of participants has grown, monitoring costs have increased and other activities such as environmental education workshops have been put aside due to time and economic constraints.

Community representatives, who attend biannual meetings at project headquarters, mediate the interaction between project managers and communities. In these meetings, project managers report on the state of Fondo Bioclimatico accounts, levels of administrative expenditure, and other project development issues, such as payments frequency, seedlings delivery, or monitoring schemes. For project managers, the appointment of local representatives has become an effective way to maintain a clear leadership structure across participant communities, which has so far proved very functional. In some cases, local representatives fail to transmit the information gathered in biannual meetings to community members, leading to misunderstandings between project managers and local communities.



**Table 1.** Evolution of Fondo Bioclimatico

Year	Communities involved	Contracts with farmers and communities <sup>a</sup>	Rural organizations	Carbon contracted per year (tC) <sup>b</sup>	Conservation hectares	Reforestation hectares
1997	6	43	1	5500 (IAF)	-	77.50
1998	17	268	1	5500 (IAF)	-	375.00
1999	17	268	1	5500 (IAF)	-	375.00
2000	20	304	2	6573 (IAF, FF)	1800	391.00
2001	25	454	5	9297 (IAF, FF)	1800	569.00
2002	31	n.a.	7	13297 (IAF, FF)	3893 <sup>b</sup>	n.a.
2003	31	n.a.	7	10012 (IAF, FF, WB)	3893	n.a.
2004	33	650	7	11967.7 (IAF, FF, WB, Dfid)	3893	845.04

<sup>a</sup> Communities involved collectively are noted here as single contracts.

<sup>b</sup> IAF-International Automobile Federation; FF-Future Forests; WB-World Bank; DFID-Department for International Development (U.K. Government).

<sup>c</sup> One single community is protecting 1800 ha, and another two communities are protecting a total of 2093 ha.

Since 2003, the international carbon broker delivered responsibilities over Fondo Bioclimatico to another member of his organization and an AMBIO member became also trustee of the carbon fund. This enabled AMBIO to gain power in decision-making within Fondo Bioclimatico and manage the bank account more according to day-to-day management needs. This increase in power, however, has not meant greater incorporation of local community representatives in project decision-making. Semester meetings in AMBIO headquarters play a bi-directional informational role and no important decisions about project management are made in this context. To date, this has not proved to be a problem. However, before some of the communities stop receiving carbon payments it is important to build and transfer decision-making responsibilities to increase local communities' ownership of the project and to promote the engagement of carbon participants in new sustainable projects beyond Fondo Bioclimatico. AMBIO has started to develop new institutional arrangements with other professional organizations in order to find positive synergies between the development of Fondo Bioclimatico and other projects of external organizations or from AMBIO itself, particularly in the area of capacity building for plantations management.

In addition to establishing fair rules for decision-making, another critical institutional arrangement is the relationship between governmental organizations, project managers and local communities. Since its origins, state-run nurseries provided the seedlings needed by project participants. Usually, communities agreed with project managers over the number of seedlings to be requested each year and then community representatives dealt directly with the nurseries. AMBIO covered the cost of transporting the seedlings from nurseries to local communities. The first problem encountered in this arrangement was that seedlings rarely met the diversity of species desired by project managers and local communities, which has had

implications for communities' productive needs. The second problem arose when the rules and procedures to access state-run nursery seedlings changed as a result of new federal forestry programs in 2003. Some project participants did not meet the new criteria and thus were unable to get seedlings. In the light of such problems, the feasibility of creating a project nursery, which could serve all participants and cover diversity requirements for all ecological zones, has been contemplated. The feasibility of promoting local seeds collection and local nurseries is also being explored and even implemented in some cases. To date, the lack of economic resources and the drawn out negotiation with government institutions has impeded an effective development of these two potential schemes. Nevertheless, Fondo Bioclimático's experience is bringing about important changes in how communities and farmers understand and implement sustainable forest management. The Plan Vivo system enables each community to develop reforestation schemes according to their own local conditions and forestry practices. The project is strengthening local environmental knowledge. At present, it has been estimated that only five percent of the farmers involved have decided to drop out from the project after their first five years of participation.

## **2. Arrangements between project managers and local communities**

The article turns now to examine institutional arrangements between project managers and local communities. For this study, two communities were selected on the basis of their longer-term involvement with the carbon project and the fact that they respond to the project in two contrasting ways. Community A plants trees in family-owned plots and only a minority of local farmers are involved in project activities. Community B is reforesting in common grazing areas and forests and all male farmers participate to some extent in planting, clearing and felling activities. These two approaches offer contrasting experiences on local arrangements and their implications for legitimacy and equity in carbon forestry projects.

### **a. Building legitimacy**

Community A's involvement in the project can be traced back to the project's early feasibility studies. Project managers approached a group of local farmers due to their affiliation with a rural organization named *Unión de Ejidos Lucha Campesina* (UELC), which was receiving political guidance and financial support from PAJAL. However, since the creation of UELC and PAJAL in the late 1970s and early 1980s, conflicts between affiliated families and other community members were frequent. Therefore, when the carbon project was introduced to the community through a community representative who belonged to UELC and PAJAL, the majority of the community saw the carbon project as hostile to their interests. Even for some of the UELC affiliated members, the carbon project did not seem attractive enough and, in 1997, only 22 out of the 45 UELC affiliated families started planting in some of their family-owned plots.

Concerns over the project's legitimacy were manifested in two different ways. Project participants felt the need for continuous reassurance that they were not implicitly selling their land to carbon investors. They saw the carbon project as a

strategy to pursue economic benefits and a way to defend their family bestowed land rights. Their emphasis on the fact that the project was being developed on their family land endowments helped them to portray the community assembly's stance against the project as illegitimate. The carbon project was an effective way to incorporate short-term (in terms of cash) and long-term (in terms of the forest growing stands) productive value to areas that were rarely exploited agriculturally and were exclusively fenced to demonstrate the existence of property. These property-related claims were strategically important in a context where land scarcity was severe and landless families had started to challenge the legitimacy of the large properties held by some.

In contrast, non-participants made connections between the carbon project and wider regional resistance to privately led development projects, which owed their existence to a broader regional political and social struggle<sup>5</sup>. One could argue that if project developers had attempted to present and develop the project through formal political authorities, this would have opened the possibilities of non-UELC families to participate in the project or it would have opened the door to planting in communally owned land. However, enquiries in this direction indicated that the possibility to develop the carbon project in communal lands were unrealistic because population growth and land scarcity dynamics were already affecting the way in which community authorities could enforce collective action in the forest commons. Despite these concerns, there has been a recent increase in the social acceptance of the project because the community leader dropped out from UELC in 1999. Consequently, the carbon project has gained legitimacy in community A and 40 new families have been incorporated.

Community B was approached through a rural organization that had wider social support in the community and the region itself. The *Unión Regional de Ejidatarios Agropecuarios, Forestales y de Agroindustria de los pueblos Zoque y Tzotzil del Estado de Chiapas* (UREAFA) was created in 1992 with the objective of developing productive projects in local communities, as well as participating in the struggle for reclaiming land that was still in private or state hands, a task that was being led in the state by the national political organization *Central Independiente Obrera y de Acción Campesina* (CIOAC). Even if not all community members were affiliated with UREAFA or CIOAC, it could be argued that the community assembly legitimized the carbon project because of general sympathy towards these organizations. Such legitimization later allowed project managers to deal progressively with local authorities and bypass UREAFA leaders.

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<sup>5</sup> Chiapas became well-known when the "*Ejército Zapatista de Liberación Nacional*" (EZLN) occupied different cities and communities across the state during the early weeks of 1994. The government put down the revolt immediately after but a political and social struggle presently continues. New forms of autonomous political and social organization have emerged in communities belonging or supporting the EZLN. The revolt can be explained by several decades of indigenous socio-political exclusion from state and federal policies and institutions, which at the same time is related to a complex regional history of land rights alienation that left most indigenous communities with the less productive lands. The revolt is also centrally explained by the evolution of Mexican political economy towards free trade agreements and the ending of the national agrarian reform. None of the communities involved in the carbon project belong to or support the EZLN.

However, the project's legitimacy is not guaranteed in the long-term in community B. At present, landless families are engaged in a struggle for acquiring land from neighbouring private properties. Some families had already asked the community assembly to distribute the forest commons and select new families from within those who are not formal land rights holders. Current authorities have not accepted this proposal but it could be accepted in the future if authorities (who change every three years) are less supportive of collective management or more land is not secured from neighbouring properties and the pressure of the landless over the commons increases.

Participants in both communities highlight the future benefits associated with short-term family or collective income. In community A, each family decides what to do with its own carbon payments. Most families have used them for small household improvements. In community B, carbon revenues are delivered to community authorities who then discuss their allocation. In past years, revenues were used to pay the community land tax, improve community roads and the church, and other collective needs. Both communities also stress the long-term use values of the new forests, such as for local construction, agricultural purposes, timber commercialization, and future environmental benefits.

### **b. Taking equity into account**

A critical question when implementing carbon projects is to analyze who participates and why. From an equity standpoint, the institutional arrangements established at the project-community interface should attempt as much as possible to recognize the diversity of productive spaces, resource users, local layers of rights and responsibilities over environmental resources and the potential benefit streams associated with the use of these resources. For example, from a gender perspective, there is strong evidence in the literature about women's important role in managing forest resources and contributing to their sustainability (Rocheleau and Edmunds 1997). Therefore, if forests are recognizable spaces in which women conduct important productive activities for household and community development, it seems compelling to pay attention to women's needs in relation to carbon forestry and identify, not only which tree species would better accommodate their interests, but also which other productive spaces, such as home gardens, would favor the women's development expectation or those of other marginalized groups, such as the landless.

Based on a survey of 95 community households, which included 53 participants and 42 non-participants, and represented 17% of community A, there appear to be major differences in the average size of land endowments between these two groups, with the former owning larger tracks of land dedicated to grazing and fuelwood collection that could be allocated for tree planting. Some of the richest participant farmers have bought woodland for planting trees under the carbon project since land costs would be substantially covered by future carbon revenues. The land bought becomes an asset that can be used for other purposes in the future, such as animal grazing, timber extraction and fuelwood gathering. For the poorest participants carbon funding has become a good opportunity to extract economic profit from unprofitable land and invest in household needs, including food, medicines or clothes.

Women in community A play neither a direct nor indirect role in the management of the family or the communal forest resources. These are essentially male-dominated productive spaces. However, most women play an effective role in the management of their home gardens. In fact, when the carbon project had a more development-related orientation in its early years, women were involved in several discussions and raised their interest in planting fruit trees in their home gardens or improving their cooking stoves. However, as institutional arrangements at project management level changed and the project focused on tree planting and effective carbon accounting, women's suggestions were not prioritised and they dropped out from project meetings.

In community B, as the carbon project developed in common forestlands, no survey relating family land endowments, forest use and tree planting was conducted. However, it was observed that women play a role in both the management of home gardens and common forest resources, particularly for the collection of fuelwood and animal grazing (Silva 2002). However, the carbon project did not address the issue of women as resource managers. When men attending discussion groups were prompted about women's participation in the selection of seedlings or in tree planting, they acknowledged that women had not participated. This was a clear sign of the carbon project's limited capacity to affect locally driven processes of non-recognition and gender exclusion, a fact noted in ongoing carbon projects in different locations (Boyd 2002).

Deficient recognition and inclusion of particular actors in project-community arrangements is accompanied by a deficit in the distribution of information across participants. Both communities raised concerns about the need to reconfigure the existing systems of information delivery and decision-making between project managers and participants. In community A, some participants stressed that now that the project has been consolidated, other members of the group should assume leadership in project management meetings. Participants defined the local representative as the only individual who had detailed information about the project, who understood it the most and, as a result, the only one entitled to make decisions on behalf of the group. In community B, several people proposed to create a local committee responsible for communal forestry practices in which those who have decision-making power in the community could be periodically brought together to discuss issues related with the conservation of common resources and the carbon project.

## Discussion

The Fondo Bioclimatico experience offers interesting insights about the dynamic nature of institutional arrangements in carbon forestry. Project management and community level arrangements have been constantly adapting to changes in power levels across project actors, changes in numbers of communities involved, changes in forestry policies and programs, and changes in local politics. A valuable observation is that deployment of project activities through one specific rural organization enabled the project to gain rapid legitimacy early on across participant groups and communities. However, as project management arrangements were redefined, the

project's legitimacy in some of these communities was eroded. This underlines the importance of being transparent with local communities and organizations from the very beginning regarding their role in the project's development and the objectives of carbon forestry activities.

Re-assigning project management to an independent organization provided project managers with more flexibility and opened the project to other organizations, communities or groups willing to engage responsibly in carbon forestry activities. Project managers should still integrate local community representatives in project decision-making, and institutional arrangements between governmental organizations and project managers should be carefully designed, especially if environmental and development outcomes of the project are at stake, as in the case of seedlings delivery. The relationship between national policy frameworks for environmental services and internationally led initiatives is an area that requires further research, as it is important that national and international efforts do not contradict and undermine each other.

Institutional arrangements at local levels are also dynamic and their legitimacy is subject to changes in local political affiliations, community authorities and local contests over environmental resources. It seems that carbon forestry activities in common forest lands are more likely to be legitimized if community-based organizations support the project and they are locally respected, and conditions of political stability, ethnic and religious homogeneity exist. In contrast, institutional arrangements with individual farmers can be heavily influenced by existent unequal property endowments and thus carbon forestry activities can induce social differentiation. However, both types of local institutional arrangements do not guarantee the success of the project in the long-term. A substantial investment in time and resources should be made to increase communication and capacity building activities. For example, it has been suggested that a leadership rotation system be established in community A and a forestry committee in community B to improve both equity and legitimacy and help distribute project knowledge among more people rather than concentrating it in few individuals who already hold power and social recognition (Corbera and Adger 2004).

The analysis of local arrangements also reveals the difficulties of addressing the plurality of formal and informal resource users, whose access to the carbon benefits should be guaranteed but might not necessarily be recognized by community representatives and community institutions. Project managers believe that it is not possible or desirable to influence context-specific and cultural norms that promote unequal distributions of power in formal decision-making. For this reason, the project appears to have become detached from local distributions of power. The acceptance of groups and communities within the project is subject to certain criteria including the existence of formal property rights and the lack of community conflicts. However, given the inability of the project to target poorest households and resource users marginalized from formal decision-making, it seems clear that continued debate about how to promote a fairer recognition of actors and distribution of outcomes has to be promoted.

## Conclusion

Markets for carbon are evolving. Fondo Bioclimatico's experiences are unique. It emerged in the context of a rural organization and then became a carbon bank managed by a professional organization. This transition has had implications for the development of its institutional arrangements at project management and community levels, which in turn have affected the project's legitimacy and its ability to promote equitable outcomes. After a purely carbon management-oriented phase, there are indications that the project is moving towards a more integrated approach to sustainable development.

However, the challenges outlined in this paper also signal the problems faced by carbon forestry activities when they attempt to live up to ambitious promises. The market-oriented nature of carbon investment, and the low levels of present demand for this type of activities in Kyoto and voluntary markets, do not allow a focus on critical development outcomes, such as increasing levels of representation and inclusion in decision-making and better awareness of local histories and resource management conditions. In the context of scarce investment, the emphasis should be on making institutional arrangements more flexible and adaptive at all levels, create more local capacities and distribute decision-making power. Coordination with government agencies and the development of non-carbon related complementary projects are crucial to build a vision for long-term sustainable resource use in local communities.

Finally, it is important that policymakers, practitioners and researchers reflect on the implications of carbon forestry activities for global environmental justice. More profound questions about what are investors are gaining in exchange for farmers' sustainable efforts need to be asked in order to determine the fairness of carbon as a new forestry commodity. Markets for carbon are not designed to solve the problems of the rural poor but they should not become a way by which the rich get exempted from further responsibilities in reducing poverty and mitigating climate change.

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## References

- Adger, W.N., Benjaminsen, T.A., Brown, K. and Svarstad, H. 2001 Advancing a political ecology of global environmental discourses. *Development and Change* 32(4): 681-715.
- Barrett, C.B., Lee, D.R. and McPeak, J.G. 2005 Institutional Arrangements for Rural Poverty Reduction and Resource Conservation. *World Development* 33(2): 193-197.
- Bawa, K.S. and Gadgil, M. 1997 Ecosystem Services in Subsistence Economies. *In: Daily, G.C. (ed.) Nature's Services. Societal Dependence on Natural Ecosystems.* Island Press, Washington, D.C.
- Biot, Y., Blaikie, P.M., Jackson, C. and Palmer-Jones, R. 1995 Rethinking Research on Land Degradation in Developing Countries, World Bank Discussion Paper 289. The World Bank, Washington D.C.
- Boyd, E. 2002 Scales, power and gender in climate mitigation policy. *Gender and Development* 10(2).
- Bromley, D.W. 1989 Economic Interests and Institutions. The Conceptual Foundations of Public Policy. Basic Blackwell, New York.
- Brown, K. and Corbera, E. 2003 Exploring equity and sustainable development in the new carbon economy. *Climate Policy* 3(S1): s41-s56.
- Corbera, E. and Adger, N. 2004 The equity and legitimacy of markets for ecosystem services: Carbon forestry activities in Chiapas, Mexico. The Digital Library of the Commons. Paper to the Workshop in Political Theory and Policy Analysis, Indiana University.
- Costanza, R. *et al.* 1997 The value of the world's ecosystem services and natural capital. *Nature* 387(6630): 253-260.
- Daily, G.C. 1997 Nature's Services: Societal Dependence on Natural Ecosystems.
- de Jong, B. and Montoya, G. 1994 Sustainable Management of Forest Resources: A Proposal for the Highlands of Chiapas, Mexico. Instituto Nacional de Ecología.
- de Jong, B., Montoya-Gomez, G., Nelson, K., Soto-Pinto, L., Taylor, J. and Tipper, R. 1995 Community Forest Management and Carbon Sequestration: A Feasibility study from Chiapas. *Interciencia* 20(6): 409-416.
- de Jong, B.H.J., Tipper, R. and Montoya-Gomez, G. 2000 An economic analysis of the potential for carbon sequestration by forests: evidence from southern Mexico. *Ecological Economics* 33: 313-327.
- Department for International Development 2003 Promoting Institutional and Organisational Development.
- Goulder, L.H. and Kennedy, D. 1997 Valuing Ecosystem Services: Philosophical Bases and Empirical Methods. *In: Daily, G.C. (ed.) Nature's Services. Societal Dependence on Natural Ecosystems.* Island Press, Washington, D.C.
- Ostrom, E. 1990 Governing the commons: The evolution of institutions for collective action. Cambridge University Press, Cambridge.
- Ostrom, E. and Schlager, E. 1996 The Formation of Property Rights. *In: Hanna, S., Folke, C. and Maler, K.G. (eds.) Rights to Nature. Ecological, Economic, Cultural and Political Principles of Institutions for the Environment.* Island Press, Washington, D.C.



- Pagiola, S., Landell-Mills, N. and Bishop, J. 2002 Market-based Mechanisms for Forest Conservation and Development. *In:* Bishop, J. (ed.) Selling Forest Environmental Services. Market-based Mechanisms for Conservation and Development. Earthscan, London.
- Pagiola, S., Arcenas, A. and Platais, G. 2005 Can Payments for Environmental Services Help Reduce Poverty? An Exploration of the Issues and Evidence to Date from Latin America. *World Development* 33(2): 237-253.
- Rocheleau, D. and Edmunds, D. 1997 Women, Men and Trees: Gender, Power and Property in Forest and Agrarian Landscapes. *World Development* 25(8): 1351-1371.
- Rosa, H., Kandel, S. and Dimas, L. 2003 Compensation for environmental services and rural communities. Lessons from the Americas and key issues for strengthening community strategies. Programa Salvadoreño de Investigación sobre Desarrollo y Medio Ambiente (PRISMA)
- Silva, L.C. 2002 Las formas comunitarias de aprovechamiento de los arboles y arbustos de Rincon Chamula, Chiapas, Mexico.
- Soto-Pinto, L., Jimenez-Ferrer, G., Vargas Guillen, A., de Jong, B. and Esquivel-Bazan, E. 2001 Experiencia agroforestal para la captura de carbono en comunidades indígenas de Mexico.
- Tipper, R. 2002 Helping Indigenous Farmers to Participate in the International Market for Carbon Services: The Case of Scolel Te. *In:* Pagiola, S., Landell-Mills, N. and Bishop, J. (eds.) Selling Forest Environmental Services. Market-based Mechanisms for Conservation and Development. Earthscan, London.
- United Nations Framework Convention on Climate Change (UNFCCC) 2002 Sixth Synthesis Report on activities implemented jointly under the pilot phase. Subsidiary Body for Scientific and Technological Advice. FCCC/SBSTA/2002/8.
- Vira, B. 2001 Claiming legitimacy: analysing conflict in the environmental policy process. *Environment and Planning C. Government and Policy* 19: 637-650.

# Social and Legal Issues in the Implementation of Sustainable Forest Management and Environmental Service Projects

*(Documento de Soporte de la Ponencia Sobre el Manejo Social y Jurídico del Proyecto de Manejo Sostenible de los Bosques de San Nicolás, Implementado en la Republica de Colombia)*

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## **Abstract**

*This paper presents a series of legal considerations which would need to be taken into account for the design of a CDM and environmental service project. They derive from the experience of setting up a sustainable forest management-environmental service project in Colombia. The paper addresses first the importance of taking into account formal and informal resource tenure regimes, and provides the necessary steps for the elaboration of a situational synthesis exercise in project design. It then addresses the question of identifying and forming suitable stakeholder partnerships for project implementation.*

## **Ownership, tenure and access to resources**

One of the most important aspects, from a legal and social perspective, that should be taken into account for a Clean Development Mechanism (CDM) and environmental service project is the analysis, evaluation, inventory and characterization of land tenure systems. The project should respect local concepts of land and natural resource ownership and existing legal precepts for the jurisdiction where the project is to take place. Government agencies and local institutions that have spatial control or authority should be identified in order to articulate their participation in project

activities. It is necessary to identify the different actors which have a stake in land tenure issues and include them in the project framework. By these means, one ensures that project design is sustained on regional and local consensus rather than imposed from outside.

In the initial state of the project, it is important to understand the project proposal within the normative framework as it applies to the regional context. This is done through a simple and schematic procedure that helps to develop a diagnosis of the social, institutional and legal framework. This procedure is also known as situational synthesis or norm mapping. The procedure allows us to determine the strengths and weaknesses of the different legal options related to ownership, tenure, or natural resources use, and to understand the historical process that has affected the communities. This diagnosis provides a basis for articulating a proposal that allows for participation of regional, national and international actors. This, in turn, ensures that natural resource ownership and access schemes are not harmed and that, at most, this conceptual framework will be subject to legal, technical, and financial reorientation in order to guarantee environmental, social and financial sustainability of an ecosystem.

This process should consider the following 11 steps:

- 1) Identify the legal ownership regime of forest and land resources according to existing regulations on this subject.
- 2) Identify ways to gain access to natural resource use from a legal and social perspective in order to determine the likelihood of access to and assignment of renewable natural resources to one or various project parties as there could be claims or limitations upon the land which could preclude its use by specific owners or users.
- 3) Identify the legal and administrative structure in the region, as well as the institutions and the actors and how they relate.
- 4) Assess the community organizational styles and its interaction with other social structures or patterns.
- 5) Investigate the different management approaches and instruments that could be used to engage the efforts, technology and other resources of an individual or community to carry out the project. By management approaches is meant the methodologies and instruments used to tackle a particular task. For example, there are the formalities used to summon a community in written form or verbally, through a community member or a technician, with participation of all actors or only with the most representative, once or on several occasions according to local cultural schemes, etc. By instrument is meant the actual object that is used to “materialize” the proposal, such as a legal pattern of association, a written contract, a title, a certificate, etc.
- 6) Identify the different forms of association (both profit and/or non-profit) that are used within the context of commercial law and associations which may enable to join efforts, technology and other resources with individuals and local communities to develop the project and thus overcome challenges imposed by

- market forces (i.e. partnerships of interested parties, partnerships by quotas, partnerships of shareholders, cooperatives, associations).
- 7) Establish guidelines to determine the choice of corporate instruments for the development of the project according to their comparative advantages within the perspective of local rules. This aspect is only necessary for those projects in which property, tenure, possession and/or use are in the hands of the different actors. As more social actors become involved, there is a stronger need to define a democratically based corporate instrument.
  - 8) Identify the mechanisms and legal instruments necessary to market environmental services based on the perspective of existing international experiences.
  - 9) Engage all project actors in defining a proposal for corporate organization and eventual statutory structure for the partnership (social contract pattern) to follow through the stage of project development and consolidation.
  - 10) Establish project management instruments that correspond to national and international laws, and that are suitable for local adaptation. For this, communication, socialization and consensus processes should be integrated that allow for interaction of the actors involved in the project, with clear processes for decision-making and consultation. In this regard, regional forums and coordination panels are recommended (see 2).
  - 11) Finally, establish instruments that will assure that the rights to all the environmental services derived from the project will belong to and be negotiated by and for the owners (small or large, individual or collective) in the region. In this regard, benefits from the project should become and should be envisioned as social and financial revenues aimed at each one of the participants in proportion to their individual contribution, without jeopardizing property rights or access to natural resources according to existing legal precepts for each case.

## Forms of partnership

Once the participation scheme is configured and developed for the project, the actors are defined and community interest is consolidated, communications channels are adopted between the different parts of the project, and the forestry development model for the region is approved. At this point, the need arises to create a legal representation capable of articulating and increasing the efforts of all regional players in order to generate alliances and consolidate the execution of the development model.

The need then arises to analyze the structure of the different forms of partnership and production to ensure transparent, democratic, and simultaneous participation of the public and private sectors, and of local communities. Current social dynamics are mainly focused on free association and this, in essence, is the right of individuals to manifest their wills through efforts, as well as material and immaterial goods, in a stable and permanent fashion to achieve common goals.

In a broad sense, association means the joining of two or more people that agree to join efforts towards common good, obliging each other to cooperate to achieve something, through a stable organization.

## **1. Intersections of sectors**

In theory, there is a clear way to classify the social structure of a territory such as a state, region, province, etc. This classification is based on the analysis of the actors that carry out activities within this territory. In general, the organizational scheme within a territory where human populations live is formed by three sectors, namely: a) public or institutional; b) private or entrepreneurial; and c) community or social. These gather a heterogeneous group of actors, institutions, traditions, and have specific characteristics. The importance of this classification cannot be overstressed and it is safe to state that the political trend of a territory is measured in terms of the size or influence of one of these sectors within the dynamics of the territory.

## **2. Partnership patterns**

According to most current constitutional schemes, the public sector or government is responsible for covering the basic needs of society, within clear concepts of equality, fairness, solidarity, and justice, in particular for those who are disadvantaged in relation to the rest of the population. This, however, does not preclude communities from participating in government decision-making, planning and managing, or in monitoring accountability of civil servants and resource allocation. Within this context, local communities have maintained some patterns of partnership that have allowed for regional economic development and that can also allow for the implementation of clean development and environmental services projects.

These partnership patterns have the following functions:

- To encourage community building as a factor of respect, tolerance, coexistence, and solidarity in achieving peace, which requires reshuffling government practices and citizen education.
- To promote consensus, dialogue, and agreements as development strategies.
- To validate planning as an instrument for development in communities.
- To increase capacity for management, self-management, and co-management in communities.
- To promote community education as a necessary instrument to recreate and add value to participation in local, regional, and national issues.
- To promote creation of grassroots organizations and community enterprises.

There are also other types of management instruments developed around private initiatives, which could be catalogued as associations that may or may not be profit-oriented. Among mechanisms for private management we find ways of association that are used by an individual or community to overcome challenges imposed by market forces. A mere gathering of individuals to reach a common goal is not sufficient to create the desired type of organization, since there should be a distinction between non-profit associations and those formed for profit. The latter refer to civil and commercial partnerships; the former to associations, foundations and NGOs in general. Profit-oriented partnerships can be commercial partnerships or civil associations; the difference between these is the activity carried out. Commercial partnerships are focused on economic objectives, while civil associations are aimed at achieving other kinds of objectives that differ from economic goals.

### **a. Commercial partnerships**

Commercial partnerships include three kinds of groups: partnerships of interested parties, partnerships by quotas and partnerships of shareholders

#### *Partnerships of interested parties*

Within these we find collective partnerships and *de facto* partnerships:

**Collective partnerships:** The current legal context defines these as those that require a minimum of two partners; the maximum number of partners is not defined. Partner liability is always joint and unlimited although the legislation states that it is subsidiary. All industry investments are not specifically assessed in economic terms and are not part of the social capital. All partners are administrators, but can delegate this function upon one of them or a third party. In general this form of association is applied to small family-owned enterprises and the motive for association is dependent on the individuals that use it (*Intuito Personae*).

**De facto partnerships:** The current legal context defines these as those that, as their name specifies, are not created through public documents. Similar to collective partnerships, they require a minimum of two partners and the maximum membership is undefined. Partner liability is joint and unlimited. Member participation is adjusted to the conditions agreed by the partners. This type of partnership corresponds to cottage industries, retail commerce, professional services, and arts and crafts.

#### *Partnerships by quotas*

These are divided into simple limited partnerships and limited liability partnerships:

**Simple limited partnerships:** The current legal context defines these as those comprised, minimally, by a managing partner and a silent partner. Normally, the maximum number of partners may be undefined. Liability of managing partners is joined and unlimited and that of silent partners is limited to the amount of their investments. Normally the managing partner contributes industry or labor, and also manages and legally represents the partnership. Silent partners may only represent it as delegates of the managing partner. This form of partnership is applied, in many instances, to small family-owned companies.

**Limited liability partnerships:** The current legal context defines these as those with a minimum of two partners and a maximum of 25. Partner liability is limited to the amount of their investments, but some or all the partners may stipulate greater liability or supplementary warranties. The value of investment in industry is not assessed and is not part of the social capital. Partnership management and representation may be exercised by all the partners, but the board could delegate it to a manager. This form of partnership is used for small and medium-sized companies.

#### *Partnerships of shareholders*

These are divided into limited partnerships by shares and corporations:

**Limited partnerships by shares:** The current legal context defines these as those that require a minimum of six partners, a manager, and five silent partners. The maximum number of partners is undefined. Partner liability is similar to that of simple limited partnerships. Contrary to other partnerships, the manager may free shares towards

losses and profits. Partner liability in management is similar to that of simple limited partnerships. This form of partnership is used for medium-sized companies, generally of closed type.

**Corporations:** The current legal context defines these as those that require a minimum of five partners and with an undefined maximum number of partners. Partner liability is limited to the amount of their investments. Those contributing industry may earn profits or free shares. Partners may be part of the board of directors or legal representatives or employees of the partnership. This form of association is used for large companies.

### **b. Non-profit entities**

Non-profit entities are involved in many fields of human activity, often covering those functions that government is unable to provide. They do not pursue financial profit, attempting instead to benefit society. Non-profit entities generate enormous physical and moral profit for those that receive their help, but with no pecuniary gains for their members or founding partners. Thus, the legal and tax treatment they receive is different to that aimed at profit-oriented entities or commercial partnerships.

### **c. Associations**

Associations are entities that emerge from the permanent joining of two or more members. Its altruistic ends may refer to the social conglomerate in general or to a sector of it, or may be aimed at encouraging, advocating and promoting the common interests of the members. Thus the field of work for associations may refer to diverse ends such as, for instance, environment, education, cultural, recreational, charity, scientific or religious. Associations emerge as an agreement of wills, linked through contributions in money, kind or activity, towards an end. The single will, as a result of the merging of the individual wills of the associates, is one of the definitive features of associations, in contrast with other groups such as foundations. The will of the majority is the will of the association, and it defines the bylaws and fundamental decisions of the entity. Associations are autonomous in their creation and operation. Associations can renovate, modify, or dissolve by will of the majority of its members, as per their bylaws, which, in turn, are subject to reforms at any time by that same will. They do not require starting assets in order to operate and have the legal capability to buy goods and generate funds.

### **d. Cooperatives**

These are companies formed as non-profits in which workers or users, as the case might be, are at the same time investors and managers of the company created in order to distribute or produce jointly and efficiently goods or services to satisfy the needs of their members and of the community in general.

Cooperatives have, among others, the following features:

- Member entry and exit are voluntary
- The number of members is variable and unlimited
- They operate based on the principle of democratic participation
- They carry out continuing cooperative education

- Their assets are variable and unlimited; however, bylaws should establish a minimum amount of social investments deductible during the lifetime of the cooperative.
- They establish that social reserves and surpluses, in case of liquidation, are not subject to distribution.
- The minimum number of founding members is twenty although legal exceptions may occur.
- Liability is limited for cooperatives. This means that member liability is restricted to the value of their investments and cooperative liability towards third parties is limited to its social assets.
- Cooperatives must register at the “Superintendencia de Economía Solidaria” the entity that controls and monitors the cooperative sector.

### **e. Foundations**

Foundations are legal entities that emerge from private or public initiatives, allocating funds or goods towards an altruistic end stipulated in their incorporation. A donation is mandatory to create a foundation. This contribution may be in the form of money or any kind of goods. The document of incorporation should indicate the total amount of the said initial contribution. Also, the legal representative or the tax auditor should indicate, in writing, that the contribution was indeed made.

Foundations are not necessarily the product of agreeing wills, since only one will is sufficient to create a foundation. Once the will is expressed, the means to realize it are allocated and the authorities officially recognize it, the entity does not require further manifestations of the will of the founder or founders to carry out and reach its objectives. The initial will is somewhat stratified; the rest will be a matter of carrying it out and interpreting it through its own means. In terms of assets, it is worth noting that the founding act is directly linked to the donations, since the founder assigns the assets to the entity being created in a unilateral act of endowment.

## **Conclusion and Recommendations**

A forest management project that wishes to include a CDM component should necessarily link the largest number of potential actors in the region where the project will be implemented. The association scheme to be used could be chosen according to the particular conditions of each territory and jurisdiction. What is important in this process is to select actors and institutions that can participate through a joint effort.

The partnership pattern chosen to implement a project should take into account the following aspects:

- Focus on a strategic vision that goes beyond mere donations or financial disbursements, and that commits to participating contributing time, technological information, facilitating market alliances and links, as well as other assistance resources that we know as social responsibility.
- Join abilities, experiences, ingenuity and creativity. Develop tools to design projects according to necessary time periods, regardless of public administration terms.



- Be aware that economic development is not easy to achieve; it requires opportunities as well as rights and duties. Economic equality is not possible. What is possible is to reduce extremes. The solution does not lie in distributing wealth, but in generating wealth with distribution alternatives achieved through personal efforts.
- Function as a bridge between regional and international actors in order to mobilize resources from different sources and also to link diverse institutions through the projects.

## References

- CORNARE. 1989 Cuadernos de Investigación y desarrollo regional. Documentos de trabajo para PRISER.
- Food and Agriculture Organization of the United Nations (FAO) 2002 Colombia y Holanda . Proyecto GCP/COL/022/NET. Desarrollo de la Participación Comunitaria en el Sector Forestal, Fase II “PACOFOR”. Misión de Evaluación Final. Bogotá. D.C. 34 p.
- Luis, C.N.L. 2002 Un procedimiento para la planeación participativa en el nivel local. CVC.

## Resumen

Este artículo presenta una serie de consideraciones legales, las cuales deben ser tenidas en cuenta en el diseño de proyectos MDL y de servicios ambientales. Estas consideraciones se originan de la experiencia del establecimiento de un proyecto de manejo sostenible-servicios ambientales en Colombia. El artículo muestra primero la importancia de tener en cuenta los regímenes formales e informales de tenencia de la tierra y las costumbres de la comunidad, y suministra los pasos necesarios para la elaboración de un ejercicio de síntesis situacional en el diseño del proyecto forestal. Luego presenta la manera de identificación y conformación de la asociación más apropiada de actores para el proyecto.

## Propiedad tenencia y acceso a los recursos

Uno de los factores de mayor importancia que desde la perspectiva legal y social que deben ser contemplados dentro de un proyecto de MDL y de venta de servicios ambientales es el análisis, la evaluación, el inventario y la caracterización de los sistemas de tenencia de la tierra, bajo un espectro de respeto a los conceptos locales de propiedad del suelo y de los recursos naturales, en consonancia con los preceptos legales vigentes en la jurisdicción donde se desarrolle el mismo. En este sentido, se deben identificar las instancias estatales e institucionales con incidencia espacial dentro del desarrollo del proyecto y evaluar la viabilidad formal y sustancial para su implementación.

Una vez desarrollada la claridad conceptual frente a aspectos trascendentales como el legal, el social, el institucional y el territorial se puede proceder a la construcción de un proceso que permita identificar la posibilidad de participación de los diferentes actores involucrados en el proyecto con una perspectiva clara de la real oportunidad de actuación de cada uno de los mismos, logrando que la propuesta jurídica se convierta más en un proceso de articulación de iniciativas regionales, en un esquema de concertación y construcción desde lo local, que en un proceso de imposición institucional, el cual a la larga, corre el riesgo de fracasar por su eventual ausencia de legitimidad.

En la fase inicial del proyecto se evidencia la necesidad de comprender la propuesta dentro del marco dado por la normativa aplicable al contexto regional. Esto se hace mediante un procedimiento simple y esquemático con el cual se construye un diagnóstico del marco social, institucional y legal. Este procedimiento se le conoce también como síntesis situacional o mapeación de la normativa. Este procedimiento permite reflejar las potencialidades y debilidades de las diversas opciones legales relacionadas con la propiedad, tenencia o uso de los recursos naturales, y entender el proceso histórico que las comunidades han efectuado sobre los mismos. Este diagnóstico servirá de base para la articulación de una propuesta que abra el espacio de participación de cada uno de los actores regionales, nacionales e internacionales, garantizando en lo posible desde lo formal y lo sustancial que los esquemas y conceptos de propiedad y acceso a los recursos naturales renovables no serán vulnerados y que a lo sumo estos marcos conceptuales se verán sometidos a un

redireccionamiento legal, técnico y económico en aras de garantizar la sostenibilidad ambiental, social y económica de un ecosistema.

En consonancia con lo anterior, el proceso referido debe considerar como mínimo los siguientes pasos:

- 1) Régimen legal de la propiedad: Busca identificar los modos de adquirir el derecho a la propiedad y la situación particular de la comunidad beneficiada con el proyecto en yuxtaposición a la normatividad existente en la materia.
- 2) Modos de acceder al aprovechamiento de los recursos naturales desde la perspectiva legal y social: Este acápite determina la posibilidad de acceder al uso, al goce y a la disposición de los recursos naturales renovables, dado que en algunos eventos pueden existir afectaciones o limitaciones sobre los predios que impiden obtener provecho de los mismos para quienes ostentan la calidad de propietarios, poseedores, tenedores o usuarios.
- 3) Contexto jurídico de la región: En este acápite se pretende identificar cual es la estructura jurídica y administrativa de la región, las instituciones y los actores así como su forma de concurrencia.
- 4) Las figuras organizacionales de la comunidad y su interacción con las estructuras o modelos de sociedad,: Se evalúan en este aspecto las características jurídicas, sociales y económicas locales y regionales partiendo de las formas asociativas que históricamente han sido adoptadas por parte de la comunidad.
- 5) Instrumentos de gestión pública y privada para la implementación del proyecto: Pretende este aspecto evidenciar las posibilidades encontradas en las diversas formas de gestión que se utilizan para afrontar la necesidad de aunar esfuerzos, tecnología y otros recursos que tiene un individuo o una comunidad para desarrollar una determinada actividad y superar los retos que impone el mercado. Entiendase por formas de gestión, la metodología con que se afronta una labor o trabajo; para el caso que nos interesa, podemos citar como ejemplo las solemnidades o formalismos con que se convoca a una comunidad (por escrito o verbalmente, mediante un miembro de la comunidad o con un técnico, con la participación de todos los actores o solo con los mas representativos, en una sola instancia o en varias instancias de acuerdo al esquema cultural local etc.) y por instrumento se entiende el objeto que sirve para materializar una propuesta, vale indicar un modelo Jurídico de asociación, un contrato escrito, una escritura un certificado etc.
- 6) Instrumentos de gestión para la articulación de actores (sociedades con y/o sin ánimo de lucro): Es este aspecto se identifican las diversas formas de asociación que como mecanismo de gestión se utilizan en el contesto del derecho comercial y de sociedades para afrontar la necesidad de aunar esfuerzos, tecnología y otros recursos que tiene un individuo o una comunidad para desarrollar una determinada actividad y superar los retos que impone el mercado (sociedades por partes de interés, sociedades por cuotas y sociedades por acciones, cooperativas, corporaciones, etc)

- 7) Lineamientos para determinar la elección del instrumento Corporativo: se pretenden abordar en punto, las diversas ventajas comparativas entre las figuras asociativas evaluadas en el panorama Normativo local, con el fin de brindar los elementos de juicio necesarios para que el equipo executor del proyecto seleccione el mejor instrumento de integración Estado – Sociedad para el MDL. Este acápite es necesario solamente en aquellos proyectos en los que la propiedad, tenencia, posesión y/o uso este en manos de diversos actores. A mayor cantidad de actores sociales involucrados mayor importancia tiene el definir un instrumento corporativo de base democrática.
- 8) Mecanismos jurídicos de aplicación en el MDL: Dado que uno de los objetivos del proyecto es fomentar el aprovechamiento sostenible de los bosques se identifican en este punto los diferentes mecanismos e instrumentos legales para comercializar los servicios ambientales dentro de la perspectiva de la experiencia internacional.
- 9) Propuesta de Organización Corporativa: y eventual estructura estatutaria para la Corporación (modelo de contrato social): Seleccionado el instrumento por los actores regionales se pretende acompañar a los mismos hasta la instancia de creación y consolidación del mismo, aprovechando la dinámica generada por el proyecto y garantizando al máximo su estabilidad futura.
- 10) Durante la fase de diseño deben establecerse instrumentos que correspondan con la legislación nacional e internacional y que estén en capacidad de adaptarse a lo local. Para ello deben integrarse los procesos de comunicación, sociabilización y concertación que permitan interactuar a los actores involucrados en el proyecto, con instancias claras de decisión y consulta, en este aparte se recomienda la implementación de mecanismos como los foros regionales y las mesas de concertación. (ver numeral 2)
- 11) Finalmente se resalta en este punto la necesidad de fijar desde el planteamiento y ejecución del proyecto los instrumentos que permitan garantizar que el derecho de todos los servicios ambientales derivados del mismo pertenecerían y serán negociados para y por los propietarios (pequeños o grandes, individuales o colectivos) de la región. En este sentido los beneficios del proyecto deben constituirse y visualizarse como un ingreso social y económico dirigido a cada uno de los participantes en proporción a su aporte individual, sin vulnerar o poner en riesgo el derecho a la propiedad y el acceso a los recursos naturales de acuerdo a los preceptos legales existentes en cada caso.

## Formas de asociación

Que permitan llevar a cabo un proyecto:

Explicar que cada uno de ellos (sector privado, sociedad civil o estado) pueden ser participantes de proyectos por sí solo o que se pueden agrupar/asociar

Formas para combinar sector privado-sociedad civil y estado

Configurado y construido el esquema de participación del proyecto, definidos los actores y consolidado el interés comunitario, adoptados los instrumentos de comunicación entre las diferentes partes del proyecto y aprobado el modelo de

desarrollo forestal de la región, se abre paso la necesaria construcción de una figura jurídica, con capacidad de articular y potencializar el esfuerzo de todas las instancias regionales que fueron congregadas hasta esta fase del proyecto permitiendo generar alianzas y consolidar la ejecución de las propuestas del modelo de desarrollo.

En este punto del proceso se hace necesario acudir al análisis de la estructura de las diferentes formas de asociación y producción que permitan la participación transparente, democrática y simultánea del sector público o estatal, del sector privado o empresarial y de la comunidad local.

La dinámica social actual consagra en su mayoría el derecho a la libre asociación, este en esencia, es el derecho de todas las personas a sumar sus voluntades a través de esfuerzos y bienes materiales e inmateriales de un modo estable y permanente para alcanzar fines comunes.

En sentido amplio asociación no quiere decir otra cosa que la unión de dos o más personas que a través de su voluntad, acuerdan unir sus esfuerzos con miras a un fin común, obligándose cada uno de ellos a cooperar en el logro del fin propuesto, mediante una organización estable.

### **1. La intersección sectorial; lo público, lo social y lo productivo.**

Existe una evidente posibilidad desde lo teórico de clasificar la estructura social de un territorio llámese Estado, región, provincia etc. Esa forma de clasificación se funda en el análisis de los actores que se desenvuelven dentro del mismo. Por lo general el esquema organizacional dentro de un territorio en donde habita una población humana esta compuesto por tres sectores a saber: a) El público o institucional, b) el privado productivo o empresarial y c) El comunitario o social, estos reúnen dentro de si a un grupo homogéneo de actores, instituciones, tradiciones y características particulares. Es tal la relevancia de esta clasificación que puede afirmarse que la tendencia de política de un territorio se mide en virtud al tamaño o injerencia de uno de estos sectores dentro de la dinámica del territorio.

### **2. Elementos para determinar el modelo de asociación y la selección del sector que lo jalonará.**

Si bien la mayoría de los esquemas Constitucionales de la teoría del estado moderno, ubican al sector público o gobierno como un responsable de la atención de las necesidades básicas de la sociedad, dentro de claros conceptos de igualdad, equidad, solidaridad y justicia, en particular con aquellos a quienes, por su condición de debilidad, se encuentran en posición de desventaja real y sustancial frente al resto de la población, esto no quiere decir que la comunidad no deba tomar parte en sus decisiones, en la planeación de su acción y entorno, en la gestión de sus asuntos y en la vigilancia del comportamiento de sus funcionarios y de la destinación de sus recursos.

Enmarcado dentro de este contexto, las comunidades históricamente han venido desarrollando desde el punto de vista jurídico y social algunos modelos de asociaciones o agremiaciones que han permitido obtener un nivel de organización social tal que permite aligerar el desarrollo económico regional y que puede permitir la inclusión de un componente MDL en el proyecto.

Estas figuras asociativas han tenido las siguientes funciones:

Fomentar la construcción de comunidad como factor de respeto, tolerancia, convivencia y solidaridad para el logro de la paz, para lo que se requiere el reacomodo de las prácticas estatales y la formación ciudadana;

- Promover la concertación, los diálogos y los pactos como estrategias del desarrollo.
- Validar la planeación como instrumento de gestión del desarrollo de la comunidad.
- Incrementar la capacidad de gestión, autogestión y cogestión de la comunidad.
- Promover la educación comunitaria como instrumento necesario para recrear y revalorizar su participación en los asuntos Locales, Regionales y Nacionales.
- Promover la construcción de organizaciones de base y empresas comunitarias.

Igualmente existen otros tipos de instrumentos de gestión configurados en torno a la iniciativa carácter privado, los cuales pueden ser catalogados como sociedades y o asociaciones que igualmente pueden contener o no, ánimo de lucro.

Dentro de los mecanismos de gestión privada encontramos las diversas formas de asociación que se utilizan para afrontar la necesidad de aunar esfuerzos, tecnologías y otros recursos que tiene un individuo o una comunidad para desarrollar una determinada actividad y superar los retos que impone el mercado.

La simple reunión de los individuos para alcanzar el fin común, no es suficiente para conformar el tipo de organización que se desee, pues se debe distinguir entre las asociaciones de personas con ánimo de lucro y sin ánimo de lucro, es decir, las primeras hacen referencia a las sociedades civiles y comerciales; y las otras hacen alusión a las Corporaciones, Fundaciones y ONG's en general.

Las asociaciones de personas con ánimo lucrativo se dividen en Sociedades Mercantiles y Sociedades Civiles, la diferencia esencial entre unas y otras es la actividad desarrollada, pues mientras en las Mercantiles desarrollan un objeto esencialmente económico, las Sociedades Civiles centran sus esfuerzos en alcanzar otro tipo de objetivos diferentes a los económicos.

### **a. Las sociedades mercantiles**

Se dividen en tres grupos: Sociedades por partes de interés, sociedades por cuotas, Sociedades por acciones.

#### *Sociedades por partes de Interés*

Dentro de éstas encontramos las Sociedades Colectivas y las Sociedades de Hecho; Las Sociedades Colectivas: Normalmente el contexto legislativo actual las define como aquellas que requieren de una cantidad mínima de dos socios, la cantidad máxima de integrantes puede ser indefinida, la responsabilidad de los socios es siempre solidaria e ilimitada aunque la ley afirma que es subsidiaria, los aportes de industria no tienen estimación económica específica y no integran el capital social, todos los socios son administradores pero pueden delegar esta labor en uno de ellos o en un tercero, generalmente esta forma asociativa se aplica para pequeñas empresas de carácter familiar y el motivo de su asociación se realiza en razón de las personas que la conforman (Intuito Personae ).

Las Sociedades de Hecho: Normalmente el contexto legislativo actual las define como aquellas que como su nombre lo indica no se constituyen por escritura pública, igual que las colectivas la cantidad mínima de socios es de dos y la máxima es indefinida, la responsabilidad de los mismos es solidaria e ilimitada, la participación de los socios se ajusta a las condiciones que ellos acuerden, éste tipo de sociedades corresponden a industrias artesanales, comercios minoristas, servicios de profesionales y artes u oficios.

#### *Dentro de las Sociedades por Cuotas*

Se dividen en Sociedades en Comandita Simple y Las Sociedades de Responsabilidad Limitada:

Las Sociedades en Comandita Simple: Normalmente el contexto legislativo actual las define como aquellas que mínimamente deben estar conformadas por un socio gestor y un socio comanditario, su número máximo normalmente puede ser indefinido, la responsabilidad del socio gestor es solidaria e ilimitada y la de los comanditarios se limita al monto de sus aportes, normalmente el socio gestor aporta industria o trabajo, este también administra y representa legalmente a la sociedad, los socios comanditarios solo pueden representarla como delegados del gestor, esta forma asociativa se aplica en muchos casos a empresas pequeñas de índole familiar.

Las Sociedades de Responsabilidad Limitada: Normalmente el contexto legislativo actual las define como aquellas que tienen un mínimo de dos socios y un máximo de 25, la responsabilidad de los socios se limita al monto de sus aportes, pero alguno o todos pueden estipular una mayor responsabilidad o prestaciones accesorias o garantías suplementarias, los aportes de industria no tienen estimación de su valor y no integran el capital social, la administración y representación de la Sociedad corresponde a todos, pero la Junta de Socios puede delegarla en un gerente, esta forma asociativa se aplica a pequeñas y medianas empresas.

#### *Finalmente dentro de las Sociedades por acciones*

Las cuales se dividen en Sociedades en Comandita por Acciones y Las Sociedades Anónimas:

Las Sociedades en Comandita por Acciones: Normalmente el contexto legislativo actual las define como aquellas que tienen un mínimo de seis socios, un gestor y cinco comanditarios, su número máximo es indefinido, la responsabilidad de los socios es similar a la Sociedad en Comandita Simple, contrario a las otras sociedades el gestor puede liberar acciones de industria con cargo a pérdidas y ganancias de cada ejercicio, la participación de los socios en la gestión es similar a la comandita simple, esta forma asociativa se aplica a empresas medianas, generalmente de tipo cerrado.

La Sociedad Anónima: Normalmente el contexto legislativo actual las define como aquellas que tienen un mínimo de cinco socios y máximo indefinido, la responsabilidad de los socios es limitada al monto de sus aportes, el aportante de industria puede percibir utilidades o liberar acciones de industria, los socios pueden ser miembros de la junta directiva o representantes legales o funcionario de la sociedad, esta forma asociativa se aplica a grandes empresas.

## **b. Las entidades sin ánimo de lucro**

Las entidades sin ánimo de lucro se desempeñan en multitud de campos de la actividad humana, en muchos de los cuales cumplen funciones que no alcanza a prestar el Estado. Como su nombre lo dice, al desarrollar su acción, no buscan obtener una ganancia económica sino generar un beneficio para la sociedad. Las entidades sin ánimo de lucro producen enormes ganancias físicas y morales para quienes son objeto de su ayuda, pero ninguna utilidad pecuniaria para quienes son sus miembros o fundadores. Por esta razón el tratamiento jurídico y tributario que reciben es diferente a los planteados para las entidades constituidas con ánimo de lucro o sociedades comerciales o mercantiles.

Definiciones Sobre Algunas Entidades Sin Ánimo de Lucro Sujetas a Inscripción en Cámara de Comercio

## **c. Asociaciones y corporaciones**

Las Asociaciones y Corporaciones son, en términos generales, entidades que surgen de la unión permanente o estable de dos o más personas naturales o jurídicas. Su finalidad altruista puede estar referida al conglomerado social o en general a un sector del mismo, o bien, puede orientarse al fomento, defensa y promoción de intereses comunes de los asociados.

Así, el campo de trabajo de las Asociaciones y Corporaciones puede estar referido a los más diversos campos, de suerte tal, que pueden tener objetivos ambientalistas, educativos culturales, recreativos, de beneficencia, gremiales, científicos, religiosos, etc.

La Asociación o Corporación, como su nombre lo indica, surge del acuerdo de una pluralidad de voluntades que se vinculan mediante aportes en dinero, especie o actividad, en orden a un fin. La voluntad única, como resultante de la integración de las voluntades individuales de los asociados, mediante el mecanismo del sistema mayoritario, es uno de los rasgos definitivos de la Corporación, frente a figuras como la Fundación. La voluntad de la mayoría es la voluntad de la Corporación y de esa voluntad depende su régimen estatutario y las decisiones fundamentales de la entidad. La Corporación es pues autónoma en su creación y en su funcionamiento.

La Corporación puede renovarse, modificarse o disolverse por la voluntad mayoritaria de sus asociados, en la forma prevista en sus estatutos, los cuales a su vez son susceptibles de reforma, en cualquier momento, por ministerio de esa misma voluntad.

En cuanto al patrimonio de las Corporaciones cabe decir que es de carácter abstracto, dado que no requiere de un patrimonio inicial para su existencia puesto que posee la capacidad jurídica para adquirir bienes y crear un patrimonio.

## **d. Cooperativas**

Son empresas asociativas sin ánimo de lucro en las cuales los trabajadores o los usuarios, según el caso, son simultáneamente los aportantes y los gestores de la empresa creada con el objeto de distribuir o producir conjunta y eficientemente bienes o servicios para satisfacer las necesidades de sus asociados y de la comunidad en general.

Las Cooperativas poseen entre otras las siguientes características:

- Tanto el ingreso de los asociados como su retiro son voluntarios
- El número de asociados es variable e ilimitado



- Funcionan con el principio de participación democrática
- Realizan permanentemente actividades de educación cooperativa
- Su patrimonio es variable e ilimitado; no obstante, los estatutos deben establecer un monto mínimo de aportes sociales reducibles durante la existencia de la cooperativa.
- En ellas se establece la irrepartibilidad de las reservas sociales y en caso de liquidación las del remanente.
- El número mínimo de sus fundadores será de veinte asociados salvo excepciones legales.
- Las cooperativas son de responsabilidad limitada. Esto quiere decir que la responsabilidad de los asociados se limita al valor de sus aportes y la responsabilidad de la cooperativa para con terceros al monto de su patrimonio social.
- Las cooperativas deben registrarse ante la Superintendencia de Economía Solidaria, esta entidad ejerce el control y vigilancia del sector cooperativo

### **e. Fundaciones**

Las Fundaciones son personas jurídicas surgidas por iniciativa privada o pública mediante la destinación o afectación de un patrimonio o conjunto de bienes a una finalidad altruista determinada en su acto de constitución.

La Constitución de una fundación necesita siempre de la realización de un aporte por una persona natural o jurídica. Este aporte puede darse en dinero o en toda clase de bienes muebles o inmuebles.

El documento por medio del cual se constituye una fundación deberá expresar el monto total de dichos aportes iniciales. Adicionalmente, el representante legal o el revisor fiscal manifestaran por escrito que el pago de dichos aportes efectivamente se realizó.

La fundación no surge necesariamente del acuerdo de voluntades, dado que una sola voluntad puede generar su nacimiento. Expresada la voluntad, dispuestos los medios para realizarla y obtenido el reconocimiento de las autoridades, el ente no requiere en principio de posteriores y periódicas manifestaciones de la voluntad del fundador o fundadores para desarrollar y alcanzar sus objetivos.

La voluntad inicial queda como estratificada; todo lo demás será desarrollarla e interpretarla por conducto de sus órganos propios, sin embargo nada impide que el fundador en el acto de creación determine la inmodificación de los objetos y fines planteados.

En cuanto a su patrimonio, cabe anotar que el acto de fundación esta directamente relacionado a la dotación dado que el fundador asigna el patrimonio al ente que erige, este acto de dotación es un acto unilateral de disposición gratuita que exige capacidad para enajenar.

## Conclusión y Recomendaciones

Necesariamente un proyecto de manejo forestal que quiera incluir un componente MDL, debe vincular al mayor número de actores potenciales asentados en la región donde se pretenda desarrollar el proyecto, el esquema de asociación que se seleccione podrá ser escogido de acuerdo a las especiales particularidades de cada territorio y jurisdicción, lo importante es que este proceso sea seleccionar actores e instituciones que puedan intervenir aunando esfuerzos a través del esfuerzo común.

Frente a las experiencias evaluadas en torno al impulso de nuevos modelos de desarrollo económico a nivel internacional, que a pesar de sus obvias diferencias con los esquemas de MDL, pueden ser equiparables a este tipo de proyectos y que vienen siendo implementados centrando sus esfuerzos en el impulso a las unidades productivas básicas, puede llegar a decirse que la figura que se escoja debe caracterizarse por atender los siguientes aspectos:

- Centrarse en una visión estratégica que más allá de la simple dádiva o el desembolso económico, se compromete a participar aportando tiempo, información tecnológica, facilitando alianzas y puentes de mercado así como otros recursos asistenciales (jurídicos, tributarios, etc.) es lo que hoy conocemos como Responsabilidad Social.
- Poseer áreas y métodos de trabajo propios, que cubran necesidades que el gobierno, por su propia naturaleza, difícilmente pueda atender.
- Conjuntar habilidades, experiencias, ingenio y creatividad. Desarrollar herramientas para diseñar proyectos comunes al plazo y permanencia necesarios sin que estos dependan de los tiempos de las administraciones públicas.
- Ser consciente de que el desarrollo armónico de la sociedad no es fácil de lograr, exige oportunidades acompañadas de derechos y obligaciones. La igualdad económica no es posible. Lo que sí es posible es que los extremos no se alejen, se reduzcan. No es la distribución de la riqueza la solución, es más importante la creación de la riqueza con alternativas de distribución logradas mediante el esfuerzo personal.
- Servir de puente entre los actores regionales e internacionales. Esto permite ser agente movilizador de recursos de diversas fuentes y también permite vincular a diversas instituciones en los proyectos.

# Pulpwood Plantations as Carbon Sinks in Indonesia: Methodological challenge and impact on livelihoods

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## **Abstract**

*The Clean Development Mechanism (CDM) was created under the Kyoto Protocol, in order to help industrialized countries achieve their Greenhouse Gas (GHG) emission reduction targets at a lower cost. A second objective of the CDM is to help developing countries achieve sustainable development. To become eligible these projects have to demonstrate their additionality, and have a positive impact on local communities' livelihoods. But the methodologies that have been proposed seem unsatisfactory, and the social impacts are often debated. This paper provides new insights on these methodologies, their weaknesses and potential improvements, and explores the social impacts of an afforestation/reforestation CDM activity with a high carbon sequestration potential.*

*We studied a large-scale pulpwood plantation in Indonesia, which is perceived as a way to sequester great quantities of carbon in a short time, and as an alternative to natural forest supplies for the domestic pulp industry. We collected complete data on the establishment and production costs, and the carbon sequestration potential. We also took advantage of our ongoing research on the Indonesian Pulp & Paper (P&P) sector to interpret these results, and evaluate the relevance of widely used and proposed methodologies for additionality assessment. Finally, research on site allowed us to obtain data on the plantation's impact on the people living nearby.*

*According to our research, fast-growing tree plantations face production costs far higher than revenues gained from the sale of carbon credits, even with a relatively important carbon sequestration. But calculations made according to usual methodologies can be misleading. We show that context analysis is more relevant, and that profitability calculations lead to wrong conclusions. From a social point of view, pulpwood plantation projects could increase livelihoods in the short term, but this depends very much on the opportunities for locals to combine employment in the plantation with land uses generating higher incomes per hectare.*

## Introduction

As the Kyoto Protocol will come into force after it is ratified by Russia, the flexibility mechanisms may soon become reality. One of these, the Clean Development Mechanism (CDM), which provides the opportunity to finance projects in developing countries through the marketing of carbon emissions credits in order to favor their development (Karsenty and de Gouvello 2003), had most of its rules approved during the COP9 in Milan, December 2003 (SBSTA 2003). But the Land Use, Land Use Change and Forestry Sector (LULUCF) still remains highly controversial, and its guidelines are subject to interpretation, such as how to assess whether a project would not have occurred without CDM financial contribution. This eligibility criteria is called “additionality.” In the literature, various definitions and nuances have appeared, and expressions such as “financial additionality,” “GHG emissions additionality” (or environmental additionality), “investment additionality” (or project additionality) became popular, depending on what had to be considered additional (an activity, a subsidy or an emission reduction), or how it was tested (by an economic calculation, the presence of barriers, etc.). In this paper, additionality is when a afforestation/ reforestation activity would not have been undertaken if it hadn’t been included as a CDM project.

The challenge of additionality still needs to be overcome. Scientists have not been able to propose more than general remarks and orientations concerning additionality. The institutions in charge of the definition of the rules and modalities have not formalized methods that can be used in their actual state. Environmental NGO’s have usually been arguing that these kinds of commercial projects were not additional, except if rigorously proven by the candidate. The solution eventually adopted is to ask the project developers to attach the methodologies to their application files, and these are evaluated by the Methodological Panel and the Executive Board for CDM.

Concerning large-scale commercial plantations, it is expected that the methodology will either focus on the calculation of the Net Present Value<sup>1</sup> (NPV), the incremental cost approach used by the Global Environment Facility, or be more qualitative and based on uses trends in the forestry sector<sup>2</sup>. All these approaches have their logic, and allow for efficient project assessment. Nevertheless, our observations of the Indonesian forestry sector tell us that these approaches could also lead to wrong and contradictory conclusions. Even though some plantation companies in Indonesia are studying how to benefit from CDM financing, we have some doubts about the role of carbon revenues for pulpwood plantation establishment. In studying the pulp and paper (P&P) sector, which may potentially use carbon credits for the financing of its activities, and which has the capacity to quickly sequester large quantities of carbon, we can contribute to the debate on the capacity of the CDM to achieve its environmental goals.

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<sup>1</sup> To date, no methodology for carbon sequestration projects has been accepted, but this criteria has the favor of CDM developers for its rather simple use.

<sup>2</sup> This is the option chosen by the Plantar project, which is the major CDM candidate having an industrial plantation component (Prototype Carbon Fund 2001).

In this paper, we talk about CDM projects at a very large-scale, with major financial sums at stake and occupying tens of thousands of hectares. The social impacts are obviously important, especially in the case of industrial monospecific plantations. These types of plantation are controversial and criticized for several reasons, including supposed bad social impacts. The purpose of this paper is not to make a complete review of this debate<sup>3</sup>, but to describe the social impacts we observed in the field. We also explore the potential to combine the CDM project with other land uses of higher added value, the former having the potential to improve local incomes when the labor force remains.

## Material and methodology

Our analysis occurs at two levels: the P&P sector; and the plantation project. We use data from an Indonesian pulpwood plantation company to obtain realistic production costs, carbon sequestration and revenues figures, and data on livelihoods. We also use our experience and research on the Indonesian P&P sector as a whole, its development and strategies for wood supply, and the history of financial incentives for plantation development. This two-level approach enables us to interpret the results from one potential project candidate, while placing it in a more global context.

The project data were collected from the plantation company PT Musi Hutan Persada (MHP), located in South Sumatra province, 150 km away from the provincial capital Palembang. The long cooperation with CIFOR to do research, and the possibility for CIFOR staff to freely collect data on site, was a great opportunity to gather the information needed for this study.

The plantation MHP covers an area of 193,500 ha, planted mainly with *Acacia mangium*, and aims at supplying the pulp mill PT Tanjung Enim Lestari located nearby. Both are not formally integrated as their respective majority shareholders are different. But the fact that long-term supply contracts have been signed since the beginning of the operations, and that both the pulp mill and the plantation were designed for cooperation, makes the plantation behave as an affiliated company to the mill.

We determined the plantation's annual production costs in order to record the financial flows, and distinguished between plots close to the mill (<50km), far from the mill (>140km), or at an average distance, as this had a noticeable impact on total cost. The interest rate for discounting at the Indonesian company level is 15%. A complete description of the methodology used for these costs calculations is available in Annex 2. We do not include transaction costs for a CDM project, even though these are potentially influential for large-scale projects, and would decrease part of the revenues from carbon credits by a few percent. On the one hand, these costs are very hard to estimate, and differ dramatically among projects as shown by Milne (2002). Their inclusion, however, would not change the conclusions of the paper as we will see later.

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<sup>3</sup> For a review of the debate on the fast-growing tree plantations, see Cossalter and Pye-Smith (2003).

Carbon sequestration data are based on the aboveground biomass growth figures on experimental plots in the plantation, and Hardiyanto *et al.* (2004). These data concern the amount of ADt/ha (Air Dry), i.e. the total aboveground biomass after the logging. We deduce the amount of BDt/ha (Bone Dry), which is the weight once the biomass is dry and without its moisture content, using a conversion factor of 0.49. After that we deduce the carbon content of the biomass, using a 0.5 conversion factor. As variations are observed between the plots, we average the figures for the three sets of data available. To be sure the carbon data are realistic, we estimate the carbon emissions due to the fuel consumption during the operations on site, including the felling-forwarding-loading-transportation.

To calculate the carbon revenues, we use tCER credits as defined at COP9, and assumptions on price of Locatelli and Pedroni (2003), without variation in time. The interest rate used to calculate the tCER price relative to the CER price is 6%:

$$\$TCER_0 = \$CER_0 - \frac{E(\$CER_{LifetimeTCER})}{(1+i)^{LifetimeTCER}},$$

and the lifetime for these credits is 5 years. With the hypothesis on CER prices being US\$3, US\$6, US\$9 and US\$12/tCO<sub>2</sub>-e, we calculate tCER prices as respectively US\$0.75, US\$1.51, US\$2.27 and US\$3.03/tCO<sub>2</sub>-e.

Research on the livelihoods impact of the project was done at the same plantation MHP in South Sumatra. We gathered data from the company on the labor in the plantation. Visiting the headquarters and units on the field, we could compare the figures for the standardized operations and the figures actually registered at the units level. We deduced average values from the theoretical and realized figures. The company tends to increase the number of partnerships with neighboring villages, and supports the creation of local cooperatives it can deal with. We could check the data given by the company through our research in one of these villages (Tanjung Agung, on the border of the concession), and the numerous interviews we had with the members of the cooperative. Data on livelihoods were also obtained in this village through interviews with the villagers about their activities. We could therefore identify three principal land uses (rice fields, rubber and coffee plantations), and their respective labor needs and incomes.

To explore the possibility of increasing the positive impacts of the CDM project, with the labor it can provide to locals in addition to their core activities, we first maximized the area potentially cultivated by the villagers using a Simplex algorithm. For this, we put constraints on the labor available in the village per month (details in Annex). The next step was to calculate the pulpwood plantation area that can be managed with the remaining local labor force, using a constraint on the labor per year. This constraint was fixed per year, because we observed that the villagers can work in the plantation at relatively far locations, with transportation provided by contractors. Then we can consider that an even flow of labor force is required every year in the plantation.

The idea is to understand to what extent both types of activities (CDM project and traditional local land uses) can be combined, rather than estimating the most

realistic scenario. Therefore, we did not use any economic parameters (like the investment capital needed or the income) to estimate the area cultivated by locals under traditional systems. On the contrary, by using constraints only related to the labor force available, we considered the pulpwood plantation as a real *side* activity that employs the remaining and unused labor force only.

## The Indonesian pulp and paper industry and pulpwood plantations

The P&P sector became a priority for the Indonesian government since the second half of the 1980s, as a source of export revenues and a way to promote national development (Iskandar 2003). Various kinds of incentives were offered to both the industry and the tree plantations, and the consequence was an extraordinary expansion of pulp and paper production capacities. The capacities doubled between 1996 and 2000, and in 2003 the equivalent needs in wood fibers are 25 to 30 million m<sup>3</sup>/year for pulp production.

Two of the biggest pulp mills in the world are located some 100 km from each other, and have been a major cause of deforestation in Sumatra. Each one has a capacity of around 2 million tons of pulp a year, and their cumulative wood consumption is 18 millions m<sup>3</sup> a year. They have already established acacia and eucalyptus plantations, but at an insufficient scale and mainly on forested lands, showing that investors were more interested in industrial expansion than in plantation estate establishment. We evaluate that each one would need around 400,000 ha of plantations to be sustainable, which is both a financial and organizational challenge. Today, the clear-cutting of local natural forests still accounts for 70 to 80% of their wood supply, a fact that generates great scepticism on the sustainability of the industry.

The main incentive for tree plantations establishment has been the creation of the Reforestation Fund in 1990, which aims at collecting taxes from the natural forest concessionaires and redistributing these to plantation companies for reforestation activities (Keppres29/1990), through free loans and public participation in the capital (Keppres255/KptsII/1991). Other non-financial incentives were created, like law PP7/1990 on their status, or the transmigration scheme that allowed plantations to get manpower from the public program aimed at transferring people from the densely inhabited island of Java to the outer islands of Sumatra and Kalimantan (SKB81/MEN/1990 – 376/KptsII/1990). Unfortunately, neither of these incentives achieved what was expected, and this was finally acknowledged by the government (see Table 1). According to a report on the impact of incentives, the direct subsidies resulted in 0.9 million ha planted in joint ventures when private companies only planted 0.7 million ha (Guizol 2003). On the one hand, the allowance of forested areas for pulpwood plantation establishment has proved to be a major disincentive for the P&P industry to invest in plantations when it had access to this cheaper raw material. On the other hand, the Reforestation Fund has been manipulated at a rather large scale, and many companies have received subsidies for larger areas than effectively planted. As a result, pulpwood plantations have been developed at an insufficient scale despite the multiple incentives available. Now, the majority of these incentives

have been suppressed and the P&P groups are establishing plantations at a higher rate, and on lands less suited such as peatlands.

**Table 1.** Area planted and allocated for plantation as for may 2002, per type of industrial plantation.

	Hectares effectively planted	Global area of the concessions*	% of the concession effectively planted
Plantations for pulpwood	1,402,279 ha	5,450,518 ha	25.5%

\* The plantable area may represent approximately two-third of the global area.  
Source: Iskandar 2003.

Real figures on the financial subsidies received by each company are not available, in part because of the large manipulations that happened in the process. However, we tried to make an estimation so that we could compare these with carbon revenues. According to figures provided by managers of companies that benefited from the Fund<sup>4</sup>, the amount of money collected at the beginning of the operations as a free loan for the total duration of the first rotation increased from Rp 760,000 in 1993 to Rp 1.2 million/ha in 1998. In the next section, we compare these results with the anticipated carbon revenues.

## Afforestation production costs and carbon sequestration revenues

Our research on the costs of pulpwood plantations, and the carbon quantities sequestered during each rotation, are summarized in Table 2, and Figure 1. The estimated carbon emissions due to the fuel consumption during the operations on site, including the felling-forwarding-loading-transportation, appeared to be marginal: 0.35tC/ha/rotation due to 600 liters of fuel.

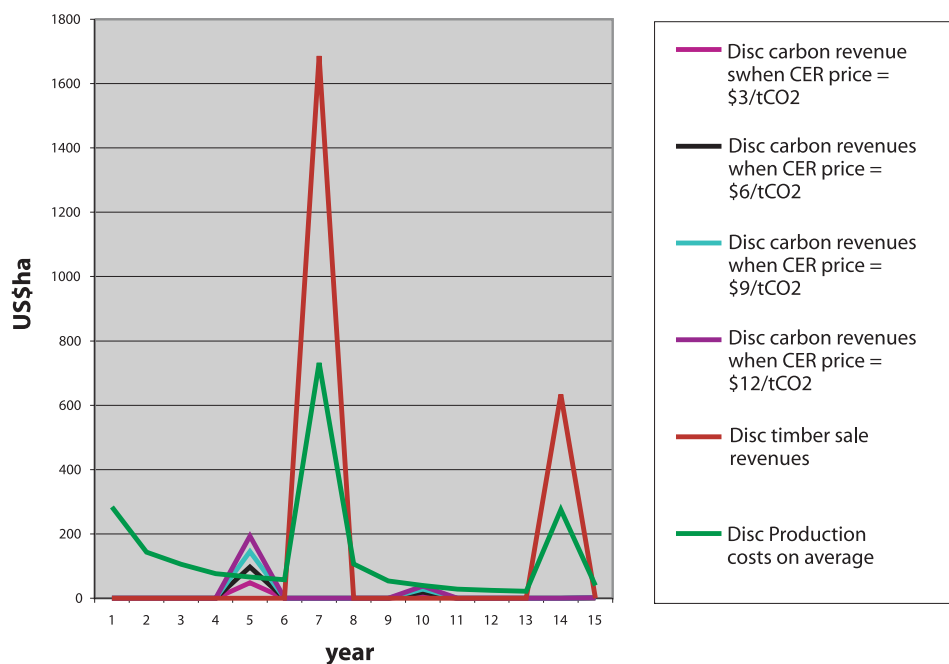
**Table 2.** Carbon flows.

Year	ADt aboveground biomass/ha	BDt aboveground biomass/ha	tC/ha
1	5,29	2,59	1,30
2	17,56	8,60	4,30
3	44,35	21,73	10,87
4	81,07	39,73	19,86
5	114,01	55,86	27,93
6	147,44	72,25	36,12
7	185,79	91,04	45,52

<sup>4</sup> Confidential interviews collected during a trip to East Kalimantan from 12-20 July 2004.



According to our calculations, the revenues from carbon sequestration and the participation to CDM are low compared to the costs to produce the timber for a commercial plantation. The most favorable scenario for the price of the carbon credits has revenues from their sale at between 10.8% and 13.2% of the production costs during a 30-year period. The least favorable scenario shows revenues between 2.7% and 3.3% of the production costs. Figure 1 details revenues from timber sales and from the sale of carbon credits. Whatever the hypothesis for the future price for tCER, carbon revenues seem to be nothing more than a small side revenue, with the real, core business being timber marketing.



**Figure 1.** Discounted financial flows.

Our analysis of the Reforestation Fund for tree plantation development is very useful, allowing us to conclude that carbon revenues are small. Indeed, subsidies were on average \$505 to \$797/ha for unpaid interests over seven years, whereas the carbon revenues amount to \$85 to \$338/ha after five years, depending on the assumptions for the tCER market price.

Nevertheless, one may argue that this side money is significant, and may convince an investor to establish the plantation, if these additional revenues help achieve the profits desired by the decision-maker. Herein lies the relevance of our broader study of the P&P sector, which gives us the tools to demonstrate why it may not be the case, and allows us to interpret the figures correctly.

## **Discussion of the methodology for additionality statement: Loopholes of a neoclassical profitability study**

Using the results of our research and experience of the sector in Indonesia, we reveal cases that show the irrelevance of an additionality test based on the usual profitability study.

### **1. Artificially low wood price for restructuring plantations**

Plantation companies that supply pulp mills are hardly independent companies, even if the shareholders are apparently not related to the mills. The P&P groups in Indonesia control numerous enterprises that are active as plantations, mills, wood traders, contractors, and it is usually very difficult to know who controls the business. In particular, it appears that a few public industrial plantations companies in Sumatra, which used to be active as plywood producers in the past, created joint ventures with investors affiliated to the P&P groups, even if the Ministry of Forestry (MoF) was considering these entities as having only simple agreements with the mills for wood supply. As a direct consequence of this reorganization, the operations are decided by the mills, with a director of the company being an employee of the P&P group, and the production sold at a very unclear and seemingly low price, in order that the public partner gets no profit from the transaction<sup>5</sup>.

The same type of scheme occurs with private and independent companies that used to produce plywood, but whose business has become unprofitable because of the closure of nearby plywood mills or sawmills, or poor growth rates for the species planted. Typically, these companies having plantation concessions were approached by the mills in order to restart the operations. As these plantation companies were in such a bad financial position, they were ready to accept any kind of deal, including further planting of fast-growing pulpwood species to feed the pulp mill. Therefore the price of the wood produced and delivered to the mills is very low and does not allow any substantial profit for these companies<sup>6</sup>.

In these two examples, a profitability study would have concluded that the projects are additional as the revenues are exceptionally low, when in fact they are not.

### **2. The major impact of "transfer pricing"**

For a few reasons, including the minimization of taxes and debt repayment, or profit capture, major Indonesian P&P groups have organized a fiber supply system that results in unrealistic or unknown purchase prices by the mills. In the case of the group Asia Pulp&Paper, an affiliated company called Arara Abadi manages the plantation concession used for the mill Indah Kiat, but is also in charge of purchasing fiber from outside sources to be sold to the mill. Prices at which the fiber is sold are made

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<sup>5</sup> Confidential interview with a director of one of these companies, Sumatra the 28 March 2004.

<sup>6</sup> Confidential interviews with employees of companies and local Forestry Offices in Riau, from 25-29 March 2004.

artificially high, for the mill does not receive the benefits that would result in taxes to be paid to the government. More important, the profits are enjoyed by the plantation owners only, and the debts at the mill level are not paid back. In the case of the other group, APRIL, the major shareholder created his own company to supply the mill with outside-sourced fiber. This system allows him to accumulate profits in this company, to the detriment of the group<sup>7</sup>.

These manipulations are common practice in Indonesia, and artificially move profits from one entity to another. It seems impossible in these conditions to make any calculation of profits for a pulpwood producer, and therefore to assess additionality of these plantation projects.

### **3. Effect of the Asian crisis on investment barriers**

A project candidate has also the possibility to assess additionality in describing an alternative “land use that represents an economically attractive course of action, taking into account barriers of investment” (FCCC/SBSTA/2003/L.27). These barriers to investment are a rather flexible concept, but usually mean that the risks are too high, or that the potential developers of the land lack access to capital. In Indonesia today, the effects of the Asia-wide economic crisis that started in 1997 are still widely felt. As a consequence, not only do the companies have difficulties in financing new activities, but also most of the schemes that used to be created in order to help rural populations were suppressed. After the fall of Suharto regime in 1998, and the decentralization process that started right after, many claims on the forestland by neighboring communities were accepted (Blomkvist 2000; Barber 2002). The State Forest Land was then partly acknowledged as being under the authority of newly created cooperatives for further management, and permits for alternative land uses were allocated by local authorities. As these lands are still forested, even if in a degraded condition, and as the main pulp mills in Sumatra are in an overcapacity situation relative to their fiber needs, the latter logically expressed interest in passing deals with the cooperatives for the rights to exploit the remaining timber of the forest and establishing pulpwood plantations. All the interviews we had with these right-holders on the land confirmed that they were in favor of palm oil cultivation, but that they could hardly find any investor willing to work together because of the high costs of establishment. This land use is very attractive to these people, because during the first five years they are paid salaries for their work on the plantation, and after they receive regular benefits from the sale of the production. If we compare this with deals passed with pulpwood plantation companies (US\$350/ha every 7 years), their benefits are several times higher in the case of palm oil trees (more than US\$200/ha/month<sup>8</sup>). But the P&P groups are able to impose their land use, as they provide fees for the chipwood produced during the land clearing, and they have the ability to finance the development of large areas.

In this case, taking into account the profitability of land use would have led to an assessment of the project as additional. The barriers to investment, i.e. the lack

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<sup>7</sup> Confidential interviews with private companies and CIFOR staff.

<sup>8</sup> Data collected in Sumatra by Romain Pirard in 2004.

of capital available to locals, are the factors making it not additional because there is no other choice.

#### **4. Fiber needs prevail on costs**

Since the beginning of the Indonesian P&P industry's expansion in the 1980s, most of the fiber supply has been based on natural forest exploitation, and the development of pulpwood plantations has been postponed until very recent times (Barr 2001). These were first established on the dry lands, but the concessions affiliated to the major pulp mills contain significant areas of peatlands. These are difficult to plant, as the company has to build canals for drainage, control the water levels, use innovative techniques, and face high risks of fires. Ultimately, they achieve only relatively low productivity rates. Therefore, the costs of pulpwood production are far higher than on drylands, around 20% more, not taking into account the risks of losses (Confidential report). The same companies that have always considered that their plantations on drylands, close to the mill, were not competitive when they had access to natural forests, now claim that they will develop hundreds of thousands of hectares of plantations on peatlands. Furthermore, they do so at a time when they face financial difficulties and are not capable of repaying their debts. Definitely, if using a NPV calculation<sup>9</sup> to assess the additionality of these new pulpwood plantation developments in Indonesia, these projects would be considered additional.

#### **5. Uncertainties prevail on revenues**

On the paper, the establishment of pulpwood plantations in Indonesia could be a lucrative business, even for export. International pulpwood markets exist, and flows of roundwood for pulp production, or chips, flourish around the globe. Japan, in particular, can import wood produced on Chilean plantations to feed its pulp mills. And Korea used to import chips from Australia or the U.S. (Neilson and Flynn 2002). With production costs potentially very low, as manpower and land are exceptionally cheap<sup>10</sup>, one would expect that investors to be very active in applying for industrial plantations concessions in Indonesia, and producing pulpwood either for export to nearby markets in China or Japan, or for internal pulp mills needs. Numerous uncertainties and risks may be the major reason why this never happened.

The huge debts of the pulp and paper groups operating in Indonesia<sup>11</sup> represent a valuable reason for the banks refusing to lend more money to projects considered as "high risk." Not only have their loans not been paid, but the banks also fear that the pulpwood plantations, established by these groups, will have no outlet if the mills go bankrupt. From an independent investor's point of view, the situation is even worse due to a lack of trust in these groups that continuously try to access the cheapest raw materials from natural forests, be it legal or illegal, public or private.

<sup>9</sup> As these developments are recent we do not have certain figures, but we evaluate that production on peatlands may cost around 50% more than production on dry lands.

<sup>10</sup> Most of Indonesian territory is classified as State Forest Land, and the concessionaires for industrial plantations just have to pay very low taxes and royalties, around US\$0.76/m<sup>3</sup> (Romain Pirard, 2004).

<sup>11</sup> Asia Pulp and Paper (APP), for example, is responsible of the plantation and pulp and paper operations for Sinar Mas Group in Indonesia and China, and has to repay around US\$13 billion in debt.

Uncertainty, as described above, is no doubt a central reason for the plantations not developing more on the vast grasslands available in Indonesia, while at the same time the pulp mills face a growing shortage of wood. But other uncertainties are also very disturbing for investors in Indonesia, where law enforcement is a pious wish. Indeed, there have been many cases in the past of concessions being given by the Ministry of Forestry, but overlapping either with other concessions, protected forests, or even community lands. Nowadays, with the decentralization process going on, the concessions previously allocated by Jakarta are contested by local powers, who want to change the regulations on land use. It is not unusual, in Indonesia, for a district chief to decide to allocate a mining concession on plantation land if it appears that it will be more profitable.

These uncertainties are so great that companies sometimes prefer to plant on more expensive and more scattered private lands, than on large state lands. This fact needs to be stressed as it proves that a project with lower profitability (planting on private land with higher production costs) can be chosen instead of another project with a higher uncertainty (state land with no sure rules and area).

## **6. Great ambiguities on the production costs**

Estimating the costs of a project is a hard task in the industrial plantation sector in Indonesia. A single glance at the feasibility studies of large-scale plantation projects in Indonesia, and what happens in the field, is enough to tell us about the lack of reliability of the predicted costs<sup>12</sup>. The latter is due to problems such as difficulties in working with local communities, overlapping with other concessions or claimed lands, conflicts over regulations between Jakarta and the provinces or districts, bad quality of the land in some areas, etc. Beside this, some costs can only be guessed, like those related to the rampant corruption in the country. And finally, some are invisible and are related to Transaction Costs Economics (Williamson 1985). Indeed, the quality of the wood supplied can be considered as an asset specificity, because the mill uses equipment adapted to a certain type of wood and aimed at producing a certain quality of pulp. Also, the uncertainty about the continuous supply of raw material is very critical for the mill, as it must run at almost full capacity to generate any profit. In fact, the investor uses perceptions of the costs and revenues, and not the real costs and revenues, those being truly impossible to predict for large-scale plantations in Indonesia.

## **7. Unknown investor's criteria for decision**

When considering the goals pursued by the investor, the loopholes of the neoclassical approach are known and have been described in theories of the firms (Gabrié and Jacquier 1994). When dealing with the case of an independent plantation company, the question of goals is not difficult to answer, as the quest for profit is the main motivation. But in the case of huge pulp and paper groups choosing a raw material

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<sup>12</sup> The companies use standard figures in the feasibility studies that cannot take into account area-specific conditions. The reason is less that they are not aware of this weakness, than that they do not need the most precise figures, or cannot know these.

supplying strategy, the question is more complex. Indeed, the shareholders may want an immediate profit (distribution of dividend, augmentation of the share's value on the stock exchange), but the managers may want to ensure the company is profitable in the long-term for their own position to be secured. The choice of wood supply could be an ideal means with which to distinguish these two motivations. Exploitation of forests is highly profitable but not sustainable, whereas plantations increase the company's debts first, but increase security in the long-term. In Indonesia, we also have to deal with the creditors' control of the strategy: either reimbursement is a priority, or closer control of the strategy for long-term supply as occurring in the APP case under international pressure.

This decision-making component in the simulation of the decision to plant needs more indepth study, because it can help explain some aberrant cases at least in appearance. The history of the pulp and paper industry in Indonesia is closely linked to the Suharto regime, and was largely based on favors to well-connected businessmen with access to cheap loans and wood from nearby natural forests (Barr 2001). These investors have, therefore, never been preoccupied with securing a sustainable wood supply, preferring to log as much wood as possible from the forests, as this resource looked somehow infinite (for their time horizon at least). The decision to establish plantations was not based on an economic calculation, or on a rational plan to optimize their investments in the long-term, but more on the feeling that they had to generate the greatest profits from the mills and forests they had. In this context, developing large-scale plantations means that the money is immobilized, instead of being secured elsewhere. And if there is a decision to plant trees to improve the image of the company abroad, nobody can predict how large this area will be.

## **Results for livelihoods impacts of the CDM project**

In a general way the development of tree plantations in Indonesia since the 1980s has been done through the conversion of natural forests, in both good and degraded conditions. Their establishment has been supported by the authorities and the military, and claims by locals related to land tenure were usually repressed. Since the fall of Suharto's regime in 1998, these practices have been reduced, and decisions tend to be more in the hands of local authorities through the decentralization process.

As we observed in several cases during our field research on plantation sites, establishment of the plantations (both tree or palm oil) often drastically reduced the area that villagers were using for shifting cultivation. A village of several hundred people could extend its authority over tens of thousands of hectares, mainly because of past shifting cultivation in the whole area. When plantations develop, they convert lands apparently useless to villagers, and progressively reduce the total area available for the shifting cultivation. As a direct consequence, the rotations shorten and the natural forest regrowth diminishes. Then the productivity falls because of a lack of fertility. Finally, villagers are surrounded by very degraded forests, and have usually no other choice than entering into partnership with plantation companies. This vicious circle happens in lots of locations in Sumatra, and companies can declare that villagers have agreed to get involved in these large plantations projects.

We observed also that the conversion of natural forests around the villages tends to reduce the productivity of other types of cultivation, because of the biodiversity loss, the spread of diseases, or the increasing number of vermin that used to stay in the forest (elephants, monkeys, wild pigs).

Talking about the negative social aspects of the large-scale pulpwood plantations, we should not forget they certainly have the lowest value of any land use in Indonesia. The standard partnerships between companies and local people usually end up with a so-called “profit-sharing agreement.” As transparency is not the rule for profit calculation, and for other reasons related to the absence of a market price for pulpwood in Indonesia, then locals usually end up with the payment of a fee equivalent to US\$0.5/ha/month. This is very low.

Beside these numerous problems related to the development of pulpwood plantations, some positive aspects exist and are worth mentioning. We observed that local salaries for seasonal work, such as the rice harvest or maintenance in the rubber plantations, were positively influenced by the establishment of industrial tree plantations. The companies seem to pay higher salaries, because they have to respect provincial regulations on minimum salary. This is not always the case with smallholders, and the competition on the labor market can force them to increase the salaries paid. Beside this, some villagers can benefit when the company contracts operations locally. We met some of these local contractors, and establishment of the plantation had been an occasion for them to significantly increase their capital. This sudden wealth, so far, has been mostly consumed through the purchase of motorbikes or televisions, but we expect that it will later be reinvested locally and will enhance local development.

The result of our calculations, as explained in “Material and methodology” section, is that on a maximum potential area cultivated by locals covering 2.9 ha/household, 2.3 ha are devoted to rubber plantations. This is close to what is observed in reality, and a bit higher because we voluntarily excluded financial constraints in our model.

Table 3 recapitulates the monthly labor for local cultivation, and the remaining labor available for establishing the pulpwood plantation as a CDM project.

**Table 3.** Labor force used for local cultivation and available for CDM project.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Labor for local cultivation ('000 md)	47.7	59.95	42.45	50.850	59.95	52.74	47.7	40.14	22.64	22.64	51.55	47.7
Labor available for CDM project ('000 md)	12.3	0.05	17.55	9.15	0.05	7.26	12.3	19.86	37.36	37.36	8.45	12.3

Source : donnees de terrain

This table shows clearly the great variations in local employment due to the seasonality of most activities. For instance, in February and May only 50 person days are not employed in the village for cultivation, but in September and October more than 37,000 person days are unemployed. These figures show a clear trend at least, and the potential for developing other activities and increasing local incomes.

We find that the seasonally unemployed villagers could manage around 18,000 ha of pulpwood plantation as a CDM project. We calculated that this type of plantation employs 10 md/ha/year. This shows that there is a room for this type of project to benefit locals by increasing their incomes. But we should not forget that this does not take into account the environmental impacts that pulpwood plantation may have in the village. And more important, this assumes that the area is already deforested and in a grassland condition. If not, the natural forests will provide incomes as well for the locals (timber management, or NTFPs), and these we believe are greater.

## Conclusion

The large-scale pulpwood plantations in Indonesia are like “carbon factories” as they sequester great quantities of carbon in record time. An average *Acacia mangium* plantation of 50,000 ha can sequester around 2.3 million tC in seven years in its aboveground biomass. This sole fact, at a time when the trend is to increase the area planted, merits some attention from the CDM project developers and the institutions in charge of the CDM’s implementation. But our research shows that two important aspects clearly plead in their disfavor and alter their credibility for eligibility. These are the efficiency of CDM as a financial incentive and the methodological problems for additionality assessment.

For CDM to be a real incentive for pulpwood plantation development, it has to be able to convince investors to plant what they would not have planted without CDM. Our results lead to pessimistic conclusions about the relevance of the Mechanism. Not only are the side revenues from carbon credits small compared to the costs of the plantation (this can change if carbon credits prices rise significantly), but it doesn’t address major non-financial obstacles. Our judgment, based on knowledge of the Indonesian P&P sector and the history of domestic incentives for industrial plantations development, allows us to conclude that carbon revenues are relatively small for an investor. In fact, it looks very much like CDM would be considered by the P&P sector in Indonesia as a means to perpetuate the long tradition of public subsidies, for a sector that never fell short of rents.

Pulpwood plantations are commercial. Production is to be sold as a raw material to local pulp mills. This is the reason why the methodology usually proposed for additionality assessments, is to undertake a profitability study. However, we strongly oppose this approach, as it seems to us particularly inappropriate in this case. Indeed, we identified four fundamental loopholes: 1) absence of a market price; 2) difficulty to know about the future costs; 3) major non-financial barriers; and 4) the decision-making process is not clear. It seems to us that a more appropriate approach would be to study how pulp mills decide their supply strategies, how they compare the few alternatives to get their raw material, and if they can choose not to run at full capacity



rather than investing money to establish more plantations. The research has already taught us that a great number of factors influence the structure of the wood supply including forest resources available locally, quality of pulp and paper produced, region of marketing, access to capital for the plantation establishment, law enforcement, etc. This is the reason why the Indonesian pulp mills can greatly differ from each other. The fact is that there may not be only one logic behind the investor's decisions in this sector, and the wood sources may not be comparable. Last but not least, if we want to compare the costs of producing timber by a plantation or by other means, we face a fundamental problem of transparency in Indonesia. Indeed, as a part of the wood supply is provided by illegal means (illegal logging, over-exploited forest concessions), the respective costs of the alternative sources remain difficult to estimate.

The social impacts of this type of CDM project are clearly negative. Land expropriation, low value added to the land compared to other local land uses, incompatibility with traditional shifting cultivation, undesirable environmental impacts, all plead against their eligibility. Indeed, these projects definitely do not seem to support sustainable development. But in analyzing the potential for these projects as side activities for villagers, we found out that there is room for improving livelihoods. Under certain conditions, such as a landscape in critical condition and the inability to finance local investments, they may provide employment opportunities during some periods of the year.

## Acknowledgement

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## References

- Asosiasi Pulp dan Kertas Indonesia (APKI) 2004 Indonesian pulp & paper industry. Directory 2003. Indonesian Pulp & Paper Association, Jakarta.
- Barber, C.V. 2002 Forests, fires and confrontation in Indonesia. *In*: Matthew, R. et al. Conserving the peace: resources, livelihoods and security". International Institute for Sustainable Development, Winnipeg.
- Barr, C. 2001 Banking on sustainability: structural adjustment and forestry reform in post-Suharto Indonesia. WWF-CIFOR, Bogor.
- Blomkvist, L.A. et al. 2000 Forest/non forest land issues in Indonesia. Land Administration Project – Part C, Topic Cycle 5. BAPPENAS, Jakarta.
- Cossalter, C. and Pye-Smith, C. 2003 Fast-wood forestry. Myths and reality. CIFOR, Bogor.

- Gabrié, H. and Jean-Louis, J. 1994 La théorie moderne de l'entreprise. L'approche institutionnelle. Economica, Paris.
- Guizol, P and Aruan, A.L.P. 2003 Impact of incentives on the development of Forest plantation resources in Indonesia. Unpublished.
- Hardiyanto, E.B., Anshori, S. and Sulistyono, D. 2004 Early results of site management in Acacia mangium plantations at PT Musi Hutan Persada, South Sumatra, Indonesia. *In: Site management and productivity in tropical plantation forests. Proceedings of Workshops in Congo, July 2001 and China, February 2003.* CIFOR-JICA.
- Iskandar, U., Ngadiono and Nugraha, A. 2003 Hutan Tanaman Industri di persimpangan jalan. Arivco Press.
- Karsenty, A. and de Gouvello, C. 2002 MDP et politiques et mesures domestiques. Version synthétique du rapport final. Gestion et Impacts du Changement Climatique.
- Locatelli, B. and Pedroni, L. 2003 Accounting methods for carbon credits: impacts on the minimum size of CDM forestry projects. Global Change Group, CATIE, Turrialba.
- Milne, M. 2002 Transaction Costs of forest carbon projects. Working Paper CC05. ACIAR project ASEM 1999/093.
- Neilson, D. and Flynn, R. 2002 International woodchip and pulplog trade review. DANA.
- Subsidiary Body for Scientific and Technological Advice (SBSTA) 2003 Methodological issues. LULUCF: definitions and modalities for including afforestation and reforestation activities under Art 12. Recommendation of the SBSTA. (FCCC/SBSTA/2003/L.27) UNFCCC.
- Williamson, O.E. 1985 The economic institutions of capitalism. The Free Press, New York.

## Annex 1 : Methodology and hypothesis for the calculation of production costs on pulpwood plantations

In order to estimate the production cost of the wood, we make the following assumptions:

- The cost of road construction is an investment during the time of the concession (100 years). It is depreciated in 20 years according to the accountancy rule. But as the concession is for 100 years according to the new regulations for the industrial plantations, we consider that it is depreciated in 100 years. According to the figures collected by ICRAF<sup>13</sup>, and taking into account a production of 2,000,000 m<sup>3</sup>/year during 100 years with an interest rate of 15%, we obtain a cost of US\$2.7/m<sup>3</sup>.
- Based on the figure given by the GM operational of the company, we consider an average cost of road maintenance US\$2/m<sup>3</sup>. This allows us to avoid the fastidious if not impossible, and in many ways irrelevant, work of trying to connect the road maintenance to production plots.
- We took into account the costs of R&D and fire prevention for the year 2003 to make the calculation, even if these expenses include investments, and will not be evenly spent in the future.
- We used a discounting rate of 15%. This value is a choice more than a fact, as part of the production is financed through bank loans with an interest rate between 18% and 20%, and part is self-financed.

Not all the operations have costs in the same unit, and we have to use some conversion factors and assumptions in order to calculate a cost per m<sup>3</sup> or per ha :

- Productivity 150 m<sup>3</sup>/ha. This is an average value, as the yields show great differences between plots, less than 100m<sup>3</sup>/ha to an undetermined figure. We do not know the best productivity achieved in the plantation, because the company did not specify the age of the trees at time of harvest. Some of the plots harvested and yielding almost 200m<sup>3</sup>/ha may therefore include trees with an age of more than seven years.
- Annual production 1,900,000 m<sup>3</sup>, according to the needs by the mill Tanjung Enim Lestari.
- US\$ = Rp 8,500, which is a rather stabilized rate since several years.
- 1 Air Dry Ton (ADT) = 1.25 m<sup>3</sup> (average value)<sup>14</sup>. Sometimes the wood is transported a few days after the felling, and the value of ADT is close to 1.142 m<sup>3</sup>, sometimes it is transported after up to one year after the felling and the value of ADT is more close to 2 m<sup>3</sup>. This figure 1.25 m<sup>3</sup> for one ADT is so arbitrarily chosen.

<sup>13</sup> The World Agroforestry Center (ex-ICRAF) undertook a cost study of MHP in 2001, under the supervision of Pak Suseno, who kindly provided the figures for the road construction.

<sup>14</sup> ADT is the record log weight after the felling. As it does not specify how long the wood has dried to open air, it ranges between the value of GMt (record log weight without moisture content compensation) and BDt (record log bone dry).

## Annex 2 : Maximization of the area potentially cultivated by the village Tanjung Agung

There are 3,000 potential workers in the village (among 1,189 households and 5,219 people), with twenty working days/month, and they have the choice between three land uses (rice field, rubber and coffee plantation). The rice fields area is limited to 350 ha due to soil conditions.

$$\underset{x_i \geq 0}{\text{Max}} \left( \sum_i x_i \right) \text{ with constraints } \sum_i (x_i \text{md}_{i,j}) \leq z, \text{ for each } j : 1..12.$$

i : type of culture.

j : one month period.

z : labor force available in the village for each period (man days).

md<sub>i,j</sub> : labor for land use i during period j.

# What Can a Clean Development Mechanism Do to Enhance Trees in the Landscape? Experience with Rubber, Coffee and Timber-based Agroforestry Systems in Indonesia

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## Abstract

*Terrestrial carbon storage is one of a broader array of environmental services and lessons that can be shared between the mechanisms developed or under development for watershed functions, biodiversity, carbon storage and landscape beauty. In many situations a “bundling” of services will be needed to provide sufficient incentives for smallholders to avoid conversion to low-ES land use types. The Clean Development Mechanism (CDM) is often considered to be intended for project-scale investment, with the reforestation CDMs focussed on fast growing trees. In fact, the mechanism can also be used by local government units to use an array of incentives to stimulate their farmers to convert the landscape to a more tree-based land use pattern, as long as a sufficient part of the landscape makes the transition from non-forest (less than 30% crown cover with Indonesia’s operational forest definition) to forest (more than 30% crown cover of trees potentially growing to more than 5 m tall, at a 0.5 ha scale). A number of constraints to more tree-based land use can be identified and efforts to remove the key constraints at local scale can qualify under the Clean Development Mechanism, as long as there is a measurable increase in overall carbon stock. As a delivery mechanism, the reduction of taxes and of transaction costs for land use agreements (HKM) may be more effective for farmers than direct payments. The paper discusses the land use patterns in three benchmark sites of the Alternatives to Slash and Burn (ASB) program in Indonesia, with rubber and coffee-based land use systems.*

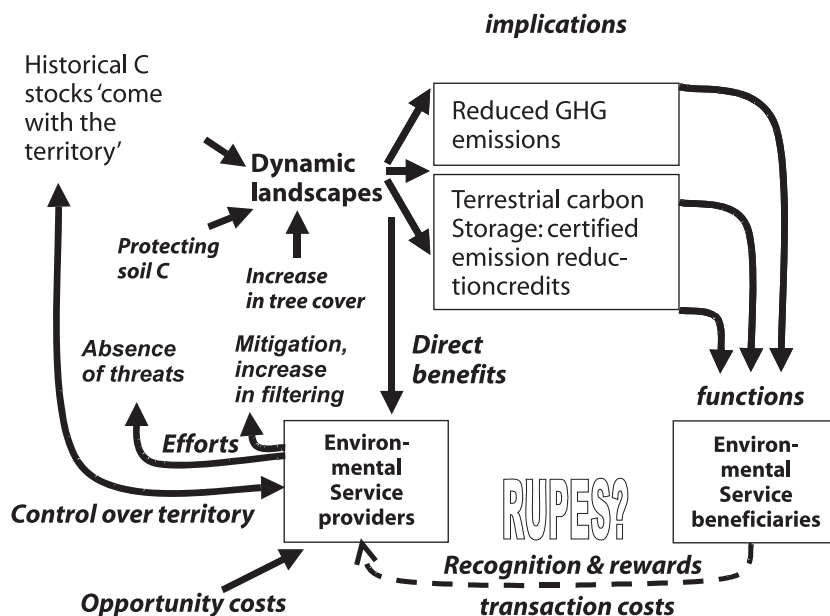
## Introduction

Rewards and payments for terrestrial carbon storage is part of a broader issue: rewards for environmental services provided by land use (Table 1). Based on the CGIAR's commitment to poverty reduction and meeting the Millennium Development Goals, we are specifically interested in the use of such reward and payment mechanisms in the context of smallholder farmers—with carbon stocks, biodiversity, watershed functions and landscape beauty as four categories of environmental service (ES) functions. In the context of the RUPES project (Rewarding Upland Poor for the Environmental Services they provide), a typology of environmental services was developed (van Noordwijk 2005) that leads to the distinction of 12 prototypes of situations where the upland-lowland relationship is focused on a specific environmental service function (Table 2). For each of these situations we need to understand the perspective of the ES providers/sellers, the ES users/buyers and the intermediaries who try to broker between the two parties.

Although avoiding degradation may be easier and less costly than restoring a degraded situation, the politics of attribution make it difficult to design effective reward systems. The international debate on CDM has demonstrated that investment for rehabilitation (reforestation) is easier to generate than for avoided deforestation or for avoided loss from peat soils.

**Table 1.** Environmental services relating to carbon stocks among 25 environmental services in 5 main categories (Van Noordwijk 2005).

<b>Biodiversity functions (B)</b>	<b>7 services</b>
<b>Watershed functions (W)</b>	<b>5 services</b>
<b>Carbon stocks (C) 4 services:</b>	
C1	Protecting natural forest area, peat soils and other carbon storage areas
C2	Protecting above- and/or belowground carbon stocks in areas used for (agro)forestry and/or agriculture
C3	Restoration, increase in tree cover (in a 'sustainable harvest' regime the time-averaged C stock of a land use system does not depend on the growth rate, but on maximum stock at time of harvest)
C4	Accumulating wood and other products derived from recent plant production in, for example, the form of houses, furniture, paper, organic waste dumps.
<b>Productivity and direct profitability (P)</b>	<b>4 services</b>
<b>Human health &amp; landscape beauty (H)</b>	<b>5 services</b>



**Figure 1.** Key relationships in landscapes where local guardians and stewards are rewarded for the carbon storage services they provide (Van Noordwijk 2005).

It has been suggested that oxygen supply is an additional environmental services provided through trees. As there is no global shortage of oxygen, this is not a service that is likely to merit rewards (Box 1)

**Box 1.** Oxygen supply a forest function?

The counterpart process of carbon sequestration is the release of oxygen to the atmosphere. Decomposition of the sequestered carbon will tend to re-use the same amount of oxygen as was produced. Popular accounts of forest functions and benefits of having trees around, tend to include production of oxygen as a service that should be included in valuing trees and forests. People can't live without oxygen, so any increase in oxygen supply should be welcome.

Counter arguments are:

- ◆ With over 20% of the atmosphere consisting of O<sub>2</sub> there is no shortage of oxygen, except in locations with poor atmospheric contact (in water, in wet soils, in closed air spaces), so only local supply within locations with shortages are relevant, not additions to the global atmosphere,
- ◆ A doubling of atmospheric CO<sub>2</sub> concentration due to the oxidation of stored carbon (biomass or fossil fuels) will be linked to a change the atmospheric O<sub>2</sub> concentration of only 0.03%, which is negligible.

**Table 2.** Twelve prototype situations for ES rewards in upland agricultural systems (Van Noordwijk 2005).

<b>Environmental service</b>	<b>Providers/ sellers</b>	<b>Users / buyers</b>	<b>Main issue</b>
<b>1. Total water yield for hydroelectricity via storage lake</b>  (W <sub>cons-1</sub> )	Impacts on total water yield small; reservoir sedimentation issue may dominate the debate; option for sediment traps and landscape filters	Consumer satisfaction depends on continued functioning; high project investment costs,	Intercepting sediment flows rather than avoiding them is generally easier to accomplish; sediment flows out of well-managed upper catchments may still be high because of geological and geomorphological processes
<b>2. Regular water supply for hydroelectricity via run-off-the- river</b>  (W <sub>cons-2</sub> )	A change from soil quick flow (saturated forest soils) to overland flow will have some effect on buffering of river flows and hydroelectric operation time	little subsequent management flexibility	Interventions influencing the speed of drainage (linked to paths, roads and drains) have the most direct effect on buffering at larger scales
<b>3. Drinking water provision (surface or groundwater)</b>  (W <sub>cons-3</sub> )	Intensive agriculture and horticulture will cause rapid pollution of surface flows and slow but persistent pollution of groundwater flows with nitrogen and pesticides; people residing around streams cause pollution E.coli and diseases	Willingness to pay for drinking water depends on quality assurance from medical perspective, as well as taste	Slow response of groundwater flows to changes in the pollutant status make 'regulation' a more effective solution than results based markets
<b>4. Flood prevention</b>  (W <sub>cons-4</sub> )	Land use effects strongest for flow buffering of small-to-medium sized events, with saturation dominating the large events	Relevance of upland land use depends on location ('floodplains') and engineering solutions (dykes, storage reservoirs)	Risk avoidance for the rare category of large events
<b>5. Landslide prevention</b>  (W <sub>cons-5</sub> )	Mortality of deep-rooted trees ('anchors') causes temporary increase in landslide risk	Relevance depends strongly on location in the flow paths	Deep landslides are little affected by land cover
<b>6. General watershed rehabilitation and erosion control</b>  (W <sub>reh</sub> )	Promoting tree cover and permanence of litter layer protecting the soil is a good precaution	"Holistic" perception of watershed functions survives despite the lack of clear impacts on specifics	Communication gap with scientists who try to enhance clarity



Table 2. *Continued*

Environmental service	Providers/ sellers	Users / buyers	Main issue
<b>7. Biodiversity bufferzones around protected area</b>  (B <sub>cons-1</sub> )	Use value of buffer zones depend on hunting restrictions, presence of human-life threatening species	Flagship species still dominate the public perception of value	Push and pull factors in human land use; livelihoods operate at larger scales than most conservation plans acknowledged
<b>8. Biodiversity landscape corridor</b>  (B <sub>cons-2</sub> )	Still new concept in agriculture/forest land use mosaics in the tropics; use value of patches in the "stepping stones" similar to the buffer zone case	Relevance depends on dispersion properties of the species of main interest; sometimes higher connectivity not desirable; relevance increases with climate change concerns	Ex-ante impact assessment of effectiveness is still difficult
<b>9. C restocking degraded landscapes</b>  (C <sub>reh</sub> )	Options for profitable tree restocking primarily depend on policy reform	Demand is for Certified Emission Reduction (CER) rather than carbon	Additionality issues in CDM; high transaction cost
<b>10. C protecting soil and tree stocks</b>  (C <sub>cons</sub> )	Road construction (accessibility) is main determinant of opportunity costs for non-conversion		Not recognized as part of CDM
<b>11. Guaranteeing production landscapes meet environmental standards</b>  (Ecolabel)	Where the eco-label process starts from the consumer side, there can be a substantial gap in communication and trust, leading to high transaction costs	Consumers with high sense of personal responsibility; gradually replaced by the introduction of standards and the raising of baselines of "acceptable" behavior	Relevance of global standards in the face of variation in local conditions; transparency of the standards and compliance monitoring; transaction costs
<b>12. Providing guided access to landscapes of</b>  (Ecotourism)	The local and international appreciation for landscape beauty depends on culture and time (fashion); rewards are for roles as guide and provider of accommodation, food, transport and handicrafts; gender aspects of provider roles may be prominent	The appreciation of landscape beauty and cultural traditions does not reduce the need to provide security and comfort to potential tourists	Global ecotourism is a highly volatile market where security and political concerns can interfere

In this contribution to the debate we will focus on the Clean Development Mechanism and its possible application in Indonesia, building on the experience in three benchmark sites of the Alternatives to Slash and Burn (ASB) program where a number of international and national centers cooperate.

## **Clean Development Mechanism: A project or programmatic approach?**

Much of the language and concepts surrounding CDM (Clean Development Mechanism) applications is in terms of *projects*: activities with a specific spatial and temporal timeframe, management entity, investment mechanism and expectation of end-of-project benefits. Yet, in rural development projects have obtained a negative connotation: they tend to be dominated by their initial design rather than by learning along the way; private benefits of the various actors do not depend on improvement in the overall performance of the system; private benefits do depend on maintaining positive news and goods to the higher hierarchical levels; projects tend to distort markets with temporary subsidies that cannot be maintained once the project is over, leading to the collapse of most of the apparent project successes.

The Clean Development Mechanisms should be about removal of (generic) constraints to development, allowing bottom-up processes and self-organizing structures to contribute to household benefits (improving the Human Development Index, reaching Millenium Development Goals) as well as provision of services to local and external stakeholders. Increased services to external stakeholders in the form of enhanced storage of CO<sub>2</sub> from the atmosphere is the basis for financial transfers in the carbon market, which in fact, may be more correctly labelled as a certificates of emission reduction (CER) market. Most of the economic value is in the certification rather than in the carbon storage per se, and that is reflected in a situation where about half of the financial value will go to the intermediaries (project developers, evaluators, certifiers).

A cynic might conclude that this allocation of the financial benefits to consultants and government agencies is logical given the primary decision-makers on CDM. However, the low level of trust between the various stakeholders in the international negotiations has lead to rules and conditions that are in danger of defying the purpose: enhancing net carbon storage in terrestrial systems (from a generally negative baseline in most tropical countries), to “buy time” for the development of life styles and technologies that are less dependent on fossil fuel use and greenhouse gas emissions. The rules for additionality may be perverted to “if it makes sense you should have done it any way” and thus favor projects that don’t make sense. The rules for leakage may be perverted to the reduction of the freedom of (poor) economic actors outside of the domain of beneficiaries of the project. The permanence issue will tie local partners into long-term commitments that they may not fully understand or are able to judge. The link between carbon storage and land ownership may lead to a skewed distribution of development benefits where the local rich benefit and local landless or smallholders see little benefit or are negatively affected.

Within the Annex I countries of the Kyoto Protocol a substantially different regime applies. The primary performance criterion is the net impact on the national account of greenhouse gas emissions. Definition of “forest” does not matter, as all land cover classes are taken into account at their mean carbon stock densities. Protecting existing carbon stocks is at least as important as enhancing terrestrial C sequestration, while additionality and leakage are of no concern to the international community and monitors of compliance to the agreements. Permanence is also embedded in the annual reporting commitment of the national entity. It is thus in the best interest of the countries to stimulate terrestrial carbon sequestration by generic incentives such as tax cuts rather than at project level with complex disbursement schedules. The government can evaluate the effectiveness of its rules by national scale monitoring, which it is committed to do anyway, leading to low transaction costs attributed to the C sequestration activities *per se*.

What can we learn from the difference between Annex I and non-Annex I countries? First of all that in the long run the global climate change issue will be best served if all countries undertake commitments and report at national scale. For developing countries these commitments should be to limit their growth in emissions to specified levels rather than reduce emissions. Such a change, however, will take a substantial improvement in global level social capital that primarily depends on improvements in global processes regarding trade, security and social benefit flows, rather than that it can be negotiated for the climate issue alone.

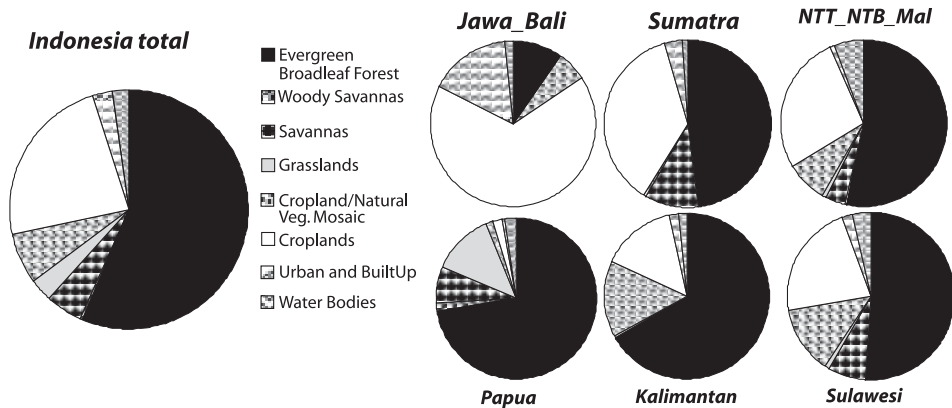
Secondly, the current CDM rules allow for a much closer approach to the way Annex I countries can stimulate terrestrial C storage than may have been realized so far. Any effective enhancement in tree cover in areas that lost forest cover before 1990 is fair game, as long as the results meet the “forest” definition (Indonesia selected a 30% canopy cover rule at scales > 0.25 ha, with trees > 5 m at maturity) and are tractable. Additionality can be argued on the basis of removal of current obstacles (policies, lack of fire control) rather than starting non-economical land use activities. Leakage issues are easier to deal with if entities such as districts that encompass overall livelihood systems rather than specific reforestation areas are the target. Benefits to the farmers and land users can be primarily in the form of removal of policy obstacles, rules and taxation instruments, rather than a direct share in future trade in CER's.

A “removal of constraints” rather than “project” approach may lead to positive spin-offs and enhancement of market function rather than distortion. In this contribution to the debate on the use of CDM we will explore the current constraints to enhancement of trees in the landscape and discuss how removal of such constraints could be the basis of a new type of CDM program that still meets the current project requirements.

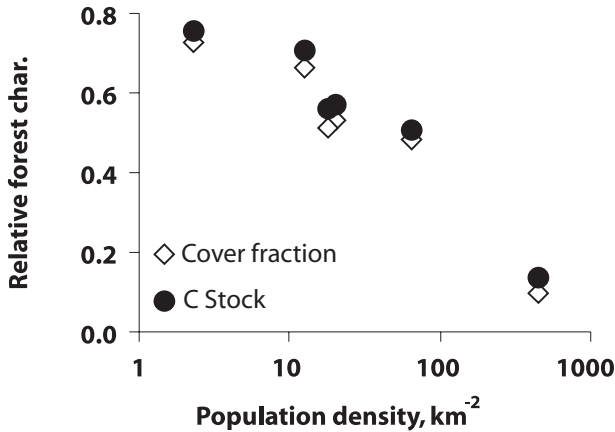
## Terrestrial carbon stocks in Indonesia

To get a general feeling for the aboveground terrestrial carbon stocks in Indonesia, we can start with remote sensing data on vegetation with a simple legend distinguishing closed canopy forest, various forms of savanna and more open crop fields. For Indonesia as a whole the data (based on imagery in the early 1990s) more than 50% was still closed canopy forest and about 60% met Indonesia's operational "forest" definition (that includes most of the savanna of the IGBP legend). The proportion of the land area forested varies between the islands from more than 70% for Papua to nearly 10% for Java. The data for Sulawesi and the islands of the Nusa Tenggara and Moluccan show the same profile, so they can be grouped.

Overall, there is a clear relationship (Figure 2) at island level between the logarithm of population density (number of inhabitants per km<sup>2</sup>) and the fraction of closed forest cover or relative carbon stock (using guesstimates for the various vegetation types). (Note: The logarithmic relationship suggests that an even spread of Indonesia's population over all the available land would lead to a substantial decline in forest cover and carbon stocks). The relationship between forest cover and population density also holds (and explains 61% of data variability) at district scale for a data set of pre-1990 forest cover (Murdiyarso *et al.* In press)



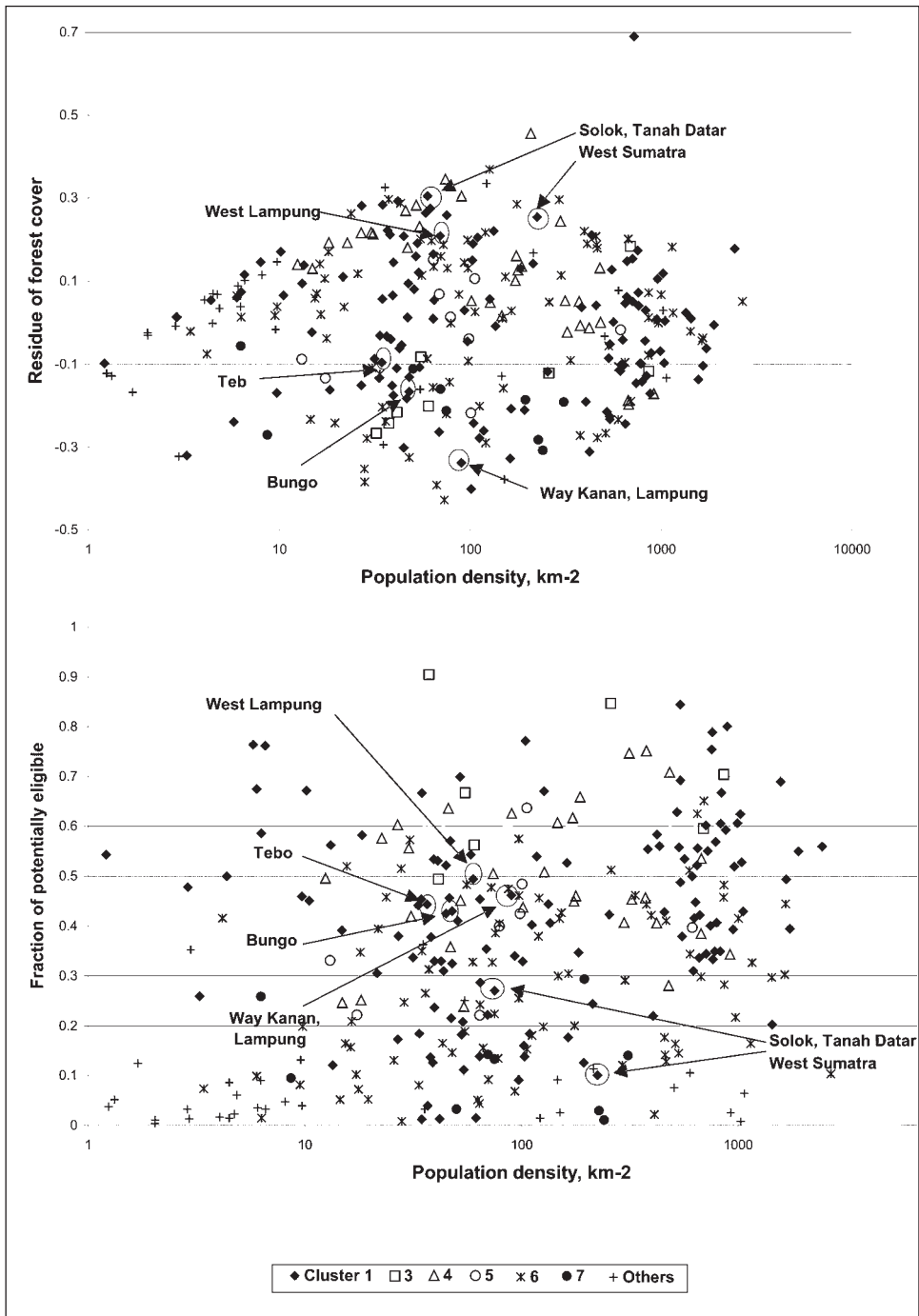
**Figure 2.** Land cover classification for Indonesia's islands (excluding the seas) according to the IGBP legend (source: Global Land Cover Characterization from USGS EROS Data Center, International Geosphere Biosphere Programme (IGBP) Land cover map; based on imagery of the 1992-1993 period) (Hadi and van Noordwijk 2005).



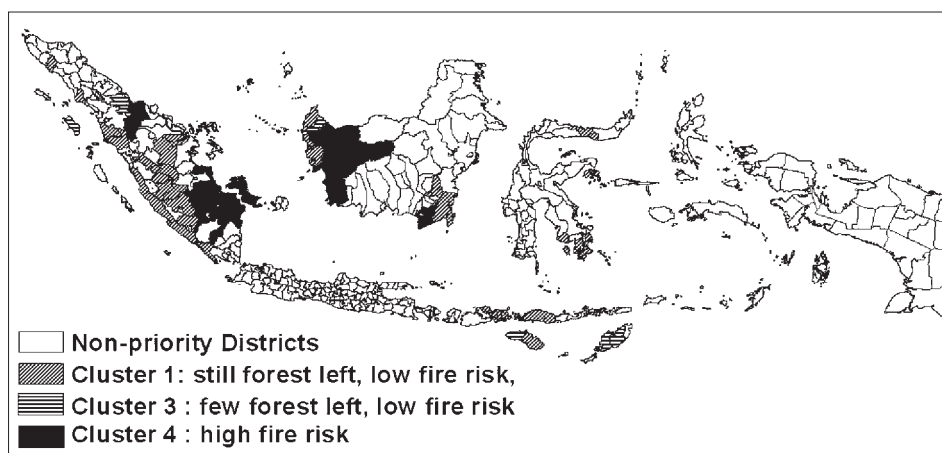
**Figure 3.** Island scale relationship between population density and the fraction of closed canopy forest (Figure 1) or aboveground carbon stock for Indonesia.

The regression of 1990-forest cover on population density can be used to calculate a difference (residue) between expected and actual forest cover for the various districts. This residue varies from over +30% to less than -30%, suggesting that there is substantial variation. This variation together with data on human development index and fire frequency was used for a cluster analysis (Murdiyarso *et al.* In press). Restricting the choice to districts with below-average Human Development Index (HDI) as poverty indicator and a population density in the range 10-100 persons km<sup>-2</sup> where the land/labor ratio may be conducive to tree-based livelihoods, suggests three broad groupings for CDM application:

- Cluster 4, characterized by high frequency of fire and the districts are mostly located in the low penneplain areas of eastern part of Sumatra and in West Kalimantan; there are 32 districts in this cluster and 18 are in the priority list for CDM projects; for CDM projects proposed in these districts, fire risk should be taken into consideration.
- Cluster 1, characterized by low frequency of fire and the districts are located in most part of Sumatra, especially along the western mountainous range of Bukit Barisan; there are 126 districts with these characteristics, and 33 are in priority list for CDM projects.
- Cluster 3, characterized by low forest cover (relative to population density) and low fire risk ; the districts are mostly in Nusa Tenggara; 8 districts are in the cluster and 7 of them are in the priority list for CDM projects.



**Figure 4.** Relationship between population density and the difference between “expected” (on the basis of regression on population density) and observed pre-1990 forest cover as well as the fraction of potentially Kyoto-eligible lands; the districts are grouped on the basis of a cluster analysis of similarity (details in Murdiyarso *et al.* In press).



**Figure 5.** Three clusters of districts that meet priority criteria for reforestation CDM in Indonesia, based on multidimensional similarity (Murdiyarto *et al.* In press).

The ASB benchmark areas in Lampung (West Lampung district with Sumberjaya and Krui as two ASB sites and Way Kanan, formerly part of North Lampung district) and Jambi (Bungo and Tebo districts) are part of clusters A and B. The existing district level data for these benchmark sites are presented in Table 3. Along with the dominant land use types, the opportunities for increasing tree biomass differ substantially.

**Table 3.** District statistics for three ASB benchmark areas in Indonesia, all falling within the initial priority criteria for CDM development.

ASB benchmark area	1990 closed canopy forest cover, (residue <sup>1</sup> ) and rice fraction <sup>2</sup>	1995 Population density	2000-2004 Fire index	Human development index <sup>3</sup>	Land use options that increase carbon stocks
Northern Lampung (currently Way Kanan district; kecamatan Negeri Besar)	0.191 (- 0.308) 0.07	99	0.40	65	Conversion from cassava/Imperata to rubber, oil palm or timber based agroforestry
West Lampung (Krui and Sumberjaya)	0.742 (+0.223) 0.06	84	0.02	63	Switch from monoculture to multistrata coffee
Jambi (Bungo and Tebo districts)	0.454 0.568 (-0.130) -0.037) 0.04 0.03	50 42	0.19 0.12	64 65	Maintaining complex rubber agroforests rather than conversion to oil palm or plantation rubber

Residue is calculated on the basis of the following expected value:

1. Paddy rice field on the basis of agricultural statistics
2. The Human Development Index combines data on health, education and household expenditure; average value for Indonesia as a whole is 66

## Understanding constraints to increasing tree cover in rural landscapes

In working with farmers in the three benchmark areas and other project sites, a number of constraints to increasing trees in the landscape have become apparent (Table 4). Few of these constraints can be overcome by farmers alone, as they require collective action at the scale of local communities and/or of formal government systems at subdistrict or higher level. Incentives may be lacking at the formal government scale to help overcome these constraints, although greater welfare of farmers is in their long term interest.

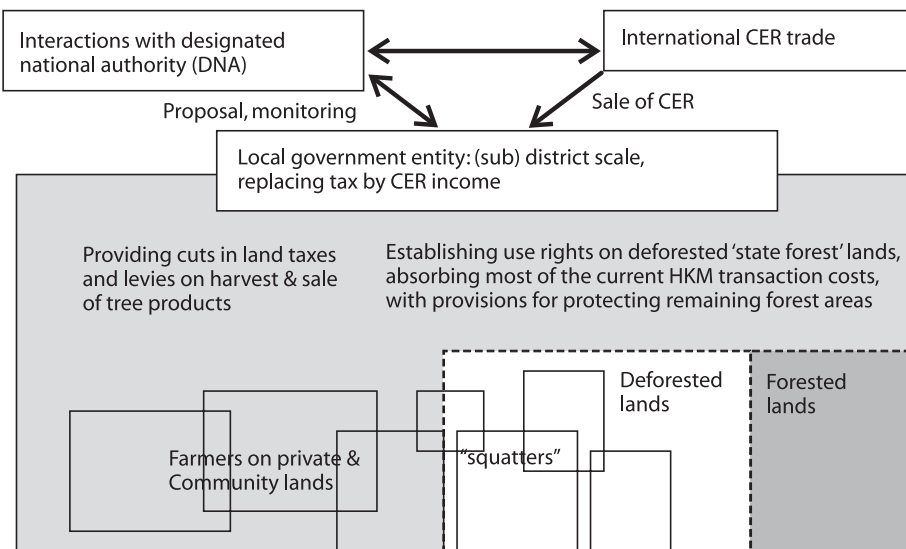
**Table 4.** Scale at which 10 constraints to having more trees in the landscape are primarily determined (as indicated by the number of \*).

10 constraint to more trees in the landscape	Require action of:		
	Local governments	Local community organizations	Farmers
1. Lack of land and/or tree tenure (physical or economic <b>access to land</b> for tree planting linked to use rights of tree products)	*** change of rules	** change of rules	* change of action
2. <b>Fire</b> : reasons for starting fire, lack of fire control	* change of rules	** change of sanctions	** change of action
3. Lack of suitable, <b>high-quality planting stock</b> adapted to soil, climate, pests and disease, intercropping systems, local preferences and markets	* increased access to knowledge	** better seed sources, increase in knowledge	* increase in knowledge
4. Poor <b>delivery mechanisms</b> for high quality planting material	-/* better certification schemes	** better nursery supply chains	** increase in knowledge
5. Lack of knowledge, labour or inputs for <b>managing tree growth</b> in intercropping or monoculture plantations	* increased access to knowledge	** increased sharing of knowledge	** increase in knowledge
6. Lack of <b>physical performance</b> of the tree due to drought, floods, grazing animals, pests, diseases, suboptimal thinning and pruning	-	* increased sharing of knowledge	*** better farm management
7. Lack of perception of <b>non-economic or cultural benefits</b> , e.g. due to lack of appreciation for microclimatic benefits of trees, concerns over their associated high water use or over their influence on soil conditions or water flows	* general awareness raising	** increased sharing of knowledge, motivation, collective action	* interact with local community
8. Lack of local <b>demand</b> and/or physical and institutional <b>access to markets</b> for tree products	** change of rules, better roads	** change of rules, better feeder roads	* increase in knowledge
9. High <b>transaction costs</b> (permits, formal and informal taxes) for harvesting trees and tree products	** change of rules & taxes	** change of rules & taxes	-
10. High <b>opportunity costs</b> : no-tree land use options are more profitable than tree-based ones	* all the above, lack of special incentives	** all the above, lack of special incentives	** depends on land/labour ratio



## A CDM approach based on removal of constraints

At the currently discussed indicate CER price of US\$20/t C (that is considered to be optimistic), with an estimated 50% for transaction costs (that is considered to be optimistic), the potential net benefit to farmers of US\$10/t C is probably less than 10% of the sale value of timber (low quality *Paraserianthes falcataria* (Sengon) has a farmgate price in Indonesia of about US\$35 m<sup>-3</sup> (300,000 Rp) equivalent to US\$100/t C, other types of timber fetch higher prices). At this price for CERs the CDM incentive is at best a modifying factor on land use decisions, rather than a primary driver (i.e. reforestation CDM barely meets the additionality test itself). The financial value of CDM is, however, of the order of magnitude of land tax and the transaction costs for HKM type of agreements between farmers and local government. Instead of adding a CDM administration to the already existing ones, we may imagine a situation where CDM is used to reduce existing transaction costs for small farmers, abolish local tax for tree planters and facilitate local use rights agreements. The local government will get part of its income from the future sale of CERs rather than local tax, and will be able to provide services to its citizens. Farmers can benefit primarily through the sale of tree products, including timber, as the market price for timber will be a main driver for farm-level rationality in investing in trees.

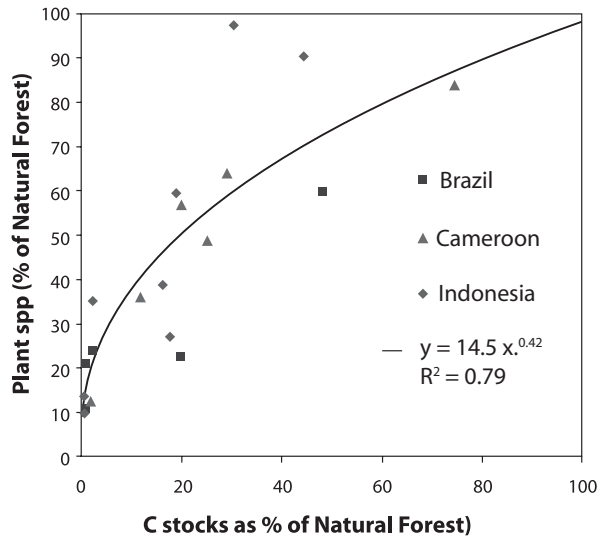


**Figure 6.** Potential relationships in a district level CDM commitment.

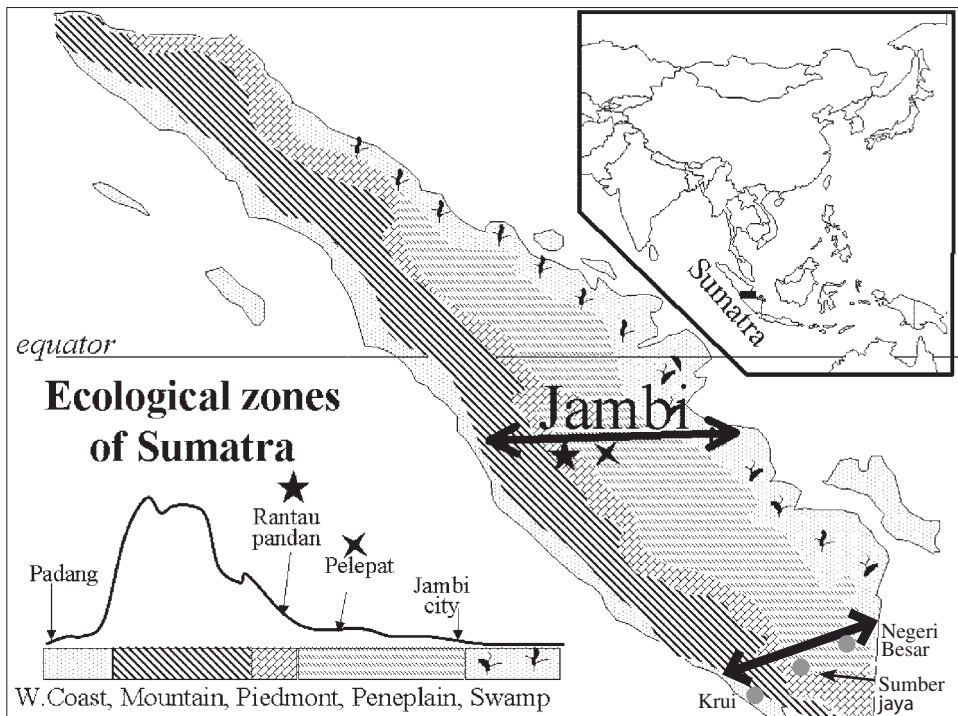
## ASB benchmarks

The global Alternatives to Slash and Burn (ASB) program has pioneered the integrative assessment of land use practices in the margins of tropical forests, compiling quantitative indicators of profitability, returns to labour, carbon stocks and biodiversity across the full spectrum of land use from intact forest to degraded lands.

From this data set the various tradeoffs between poverty reduction and environmental services can be explored, as well as the relationships between the various species diversity (Figure 7).



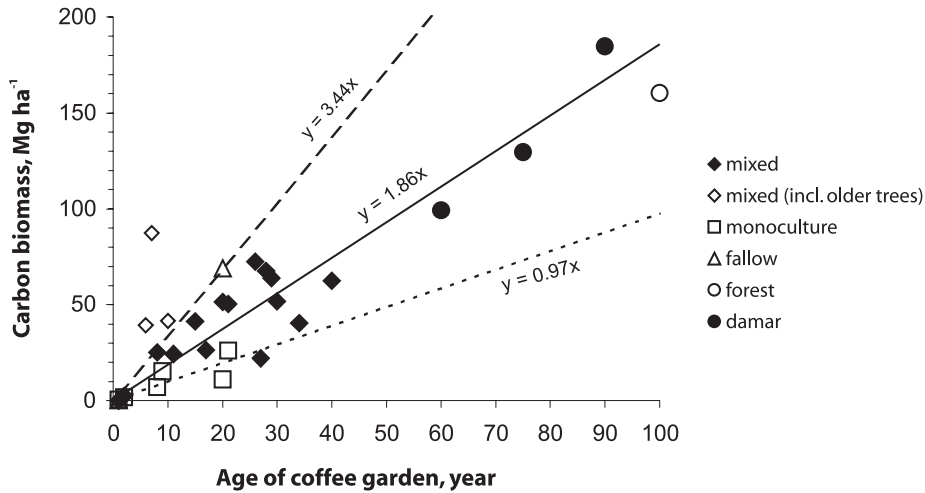
**Figure 7.** Relative loss of C-stocks and plant species richness for forest-derived land use practices in the Jambi transect, with similar data for the ASB benchmark areas in Cameroon and the western Amazon in Brazil (Murdiyarso *et al.* 2002).



**Figure 8.** Two transects through Sumatra studied by the ASB consortium in the 1990s (Murdiyarso *et al.* 2002).

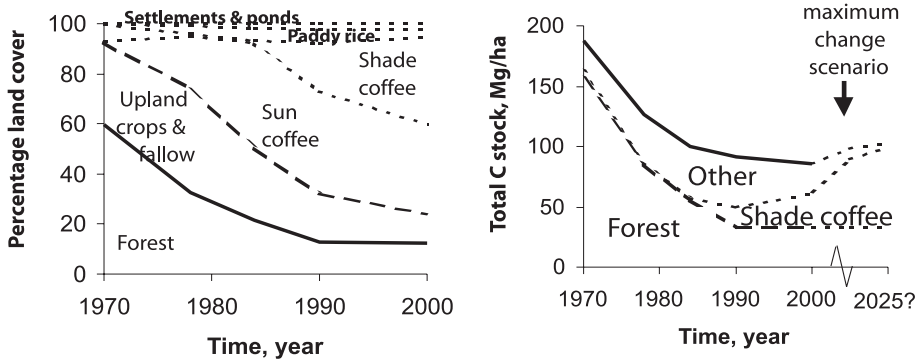
### 1. Sumberjaya benchmark: Coffee systems

Van Noordwijk *et al.* (2002) assessed the change in stored carbon (C) stocks for a 700 km<sup>2</sup> area where in the last 30 year forest cover decreased from 60 to 10% while the area under coffee increased from 7 to 70%, but where a gradual evolution from open sun-coffee systems to multistrata shade-coffee systems provides a partial compensation for C loss. Annual aboveground C stock accumulation rates during the establishment stage after slash-and-burn land clearing were 1, close to 2 or 3.5 Mg C ha<sup>-1</sup> year<sup>-1</sup> for sun coffee, shade coffee and fallow regrowth, respectively (Figure 9).



**Figure 9.** Relationship between aboveground C stock and age of coffee gardens (Van Noordwijk *et al.* 2002).

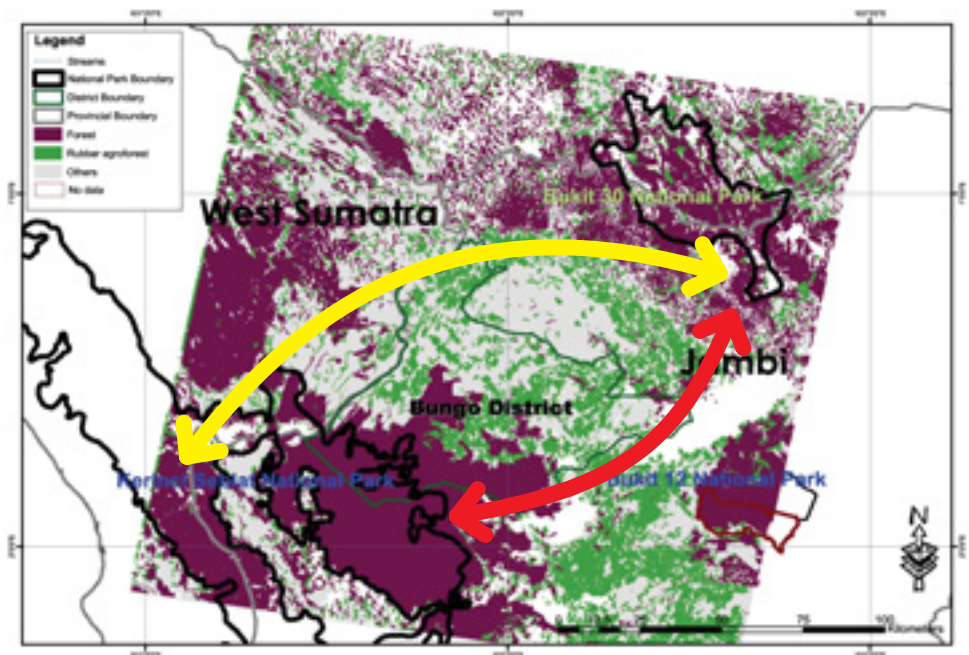
Forest remnants, shade coffee and sun coffee had soil C stocks in the upper 30 cm of the soil that were 79, 60 or 45%, respectively, of the values expected for primary forest in Sumatra. Total C stock (time averaged, above -0.3 m in the soil) for forest, shade and sun coffee was 262, 82 and 52 Mg C ha<sup>-1</sup>, respectively. In the 1970 – 1984 period, while forest cover was reduced from 59.5 to 19.7%, the landscape lost on average 6.8 Mg C ha<sup>-1</sup> year<sup>-1</sup>; in the 1984-2000 period forest cover was further reduced to 12.6%, but the landscape lost only 0.39 Mg C ha<sup>-1</sup> year<sup>-1</sup>, as forest loss was partially compensated by an increase in shade coffee systems. Conversion of all current sun coffee to shade coffee systems while protecting the remaining forest, could increase average landscape level C stocks by 10 Mg ha<sup>-1</sup> over a timeframe of say 20 years, or 0.5 Mg C ha<sup>-1</sup> year<sup>-1</sup> averaged over the whole landscape (Figure 10).



**Figure 10.** Landscape level C stocks above a soil depth of 0.3 m for Sumber Jaya in the period 1970 – 2000, with an extrapolation to the future assuming all coffee gardens to become shade coffee, while the remaining forest is left intact.

**2. Jambi benchmark: rubber agroforests, rubber and oil palm plantations**

Land use change in Jambi was described by Murdiyarso *et al.* (2002) and Tomich *et al.* (2001). In this fragmented forest landscape rubber agroforests (Joshi *et al.*) along the rivers still provide an ecological infrastructure. Their carbon stocks are substantially below that of natural or logged forest, but higher than that of intensively managed rubber or oil palm plantations and substantially above the time-averaged



**Figure 11.** Forest fragmentation and rubber agroforest as corridor between remaining forest in protected areas (Ekadinata *et al.* in prep.).

carbon stock of pulp wood plantations. At landscape scale the “time averaged carbon stock” that considers all stages of the cycle of a land use system is an appropriate measure. During transitions to new land use systems the temporal dynamics may mean that the landscape-level average carbon stock differs from this time-averaged equilibrium value; details of this can be explored with the FALLOW model (van Noordwijk 2002).

### 3. Way Kanan ASB Benchmark

The Way Kanan (formerly part of N. Lampung) ASB benchmark area represents a landscape that was deforested in the 1980s, with logging followed by conversion to a large sugarcane and industrial tree (HTI) plantations and resettlement of “forest squatters” (spontaneous migrants from Java who came to the fertile soils of the Lampung mountains to establish coffee gardens and were resettled on the much poorer soils of the lowland peneplain (Van Noordwijk *et al.* 1998). The farming systems of these translocated migrants was designed around intensive food crop production systems. However, soil fertility could not be maintained and cassava has become the crop of last resort that still provides some positive returns to labor, although at a low

**Table 5.** Socio-economic indicators of land use options in Jambi and the time-averaged carbon stocks (aboveground plus top 20 cm of the soil) of these systems (Modified from: Murdiyarso *et al.* 2002).

Land- use type	Returns to labor, relative to minimum wage rate		Labor requirement (Person-days ha <sup>-1</sup> )			Equivalent population density, people <sup>1</sup> km <sup>-2</sup>	Time averaged C-stocks Mg ha <sup>-1</sup>
	Private prices	Social prices	Establishment	Operation phase	Total		
$F_m$ Ext. Managed forest	2.9	2.8	Na	0.2 - 0.4	0.2 - 0.4	0.2	254
$F_r$ Sustainably logged forest	-4.3 - 0.5	2.0 - 7.8	15 - 100	17 - 41	31	17	150
$T_e$ Jungle rubber	1.0	1.0	271	157	111	59	116
$T_m$ Improved RAS	1.0 - 1.7	1.1 - 1.9	444	74	150	80	103
$T_{s\_rubber}$ Rubber Plantation	1.7	0.7	344	166	133	71	97
$T_{s\_oilpalm}$ Oil palm	1.5	2.5	532	83	108	58	91
$T_{s\_pulpree}$ Pulp tree					15 ?	13	60
$C_e/C_m$ Rice/fallow	0.75	0.95	Na	15 - 25	15 - 25	11	74
$C/A_e$ Cassava	1.05	1.05	Na	98 - 104	98 - 104	54	39

1. Assuming 300 work days per year for 50% of the total population and 80% of the land area available for productive land use

level. Whitmore *et al.* (2000) concluded that improved soil management practices in intensive intercropping practices following forest conversion with groundnut or cowpea can substantially increase income above the current farm practice, but in the surrounding landscape most of the soils may have been degraded too far for this option to still be available. Gradual conversion of the cassava fields (alternating with *Imperata cylindrica* dominated fallows) to tree-based production systems may provide better options. In follow up research, the Smallholder Agroforestry on Degraded Soils (SAFODS) project is now testing the hypothesis that “The transition into tree-based farming systems has to be gradual to cater for short-term financial and food security needs; certain forms of agroforestry will allow for such transition and are compatible with farmers’ livelihood strategies.”

PAM (Policy Analysis Matrix) results for food crop and food crop + tree systems in the area show substantial differences between land use systems in terms of profit, more precisely the return on land based on discounted future net revenue flows. The land use system of pepper plus paddy, corn and groundnut found on the better soils provides the highest level of profit (Rp 64.5 million ~ about US\$7,100), while the cassava monoculture on the poorest soils provide the lowest level of profit (Rp 2.7 million ~ about US\$300). All land use systems have negative divergence effects on the net transfer, showing a higher social profit than the private profit. This implies a taxing effect or at least, the government does not provide enough support for agroforestry practices in the study area. Even though the private profit is all positive, the net transfer of policy actually decrease the profit received by farmers or agroforestry adopters. Over-regulation of timber products, some food crops and other important crops in Indonesia or particularly in Lampung also contribute to the decrease in profit or in the return on land management. The policy options should focus on reducing the distorted policies on timber production and marketing, and improving market and financial market for food crops and other important crops in the country at large. Local governments could play more important roles in providing greater opportunities to farmers and agroforestry adopters to grow tree crops and timber-related economic activities. The growing practices of agroforestry involving high value tree crops such as *Acacia mangium*, sengon (*Paraserianthes falcataria*) and teak (*Tectona grandis*) wood suggest more economic opportunities for farmers, at least in the districts of Way Kanan and North Lampung.

## **Discussion: rewards for rubber, coffee and timber agroforesters?**

In the Sumberjaya and Bungo benchmarks the multistrata agroforests based on coffee and rubber provide income as well as carbon storage. In Sumberjaya economic calculations (Budidarsono *et al.* 2001) suggest that the shade coffee systems are in fact more profitable than the open monocultures if farmers have a long-term perspective (and corresponding discount rate). Providing security of tenure is the key in this landscape characterized by conflict in the past. Transaction costs of the lands use agreements are an obstacle (Arifin 2005). A commitment by the district level government to facilitate farmers to make the switch to these more long-term systems

may be all that is needed. The idea of a district-level CDM that provides benefits to farmers this way and ensures monitoring and accreditation of the changes in carbon stocks for sale of TCER's may be feasible here.

The rubber agroforest in Jambi is currently losing out from the income opportunities provided by more intensive rubber and oil palm plantations. These rubber agroforests represent substantial value to maintenance of forest biodiversity (Rasnovi and Vincent in prep.), but protecting these carbon stocks is not yet rewardable under current rules. As part of a bundling of services, however, the carbon stocks can be an additional argument for incentives to maintain these systems. Transition of the Imperata/cassava landscape of the Way Kanan benchmark to a tree-based system can easily meet the targets for CDM, as deforestation occurred before 1990 and the transition to treebased systems has been hampered by a number of constraints that require interventions at scales beyond the individual farm. Interventions aimed at removing these constraints can thus pass any additionality test.

## References

- Arifin, B. 2005 Constraints and Opportunities and Steps for Institutional Reform in Providing Rewards for Environmental Services in Indonesia, RUPES Working Paper. World Agroforestry Center (ICRAF) Southeast Asia, Bogor.
- Budidarsono, S., Kuncoro, S.A., Tomich, T.P. 2001 A profitability assessment of robusta coffee systems in Sumberjaya watershed, Lampung, Sumatra, Indonesia. Southeast Asia Policy Research Working Paper No. 16. ICRAF-SEA, Bogor.
- Gillison, A.N., Liswanti, N., Budidarsono, S., van Noordwijk, M. and Tomich, T.P. 2004 Impact of cropping methods on biodiversity in coffee agroecosystems in Sumatra, Indonesia. *Ecology and Society* 9(2): 7. <http://www.ecologyandsociety.org/vol9/iss2/art7>
- Hadi, D.P. and van Noordwijk, M. 2005 Agro-ecosystems, their population densities and land cover in Indonesia in the context of upland-lowland relationships. ICRAF-SEA working paper. ICRAF-SEA, Bogor.
- Hairiah, K., Sitompul, S.M., van Noordwijk, M. and Palm, C.A. 2001 Carbon stocks of tropical land use systems as part of the global C balance: effects of forest conversion and options for 'clean development' activities. ASB\_LN 4A. *In*: Van Noordwijk, M., Williams, S.E. and Verbist, B. (eds.) Towards integrated natural resource management in forest margins of the humid tropics: local action and global concerns. ASB-Lecture Notes 1 – 12. International Centre for Research in Agroforestry (ICRAF), Bogor. <http://www.icraf.cgiar.org/sea/Training/Materials/ASB-TM/ASB-ICRAFSEA-LN.htm>
- Hairiah, K., Sitompul, S.M., van Noordwijk, M. and Palm, C.A., 2001 Methods for sampling carbon stocks above and below ground. ASB\_LN 4B. *In*: Van Noordwijk, M., Williams, S.E. and Verbist, B. (eds.) Towards integrated natural resource management in forest margins of the humid tropics: local action and global concerns. ASB-Lecture Notes 1 – 12. International Centre for Research in

- Agroforestry (ICRAF), Bogor. <http://www.icraf.cgiar.org/sea/Training/Materials/ASB-TM/ASB-ICRAFSEA-LN.htm>
- Hairiah, K., Widianto, Suprayogo, D., Widodo, R.H., Purnomosidhi, P., Rahayu, S. and van Noordwijk, M. 2004 Ketebalan seresah sebagai indikator daerah aliran sungai (DAS) sehat. [Litter layer as indicator of healthy watershed conditions]. World Agroforestry Centre (ICRAF), Bogor. 41p.
- Joshi, L., Wibawa, G., Vincent, G., Boutin, D., Akiefnawati, R., Manurung, G., van Noordwijk, M. and Williams, S. 2002 Jungle Rubber: a traditional agroforestry system under pressure. International Centre for Research in Agroforestry, ICRAF-SE Asia, Bogor.
- Murdiyarso, D., van Noordwijk, M., Wasrin, U.R., Tomich T.P. and Gillison A.N. 2002 Environmental benefits and sustainable land-use options in the Jambi transect, Sumatra, Indonesia. *Journal of Vegetation Science* 13: 429-438.
- Murdiyarso, D., Puntodewo, A., Widayati, A., and van Noordwijk, M. In press. Determination of eligible lands for A/R CDM project activities and of priority districts for project development support.
- Tomich, T.P., de Foresta, H., Dennis, R., Ketterings, Q.M., Murdiyarso, D., Palm, C.A., Stolle, E., Suyanto, S. and van Noordwijk, M. 2002 Carbon offsets for conservation and development in Indonesia? *American Journal of Alternative Agriculture* 17: 125-137.
- Van Noordwijk, M., Murdiyarso, D., Hairiah, K., Wasrin, U.R., Rachman, A. and Tomich, T.P. 1998 Forest soils under alternatives to slash-and-burn agriculture in Sumatra, Indonesia. *In: Schulte, A. and Ruhayat, D. (eds.) Soils of Tropical Forest Ecosystems: Characteristics, Ecology and management*, 175-185. Springer-Verlag, Berlin.
- Van Noordwijk, M. 2002 Scaling trade-offs between crop productivity, carbon stocks and biodiversity in shifting cultivation landscape mosaics: the FALLOW model. *Ecological Modelling* 149: 113-126.
- Van Noordwijk, M. 2005 RUPES typology of environmental service worthy of reward. RUPES working paper, ICRAF-Southeast Asia, Bogor. 53p.
- Van Noordwijk, M., Subekti, R., Kurniatun, H., Wulan, Y.C., Farida, A. and Verbist, B. 2002 Carbon stock assessment for a forest-to-coffee conversion landscape in Sumber-Jaya (Lampung, Indonesia): from allometric equations to land use change analysis. *Science in China (Series C)* 45 Supp:75-86.
- Van Noordwijk, M., Roshetko, J.M., Ruark, G.A., Murniati, Delos Angeles, M., Suyanto, Fay C. and Tomich, T.P. 2003 Agroforestry is a form of Sustainable Forest Management. UNFF meeting on plantation forestry. Wellington, New Zealand.
- Van Noordwijk, M., Chandler, F. and Tomich, T.P. 2004 An introduction to the conceptual basis of RUPES: rewarding upland poor for the environmental services they provide. ICRAF-Southeast Asia, Bogor. 41p.
- Whitmore, A.P., Cadisch, G., Toomsan, B., Limpinuntana, V., Van Noordwijk, M. and Purnomosidhi, P. 2000 An analysis of the economic values of novel cropping systems in N.E. Thailand and S. Sumatra. *Netherlands Journal of Agricultural Science* 48: 105-114.



# Carbon Decline from Peatlands and Its Implications on Livelihood Security of Local Communities

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## **Abstract**

*Peatlands in West Kalimantan province are about 1.7 millions ha, and are distributed in coastal, sub-coastal and inland areas. All of these peatland types, both forested and non-forested peatlands, rapidly decline due to logging, biomass burning, and over-drainage for agriculture and human settlements. This paper presents carbon decline from selected peatlands and its implications on livelihood security of local communities. Samples for carbon analysis were collected from forested peatlands in Danau Sentarum National Park and open peatland used for agriculture in the Rasau Jaya region. Communities living in these forested and non-forested peatlands are indigenous Malays, Dayaks and transmigrated farmers. The major local community occupation is fishing in Danau Sentarum and farming in Rasau Jaya. Semi-structured interviews, group discussions, occasional participant observation, and workshops were used to analyze the link between livelihoods and peatland resources.*

*In Danau Sentarum National Park, peatland and water resources are interdependent. The decline of water resources has led to an increase in timber extraction from forested peatlands. Disturbances on peatland forest resources further deteriorate water quality, which damages breeding habitat for most fish. Rapid peat subsidence really harms the sustainability of peatland agriculture in the long run as this means the loss of cultivation medium.*

*Efforts to help local communities stop further peatland decline have not yet been successful since there is a lack of proper policy on peatland resource management. Peatland resources are commonly underestimated, and then converted into other uses. Ecological values of forested peatlands that secure livelihoods of local communities are largely overlooked. To control peatland decline, it is essential to have policies that properly address both economic and ecological values of peatland resources, poverty eradication, environmental extension and empowerment programs, water management, and market-oriented productions.*

## Introduction

Tropical peatlands are a very important form of storage for carbon, and play an important role in the global carbon cycle. As the formation of some tropical peats is found to be earlier than that of temperate and boreal peats (7000-8000 <sup>14</sup>C yr BP), these tropical peats (10000 – 24000 <sup>14</sup>C yr BP) play a significant role in global carbon cycle (Page *et al.* 2004). The majority of soil carbon is found in peatlands, ranging from 329 to 528 Pg (1 Pg = 10<sup>15</sup> g = 1 Gt) (Gorham 1991; Immirzi and Maltby 1992; Page *et al.* 2004). This means about one fifth of global soil carbon is located in peatlands (Page *et al.* 2004). About 90% of global peatlands are located in cool temperate and boreal areas (360 millions ha). Tropical peatlands are estimated at only 42 millions ha, and approximately contain 70 Pg carbon, or 20% of global peat soil carbon (Page *et al.* 2004).

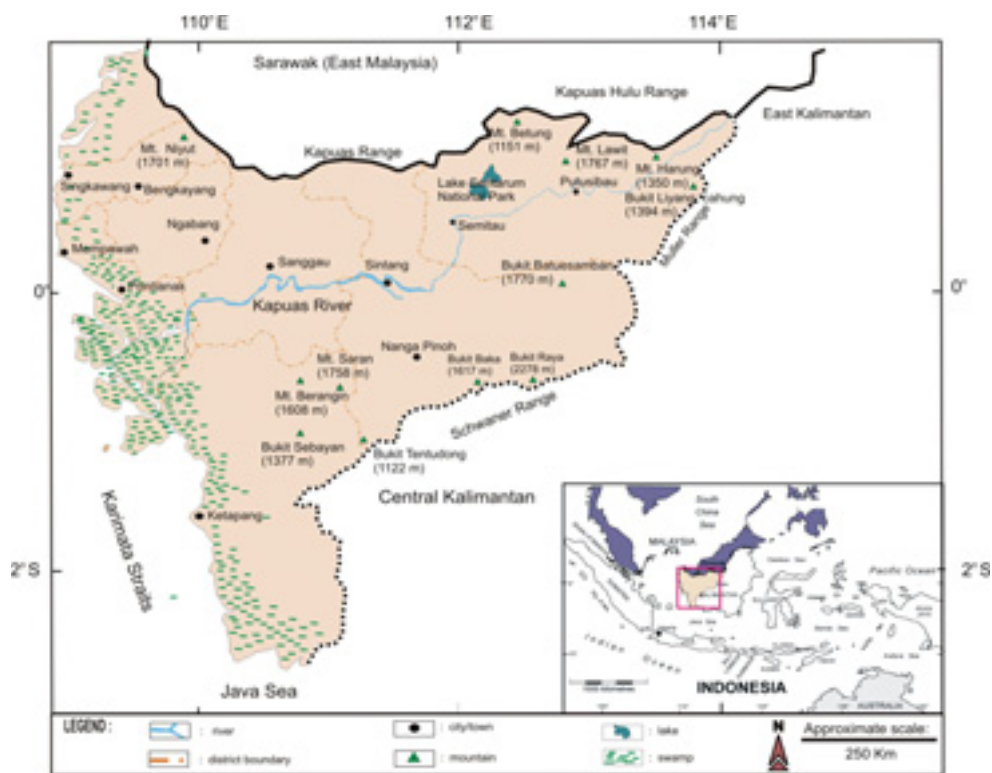
Tropical peatlands are mainly located in Southeast Asia (Borneo, Sumatra, West Papua, and Thailand). At present, a large amount of tropical peatlands are heavily degraded due to timber harvesting, conversion into agriculture and human settlements, and biomass burning. It is unfortunate that peatland may function as more carbon source than carbon sink if human impacts on peatland resources and global warming cannot be controlled.

The formation of peats is dynamics, and controlled by climatic and human factors. Brady (2002) reports that the peatland ecosystem in Sumatra is still growing or in a steady state if there are no human impacts. Throughout history, peat accumulation and degradation are an alternating phenomenon. At times peat acts as carbon sink, and as a carbon source at other time. Under conditions of human intervention, peat often functions as a carbon source. This paper presents carbon decline from selected peatlands from West Kalimantan province and its implications on livelihood security of local communities

## Methods and Research Site

The research site is located in the province of West Kalimantan (See Figure 1). Several peat cores were collected from forested peatland in Danau (lake) Sentarum National Park (132,000 ha), and open peatland designated for agriculture in Rasau Jaya region, near Pontianak, the capital of West Kalimantan. The park (00°51'N 112°06'E) is located in the Upper Kapuas River Basin, and belongs to Kapuas Hulu district. It is about 700 km away from Pontianak. The elevation of the park is between 35-50 meters above sea level (amsl). The park has been listed as a Ramsar site since 1994,

and is considered as wetland of international importance. It consists of seasonal lakes, peat swamp forest, tall peatland forest, and dryland forest. The ecology of Danau Sentarum, the use of park resources and its biodiversity are discussed by a number of scientists (Giesen 2000; Giesen and Aglionby 2000; Colfer *et al.* 2000; Dudley 2000).



**Figure 1.** A map of West Kalimantan Province, showing the location of Danau Sentarum National Park in the upper Kapuas River Basin (Source: Modified from Bakosurtanal 2000).

Rasau Jaya region is located in the delta of Kapuas River, with an elevation between 1-3 masl. In the 1970s, Muljadi *et al.* (1974) estimated the peatland forests in this region to be about 6,000 ha. Many commercial species, such as ramin (*Gonystylus bancanus*), jelutung (*Dyera lowii*), meranti bunga (*Shorea parvifolia*), kempas (*Koompassia malaecensis*), dan pelaik (*Alstonia spactuhlata*), were logged. At present, Rasau Jaya is deforested and colonized by fern species, such as *Blechnum orientale*, *Gleichenis linearis*, *Cyathea moluccana*, *Nephrolepis* spp, *Stenochlaena palustris*, and *Adiantum* spp (Anshari 2003).

Preliminary research was done in 1997, when four peat core samples were collected from Danau Sentarum National Park. Pollen contents from these cores were analyzed in order to describe vegetation change in this region. Radiocarbon dates were also carried out by Waikato Laboratory, New Zealand and ANSTO. From this

study, three papers were published (Anshari *et al.* 1999, 2001, 2004). In 2004, two cores from forested peatland in Danau Sentarum National Park, and two cores from open peatland in Rasau Jaya region, were collected, and analyzed for carbon contents, using NC Analyzer at the Soil Laboratory of Bogor Agricultural University (IPB).

The qualitative assessment of local community livelihoods was derived from projects. From 2001 until August 2005, a small-scale project managed by Yayasan Konservasi Borneo has been carried out in Danau Sentarum National Park. The overall objective of this project is to manage human impacts on natural resources in Danau Sentarum National Park. In Rasau Jaya, the International Organization for Migration (IOM) provided emergency assistance to Internally Displaced Persons (IDPs), who have been settled by the government of West Kalimantan on peatland area. These IDPs have no experience in peatland agriculture because they came from dryland areas. The purpose of the project is to provide IDPs with some technical assistance to cope with new challenges in peatland agriculture. The project lasted from 2003 to 2004. Semi-structured interviews, group discussions, occasional participant observations, and workshops were used to understand the link between livelihoods and peatland resources.

## Peatlands in West Kalimantan Province

It is estimated that peatland distribution in West Kalimantan is about 1.7 million ha. These peats are widely found in coastal areas, and in the upper Kapuas River Basin in Kapuas Hulu District. Coastal peats are mostly derived from freshwater and mangrove forests (Anderson and Muller 1975). Inland peats are formed from Kerangas (heath) or kerapah (inundated heath) forests (Morley 2000). Table 1 presents the distribution of peatlands in West Kalimantan province.

**Table 1.** Distribution of peatlands in West Kalimantan province.

No	District/City	Total land size (ha)	Peatland size (ha)	%
Coastal and subcoastal peats				
1.	Sambas and Bengkayang	1,229,600	71,250	5.79
2.	Pontianak and Landak	1,817,120	450,000	24.76
3.	Ketapang	3,580,900	627,500	17.52
4.	Pontianak City	10,780	1,100	0.93
Sub-total of West Kalimantan			1,149,850	7.80
Inland peat				
5.	Sanggau	1,830,200	98,000	5.35
6.	Sintang	3,227,900	107,200	3.32
7.	Kapuas Hulu	2,984,200	322,500	10.81
Sub-total of West Kalimantan			527,700	3.60

Note: The size of West Kalimantan province is 14,680,700 ha  
Modified from: Dinas Pertanian Tanaman Pangan, 2003

Based on analyses of pollen from peats, Danau Sentarum region has had an ever-wet climate since Late Quaternary. Radiocarbon dates on peat and pollen sediment from forested peatland in Danau Sentarum confirm that ever-wet climatic conditions were favorable for peat initiation in Pleistocene ice age. The present annual rainfall in the Upper Kapuas River Basin (i.e. Danau Sentarum) is up to 5000 mm, and in the lower Kapuas River Basin (i.e. Rasau Jaya) is greater than 3000 mm. Table 2 presents radiocarbon dates on peat from Danau Sentarum National Park.

**Table 2.** Radiocarbon dates on peats from Danau Sentarum National Park.

Core and Sample ID	Depth (cm)	Radiocarbon Age (Yr BP)	$\delta^{13}\text{C}$ (‰)	Material Dated	Remarks
<b>Core A</b>					
OZE 137	10-11	12 440 ± 60	-30.0*	Pollen	AMS date
OZE 138	27-28	28 900 ± 250	-30.0*	Pollen	AMS date
OZE 139	49-50	28 250 ± 150	-30.0*	Pollen	AMS date
OZE 140	102-103	24 250 ± 120	-30.0*	Pollen	AMS date
Wk 5777	120-148	23 570 ± 170	-29.7 ± 0.2**	Bulk sediment	Conv.date
OZE 141	149-150	32 800 ± 300	-30.0*	Pollen	AMS date
<b>Core B</b>					
OZE 133	14-15	265 ± 35	-30.0*	Pollen	AMS date
Wk 6278	41-42	1 366 ± 72	-29.9**	Pollen	AMS date
OZE 134	60-61	2 920 ± 50	-30.0*	Pollen	AMS date
Wk 6275	67-68	3 117 ± 57	-29.4**	Pollen	AMS date
OZE 135	71-72	13 070 ± 70	-30.0*	Pollen	AMS date
Wk 6277	91.5-92.5	16 840 ± 120	-29.5**	Pollen	AMS date
OZE 136	94-95	28 600 ± 250	-30.0*	Pollen	AMS date
Wk 5779	104-124	28 780 ± 100	-30.1 ± 0.2**	Bulk sediment	Conv.date

Note: OZE : ANSTO, Wk: Waikato Laboratory, New Zealand

Adopted from: Anshari *et al.* 2004.

Peatland and dryland forests in Danau Sentarum are currently logged for commercial purposes. This illegal commercial logging has been common since 2000, and is managed by local communities who have access to the Malaysian timber marketing network. In the 1970s, logging in this forested peatland was carried out by private companies.

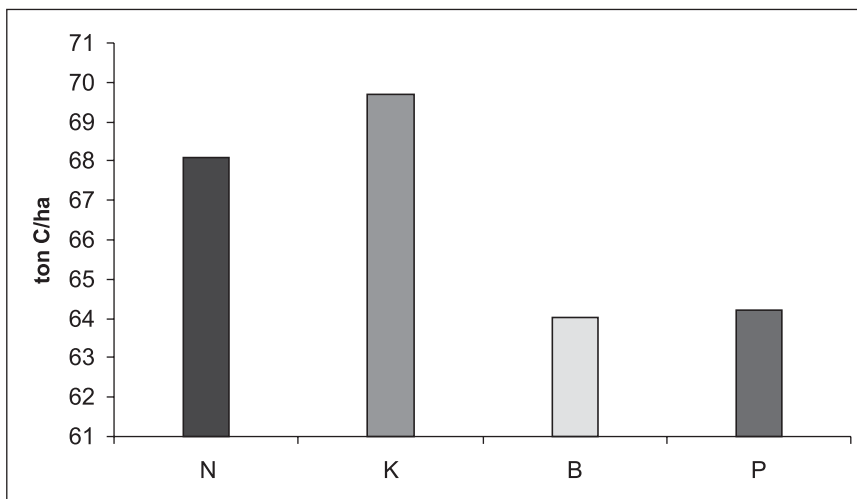
In Rasau Jaya, a peatland site was initially opened in 1955 for the transmigration project. It was logged in early 1970, and substantially drained in mid-1970 for agriculture development associated with transmigration projects. At that time, peat was treated as an enemy of agriculture development. As a result, peat was substantially

oxidized in order to make an appropriate medium for rice paddy cultivation. Unfortunately, efforts to plant rice paddy on peat did not give satisfactory yields, causing the site to be abandoned. At present, some coastal peat in Rasau Jaya is used for cultivating vegetables, corn, and *Aloe vera*. The uncultivated peat is recently invaded by ferns. Every dry season, this undervalued peat is prone to fire associated with land preparation for agriculture, especially for planting corn and vegetables. Peat sites used for *Aloe vera* plantations are not annually burnt as high investments are required to establish *Aloe vera* plantations.

The use of fire in peatland agriculture and timber exploitation on peatland forests in Danau Sentarum National Park degrades peatland functions such as carbon storage and other environmental services. The decline of peatland resources threatens livelihood security of local communities in both Rasau Jaya Region and Danau Sentarum National Park.

## Carbon decline and livelihoods

Preliminary results of elemental carbon analysis on peats from Danau Sentarum and Rasau Jaya are depicted in Figure 2. This analysis shows that carbon contents from forested peatland in Danau Sentarum are substantially higher than that from open peatland in Rasau Jaya. However, the laboratory results of carbon contents from peatlands in Danau Sentarum and Rasau Jaya did not show statistically significant differences (Armiyarsih 2005). This indicates that all peatlands are important sites for carbon storage. And the importance of carbon storage in peatlands is greatly determined by peat depths and varying degrees of peat growths.



**Figure 2.** Carbon contents in top layer (50 cm) from forested peatlands (N and K) of Danau Sentarum, and open peatlands (B and K) from Rasau Jaya (Source: Armiyarsih 2005).

In the absence of human disturbance and under wet climatic condition, the rates of tropical peat and carbon are often accumulated faster than boreal and temperate peats. In Central Kalimantan, the rate of peat accumulation in the Sebangau River is  $\sim 0.4\text{-}2.2 \text{ mm yr}^{-1}$ , and the rate of long-term carbon accumulation is estimated to be  $56 \text{ g C m}^{-2} \text{ yr}^{-1}$ . This data is derived from a 980 cm core, with a basal date of around 20,000  $^{14}\text{C}$  yr BP (Page *et al.* 2004). The rate of peat accumulation in Danau Sentarum is fairly slow, ranging from  $0.2\text{-}0.4 \text{ mm yr}^{-1}$ , comparable to the rates of boreal, arctic, and temperate peat accumulation, about  $0.2\text{-}1.0 \text{ mm yr}^{-1}$  (Aaby and Tauber 1975; Gorham 1991).

It is important to mention here that the origin of peat is an important factor that influences peat growth. The growths of peat originating from kerangas or kerapah seem to be slower than those of from freshwater and mangrove forests. In addition, rapid peat loss in Danau Sentarum might also occur because of logging, fire, and prolonged dry seasons. As the removal of forests in Danau Sentarum catchments area becomes so intensive, this region more frequently dries, turning an aquatic, waterlogged environment into terrestrial, bushland environment. In Rasau Jaya Region, where peatland agriculture takes place, rapid peat loss occurs due to fire and over-drainage. The amount of carbon loss from every cm peat layer is estimated to be between 3 and 6 tons C  $\text{ha}^{-1}$ .

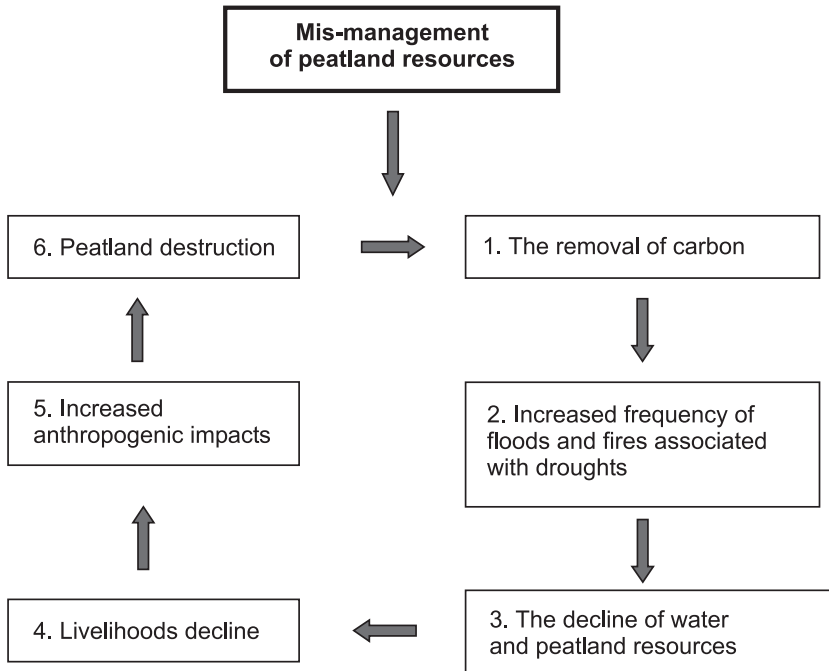
Peatland forests in Danau Sentarum play many functions. Timber, wildlife, and non-timber forest products (especially wild honey, resins, and rattan) are commonly extracted by local communities. In addition, peatland is absolutely important for regulating water quantity and quality. Peat is known to be able to retain a lot of water, up to 1000% of its dry weight. In Danau Sentarum, peatland and other swamp forests play a significant role in providing foods (seeds and nuts) for fish. Humic acids released from peat may also be essential for enriching nutrient availability in this oligotrophic environment. These food webs and nutrient cycles are thought to be important for maintaining fish population in Danau Sentarum National Park. Local communities state that the loss of peatland forests is linearly associated with the decline of fish catches in Danau Sentarum National Park. Over-exploitation in peatland forests in Danau Sentarum National Park seems to be a major cause of livelihood decline (Anshari 2004). A model that depicts a link between the destruction of peatland forest and livelihood decline is described in Figure 3.

In open peatland of Rasau Jaya, the use of fire during seedbed preparation has caused substantial peat loss, and over-drainage caused rapid peat subsidence. Every year, it is estimated that between 2 and 5 cm of peat layer may be lost by fire, and the rate of peat subsidence is at least  $1 \text{ cm yr}^{-1}$ . The abandoned peatland is then infested by ferns. According to Anshari (2003), ash derived from the fire on fern biomass does not substantially improve peat soil fertility. This may explain why farmers leave the site after one cycle of farming. Also, these open peatlands, which are recently colonized by fern species, have lower water capacity than forested peatlands. As a result, open peatlands seem to function as a water depleting ecosystem, especially in dry season (Anshari 2003). The result of water content analysis, using ring samples, shows high values in forested peatlands in Danau Sentarum (544-818%), and low values in open peatlands in Rasau Jaya (282-325%). Under these circumstances, present peatland agriculture practice is not sustainable.

Efforts to control the decline of forested peatland in Danau Sentarum and to introduce wise practices in peatland agriculture have been tried. To slow the rate of peat loss and subsidence, it is important to ban the use of fire in peatland agriculture, and at the same time to maintain a high water table. It is widely known that fire use in peatland agriculture aims to produce ash that would improve peat soil fertility. Alternatives to ash, lime and ocean mud could be used. Lime is not locally available, expensive and detrimental to soil and water. Ocean mud is a good ameliorant to improve peat soil fertility. Studies show that ocean mud could mix with peat fractions and improve peat soil fertility by increasing pH and base saturation, and adding some macro- and micronutrients (Pujianto 1993; Maulidia 1995; Suyadi 2003; Rianto *et al.* 1996; Latief 2003). There are some difficulties in this practice. First, ocean mud is relatively heavy, causing a major problem for poor farmers to transport the material to the farm. Second, the ocean mud is collected from the beach, quite far from the peatland agriculture site (about 70 km away). Third, there is still lack of promotion of this practice, and there is no market value to ocean mud. As a result, it is difficult for policymakers to determine an appropriate price to adopt this practice (Anshari *et al.* 2003).

Figure 3 shows that Danau Sentarum National Park is not carefully managed in terms of securing local community livelihoods. At present, the management authority of the park is under the Department of Forestry (i.e. BKSDA Kalimantan Barat). This central government agency has little capacity and budget to manage this wetland of international importance. As the management authority is centrally granted, local governments (both the West Kalimantan province and Kapuas Hulu district) avoid taking part in the management of Danau Sentarum National Park. As a result, mismanagement of the park creates a condition of open access, which provides opportunities for outsiders to come and exploit park resources. All timber extraction in Danau Sentarum is inspired and sponsored by outsiders who have the potential to destroy the integrity of the park's ecosystem. As the influence of global markets increases, local communities in Danau Sentarum National Park have also been short of institutional mechanisms to protect their long-term interests, and get more interested in short-term gains. Most members of these communities tend to act on the basis of individual gains. The destruction of peatland and other park resources clearly diminish livelihoods of local communities, particularly the poor. In line with natural resource destruction, poor management leads to local elites securing natural resources to protect their individual interests. In the near future, some locals will set fire to land, plant commercial crops, and then claim it as a private property. This strategy can be seen everywhere in the tropics, especially when land tenure is not clearly defined, local institution is weak, and customary laws are not enforced.





**Figure 3.** A model that describes a link between the destruction of peatland and livelihood decline.

## Conclusion and Recommendation

This study and our experience in working with local communities that depend on peatland resources, have demonstrated the importance of peatland conservation for securing their livelihoods. The decline of peatland resources has had detrimental impacts on the environment and livelihoods. In Danau Sentarum National Park, peatland is important for regulating water quantity and quality, as a fish breeding site, for providing local communities with timber and non-timber forest products, and for developing biodiversity. The destruction of peatland resources in this park is strongly linked to open access conditions, due to poor management by the Department of Forestry.

Present peatland agriculture practices are not sustainable, given the loss of cultivation medium in the long term and environmental deterioration. Annual peat fires causes haze and peat loss. Rapid peat subsidence also occurs because of over-drainage. The decline of peatland, peat loss by fire, and peat subsidence turns peatland functions from carbon storage into a carbon source. Carbon emitted from these tropical peatlands plays a significant role in adding atmospheric carbon. Although forested peatland is not currently accounted for in the present CDM phase, global carbon cycle is greatly influenced by the growths of peat, which is vegetation interdependent (Moore 1989; Page *et al.* 1999). The protection and wise use of tropical peatland resources are not only important for reducing atmospheric carbon but also ensuring livelihoods of local communities.

In order to anticipate the inclusion of forested peatlands in CDM mechanisms in the near future, and to support development practices that are friendly to the climate, it is urgent that governments pay more attention to wise use and conservation of peatland resources. In Danau Sentarum National Park, peat initiation was recorded to extend back to Late Quaternary. The forested peatlands in this park could be well-managed under a community-based management scheme. It is important for the government to recognize and share management authority with local communities in Danau Sentarum National Park.

The use of fire in peatland agriculture needs to be replaced by fire-free agriculture techniques. In reality, peatland agriculture is commonly practiced by landless and poor farmers. A policy that gives landless and poor farmers access to open peatland is needed in order to help these farmers adopt fire-free agriculture techniques. Efforts to reduce peat subsidence, i.e. the maintenance of high water tables, are also needed. To control peatland decline, it is essential to have policies that address both economic and ecological values of peatland resources, poverty eradication, environmental extension and empowerment programs, water management, and market-oriented production.

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## References

- Aaby, B. and Tauber, H. 1975 Rates of peat formation in relation to local environment as shown by studies of a raised bog in Denmark. *Boreas* 4: 1-17.
- Anderson, J.P. and Muller, J. 1975 Palynological study of a Holocene peat and a Miocene coal deposit from NW Borneo. *Review of Palaeobotany and Palynology* 19: 291-351.
- Anshari, G., Kershaw, A.P. and van der Kaars, S. 1999 Evidence of climate change in lowland, Pemerak peatland forest within the Danau Sentarum Wildlife Reserve, West Kalimantan over the last 28000 Yr BP. Proceedings second international conference on science and technology for the assessment of global climate change and its implication on Indonesian Maritime Continent. Agency for the

- Assessment and Application of Technology, Weather modification technical service unit-BPPT: B2.1-B2.13. Jakarta.
- Anshari, G., Kershaw, A.P. and van der Kaars, S. 2001 A Late Pleistocene and Holocene pollen and charcoal record from peat swamp forest, Lake Sentarum Wildlife Reserve, West Kalimantan, Indonesia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 171: 213-228.
- Anshari, G. 2003 Developing an early warning system for peat fire prevention. Paper to Indonesia Toray Science Foundation (ITSF) seminar on science and technology. Jakarta, Indonesia, 3 February 2003.
- Anshari, G., Rianto, F., Mirjaya, A. and Nelly, F. 2003 Promoting best agriculture practice for peatland conservation and income generating activities. Proceeding workshop on wise use and sustainable peatland management practices, 255-262. Jointly organized by Wetlands International-Indonesia Programme, Wildlife Habitat Canada (WHC) and Global Environment Center (GEC) Malaysia. Sponsor: Canadian Climate Change Development Fund-CIDA.
- Anshari, G. 2004 Managing anthropogenic impacts on Danau Sentarum National Park. Paper to the UNEP-IETC 10<sup>th</sup> Anniversary International Symposium on Integrated Water Resource Management. Lakes as the Initial Point at Lake Biwa Museum. Kusastu City, Japan, 6-7 June 2004.
- Anshari, G., Kershaw, A.P., van der Kaars, S. and Jacobsen, G. 2004 Environmental change and peatland forest dynamics in the Lake Sentarum area, West Kalimantan, Indonesia. *Journal of Quaternary Science* 19(7): 637-656
- Armiyarsih, D. 2005 Studi pendahuluan kandungan karbon pada lapisan atas gambut. Skripsi. Jurusan Ilmu Tanah, Fakultas Pertanian. Universitas Tanjungpura, Indonesia.
- Brady, M.A. 2002 Peat accumulation in Sumatra: Does Clymo's model apply? *In*: Rieley, J.O., Page, S.E. and Setiadi, B. (eds.) Peatlands for people, natural resource functions and sustainable management. Proceedings of the International Symposium on tropical peatland, 50-51. BPPT and Indonesian Peat Association, Jakarta.
- Colfer, C., Salim, A., Wadley, R. and Dudley, R.G. 2000 Understanding patterns of resource use and consumption: a prelude to co-management. *Borneo Research Bulletin* 31: 29-88.
- Dinas Pertanian Tanaman Pangan 2003 Laporan Tahunan Dinas Pertanian Tanaman Pangan Propinsi Kalimantan Barat Tahun 2002. Pontianak.
- Dudley, R.G. and Colfer, C. 2000 The fishery of Danau Sentarum. *Borneo Research Bulletin* 31: 261-306.
- Giesen, W. 2000 Flora and vegetation of Danau Sentarum: Unique lake and swamp forest ecosystem of West Kalimantan. *Borneo Research Bulletin* 31: 89-122.
- Giesen, W. and Aglionby, J. 2000 Introduction to Danau Sentarum National Park West Kalimantan, Indonesia. *Borneo Research Bulletin* 31: 5-28.
- Gorham, E. 1991 Northern peatlands: role in the carbon cycle and probable responses to climatic warming. *Ecological Applications* 1: 182-195.
- Latief, A. 2003 Pengaruh Lumpur laut terhadap pertumbuhan dan hasil tanaman paprika (*Capsicum annum* var. *grossum*) pada tanah alluvial. Skripsi. Fakultas Pertanian, Universitas Tanjungpura, Indonesia.

- Maulidia, R. 1995 Pengaruh pemberian Lumpur laut terhadap pertumbuhan produksi beberapa varietas sawi (*Brassica spp*) pada tanah gambut. Skripsi. Fakultas Pertanian, Universitas Tanjungpura, Indonesia.
- Moore, P.D. 1989 The ecology of peat-forming processes: a review. *International Journal of Coal Geology* 12: 89-103.
- Morley, R.J. 2000. Origin and evolution of tropical rain forests. John Wiley & Sons. Chichester.
- Muljadi, D., Soepraptohardjo, M., Soekardi, M., Suhardjo, H., Surjanto, W.J. 1974 Survey dan penelitian tanah. Daerah Rasau Jaya, Kalimantan Barat. Lembaga Penelitian Tanah No.2/1974. Bogor.
- Page, S.E., Rieley J.O., Shotyky, W. and Weiss, D. 1999 Interdependence of peat and vegetation in a tropical swamp forest. *Philosophical Transactions of the Royal Society B* 354: 1885-1897.
- Page, S.E., Wuest, R., Weiss, D., Rieley, J.O., Shotyky, W., Limin, S.H. 2004. A record of Late Pleistocene and Holocene Carbon accumulation and climate change from an equatorial peat bog (Kalimantan, Indonesia): Implications for past, present and future carbon dynamics. *Journal of Quaternary Science* 19(7): 625-636
- Pujianto 1993 Pengaruh pemberian lumpur laut terhadap beberapa sifat kimia tanah dan produksi kedelai (*Glycine max (L) Merrill*) pada tanah gambut (tropohemist), Skripsi. Fakultas Pertanian, Universitas Tanjungpura, Pontii.
- Rianto, F., Suyadi, Gunawan, Joni, Khaidir, and Rachmat. 1996 Penggunaan Lumpur laut dan bakteri bintil akar dalam upaya peningkatan produksi kedelai di lahan gambut. Laporan penelitian. Lembaga penelitian Universitas Tanjungpura bekerjasama dengan Agricultural Research Management Project II. Badan Penelitian dan Pengembangan Pertanian.
- Sorensen, K.W. 1993 Indonesian peat swamp forests and their role as a carbon sink. *Chemosphere* 27: 1065-1082.
- Suyadi 1995 Influence of coastal sediment and lime in peat chemical properties in relation to soybean cultivation. Magister Thesis. Inst Agron in the tropics gric: Georg August Univ Goettigen.

# Community-based Approach to Peatland Adaptation and Management in Central Kalimantan, Jambi and South Sumatra, Indonesia

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## Abstract

*The Climate Change, Forests and Peatlands in Indonesia (CCFPI) project is a four-year (August 2001- September 2005) carbon sequestration initiative funded through the Canada Climate Change Development Fund (CCCDF). The project consists of a range of community-based and policy-level activities related to the protection and rehabilitation of peat swamp forests and peatlands in Indonesia.*

*The goal of the project is to improve the management of Indonesia's globally important peatlands in order to improve the livelihoods of current and future generations, maintain and increase carbon storage, and conserve biodiversity. The specific objectives of the project are mainly to enhance the sustainable management of two core peatland areas in Indonesia, and the national capacity to participate in evolving climate change mitigation initiatives (so as to promote sustainable community livelihoods and carbon storage and sequestration). Sustainable management includes improved livelihoods, reduction of deforestation and wetland degradation, maintenance of carbon stocks and sequestration functions, and conservation and sustainable use of biodiversity.*

*In Sumatra, the project activities are focussed in the buffer zones of Berbak National Park, Jambi and Sembilang National Park, South Sumatra.*

*As the project enters its final year of implementation, clear results are emerging from both direct activities to protect and rehabilitate peatlands, and indirect interventions intended to provide livelihood alternatives so that local residents are not compelled to engage in destructive natural resource extraction from peatland areas. Some highlights of progress to date are presented on this paper. Further information is available from the peat portal ([www.peat-portal.net](http://www.peat-portal.net)).*

## Introduction

Tropical peatlands are found in Southeast Asia, the Caribbean, Central America, South America and Central Africa, wherever rainfall and topography lead to poor drainage, permanent water logging and substrate acidification, slowing down organic matter decomposition. The total area of undeveloped tropical peat is estimated to be between 30 and 45 million ha, which is approximately 10%-15% of the global peatland resource (Immirzi and Maltby 1992; Lappalainen 1996). Indonesia contains the largest area of peat in the tropical zone; estimates range from 16 to 27 million ha (Radjagukguk 1992; RePPPProT 1990; Rieley *et al.* 1996a; Rieley *et al.* 1996b), representing over 70% of the peatland area of Southeast Asia and about 50% of the world's tropical peatland. Most of this peat is located at low altitude in the coastal and sub-coastal lowlands of Papua, Kalimantan and Sumatra, with areas of approximately 8.9, 4.4, and 7.2 million ha respectively. These regions experience a wet, humid, equatorial climate. Daily temperatures are high (30 °C to 34 °C) and the diurnal range is greater than seasonal variation.

Lowland tropical peat consists mainly of slightly or partially decomposed trunks, branches and roots of trees within a matrix of almost structureless, dark brown, amorphous, organic material that also originated from rain forest plants, mostly trees (Rieley *et al.*, 1996). The peat is mainly fibric, with low ash and mineral contents, and its thickness varies from 0.5 m to in excess of 20 m (Anderson 1983).

At the present time, undisturbed lowland peat swamps support forest vegetation, although fern, sedge or scrub dominate degraded peatlands. The vegetation is mostly medium- to low-canopy forest that varies from a mixed forest community, with up to 240 tree species per hectare, to areas of lower tree species diversity dominated by one or a few species, with an average of 30 to 55 tree species per hectare (Anderson 1963; Rieley and Shah 1996). In Indonesia, several commercial tree species are logged selectively from peat swamp forest, including ramin (*Gonystylus bancanus*) and Meranti (*Shorea* spp.). These forests also supply a range of non-timber forest products, including rattan (*Calamus* spp.), latex (from trees of *Dyera* spp.) and incense bark (from the Gemur tree, *Alseodaphne coriacea*).

The tropical peat swamp forest ecosystem has, until recently, received little attention from ecologists and environmentalists, despite the fact that it forms a major component of the tropical rainforest mosaic in Southeast Asia. The peat swamp forests of Kalimantan, for example, are extensive, yet very little is known about either their forest species composition or structure. As part of a wider study of the ecology of the peat swamp forests of Central Kalimantan, a detailed investigation has been made in one large, peat-covered catchment. Most similar studies within the region have been carried out on coastal peat swamps that have formed over former marine sediments in low topographic situations (0- 10 m above mean sea level). In contrast, the interior peatlands of Central Kalimantan are located as much as 200 km from the coast and occur in more elevated situations (10-30 m above mean sea level), occupying entire catchments and watersheds overlying sand and gravel deposits of fluvial origin (Sieffermann *et al.* 1988; Rieley *et al.* 1992).

## Value of peatlands

Indonesian peatlands have a broad range of values to local communities, the nation, as well as the globe. Peatlands are important sources of timber and non-timber forest products and also play a key role in the hydrology of surrounding areas, moderating floods and providing dry season water supply. In addition, they are globally significant as carbon stores and sinks, as well as for the conservation of biodiversity.

Indonesian peat swamp forests have been recognized as an important reservoir of plant diversity (Silvius *et al.* 1984; Whitmore 1984). Peat swamp forests have a high diversity of tree species. More than 300 tree species, some of which are becoming increasingly rare, have been recorded in the swamp forests of Sumatra. These forests are home to many rare and endangered wildlife species, such as the Sumatran tiger, tapir, Asian elephant, Sumatran rhino, orangutan and hundreds of bird species. Black-water rivers (peatland rivers) in Indonesia are important fish habitats that often have a higher degree of localized endemism than other rivers, and are important sources of aquarium fish.

Indonesian peat swamp forests play important functional roles in the regulation of hydrology. Such functions as flood control, flow regulation, water supply and prevention of saline water intrusion are crucial to maintaining the integrity of the surrounding ecosystem.

### **1. Local community's dependence on peatlands**

Significant numbers of people live in, and adjacent to, important peatlands in Indonesia. The peatland ecosystem offers significant benefits to surrounding communities, including both timber and non-timber forest products (such as fruits, rattans, medicinal plants, fish, etc.). In addition, peatlands also provide other important values, such as water supply and flood control. Some areas of shallow peat or adjacent mineral soils have been developed for agriculture, which may be sustainable with careful management. The current economic and social situation in the country means that an increasing proportion of the population is dependent on the natural resource base.

In many areas in Indonesia where peatlands have been “developed” on a large scale, the natural benefits to local communities have often been lost or disrupted. Drainage, clearance or burning of the peatlands has led to severe socio-economic problems with few benefits, if any. In several cases, peatlands have been cleared or drained as part of large-scale land development schemes, such as Transmigration Program and Mega Rice Project that are funded by the Indonesian Government. Placement of poor communities on deep peat soils with inadequate infrastructure or support services has often led to disaster. Deep peat when drained will subside and also burn, in some cases leading to land height reduction by up to three metres, accompanied by destruction of settlements and increased flooding risk.

Some successful models have been developed to involve local communities in sustainable utilization of peatland areas, including the development of agriculture in adjacent mineral soils, rehabilitating degraded peat areas and harvesting timber and non-timber products in buffer zone areas. Successful models for community-led fire prevention have been developed in Berbak National Park, Jambi, Sumatra. Some of

these strategies will be promoted through the awareness and demonstration aspects of the CCFPI project.

## **2. Management issues**

As mentioned previously, over the past 10-15 years large areas of peat swamp forest have been cleared and converted for other uses, mainly agriculture. Some of this land conversion has not been successful, with a striking example being the so-called One Million Hectare or Mega Rice Project, which was abandoned in 1998. It is now recognized by the Indonesian government that the remaining peat swamp forests need to be protected and that measures are needed to ensure sustainability and to minimize greenhouse gas (GHG) emissions from areas that have already been developed. However, this is a significant challenge in the world's fourth most populous country, where much of the population is still highly dependent on the natural resource base.

Significant areas of peatland in Indonesia have been used for agriculture-based transmigration settlement, and also by local inhabitants. An increasing area of peatland is also being used for the cultivation of perennial/estate crops, such as coconut and oil palm. Furthermore, extensive logging activities to supply the timber industry have also significantly impacted peat swamp forests. These land use changes involve a great deal of deforestation, which contributes significantly to Indonesia's GHG emissions. In addition, when peatlands are drained and burnt, the stored carbon is released into the atmosphere, contributing to the greenhouse effect. These effects occurred during the 1997/1998 land and forest fires in Indonesia, resulting in extensive damage.

## **3. Peatlands and climate change issues**

As mentioned previously, Indonesia has about 50% of the world's tropical peat. Due to development and rising population pressure, severe degradation of peatland in Indonesia (with resulting loss of sink capacity and high carbon emissions) is likely to continue in coming years unless prompt action is taken to safeguard the peat swamp forest resources.

Indonesia's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), published in 1999, states that carbon dioxide (CO<sub>2</sub>) is Indonesia's main greenhouse gas (GHG) emission, responsible for 83% of CO<sub>2</sub>-equivalent emissions. In 1994, the land use, land use change and forestry (LULUCF) sectors were responsible for 63% of CO<sub>2</sub> emission sources (Pelangi 2001), a significant increase from 48% in 1990 (Pelangi 2000). One of the major causes of carbon release in these sectors is the clearance of forests for agriculture and plantations. Among carbon stores affected by this clearing, the most important are peat swamp forests. Deep peat swamp forests, when cleared and drained, will subside and are then prone to burning, releasing carbon into the atmosphere and destroying the peat's function as a carbon store and sink. Carbon that is released into the atmosphere contributes to the greenhouse effect. If peatlands are maintained in their natural state, CO<sub>2</sub> is incorporated as organic carbon into dying biomass and stored in the peat, thus moderating GHG emissions.

Over the past 15 years, large areas of Indonesia's peat swamp forests have been cleared and converted to other uses, mainly agriculture. This has led to the loss of



significant carbon stores and sinks, as well as biodiversity. It has also had an impact on the hydrological functions of the peat. Due to the development trends and rising population pressures, severe degradation of peatland is likely to continue in coming years unless prompt action is taken to safeguard peat resources.

Urgent action is becoming more critical in the light of the forest fire episodes in Indonesia. Forest fires in 1997/1998 burnt or partially degraded more than 1.45 million ha of peatlands, about 10% of the total peatland areas in Indonesia. It is estimated that during the fire event, between 0.81 and 2.57 GtC was released to the atmosphere as the result of burning peat and vegetation, an amount equivalent to 13-40% of mean annual global carbon emission from fossil fuels (Page *et al.* 2002). Fires in peat soils were identified as the major contributors (about 60% of particulates) to the smoke that enveloped a major part of Southeast Asia and led to economic damage estimated as US\$9 billion and affected some 75 million people regionally (Bappenas 1999). A recent report indicated that six of seven persistent fire prone zones in Sumatra are in peat-rich wetlands (Anderson and Bowen 2000).

Peatlands hold and sequester significant quantities of the world's carbon. The total amount of carbon in wetland standing vegetation, debris, peats and other soils has been estimated at between 20-35% of the total terrestrial carbon (IGBP 1999; Patterson, 1999). A study recently conducted by Wetlands International, reveals that wetlands may far exceed the capacity of forests to sequester and store carbon (Patterson 1999). Peatlands constitute a large carbon reservoir in the terrestrial biosphere. It has been estimated that northern peatlands alone contain more than 500,000 million tonnes of carbon and that carbon sequestration in such peatlands over the last 5,000 years, at a rate of about 100 tonnes/year (t/yr), equals 100 years of fossil fuel consumption and represents a reduction in atmospheric CO<sub>2</sub> concentration of about 40 parts per million (ppm) (Gorham 1991, 1995). However, estimates to date are preliminary at best, due to lack of agreement concerning the definition of peatlands, varying estimates concerning the total extent of peatlands, and lack of empirical data concerning the depth of carbon deposits.

In Indonesia, despite the major release of carbon as a result of the land and forest fires, there have been no in-depth studies of the role of peatlands as carbon stores or sinks, the rate of release of carbon due to these fires and the impact on global climate change, and the management measures which could be introduced to reduce carbon loss and to restore peat systems so that they continue to effectively store and assimilate carbon. The CCFPI project will help to fill this knowledge gap.

## **Community-based approach to peatlands adaptation and mitigation**

The CCFPI project is a four year (August 2001 - September 2005) carbon sequestration initiative funded through the CCCDF. The project consists of a range of community-based and policy-level activities related to the protection and rehabilitation of peat swamp forests and peatlands in Indonesia.

The goal of the project is to improve the management of Indonesia's globally important peatlands in order to improve the livelihoods of current and future

generations, maintain and increase carbon storage, and conserve biodiversity. The specific objectives of the project are mainly to enhance the sustainable management of two core peatlands area in Indonesia, and the national capacity to participate in evolving climate change mitigation initiatives (so as to promote sustainable community livelihoods and carbon storage and sequestration. Sustainable management includes improved livelihoods, reduction of deforestation and wetland degradation, maintenance of carbon stocks and sequestration functions, and conservation and sustainable use of biodiversity.

There are four main components to the CCFPI project, all of which will be implemented over the life of the project. The activities of each component, include:

1. Supporting of the establishment of practical community-based management approaches for peatland forests:
  - Development of alternative livelihood options for communities reliant on peatland areas;
  - Restoration of hydrological regimes to sustain natural peatland processes and to maintain peatland carbon storage capacity and other important environmental services;
  - Replanting degraded peatland forests; and
  - Collaboration with local agencies on integrated spatial planning.
  
2. Technical Component:
  - Compilation of materials and experiences on peatland best management practices in Indonesia and elsewhere;
  - Estimating order of magnitude carbon storage (above and below ground) for selected project areas;
  - Developing simple methods of carbon measurements in peatland that allows for maximum involvement of local residents;
  - Providing Indonesian language training materials.
  
3. Integration of community-based peatland management into national climate change policy:
  - Compilation of information on the scope and status of Indonesia's peatland resources, and estimating the amounts of carbon stored in those peatlands (focus on Sumatra and Kalimantan);
  - Raising awareness on the importance of peatlands for climate change mitigation; and
  - Providing technical input and support for Indonesian engagement in ASEAN forum and global activities related to peatlands and climate change.
  
4. Partnership and sustainability mechanisms:
  - Capacity development to enhance the engagement of Indonesian stakeholders in existing or emerging climate change initiatives;
  - Preparation of awareness materials on peatlands management practices for use in project locations and more broadly; and
  - Collation and dissemination of information and lessons learned; promotion of awareness to key stakeholders.

## Highlights of progress

As the project enters its final year of implementation, clear results are emerging from both direct activities to protect and rehabilitate peatlands, and indirect interventions intended to provide livelihood alternatives so that local residents are not compelled to engage in destructive natural resource extraction from peatland areas. Some highlights of progress to date are presented below. Further information is available from the peat portal ([www.peat-portal.net](http://www.peat-portal.net)).

### 1. Central Kalimantan

Indigenous settlers of the project site in Central Kalimantan are primarily Dayak, whose settlements can be found scattered along the riverbanks. Like many other forest dwellers in the Indonesian archipelago, these communities draw livelihoods from natural resource goods and services from the surrounding forest and riverine ecosystem. It is also quite common for local people to grow non-timber forest products, such as rattans and fruit trees on their customary lands. In addition, peat swamp forests, with their unique hydrological systems, provide a favorable environment for traditional forest-based fish ponds called *beje*. Local people created *beje* in the forest, far from the river. Fish are trapped in the *beje* at high water level and easily collected when the water is low. With low population density, the adverse impacts of the local peoples' activities on the peat swamp forest ecosystem were minimal.

Large-scale deforestation in Central Kalimantan, including the Mega Rice Project area, has taken place since the time that timber concessionaires first began operating. The Mega Rice Project has exacerbated the situation as it was designed and implemented without adequate consideration of local biophysical and social characteristics. Project development has led to further massive forest clearance, some of it on local communities' agroforestry areas. Local people have lost access to common pool resources, as well as income sources, from their agroforestry lands. As the area's hydrological cycle changed (mainly due to canal development), local peoples' *beje* have shown steadily decreasing productivity.

Thus, in contrast to its purpose, the Mega Rice Project has brought about social and environmental hardships to local communities, as well as to the transmigrants. Villagers indicated irregular flooding cycles has taken place after canal construction, and this has led to a disturbance of their *bejes'* production.

Protection of peat swamp forests is not feasible if the people who depend on them do not have attractive livelihood options. To gain local support, conservation efforts need to be accompanied by local income generating activities. This approach has been adopted by the project, which has been pursuing local-based forest conservation and community development in the area.

Many locals who have lost their lands and livelihood sources engage in illegal timber cutting, which is now progressing deeper into the interior of Central Kalimantan. Access to the interior is now much easier through the interconnected canals. Local people usually act as the low waged tree cutters, serving as the initial (and the lowest paid) element of a long timber business chain. Capital usually comes from urban businessmen or even concessionaires.

In the meantime, enabled by the current more open political system, many local people have demanded cash compensation for lands taken by the government during the Mega Rice Project development, as well as for adversely affected livelihoods. The government has promised to meet these demands, and indeed has already compensated some families. However, there are obviously not enough resources for all of the thousands of claimants, leading to the current tensions between the local people and the government. This situation has added to peoples' disdain and mistrust of the government.

The Mega Rice Project and ongoing illegal logging have potentially destroyed a significant amount of peatland (i.e. a major carbon store and sink). Any attempt at ecological restoration should be approached holistically by considering local biophysical and socio-cultural features.

The demonstration projects adopt a combination of approaches. Where there are no local settlements, land rehabilitation involves engineering interventions, such as canal blocking. Raised water levels from canal blocking is expected to gradually restore vegetation cover. In the area where local communities' dependence on forests is high, forest protection and conservation is ensuring the active local participation of both women and men in the demonstration projects' design and implementation. This is undertaken in conjunction with the community development activities focusing on the pursuit of sustainable local livelihoods.

Blocking the primary canal of the ex-Mega Rice Project began in February 2004, following a comprehensive site selection and stakeholder consultation process. Support from the district government for this activity is very strong. After years of inaction, there appears to be a new impetus to address the ecological devastation resulting from this rice project. While it is still uncertain what mechanisms will be used in restoration and rehabilitation programs, the CCFPI project's pilot initiative in the ex-Mega Rice Project is very timely. There have been many studies undertaken and workshops held to determine the best way forward. Past jurisdictional uncertainties, and the high costs of restoration and rehabilitation, are two reasons why no action has been taken to date. With its practical intervention, piloting a canal-blocking approach based on using simple technology, local materials and engaging local people, while integrating replanting activities, the CCFPI project adds an important element to the design of any future action. It is the action-oriented nature of the CCFPI project's work that caught the imagination of the district government. The local government has strongly encouraged the continuation and expansion of the CCFPI project's work in the area. A Memorandum of Understanding been signed by the head of Kapuas District and the Wetlands International-Indonesia Program for a five-year sustainable management initiative on peatlands in Mantangai area.

## **2. Sumatra**

The project activities in Sumatra are focussed on communities surrounding Berbak National Park, Jambi. In the project areas, most villagers derive livelihoods from agriculture (approximately 82.9%), fisheries (5.6%), and other occupations, such as temporary labor (11.8%). The agricultural sector includes food crops (mainly rice and some soybean, corn, mung bean, vegetables), estate crops, and animal husbandry.

Estate crops are mainly coconuts, and some others are rubber, cocoa, banana and coffee. Fisheries include river and sea fishing, fish ponds, and fish cages (*Keramba*).

Local communities surrounding Berbak National Park consist of different ethnic groups such as Orang Laut, Bugisnese, Banjarnese, Malay, and Javanese. The indigenous population of Berbak comprises Kubu (remaining population is estimated at only 150 people), Orang Laut, and Malay, while Bugisnese and Banjarnese have gradually moved into the area since the 1950s. While most villagers farm, only a few fish. Bugisnese do sea fishing, while Malay communities usually do river fishing. Villagers are dependent on goods and services from the park, although forest-based activities do not seem to be considered as their “formal” occupation in the sense of being recorded in formal statistics. Local people have traditionally collected jelutung latex, fish, rattan, gemur, firewood, and other non-timber forest products from the forests. In some cases, these activities pose a threat to the park ecosystem as people use poisonous chemicals to kill fish or to harvest jelutung latex. Some villagers also engage in illegal commercial logging.

An increasing population adjacent to the park is creating more pressures. For the past few years, in-migration has greatly increased, while job opportunities in non-natural resource based sectors are very limited. The need for more agricultural land has led to an increasing rate of peat swamp forest clearing and draining. Over drained peat contributed to fires which, during 1997/1998, burnt an area of about 44,000 ha (about 6% of the buffer zone area). Unproductive land is expanding as a result of oxidized sulphate acids. Forests have also been cleared to make way for large-scale shrimp ponds adjacent to the coastline, leading to the increasing threat of erosion and seawater intrusion.

Peat swamp forest protection in the national park was also minimal. Significant areas have been burnt, although the exact cause is unknown. The fires are, however, likely human-induced. Park rangers have condemned the increasing amount of local illegal harvesting of timber and non-timber forest products, and lamented their lack of resources to guard the park. However, illegal logging is most likely done by outsiders as well, especially since a newly opened road means greater accessibility to the areas around the park. Local people, on the other hand, complain that park rules are too strict. Their view is that collecting non-timber forest products should not be banned since it does not harm the park ecosystem. Moreover, they have had traditional forest access long before the park was established. Different perceptions between local people and the park management with regard to the park boundaries exacerbate the problem.

Sustainable management of the Berbak forest swamp ecosystem, both in the reserve and buffer zone, is crucial to local peoples' livelihood. However, existing management and land use practices pose threats to the integrity of the Berbak ecosystem. In the past, the security-based park management (e.g. patrolling) has not worked very well, causing tensions with the local people whose traditional access is now denied. At the same time, the park management lacks the capacity to guard the vast forest areas. It has highlighted the importance of the local peoples' involvement in managing the forest, although they had no knowledge or experience of how to pursue the matter. Providing local people with a wide range of livelihood options

should be the priority to reduce pressures on forests. Introduction of any income-generating activities will likely be adopted if they are based on local peoples' needs and are in accordance with the local culture and way of life.

Accordingly, planned CCFPI demonstration projects focus on facilitating local involvement in forest protection and rehabilitation, both in the park and buffer zone areas. This process includes defining local rights and responsibilities in forest management *vis-a-vis* park management. In the buffer zone areas, in addition to land rehabilitation, income-generating activities will be an important part of management interventions for providing livelihood opportunities outside the forest. However, the interventions must be based on activities generated from local needs and culture. This requires more detailed information on local ecological, socio-economic and cultural aspects to determine specific feasible activities and ensure the active participation of both women and men in the design and implementation of these interventions. Information has been collected through participatory assessment to ensure that it complements local knowledge and perceptions, and addresses both the aspirations and needs of men and women. Due to limited resources, the interventions focussed on villages that show the most enthusiasm to collaborate, and that are accessible in terms of geographical and logistical support.

Over the life of the CCFPI project there has been a continuing improvement in the relationship between the staff of Berbak National Park (Ramsar Site) in Jambi and local communities. One of the major activities designed to bring the two parties together was the joint rehabilitation of the park entrance. This has proved to be an extremely effective intervention. As mentioned earlier, in the past the relationship between park rangers and the nearby community of Sungai Rambut was adversarial. Now, however, that relationship has improved. Community members are planting trees directly behind the park facility. Rangers cite the presence of community members as one of the reason they feel secure enough to stay on site. Additionally, whereas in the past residents of the adjacent villages participated in demonstrations against the national park, this is no longer the case.

The guard post is being used to monitor and control illegal activities in the area. Before the start of the CCFPI project there was a steady flow of illegal logs coming out of the park through the entrance. With the presence of rangers, and the clear marking and physical blocking of the park entrance, this traffic has stopped.

In October 2004 the repaired national park facilities were officially launched during a high-profile event attended by government and national park officials and local community members. The tone of the well-attended celebration was extremely positive, contrasting dramatically with the situation two years ago. The local government expressed its strong support of the growing partnership between the national park and local community.

Additionally, the CCFPI project field implementer has reported a reduction in the number of community members engaged in illegal logging activities. Community members have confirmed this, indicating that if illegal loggers have livelihood alternatives, they will consider them, rather than the dangerous (and not always profitable) work of logging (see Box 1).

**Box 1. Community understanding on climate change and their responses**  
(as told by Maslian – a field staff of PINSE Foundation)

At this stage, field staff like myself has to do a lot of improvising because it is difficult to explain climate change issues to the villagers. Moreover, the two villages where we were working have the highest rate of illegal logging cases and the loggers were very suspicious of people/organizations that come from outside of the area.

For this reason, project was introduced and explained in the light of economic development and assistance related activities. We tried to explain the goals of the project only to specific community members, especially respected community leaders. This was a quite time-consuming process. The community had the opportunity to carry out tree planting and duck rising and other income-generating activities. But still there were many community members who thought that the aid provided by the project was the same as the aid they had received from previous projects.

The “loan” provided by the project to carry out economic activities was evaluated against the success of tree planting scheme. Villagers were exempted from returning the loan if an agreed rate of success of tree planting was achieved. We assume that, at the same time, the local community will protect the nearby forests and will not log illegally if they have alternatives for their livelihoods. We have to compete with the financier of illegal loggers who tend to exploit poverty of the rural community. Their justification is that they help poor people fulfil their subsistence needs.

Participatory approaches were also used by approaching women/housewives, students and teenagers who join religious services/Qoran reading and sport activities in the village. In these groups we explained climate change issues to the community gradually by linking it with their environment. For example, we pointed out that the fish that are getting scarcer, and that the agriculture planting seasons are changing. However, the community felt that the current climate change is a common natural phenomenon and they did not particularly notice any abrupt change.

In addition to the low education level, it is very challenging that the stakeholders we have to deal vary in their interests. The community members who are illegal loggers, have different interests. They are not very enthusiastic in joining the project. Instead, they suspected project field staff. We realize that the project timeframe is too short, while raising public awareness is a long-term activity. In order to be able to effectively implement the project we found that multi-stakeholders collaboration is the key. Involving local government could help improve community development activities in the future.

We notice that the communities view on donor/investor roles are actually not different from those in previous projects sponsored by the local government and other institutions. These agencies provided assistance to the community and then disappeared. Nevertheless, the community conditions did not change. The communities are still poor and more dependent on the more degraded forests. From this situation, we learn and understand the mind set of the community concerning assistance from outsiders. That is why the field staff should try every possible approach (with all the consequences) to ensure that the resources provided by the donors should be beneficial to the community although there are still differences in opinion on how to change this project into a longer term program.

Since the community has started being motivated to improve their livelihoods, the project absolutely needs to be continued. There are a lot of lessons we learned from working closely with the community. Of course, there are weak points that could be improved. However, we hope that this project will be beneficial to community for the next three to five years and will not become one of many useless projects that do not succeed because they did not take into account the communities’ psychological situation and concerns. The projects should aim to further educate the community instead of spoil them with short-term financial incentives.

On the other part of the project sites, Merang Kepahiyang Peat Swamp Forest-South Sumatra, the draft action plan for the Merang Kapahiyang Peat Swamp Forest (MKPSF) was endorsed by stakeholders in February 2004. In a sign of support, the district head instructed relevant local agencies to prepare the budgetary requirements for implementing the plan in 2005. Additionally, local agencies agreed to proceed with a number of activities using funds from the 2004 budget.

The endorsement of the plan and strong support articulated by the local authorities is considered significant. The peatlands of this area provide important environmental services. Not only do they store significant stocks of carbon, but they also form an important catchment for rivers running through both Berbak and Sembilang National Parks. Further damage to this area will exacerbate hydrological problems in Berbak National Park.

A new spatial plan is currently being prepared for the MKPSF, and notwithstanding the above-mentioned support, there are strong pressures to allocate land for non-sustainable usage that will threaten the sensitive peatland area. Over the next few months the CCFPI project will continue its engagement in developing the management and spatial plan for the area, with the specific goal of working to ensure that any plan recognizes and protects the integrity of the MKPSF.

The area along the Merang River is riddled by up to 140 log-extraction ditches cut recently to extract illegal timber. In July 2004, the CCFPI project carried out a pilot activity to block four of these ditches in an attempt to reduce the outflow of water from the area during the dry seasons, and minimize the risk of land and forest fires. By October 2004, most of the temporary blocks had been destroyed, most likely by illegal loggers. A more intensive strategy of awareness raising, combined with law enforcement, is considered necessary to address the problems in the area. In the remaining months of the project CCFPI will work with the local authorities to move ahead with these priorities. Additionally, the project has blocked two more ditches with permanent blocks. These blocks are intended to act as a showcase for local communities and authorities. Construction of the blocks will be carried out in close coordination with people living nearby.

### **3. International policy framework**

The CCFPI project is closely linked to the implementation of a range of international conventions, including the obligations for environmentally sound and sustainable development under the framework of the Rio Declaration and Agenda 21. The project is assisting in the implementation of the UNFCCC, the Convention on Biological Diversity (CBD), the Ramsar Convention on Wetlands, and the ASEAN Regional Action Plan on Transboundary Haze. In relation to the UNFCCC, the project will assist both Canada and Indonesia in meeting their obligations under the convention by addressing the mitigation of emissions from LULUCF activities.

The project is simultaneously assisting with obligations under the CBD and Ramsar Conventions— notably cooperation in the protection of forest and wetland biodiversity. The project is also in line with the Canadian-sponsored Global Action Plan for Peatlands that has been endorsed by the Ramsar Convention. It is also contributing to the proposed Joint Work Plan to be developed between the UNFCCC



and CBD, as recommended by the Conference of Parties (COP) 5 of UNFCCC in November 2000 and Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) 6 of CBD in March 2001.

The conservation of peatlands is, therefore, of considerable global importance to the objectives of the UNFCCC, CBD and Ramsar. The two following statements from a decision on Biodiversity and Climate Change adopted by the Conference of Parties to the CBD are particularly significant. The Conference of Parties:

*Notes that the Conference of Parties to the Ramsar Convention on Wetlands at its eighth meeting adopted resolution VIII/3 on climate change and wetlands, which, inter alia, called on relevant countries to take action to minimize the degradation as well as promote the restoration of those peatlands and other wetland types that are significant carbon stores or have the ability to sequester carbon and supports the request by the Parties to the Ramsar Convention on Wetlands to the Intergovernmental Panel on Climate Change to prepare a technical paper on the relationship between wetlands and climate change.*

*Welcomes the proposed assessment on peatlands biodiversity and climate change being undertaken by Wetlands International and the Global Environment Centre with the support of UNEP-GEF, the Government of Canada, the Netherlands and others and encourages the involvement of parties in this assessment and in preparations for the consideration of its findings by SBSTTA prior to COP9.*

The statements highlight the important link between peatlands (wetlands), biodiversity and climate change. The second statement is unusual in that it recognizes non-governmental organizations (NGOs), and encourages parties to the Convention to report back through a mechanism led by NGOs. The recognition of peatlands, biodiversity and climate change at the global level is part of the CCFPI project's strategic approach, which recognizes the need for an enabling environment at district, national and international levels, so that on-the-ground peatland interventions can be supported under the climate change framework. Local experiences also feed into shaping policy decisions.

Successful side events at the following meetings highlighted project activities and the importance of community involvement in peat swamp forest management (including conservation and rehabilitation): the CBD SBSTTA, the ninth UNFCCC COP, and the seventh CBD COP.

#### **4. National policy and development priorities related to peatlands**

At the request of the Indonesian Ministry of the Environment, and in order to raise awareness of the importance of peatlands for carbon storage, the project supported the preparation of two atlases showing the status, distribution, carbon content and change over time of peatlands in Sumatra and Kalimantan. These studies will provide basic knowledge for further detailed studies, and are already being used by the Ministry of Forestry in evaluating the appropriateness of certain areas of land for specific purposes.

The project also supported the preparation and publication of a series of three Indonesian language books on the international climate change framework. These books, which were launched in June 2003, filled a significant gap in Indonesian language material on climate change. By using these three books, the project has

actively participated in supporting the ratification of Kyoto Protocol by the Indonesian government, including participating in parliamentary hearings and conducting some public seminars

## Lessons learned

The project is going to be finalized this year. Some final project steps still need to be implemented, and efforts still need to be done to ensure that the existing progress is maintained. We have, however, learned from the project that many of the socio-economic and environmental interactions on our project will determine the real long-term sustainability of efforts associated with the restoration of peatlands in Indonesia. In addition, the indirect interventions of the project have provided livelihood alternatives so that local residents are not compelled to engage in the often illegal logging practices that are so destructive and more often not economically feasible for local communities.

This project has helped to restore peatlands by working directly with local communities on most of the project steps, to inform on the purposes of the activities, gain their trust, solicit their opinions, gain their local knowledge, educate them on different subject and build their capacity to undertake new activities to sustain their livelihood.

The strong support from local communities and government were mainly due to the action-oriented nature of the CCFPI initiative. Through its practical interventions based on the local communities' knowledge and involving them in the intervention, using simple technology and local materials, while integrating tree replanting activities, the project contributes to the design of any future peatlands rehabilitation initiatives in Indonesia.

## References

- Anderson, J.A.R. 1983 The tropical peat swamps of western Malesia. *In*: Gore, A.J.P. (ed.) Mires, Swamp, Bog, Fen and Moor. 4B Regional Studies, 181-199 . Elsevier, Amsterdam.
- Anderson, I.P. and Bowen, M.R. 2000 Fire Zones and the Threat to the Wetlands of Sumatra, Indonesia. Report of European Union and Ministry of Forestry Forest Fire Prevention and Control Project.
- Badan Perencanaan Pembangunan Nasional (BAPPENAS) 1999 Final report on Planning and Drought Management in Indonesia.
- Gorham, E. 1991 Northern Peatlands: Role in the carbon cycle and probable responses to climatic warming. *Ecological Applications* 1: 182-195.
- IGBP Terrestrial Carbon Working Group 1998 The Terrestrial Carbon Cycle: Implications for the Kyoto Protocol. *Science* 280:1393-1394.
- Immirzi, C.P. and Maltby, E. 1992 The Global Status of Peatlands and their Role in the Carbon Cycle. Wetlands Ecosystems Research Group, Report 11, Department of Geography, University of Exeter, Exeter. 118 p.

- Lappalainen, E. 1996 Global Peat Resources. International Peat Society, Jyska, Finland, 358 pp.
- Pelangi 2001 The Asia Pacific Region Speaks: Perspectives on Climate Change. Pelangi, Jakarta.
- Radjagukguk, B. 1992 Utilisation and management of peatlands in Indonesia for agriculture and forestry. Proceedings of the International Symposium on Tropical Peatland, 21-27. Ministry of Agriculture, Malaysia.
- Regional Physical Planning Project for Transmigration (RePPPProT) 1990 A National Overview from the Regional Physical Planning Programme for Transmigration. UK Overseas Development Administration and Directorate BINA Programme, Indonesian Ministry of Transmigration, Jakarta.
- Rieley, J.O., Sieffermann, R.G. and Page, S.E., 1992 The origin, development, present status and importance of the lowland peat swamp forests of Borneo. *Suo* 43: 241-244.
- Rieley, J.O. and Ahmad-Shah, A.A. 1996 The vegetation of tropical peat swamp forests. *In*: Maltby, E., Immirzi, C.P. and Safford, R.J. (eds.) Tropical Lowland Peatlands of Southeast Asia, 55-73 . IUCN, Gland.
- Rieley, J.O., Page, S.E. and Setiadi, B. 1996a Distribution of peatlands in Indonesia. *In*: Lappalainen, E. (ed.) Global Peat Resources, 169-178 . Peat Society, Jyska.
- Rieley, J.O., Ahmad-Shah, A. A. and Brady, M.A. 1996b. The extent and nature of tropical peat swamps. *In*: Maltby, E., Immirzi, C.P. and Safford, R.J. Tropical Lowland Peatlands of Southeast Asia, 17-53 . Proceedings of a Workshop on Integrated Planning and Management of Tropical Lowland Peatlands. IUCN, Gland.
- Sieffermann, R.G., Fournier, M., Truitomo, S., Sadelman, M.T. and Semah, A.M. 1988 Velocity of tropical peat accumulation in Central Kalimantan Borneo. Proceedings of the 8<sup>th</sup> International Peat Congress Volume 1, 90-98. Leningrad.
- Silvius, M.J., Simons, H.W. and Verheught, W.J.M. 1984 Soils, Vegetation and Nature Conservation of the Berbak Game Reserve, Sumatra, Indonesia. Arnhem Research Institute for Nature Management, Arnhem.
- Susan, P., Florian, S., Rieley, J., Hans Dieter, B., Adi, J. and Suwido, L. 2002 The amount of carbon released from peat and forest fires in Indonesia during 1997. *Nature* 420:61 - 65.
- Whitmore, T.C. 1984 Tropical Rainforests of the Far East. 2nd ed. Clarendon Press, Oxford.

# Experiences in Working Closely with Communities in Carrying Out Peatland Hydrological Restoration Activities at the One Million Hectares Ex-Peatland Project (PLG), Central Kalimantan, Indonesia

*(Pengalaman Pendampingan Masyarakat Dalam Kegiatan Restorasi Hidrologi Lahan Gambut di Eks Proyek Lahan Gambut (PLG) Satu Juta Hektar, Kalimantan Tengah, Indonesia)*

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## **Abstract**

*Climate Change, Forest and Peatlands in Indonesia (CCFPI) Project is restoring peatlands at the one million hectares ex-peatland project at Mentangai, Kapuas, Central Kalimantan, Indonesia. The main activities are canal blocking by the community and other peatland restoration-related activities such as rehabilitation activities, nurseries, fisheries, and hydrology monitoring and training activities.*

*After one and a half years working together with the community, there are a lot of both joyful and difficult experiences to report. Some examples of the joyful ones are: (i) in general, the local communities are easy to work with as long as open-minded and honest principles are maintained; (ii) communities have a great eagerness to move forward and develop but it depends on their capacity; and (iii) communities have ability to adapt, adopt and implement activities in the field. Examples of the difficult experiences are: (i) some community members are still narrow-minded about a project and think that a project is only about donating and spending cash; (ii) they want quick results; and (iii) they have limited capacity and desire to be involved in all kinds of project activities.*

*We have tried to overcome the constraints by providing project-related training and by involving communities in discussions and information dissemination.*

## Introduction

One of the activities of the Climate Change, Forest and Peatlands in Indonesia (CCFPI) Project carried out in Central Kalimantan, Indonesia is restoring part of the million-hectare peat swamp project known as ‘Mega Rice Project’ located at Mantangai, Kapuas District by blocking the canals. In addition, activities related to the peatland restoration such as land rehabilitation, nursery, fishery, hydrology monitoring and community capacity building activities are also executed.

In the field, most activities were carried out hand-in-hand with local communities that live in villages around the project site. Communities were involved in blocking the canals (providing building materials and building the canal construction), caged-fish farming, tree nursery, tree planting that was financed from the grant and hydrology monitoring activities. Community capacity building activities such as training on nursery establishment, rehabilitation techniques, fishery and forest and peatland fire prevention were also carried out. Besides that, there was also information dissemination and presentations on forest fire prevention, canal blocking and land rehabilitation techniques and seedling production, fishery, posters, etc.

After one and a half years working closely with local communities, especially *Dayak*, there are quite a few interesting and unique experiences and new insights. These experiences are valuable lessons learned and will improve the authors’ knowledge in understanding and interacting with communities that are relatively homogenous socially, culturally and ethnically, but which have dynamic and diverse behaviors and ways of life.

The interaction with the communities in the field was not always smooth and successful; sometimes there were significant constraints. Those constraints usually occurred because part of the community did not fully understand the information they received. On average their capacity is relatively low and they are ignorant about the causes of the problems happening around them. But up until now we are able to solve these issues and find a way out of the constraints.

This article presents a glimpse into the field staff’s experiences in working closely with communities in carrying out canal blocking and other activities in Block A, Mantangai, Central Kalimantan. The discussion will focus on communication methods and socialization models that were applied by field staff in the field. We will also share our view on Mantangai community’s readiness in facing the carbon project implementation era.

## Conveying project information to the local communities

At the beginning of the canal blocking project, the constraints that were faced were quite significant and the community showed varied responses to the project activities. There were pros and cons about the project. The cons that sound more like a refusal were echoed in Mantangai.

The rejection emerged because the canal blocking project issues are not familiar issues for part of the local communities. Questions such as the following were asked: What is canal blocking? Why should the canals be blocked? What are the benefits of

the blocking and the impact on our agriculture activities? What are the possibilities to be involved in the project activities? Which canals need to be blocked?. There were even provocative statements such as “canal blocking will harm the community socially and economically.”

After awhile, because of intensive socialization and information dissemination using approaches such as formal meetings with the local government office, informal meeting at people’s homes and individual and information dissemination activities using leaflets, books, stickers, etc. at the beginning of the project, the communities’ understanding, especially those who opposed the project, improved gradually. Enhancement of knowledge on the goals, benefits of the project resulted in communities’ understanding and support for the project plan.

Moreover, after local communities found out that the canal blocking activities were similar to their traditional canal blocking namely “*menabat*”, they supported and promoted the project by explaining the canal blocking activities to those who did not yet understand the process.

One of the keys for success in socialization and information dissemination is to use local language/terminologies. Because of that, during the project phase of socialization, information dissemination and implementation, the “*menabat*” terminology, which is common for local communities, was used instead of “*penyekatan kanal*” or canal blocking.

The communities’ knowledge of the project activities were improved after they were involved in blocking the canals and other related activities such as land rehabilitation, tree nursery, fishery and training activities. It was important not only that they listen to the information but also see and be involved directly in every activity. The community involvements in almost all activities produce optimistic results of communities’ support and no significant interference for instance.

Given that the education level and capacity in understanding the information of the communities that live in the project area are relatively low, the next important issue is to use simple and effective communication/information media. Because of that, information socialization and dissemination were focused on informal meetings and discussions carried one house to another, individually and in friendly ways and also by establishing a relaxing, friendly and family-like environment while disseminating information in the form of leaflets, books, magazines, comics, etc. According to field staff’s experiences, using such approaches are quite effective and successful.

From previous experiences, there are several techniques and principles that can be used for effective socialization and dissemination of project-related information to the local community. Some of these principles are: (i) Use easy to understand terms that suit the local conditions and avoid using unfamiliar terms; (ii) Use social approaches of direct, informal and friendly meetings and discussions; (iii) Do not dictate to and underestimate local communities and their knowledge; (iv) Use visual medias such as posters, books, leaflets, etc, that are brief and in an easy-to-understand language; and (v) Attend, follow and get involved directly in religious and cultural-related activities.

## **Canal blocking activities, climate change issues and transferring information in easy-to-understand methods to communities**

The most complicated and difficult task is to relate canal blocking activities to climate change then to transfer this information to local communities. The field staff's understanding of the relevance of canal blocking activities and climate change is as follows: Canal blocking activities are for restoring degraded peatland, which is caused by land clearing and development of peatland canal system. The primary, secondary and tertiary canal network such as that in the Block A northern area, has resulted in over-drained peat swamp. The surface run-off reduces the peat swamp water retention sharply and the water table finally decreased significantly. As a result, in the dry season the peat is getting drier and is very vulnerable to peat fire. If there is a peat fire, CO<sub>2</sub> will be released to the atmosphere and this will contribute significantly to the greenhouse gases level in the atmosphere. Moreover, most peatland components are organic matter that absorb carbon almost 10 times higher than other terrestrial ecosystems. The canal blocking activities hopefully will reduce surface run-off and water retention, especially in the dry season, so that the peatland will be continuously moist and wet. As a result it will reduce its vulnerability to peat fire. The canal blocking has a positive impact on peatland rehabilitation because it increases the survival rate of planted seedlings.

There are at least three benefits of canal blocking: (i) it can reduce carbon emissions by reducing vulnerability to peat fire; (ii) it can increase the carbon accumulation through reforestation activities; and (iii) restoration activities are the simplest way, although indirectly, of increasing community awareness of how degraded peatland influence climate change.

Based on that understanding, field staff tried to transform the climate change project mission and information into explanations that were simple and easily understandable by local communities, and didn't use complicated technical climate change terminology.

Information transfer and improving communities' understanding were done by explaining the direct and indirect positive impacts and benefits that will be gained by the community from canal blocking, land rehabilitation and other related activities. Knowledge improvement has emerged and hopefully will result in higher appreciation and understanding of peatland restoration and protection efforts. It is expected that this will contribute directly and indirectly to the mitigation of micro and global climate change.

## **Mantangai community preparedness in facing the carbon project implementation era**

If the Mantangai people are asked about their preparedness in facing the carbon project implementation era, especially in land use, land use change and forestry sectors, most people will certainly say that they are not ready. However, the community will respond differently and even will tend to say they are ready if they are asked about their preparedness to restore and rehabilitate degraded peatland in their area, which is linked to the one million hectares ex-peatland project. The "ready" answer from

Mantangai people should be followed up by individual and institutional capacity building.

Building local communities' capacity was carried out in the areas of project design, implementation, monitoring and reporting. Building individual capacity might be done by providing intensive education and training. Building institutional capacity includes managing finance transparently and reliably and could be carried out by providing facilitation, coaching and trainings (from government or NGO).

## **Conclusions**

Some of the conclusions produced from the restoration of the one million hectares ex-peatland project at Mantangai are:

- 1) Local communities have sufficient capacity and knowledge to implement peatland restoration activities, especially the canal blocking activities.
- 2) The key to successful information transfer and dissemination in local communities is: choosing the right communication methods, and honesty and openness in communicating with community members.
- 3) Mantangai community members are quite ready to face carbon project implementation but individual and institutional capacity building is a prerequisite for success.



## Pendahuluan

Salah satu kegiatan Proyek Climate Change, Forest and Peatlands in Indonesia (CCFPI) yang dilaksanakan di Kalimantan Tengah adalah restorasi sebagian lahan gambut eks Proyek Lahan Gambut (PLG) satu juta hektar yang terdapat di Kecamatan Mantangai, Kabupaten Kapuas, melalui kegiatan pokok penyekatan/penabatan kanal (*canal blocking*). Disamping kegiatan pokok penyekatan kanal, juga dilaksanakan beberapa kegiatan yang sifatnya paralel dan mempunyai hubung kait dengan aktivitas restorasi lahan gambut seperti rehabilitasi, pembibitan, perikanan, monitoring hidrologi dan kegiatan penguatan kapasitas masyarakat.

Implementasi kegiatan di lapangan sebagian besar dikerjakan secara bersama-sama dengan masyarakat lokal yang bertempat tinggal di desa-desa di sekitar lokasi kegiatan. Bentuk keterlibatan masyarakat pada implementasi kegiatan berupa pengerjaan konstruksi sekat kanal (penyediaan bahan sekat, pekerjaan pembangunan sekat), kegiatan hibah keramba ikan, pengadaan bibit tanaman rawa gambut, kegiatan penanaman dan monitoring hidrologi. Sedangkan kegiatan yang bersifat pengembangan kapasitas masyarakat berupa pelatihan pembuatan persemaian dan teknik rehabilitasi, teknik budidaya perikanan dan teknik penanggulangan kebakaran hutan dan lahan gambut. Disamping itu juga dilaksanakan kegiatan peningkatan kesadaran masyarakat melalui distribusi dan penyampaian materi tentang pencegahan kebakaran hutan, teknik penyekatan kanal, teknis rehabilitasi lahan dan pengadaan bibit hutan rawa gambut, budidaya perikanan, poster-poster dan lain-lain.

Selama kurang lebih 1,5 tahun mendampingi dan bekerja bersama-sama dengan masyarakat lokal cukup banyak pengalaman menarik dan unik serta nuansa-nuansa baru yang diperoleh dari hasil interaksi dengan masyarakat lokal yang umumnya adalah suku Dayak. Pengalaman menarik dan unik tersebut menjadi pelajaran berharga dan menambah khasanah pengetahuan penulis kedepan untuk dapat lebih memahami dan berinteraksi dengan komunitas yang relatif homogen dari sisi sosial budaya dan etnis tetapi sangat dinamis dan beragam dalam tindakan dan sikap hidup.

Interaksi dengan masyarakat di lapangan tidak selalu berjalan lancar dan sukses, terkadang juga ditemukan hambatan-hambatan yang cukup berarti. Hambatan tersebut terjadi umumnya karena informasi yang diperoleh sebagian warga masyarakat tidak utuh, kapasitas diri rata-rata masyarakat yang relatif masih rendah dan adanya sikap acuh tak acuh terhadap suatu persoalan yang ada di sekitarnya. Namun demikian sejauh ini kendala-kendala tersebut masih bisa diatasi dan dicari jalan keluarnya.

Tulisan ini mencoba menyajikan sekilas pengalaman pendampingan yang diperoleh penulis dalam kegiatan penyekatan kanal dan kegiatan lainnya di areal blok A Kecamatan Mantangai. Dalam tulisan ini, fokus pembahasan lebih pada pola transformasi informasi dan model sosialisasi kegiatan yang diterapkan penulis selama di lapangan. Disamping itu juga, diungkapkan pandangan penulis tentang kesiapan masyarakat Kecamatan Mantangai dalam menyongsong era implementasi proyek karbon.

## Transformasi informasi proyek dalam lingkup masyarakat sederhana

Pada waktu awal pelaksanaan proyek penyekatan kanal (*canal blocking*), tantangan yang dihadapi cukup berat dan mendapat reaksi yang cukup beragam dari berbagai kalangan warga masyarakat. Pendapat pro dan kontra bahkan kecenderungan menentang terhadap rencana kegiatan tersebut menjadi sesuatu yang jamak didengar di tengah warga masyarakat Kecamatan Mantangai.

Sikap kontra muncul dikarenakan oleh isu proyek penyekatan kanal (*canal blocking*) yang akan dikerjakan, terasa asing dan baru didengar sebagian masyarakat setempat. Pertanyaan-pertanyaan seputar: Apa itu penyekatan kanal? Mengapa kanal harus disekat? Apa manfaat yang diperoleh jika kanal-kanal yang ada disekat? Apa dampak penyekatan kanal terhadap kegiatan persawahan dan kegiatan usaha kami? Apakah kami bisa terlibat dalam kegiatan? Kanal mana yang akan disekat? Merupakan sebagian dari sekian banyak pertanyaan yang selalu mengemuka di tengah warga masyarakat kala itu. Bahkan tidak jarang didengar pernyataan provokatif dari oknum-oknum tertentu di masyarakat yang menyatakan bahwa kegiatan penyekatan kanal akan merugikan masyarakat lokal secara sosial ekonomi.

Seiring dengan perjalanan waktu dan dengan kegiatan sosialisasi dan penyebaran informasi secara intensif baik lewat pertemuan formal di kecamatan, pertemuan dan diskusi secara informal dari rumah ke rumah dan pribadi ke pribadi dan penyebaran informasi kegiatan lewat media seperti brosur, buku-buku, stiker, leaflet dan lain-lain pada tahap awal proyek, lambat laun pemahaman warga masyarakat khususnya yang bersikap kontra terhadap rencana kegiatan penyekatan kanal mulai tumbuh. Pemahaman akan maksud, tujuan dan manfaat kegiatan penyekatan kanal justru berbuah hasil berupa dukungan dan simpati terhadap rencana kegiatan tersebut.

Lebih-lebih lagi, ketika masyarakat lokal mengetahui bahwa kegiatan penyekatan kanal (*canal blocking*) mempunyai kemiripan makna dan prinsip kerja dengan teknik penyekatan parit tradisional yang dikenal dengan istilah “**Menabat**”, justru dukungan dan bantuan sosialisasi diperoleh dari sebagian warga masyarakat yang ikut menjelaskan ke pihak-pihak lain yang belum memahami hakekat penyekatan kanal.

Salah satu kata kunci keberhasilan sosialisasi dan diseminasi informasi adalah penggunaan “bahasa/istilah lokal”, dalam penyebaran informasi. Oleh karena itu selama fase kegiatan sosialisasi, diseminasi dan pelaksanaan kegiatan penyekatan kanal penggunaan istilah atau kata “*Menabat*” sebagai ganti terminologi *penyekatan kanal*, sangat jamak didengar di kalangan masyarakat di lokasi kegiatan.

Peningkatan pemahaman sebagian masyarakat tentang kegiatan proyek semakin bertambah lagi saat mereka terlibat langsung dalam pelaksanaan kegiatan penyekatan kanal di lapangan dan juga kegiatan-kegiatan lain yang juga berhubungan kait dengan penyekatan kanal seperti rehabilitasi, persemaian, perikanan dan pelatihan-pelatihan. Hal ini dikarenakan mereka tidak saja hanya mendengar akan tetapi melihat dan terlibat langsung dalam setiap kegiatan yang ada. Keterlibatan langsung pada hampir setiap kegiatan membuahkan hasil positif berupa dukungan dan tidak adanya gangguan yang berarti dan hal-hal negatif lainnya yang terjadi selama berlangsungnya kegiatan di lapangan.

Menyadari bahwa rata-rata tingkat pendidikan dan kemampuan mengolah informasi masyarakat di wilayah kegiatan relatif rendah, maka kalimat kunci selanjutnya adalah penggunaan “media komunikasi/informasi sederhana dan tepat”. Karena itu selama melakukan interaksi, sosialisasi dan penyebaran informasi maka pertemuan-pertemuan dan diskusi informal dari rumah ke rumah, pribadi ke pribadi dan hati ke hati dalam suasana santai, akrab dan kekeluargaan merupakan andalan utama disamping penyebaran informasi melalui media tertulis seperti liflet, brosur, buku, majalah, komik dan lain-lain. Pendekatan tersebut ternyata berdasarkan pengamatan penulis cukup efektif dan berhasil.

Berdasarkan pengalaman yang diperoleh selama pelaksanaan proyek restorasi lahan gambut di lapangan, maka ada beberapa teknik atau prinsip umum yang dapat dijadikan acuan dan pedoman dalam upaya sosialisasi dan penyebaran informasi kegiatan proyek agar lebih efektif dan berhasil di tingkat masyarakat. Prinsip umum tersebut, antara lain: (i) penggunaan bahasa sederhana yang disesuaikan kondisi setempat, kalau memungkinkan penggunaan istilah lokal lebih diprioritaskan dan hindari penggunaan istilah-istilah asing; (ii) pendekatan sosialisasi berupa pertemuan dan diskusi langsung dalam suasana tidak formal dan kekeluargaan lebih diutamakan; (iii) hindari dan jauhkan sikap menggurui dan sikap serba tahu; (iv) penggunaan media visual seperti poster, buku-buku, brosur dan lain-lain dengan bahasa yang sederhana dan penyajian yang singkat; dan (v) keterlibatan langsung dalam menghadiri dan mengikuti acara-acara keagamaan dan adat-istiadat di daerah.

## **Kegiatan penyekatan kanal (canal blocking), isu perubahan iklim dan transformasi informasi di tingkat masyarakat secara sederhana**

Isu keterkaitan program penyekatan kanal (*canal blocking*) dengan perubahan iklim dan bagaimana mentransformasi informasi tentang keterkaitan dua isu tersebut ke tingkat masyarakat lokal merupakan pekerjaan paling rumit dan berat. Hal ini disebabkan oleh keterbatasan pengetahuan dan pemahaman penulis tentang perubahan iklim itu sendiri dan termasuk hubungan antar kedua isu tersebut.

Pemahaman penulis tentang keterkaitan antara kegiatan penyekatan kanal (*canal blocking*) dan perubahan iklim dapat diuraikan sebagai berikut.

Bahwa kegiatan penyekatan kanal (*canal blocking*) merupakan kegiatan restorasi lahan gambut yang terdegradasi akibat adanya kegiatan pembukaan dan pembangunan jaringan kanal pada lahan gambut tersebut. Jaringan kanal primer, sekunder dan tersier seperti yang terdapat di wilayah blok A utara yang bergambut tebal menyebabkan terkurasnya air secara besar-besaran (*overdrained*) dan tingginya limpasan air permukaan (*surface runoff*) yang mengakibatkan daya retensi air (*water retention*) di lahan gambut berkurang tajam dan permukaan air gambut (*water table*) mengalami penurunan drastis. Sehingga pada musim kemarau gambut mengalami kekeringan sehingga sangat rentan terhadap bahaya kebakaran. Apabila gambut mengalami kebakaran, maka akan terjadi proses pelepasan karbon dioksida (CO<sub>2</sub>) ke udara sehingga akan memberikan kontribusi bagi yang cukup berarti bagi konsentrasi gas rumah kaca di atmosfer. Apalagi diketahui bahwa lahan gambut sebagian besar

merupakan unsur bahan organik dan memiliki daya ikat karbon hampir sepuluh kali lipat lebih besar dari ekosistem teresterial biasa.

Adanya kegiatan penyekatan kanal (*canal blocking*) diharapkan limpasan permukaan (*surface runoff*) dan daya retensi air di lahan gambut dapat dikurangi sehingga tinggi muka air gambut (*water table*) bisa dipertahankan khususnya di musim kemarau dan dengan demikian lahan gambut tetap lembab dan basah, sehingga tingkat kerentanan lahan gambut terhadap peristiwa kebakaran bisa diminimalisir. Penyekatan kanal juga memberikan dampak positif bagi kegiatan rehabilitasi lahan gambut terdegradasi karena peluang bertahan hidup (*survive*) benih tanaman lebih baik.

Dengan demikian melalui kegiatan penyekatan kanal maka terdapat paling tidak ada tiga manfaat yang dapat diperoleh dikaitkan dengan isu perubahan iklim, yaitu (i) penyekatan kanal dapat mencegah proses pelepasan emisi karbon dioksida lewat minimalisasi peristiwa kebakaran lahan gambut (CO<sub>2</sub>); (ii) meningkatkan proses akumulasi karbon melalui kegiatan revegetasi lahan gambut terdegradasi, dan (iii) merupakan media paling sederhana kendati tidak langsung dalam meningkatkan kesadaran masyarakat tentang perubahan iklim melalui upaya restorasi lahan gambut terdegradasi.

Berpijak pada pemahaman tersebut di atas, lalu kemudian penulis mencoba mentransformasi misi dan informasi keterkaitan kegiatan proyek dengan perubahan iklim dalam bahasa yang sederhana dan mudah dipahami masyarakat lokal dengan tanpa pernah menyebut secara langsung dan gamblang tentang perubahan iklim yang sarat dengan masalah teknis dan terminologi rumit.

Transformasi informasi dan pemberian pemahaman di tingkat masyarakat dilakukan dengan cara menguraikan dampak positif dan manfaat yang akan diperoleh masyarakat setempat baik langsung maupun tidak langsung dari kegiatan penyekatan kanal, kegiatan rehabilitasi lahan dan kegiatan lain-lain yang berhubungan. Dan transformasi informasi dan peningkatan pemahaman masyarakat ternyata sudah mulai tumbuh dan berjalan cukup baik ditengah masyarakat di lokasi kegiatan hingga saat ini. Peningkatan pemahaman dan pengetahuan tentunya diharapkan akan berkorelasi positif dengan tingkat apresiasi dan kesadaran masyarakat lokal terhadap upaya restorasi dan proteksi lahan gambut. Dengan demikian diharapkan berkontribusi langsung maupun tidak langsung terhadap mitigasi perubahan iklim mikro setempat maupun global.

## **Kesiapan masyarakat kecamatan Mantangai dalam menyongsong era implementasi proyek karbon**

Apabila ditanyakan kepada masyarakat Kecamatan Mantangai tentang kesiapan mereka dalam menyongsong era implementasi proyek karbon khususnya di sektor guna lahan, alih guna lahan dan kehutanan, tentu sebagian besar masyarakat akan menjawab belum siap. Jawaban ketidaksiapan tersebut sangat lumrah diperoleh, sekali lagi bila sipenanya secara gamblang dan langsung berbicara tentang proyek karbon secara utuh ditengah masyarakat dihadapkan dengan kondisi pendidikan rata-rata yang relatif rendah sebagaimana diuraikan sebelumnya.

Akan tetapi jawaban masyarakat menjadi lain dan bahkan cenderung menyatakan siap, apabila kepada mereka ditanyakan kesiapan untuk merestorasi dan merehabilitasi kawasan lahan gambut yang terdegradasi akibat eks Proyek Lahan Gambut (PLG) satu juta hektar yang terdapat di wilayah mereka.

Menjawab dengan kata “siap” tentu saja tidak cukup bagi masyarakat Kecamatan Mantangai, melainkan harus disikapi dan ditindaklanjuti dengan berbagai persiapan-persiapan khususnya pada peningkatan kapasitas sumberdaya manusia dan kelembagaan di tingkat masyarakat.

Peningkatan kapasitas sumberdaya manusia meliputi hal-hal yang berhubungan dengan kemampuan persiapan dan pendesainan kegiatan, implementasi, monitoring dan pelaporan kegiatan proyek. Pengembangan kapasitas sumberdaya manusia dapat dilakukan dengan kegiatan pendidikan dan latihan secara intensif. Sedangkan aspek penguatan kelembagaan meliputi kemampuan membentuk, mengelola dan menjalankan roda organisasi di tingkat masyarakat termasuk didalamnya kemampuan dalam mengelola keuangan secara transparan dan bertanggung jawab. Penguatan kelembagaan dapat dilakukan lewat pendampingan, fasilitasi, bimbingan dan latihan baik oleh pihak Pemerintah maupun lembaga swadaya masyarakat.

## Penutup

Beberapa kesimpulan yang dapat ditarik dari pelaksanaan kegiatan restorasi lahan gambut eks PLG satu juta hektar di Kecamatan Mantangai, antara lain:

*Pertama*, masyarakat memiliki kemampuan dan pengetahuan yang cukup untuk mengimplementasikan program restorasi lahan gambut khususnya kegiatan penyekatan kanal;

*Kedua*, kata kunci untuk suksesnya transformasi dan diseminasi informasi ke masyarakat lokal adalah kesederhanaan cara dan media komunikasi yang dipakai, disamping itu sikap keterbukaan dan kejujuran juga merupakan faktor penentu kesuksesan berinteraksi dan berkomunikasi dengan masyarakat lokal;

*Ketiga*, secara mental masyarakat Kecamatan Mantangai cukup siap menyongsong implementasi proyek karbon, namun pengembangan kapasitas sumberdaya manusia dan kelembagaan di tingkat masyarakat masih tetap menjadi syarat utama agar keberhasilan implementasi proyek karbon bisa tercapai.

# Microwatershed Enhancement through Community Participation: A pilot approach to carbon finance

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## **Abstract**

*The Laguna Lake Development Authority (LLDA), the only lake basin management authority in the Philippines, started in 2004 the implementation of the Laguna de Bay Institutional Strengthening and Community Participation Project (LISCOP). This five-year undertaking is jointly funded by the World Bank and the Royal Dutch Government from which the LLDA will operationalize its co-management approach.*

*One of the specific objectives of LISCOP is to harness and deepen community involvement in micro-watershed activities through community driven sub-projects. One of the components of LISCOP is the Carbon Finance Program (CFP) wherein CDM eligible sub-projects will be identified from among the priority sub-projects. The preparation is funded through a Japanese Grant for Climate Change Initiatives.*

*At present, there are already two CDM-eligible sub-projects. These are the reforestation and agroforestry components of the Tanay Micro-watershed Enhancement Project. They fall under the land use, land use change and forestry (LULUCF) small-scale project category of the CDM, having less than 8 kt CO<sub>2</sub>-e of GHG benefits and focusing on poor watershed communities in the Philippines. The expected GHG benefits were calculated using a high and low scenario. For the project period (2004-2014), the project will have total net carbon benefits of 3,204 tC (11,759 tCO<sub>2</sub>-e) and 1,424 (5,230 tCO<sub>2</sub>-e) under the high and low scenarios, respectively. The anticipated Total Emission Reduction Purchase Agreement (ERPA) Value is US\$ 31,380 for the low scenario and US\$70,554 for the high scenario.*

## Introduction

Climate change, more popularly known as global warming, is one of the most critical concerns of humanity today. In the last 200 years, man has made enormous progress in harnessing natural resources to support an ever-increasing level of consumption. The use of fossil fuels has largely driven this quest for industrial development. A by-product of this development path is the rise in the concentration of so-called greenhouse gases, which could lead to a change in the world's climate. The IPCC Third Assessment Report (TAR) concludes that there is strong evidence that human activities have already affected the world's climate (IPCC 2001). The impacts of climate change could affect natural systems and human communities around the world. A warmer world could lead to extinction of certain plant and animal species, the spread of diseases, and the displacement of people in coastal areas as sea level rises.

The Laguna Lake Development Authority (LLDA), the only lake basin management authority in the Philippines, initiated in 2004 the Laguna de Bay Institutional Strengthening and Community Participation Project (LISCOP). Its aim is to improve environmental quality in the lake basin and its micro-watersheds and to ensure its sustainable management. Foremost among its goals is to deepen community involvement in the management and conservation of the lake basin resources and modify the behavior of watershed users through participatory project planning and implementation of community-based environmental projects. The role of the local government officials and the different river basin councils in the different micro-watersheds is crucial in the implementation of the project.

This five-year undertaking costs US \$10 million and is equally funded by the World Bank and the Royal Dutch Government, with the Philippine Government providing a counterpart part fund of US \$2.2 million. Financial support to the community-identified subprojectssub-projects comes in a mixture of loan, grant and equity, depending on the income classification of municipalities. To encourage Local Government Units (LGUs) to invest in environmental sub-projectssub-projects and take a loan for their implementation, the LLDA has come up with a package of incentives that consists of capacity building activities, sourcing of 50% of the equity requirement for sub-project financing from its Project Development Fund, and support on construction supervision and monitoring. SubprojectsSub-projects are divided into two categories, the Green/Blue SubprojectsSub-projects, which include reforestation, forest related activities, soil conservation, watershed protection, riverbank protection and the Brown SubprojectsSub-projects, which include solid waste management, drainage, sewerage and sanitary support facilities.

Parallel to the LISCOP project is the Laguna de Bay Community Carbon Finance Project primarily aimed to at developing an enabling environment for a carbon market for small-scale environmental interventions in the Laguna de Bay watershed. This will be done through: a) building the capacity of the Laguna Lake Development Authority as an intermediary to enable small-scale environmental projects to result in certifiable emission reductions; b) piloting the implementation of carbon emissions reducing interventions that address priority environmental issues; and c) preparing a

set of environmental projects which emissions reductions credit could be purchased. The main beneficiaries will also be the communities and local governments who will be provided the opportunity to receive emissions reductions credits for environmental projects they implement. A grant of US \$ 358,450.00 was provided through the Japan Grant for Climate Change Initiatives for LLDA to implement this program.

### The LEAP Process

Local government units have a big stake in the LISCOP Project since they will be the one to invest and enter into a loan agreement. To ensure meaningful community participation and involvement, the Laguna de Bay Environmental Action Planning Process or LEAP (Figure 1) was introduced as a major component in identifying sub-projectssub-projects. It is a participatoryive and demand-driven planning tool that involves a step-wise approach to enhance the capability of stakeholders, in each sub-watershed to actively and effectively pursue an environmental agenda in their respective areas. Among the vital components are the conduct of participatory micro-watershed characterization to identify environmental issues and various causes and sources of environmental degradation; the development of micro-watershed vision and the formulation of objectives to attain the vision; the identification of measures to attain the vision through sub-projectssub-projects that would mitigate the environmental problems in the micro-watershed and the prioritization and identification of a sub-project that will contribute most to the attainment of objectives.

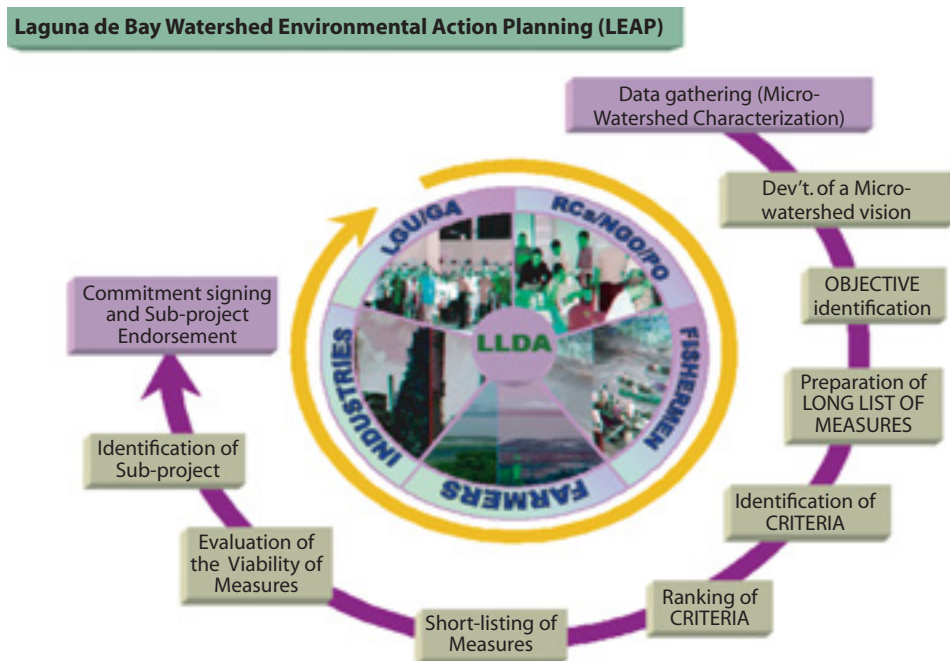


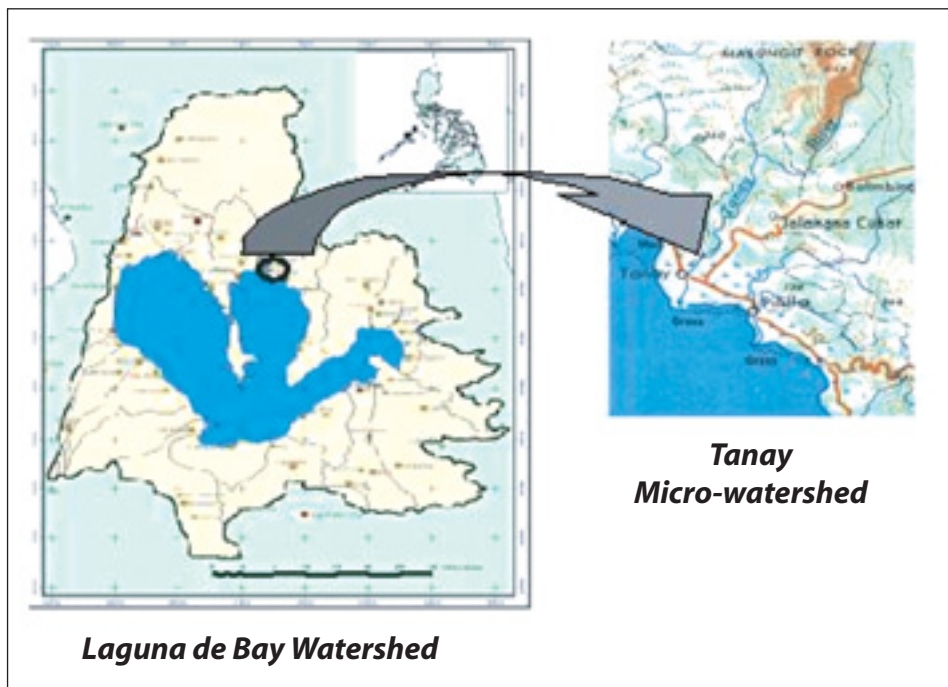
Figure 1. The LEAP Process (LLDA, 2004)



In order to mainstream the activities under the Laguna de Bay Community Carbon Finance Project, the priority sub-projects identified during the LEAP process will be screened to determine those that are eligible under the Clean Development Mechanism (CDM) of the Kyoto Protocol. They will be selected and included in the list of pipeline projects for Carbon Finance. As part of the Japan Grant for Climate Change Initiative, necessary documents such as the Project Idea Note (PIN) and Project Design Document (PDD) will be prepared and submitted to the Philippine's Designated National Authority (DNA) for evaluation and approval. At present there are two sub-projects that are being processed for Carbon Finance, which are described below

### **Carbon Sequestration Initiatives: The Tanay Micro-watershed Enhancement Sub-project**

The town of Tanay is one of the first two municipalities in the Laguna de Bay watershed that availed itself of the benefits of the LISCOP Project. It lies within the 53 km<sup>2</sup> Tanay micro-watershed and occupies 96.5 % of the total land area (Figure 2). It is characterized by mostly gently rising hills and mountainous relief ranging in elevation from 100 to 900 masl. It is drained by the Tanay River, which flows to Laguna de Bay.



**Figure 2.** The Tanay Micro-watershed (LLDA & NAMRIA)

The total population of Tanay as of 2000 is 82,000 and it is the only town within the Laguna de Bay watershed that has an organized indigenous peoples belonging to the Dumagat –Remontado tribe, which in 2001 had a recorded population of 3,982. The town also has an active river basin council called the Tanay Environmental Foundation (TEF) wherein different stakeholders are represented.

During the LEAP process, the stakeholders surfaced identified their main environmental concerns as flooding, soil erosion, deforestation and clogged river systems. To address these concerns, they came out with the Tanay Micro-watershed Enhancement Sub-project (TMEP), which consists of three components namely: reforestation, agroforestry and flood control. Among them, the first two are the potential CDM-eligible projects. Aside from environmental benefits, socio-economic benefits are also considered in the design and implementation of the sub-project.

### **1. Reforestation**

There are two main areas for reforestation. The first is streambank rehabilitation along the Tanay River while the second is reforestation in upland areas.

Streambank Rehabilitation: The purpose of this activity is to increase the riparian forest cover of the Tanay river in order to reduce erosion. Under this component, owners of private lands will be encouraged to plant trees along river banks within their property. Seedlings will be given out for free after an information and education campaign and a pledge of commitment to the project. Provision of seedlings and support services will be contracted through the Katutubo village, an upland village comprised of indigenous Dumagat and Remontado tribes. A total of 20 ha will be reforested with 33,333 trees.

Ecological Enhancement in Upland Areas: The purpose of this second sub-component will be to reforest upland areas near the headwaters of the Tanay river in order to reduce erosion. A total of 50 ha of denuded and grassland areas will be reforested at 2 x 3 m spacing with 83,333 trees. Provision of seedlings, planting and maintenance will be implemented by the Katutubo village. The species will be chosen by the community and will provide them timber, fruit and medicinal resources.

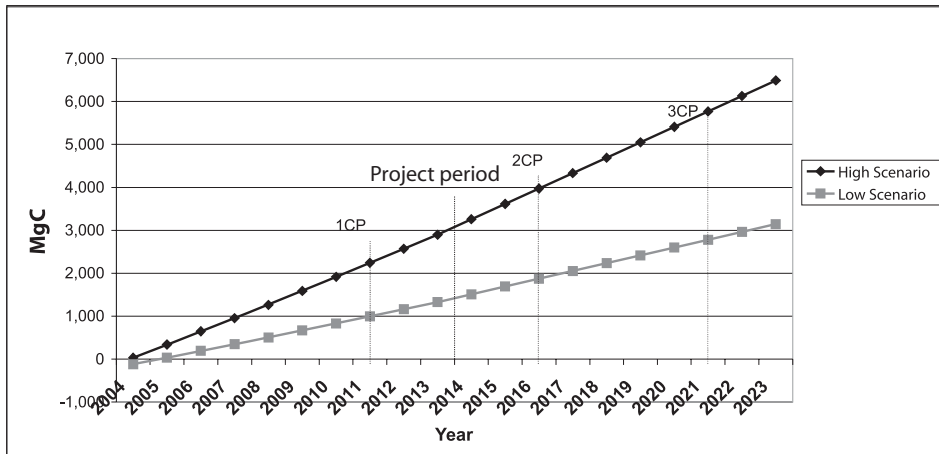
### **2. Agroforestry orchard**

The purpose of this subcomponent is to provide income for the Katutubo (indigenous peoples or IP) village through agroforestry while reducing erosion in the upland areas. This component will be undertaken in an area of 25 ha of communal land belonging to this IP community. It will integrate mango trees at 10 x 10 m spacing with cash crops using a hilly land alley cropping design. A total of 2,500 trees will be planted.

## **Expected GHG Benefits**

Carbon sequestration CDM projects in through reforestation and tree planting have a great potential in the Philippines because of land availability, fast tree growth, and long experience in upland rehabilitation (Lasco and Pulhin, 2003; Lasco and Pulhin, 2001).

The reforestation and agroforestry components of the TMEP fall under the land-use, land-use change and forestry (LULUCF) small-scale project category of the CDM, having less than 8 kt CO<sub>2</sub>-e of GHG benefits and focusing on poor watershed communities in the Philippines. For the purpose of developing it into a CDM project, it is re-titled as the Streambank Rehabilitation and Ecological Enhancement in Tanay Microwatershed. From the Project Design Document (PDD), the expected GHG benefits were calculated using a high and low scenario. For the project period (2004-2014), the project will have total net carbon benefits of 3,204 tC (11,759 tCO<sub>2</sub>-e) and 1,424 (5,230 tCO<sub>2</sub>-e) under the high and low scenarios, respectively (Figure 3 ). The indicative Carbon Emission Reduction (CER) Price, subject to negotiation and financial due diligence is between US\$4-6 per ton CO<sub>2</sub>. The Total Emission Reduction Purchase Agreement (ERPA) Value at US\$6/ton is US\$ 31,380 for the low scenario and US\$70,554 for the high scenario.



**Figure 3.** Net carbon benefits in Tanay micro-watershed for 20 years.

The Tanay micro-watershed sub-project is included along with other projects in the Laguna de Bay Watershed Rehabilitation Project proposed to the Bio Carbon Fund (BioCF), a fund mobilized by the World Bank to demonstrate projects that sequester or conserve carbon in forest and agro-ecosystems. It aims to deliver cost-effective emission reductions, while promoting biodiversity conservation and poverty alleviation. After completing the succeeding procedural and documentary requirements, negotiations for the ERPA follows.

## Next steps for CDM in the Laguna de Bay watershed

As part of LISCOP, LEAPs will be undertaken in the other micro-watersheds of Laguna de Bay and CDM-eligible projects such as the one in Tanay will be identified by local governments on a demand driven basis. This will include carbon sequestration projects, to be proposed for funding under the Biocarbon Fund, and waste management projects (composting, biogas and others) that will be proposed for funding under the Community Development Carbon Fund of the World Bank. LLDA will be developing capacity to act as a carbon finance intermediary for environmental projects in the watershed. Through this approach LLDA will be able to lower the transaction costs and streamline the procedures for CDM processing, thus providing increased opportunity for communities and local governments to participate in the carbon market, while encouraging investment in environmental improvement in the watershed. The development of cost-effective, participatory and equitable arrangements for the use of the carbon finance revenues will also be worked out.

## References

- Intergovernmental Panel on Climate Change (IPCC) Working Group I 2001 Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Houghton, J.T., Ding, Y., Griggs, D.J., Noguer, M., van der Linden, P.J., Dai, X., Maskell, K. and Johnson, C.A. (eds.)]. Cambridge University Press, Cambridge and New York. 881p.
- Laguna Lake Development Authority 2004 Laguna de Bay Institutional Strengthening and Community Participation Project (LISCOP). Project Implementation Plan, Sub-project Operations Manual. Laguna Lake Development Authority, Pasig City.
- Lasco, R.D. and Pulhin, F.B. 2001 Forestry mitigation options in the Philippines: application of the COMAP model. *Mitigation and Adaptation Strategies to Global Change* 6: 313-334.
- Lasco, R.D. and Pulhin, F.B. 2003 Philippine forest ecosystems and climate change: Carbon stocks, rate of sequestration and the Kyoto Protocol. *Annals of Tropical Research*.

# Institutional Perspectives of Landscape Co-Management: lessons learned from RUPES sites in Sumatra, Indonesia

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## **Abstract**

*This study examines institutional perspectives of landscape co-management for reduced poverty and enhanced environmental services, drawn from three different sites of RUPES (Rewarding Upland Poor for Environmental Services) in Sumatra, Indonesia. The study finds a high transaction cost of landscape co-management for better life (“landscape”), implying a non-efficient economic organization of the society in the sites. The roles of intermediaries such as NGOs (national and international) are extremely important to reduce transaction costs, ensure more sustainable resource management, and contribute to good ecosystem services. Elements for policy reforms for better landscape co-management could be summarized as follows: (1) clear, transparent, and integrated social forestry development; (2) participatory conservation of biological diversity; (3) public-private partnership for resource management to implement catchments rehabilitation for Clean Development Mechanism (CDM) activities. The immediate challenge is how to build on the interest and commitment shown by local stakeholders to rehabilitate the catchments area, and especially to empower local people who are most dependent on water and forest resources, and to improve their livelihoods for a better future. In short, the policy reforms should be directed towards land and resource rehabilitation of potential sites for CDM activities, at the same time empowering local people dependent on the water, land and forest resources.*

## Introduction

The environmental services market has increasingly obtained attention in academic communities, government agencies, private sectors and organizations concerned with the empowerment of civil society. Services include clean and abundant water supplies from watersheds, biodiversity protection, stocks of carbon that may alleviate global warming and landscape beauty for recreation and tourism. The sellers or providers of environmental services are generally people living upstream, where land use practices and the techniques and knowledge adopted for farming practices significantly affect the nature of resources and the quality of ecosystems services. The buyers or beneficiaries of the services include people living downstream, private entities, national and international organizations interested in conserving the resources. However, upland communities, generally the poor and most marginalized, are not sharing in the benefits that these services provide. The benefits of national and local investments in economic development often bypass these people and in many cases these upland communities are bearing a large share of the negative aspects of development.

There is an urgent need to support a process of self-empowerment so that poor upland communities can take the necessary decisions to build a sustainable future based on their resources, on improved technology and centuries of accumulated wisdom. Therefore, rewarding poor upland communities for providing environmental services would enhance their livelihoods and reduce poverty. The program of RUPES is formulated to develop working models of best practices for successful environmental transfer agreements adapted to the Asian context in general and to the Indonesian context in particular. However, as the institutions governing the interactions among these stakeholders have not developed properly, establishing rewards and payment transfers for providers or sellers of the services face serious complexities. The latter, which are mostly poor people very dependent on environmental resources. Under such institutional arrangements, the transaction costs of implementing rewards and payment transfers are extremely high. In addition, political constraints to implement the concepts are substantial, especially when the communities receive rewards for services only in exchange for votes.

This article examines institutional perspectives of lifescape co-management to improve livelihoods and enhance environmental services, drawn from three RUPES sites: Sumber Jaya of Lampung for watershed, Bungo of Jambi for biodiversity, and Singkarak of West Sumatra for carbon sequestration services using an entry point of watershed and hydrologic functions. First, the approach and framework or carrying out the institutional studies are described, with brief descriptions of site characteristics. Analysis of the institutional environment clarifies the roles of individuals in collective action, both at the informal and formal level. Finally, the paper concludes with steps for institutional reforms to improve lifescape co-management for reduced poverty and enhanced environmental services in Indonesia and other developing countries.

## Approach and frameworks

An institutional economic approach is mostly used in the study, combined with quantitative analyses of the transaction costs of the existing and potential collective

actions for transferring rewards. The basic principles in studying the institutional mechanisms rest on the meaning and scope of institutions as a set of rules of going concerns, as viewed by both old institutional economics and new institutional economics. The fundamental distinction between the everyday use of the term “institution”—as being synonymous with an organization such as the Ministry of Forestry or a university—and the working rules is therefore the focus here. Organizations such as a university or a corporation acquire their meaning from the working rules (institutions) that define them.

Three classes of institutions are adapted in the study: (1) norms and conventions; (2) working rules; and (3) property relations (Bromley 2003). Norms and conventions are accepted regularities in behavior, though not written, that bring order and predictability to human relationship. The enforcement of norms and conventions tends to reside close to the individual so that the roles of codes of conduct are very important. Norms and conventions must be distinguished from the class of institutions for which there exist formal (codified) enforcement mechanisms. Therefore, compliance processes must be set up by the state to enforce conformance with an evolved norm, that is, the working rules.

Collective actions relevant to the development of environmental services markets would go beyond “autonomous” processes to accumulate trusts within the group. It requires systematic efforts to search for recognition among different groups (and subgroups), and mechanisms to build long-term relations and networking systems in a broader context for more sustainable natural resource management. This implies that strong bonding social capital without bridging social capital could lead to sustained conflicts. Once the two types of social capital are combined, the level of trusts could grow significantly higher and civil society as a whole would grow healthier and even stronger than otherwise. Therefore, intermediaries are really needed to develop a negotiation support system that strengthens the “bridge” and accumulate “trusts” in the society.

Societies characterized by high levels of trust are also less dependent on formal institutions to enforce agreements. Informal credit markets dependent on strong interpersonal trust can facilitate investment where there is no well-developed formal system of financial intermediation, or where lack of assets limits access to bank credit. Interpersonal trust can also provide an imperfect substitute for government-backed property rights or contract enforcement where governments are unable or unwilling to provide them. Government officials in societies with higher trust may be perceived as more trustworthy and their policy pronouncements as thus being more credible. To the extent that this is true, trust also triggers greater investment and other economic activity. Trusting societies not only have stronger incentives to innovate and to accumulate physical capital, but are also likely to have higher returns to accumulation of human capital (Knack and Keefer 1997).

The concept of social capital could be very relevant in developing environmental services markets, and formulating the payment mechanism from the buyers, intermediaries and sellers of the services. However, from the results of empirical studies of environmental services markets, at least four prior conditions need to be fulfilled before a payments mechanism can be established (Van Noordwijk

personal communication): (1) The governance system must be responsive to the long-term interests and perspectives of the local people, and not lean towards the outside extractor/investor option; (2) The relevance of environmental services to the livelihood of the local people must be articulated alongside with health and education systems that are provided as “public services;” (3) World markets need to link the environmental services consequences for outside stakeholders to price signals that local actors perceive, and at a level that is significant in relation to the direct sale value of the products; and (4) Basic levels of *trust* are needed between local people, governance systems and external stakeholders. Without such trust, payment of environmental service transactions is unlikely to be sustainable, transparent and effective.

The present study also applies transaction-cost principles, one of the main components in the institutional economics, believing in a costly process of every economic exchange. At the community level, transaction costs could arise (1) from coordination activities among the community members and (2) from interaction (lobbying, bargaining, etc.) between local communities and state agencies (Mburu *et al.* 2003). Transaction costs may differ between households due to household characteristics and differences in the willingness of households (or the incentives created for them) to bear the transaction costs involved in collective actions of natural resource management. Previous studies on the subject suggest that transaction costs arising from coordination activities are influenced by the social cohesion or the social capital of the community members (Ostrom 1994, 2000). The transaction costs arising from the interaction with state agencies probably depend on perceived relations between the community members and the agencies concerned. The incentives for households to bear transaction costs involved in implementing community-based (agro) forestry management (CBFM) as an important proxy to provide environmental services obviously depend on the benefits that the household expects from this management. This includes the capacity of the household to spend time and resources, such as financial capital and the availability of labor in the household.

The studies were conducted using a combination of desk studies and field observations of RUPES sites in Sumber Jaya (Lampung), Bungo (Jambi) and Singkarak (West Sumatra), and by performing indepth interviews with key persons in the field, relevant stakeholders, and policymakers. The three current RUPES sites in Indonesia provide opportunities to conduct more comprehensive institutional analyses on the development of environmental service markets in Indonesia. These sites respectively represent watershed, biodiversity and carbon sequestration environmental services, where it is expected that action plans would be conducted and policy recommendations at local, national and global level offered. The study emphasizes three major aspects of institutional economic analysis, namely: (1) institutional mechanisms; (2) institutional environments; and (3) directions of policy reforms for environmental service markets in the future. These frameworks provide useful guidelines for institutional studies of RUPES sites in Indonesia and other parts of the world with similar environmental services characteristics.

To develop options for institutional mechanisms, principles originating in the old institutional economics could be expanded and complemented using the frameworks developed in the new institutional economics. Based on Commons views,



“the ultimate unit of activity must contain in itself the three principles of conflict, mutuality, and order. The unit is transaction” (see Williamson, 1998 p.6). Therefore, “transaction cost economics concurs that transaction is the basic unit of analysis and regard governance as the means by which order is accomplished in a relation which potential conflict threatens to undo or upset opportunities to realize mutual gains (Williamson 1998).” Just as interests shape the patterns of internal changes, and the dynamics within the settings of action research sites and in the external environment of local government, changes in perceptions of macro-economic conditions also affect governance structures in the overall organization.

## Sites characteristics

The following brief descriptions of the sites provide general conditions of the three environmental services, i.e watersheds in Sumber Jaya, biodiversity services in Bungo and carbon sequestration services using an entry point of watershed and hydrologic functions in Singkarak. Two other sites of environmental services development in Setulang of East Kalimantan and in Cidanau of Banten are not among the current RUPES pilot locations in Indonesia.



**Figure 1.** RUPES pilot locations in Indonesia (ICRAF Southeast Asia, 2005).

### 1. Watershed in Sumber Jaya, Lampung

The subdistrict of Sumber Jaya was first officially inaugurated by President Soekarno in 1952, as a destination of the Transmigration Program from West Java. The program was under the Administration of National Reconciliation Bureau (BRN=*Biro Rekonsiliasi Nasional*), which was also responsible for regional development. Sumber Jaya developed rapidly, with well-known coffee producers in North Lampung. As a new growth center, the subdistrict attracts more migrants, mostly from Java and neighboring regions, for coffee cultivation, forest-product extraction and agricultural

intensification. The topography of Sumber Jaya is hilly and mountainous at 700-1700 meters above sea level (masl). Mount Bukit Rigis (1,395 m) is the center of several other mountains such as Bukit Subhanallah (1,623 m) in the north, Bukit Tangkit Tebak (2,115 m) in the east, Bukit Tangkit Begelung (1,213 m) in the southeast and Bukit Sekincau (1,718 m) in the southwest. Average rainfall is 2,614 mm per year, and generally classified as B1 zone with a total of seven wet months (rainfall is over 2,000 mm). There is only one totally dry month. Average temperature is 21.2 °C, with the minimum temperature 20.3 °C and the maximum temperature 21.7 °C. The area is suitable mostly for coffee farming, vegetables and other horticulture products.

At the time of study, Sumber Jaya was part of the new district of West Lampung, which was previously included administratively in the district of North Lampung. In 2000, the old subdistrict of Sumber Jaya was divided into two subdistricts: Sumber Jaya on the east side, managing 15 villages and Way Tenong on the west side, managing 14 villages. Therefore, the total area of the new Sumber Jaya is only 35,646 ha, a significant decrease from the old Sumber Jaya of 54,194 ha. Total population in old Sumber Jaya was nearly 90,000 people, while the population of new Sumber Jaya is possibly nearly 50,000 people. Major agricultural land use in Sumber Jaya is coffee cultivation on the upper portions of watersheds (44.6%) and paddy rice on the lower portions (5.13%). The rest of land use is mostly protection forest; the ultimate function of the Way Besai sub-watershed. Coffee farmers in Sumber Jaya are practicing coffee monoculture on about 20% of the total watershed area; and coffee-agroforestry, also known as multistrata coffee, on about 24.5% of the total watershed area.

## **2. Biodiversity in Bungo, Jambi**

The district of Bungo was established in 2001, as an expansion of the former district of Bungo Tebo, separated from the district of Tebo in the east. Bungo now consists of six districts: Pelepat, Jujuhan, Rantau Pandan, Tanah Sepenggal, Tanah Tumbuh, and Muara Bungo, which also serves as the capital of Bungo district. Most of the area is relatively flat, at 500 masl or less. The district also includes a highland of Bukit Barisan, and Mount Kerinci (3,800 masl) is the highest peak of the region. Bungo has five consecutive wet months with the average temperature is 26.6 °C, ranging from 22.7 °C in the rainy season and 31.6 °C in the dry season. Average rainfall is about 3,000 mm, ranging from 100 mm per month in the dry season and 500 mm per month in wet season.

The study site in Bungo focused on 455,308 ha of Batang Hari watershed, the second largest river in Sumatra. Current land use in Bungo district is dominated by forest (37%), rubber plantation or monoculture (31%), and rubber agroforestry (13%). Remaining land use is allocated to oil palm (13%) and young oil palm (5%) and other categories such as young rubber (Kuncoro 2004). Rubber plantations and rubber agroforestry are grown by smallholders, involving different arrangements between landlords and sharetappers. Average rubber yields are only 640 kg dry rubber/ha/yr, which are relatively low compared to an average of 990 kg dry rubber/ha/yr in the special foreign-funded Smallholder Rubber Development Projects (SRDP) using clonal high-yielding varieties of rubber.

Other concerns over the biodiversity services in Bungo relate to the involvement of poor farmers in harvesting or tapping activities to collect latex. Sharetappers, called *anak kapak* locally, tap in others' rubber gardens under a harvest-sharing agreement. Sharetapping is common arrangement between villagers with few or no tappable rubber trees, but with surplus labor. Sharetapping is also common for rubber owners with surplus rubber trees for tapping but they cannot tap themselves for a number of reasons. In Jambi and in most places in Indonesia, sharetapping is implemented without prior written consent or agreement, but generally very strong commitment based on verbal agreements between the rich and the poor. Therefore, actions leading to securing the property rights at local level and improving the livelihood of rubber sharetappers could contribute to the conservation of the biodiversity in the regions.

### **3. Carbon sequestration in Singkarak, West Sumatra**

The case of carbon sequestration in Singkarak, West Sumatra looked at the management of catchments area of Lake Singkarak, covering an area of 129,000 ha and spreading from the district of Solok in the south to the district of Tanah Datar in the north. The catchments of Singkarak were previously known as the heartland of the Old Minangkabau Kingdom, and served as the food basket of the region, with elevations ranging from 360 to 1,500 masl and slopes between 26% and 75%. Annual rainfall ranges from 1,660 mm to 1,860 mm with three dry months (a month with rainfall of less than 100 mm). About 39,000 ha (31%) of the catchment is considered "critical land" as a result of non-suitable land use practices, resulting in either land degradation or wild imperata grassland. Other land uses in the catchments include rice paddy (21%), upland crops (17%), and other uses (30%). Most of these critical lands and 9,773 ha of uplands belong to the clan (*Ulayat Kaum*) and local community (*Ulayat Nagari*).

Lake Singkarak has an area of about 13,665 ha. It is 21 km long, 16 km wide, and 160 m deep. Water in the lake comes from at least five main rivers (*batang*): (1) Batang Malalo from the west (Tanah Datar district); (2) Batang Ondoh; (3) Batang Paninggahan; (4) Batang Saning Bakar; and (5) Batang Sumani, all from the south (Solok district). The original outlet of the lake is Batang Ombilin to the east, which provides irrigation for rice paddy in four downstream districts: Solok; Padang Pariaman; Tanah Datar; and Sawahlunto Sijunjung. In addition, artificial outlets of the lake to the west have been used for generating power of PLTA (hydroelectric power plant, HEPP) Singkarak, serving the electricity demands of the provinces of West Sumatra and Riau. The PLTA Singkarak has the capacity of generating power of 175 megawatts, a little higher than the PLTA Besai in Lampung.

Total population of Singkarak catchments is about 400,000 people with a density around 205 people per sq km. About 10% now live below the poverty line. The majority of people (76.6%) around Lake Singkarak make a living from agriculture and fishery, while 10% practice swidden agriculture or shifting cultivation. The famous rice production *Bareh Solok* and exotic fish *Ikan Bilih* are agricultural products specific to the Singkarak catchments, even though their production has decreased significantly in recent years. Land degradation, deforestation and unsustainable land use practices are the main causes of the decrease in the fish production. In addition, population

pressures have increased in recent years. The total number of land rotations have decreased from four to two years. Institutional arrangements within the clan and community also determine patterns of land use changes in West Sumatra.

After the fall of the centralized New Order Regime of President Soeharto, or the beginning of the Reformation Era, Singkarak benefited from decentralization policies, by reviving the significant roles of informal leaders in the governance system. The provincial government of West Sumatra issued Local Government Regulation No. 9/2000 on *Nagari Government System*. The term “*nagari*” loosely means “village,” but practically consists of several villages in the previous centralized definition of rural government, which was subordinate to subdistrict (*kecamatan*) government. One should note that in urban areas, there are basically no changes on the *kelurahan* (urban village) system, where the head of the urban village (*Lurah*) is a government officer and appointed from the top, though a recommendation from the community might also be considered. The *nagari* government is an autonomous local institution led by a mayor (*Wali Nagari*) elected at the village level. The village has representatives or a parliamentary body called *Badan Perwakilan Anak Nagari* (BPAN), consisting of *adat* elders (*Ninik Mamak*), religious leaders (*Alim Ulama*) and intellectuals (*Cerdik Pandai*). In addition, two other categories are included: the *adat* women (*Bundo Kanduang*); and the young (*pemuda*). Sometimes these are augmented by local leaders, professionals, farmers’ groups and, rarely migrants.

## **Institutional mechanisms found in the sites**

Based on classes of institutions, major stakeholders in Sumber Jaya have adopted the norms and conventions based on (economic) values of migrant, frontier and forest-pioneer characters. Military operations in the 1990s to overcome the misuse or encroachment of protection forests, led to major evictions out of the forest of small farmers practicing coffee gardens and mixed agroforestry. These evictions were a nightmare and very hard to forget for the majority of Sumber Jaya’s population. The villagers or providers (and beneficiaries) realized that if they were united in an organization, they could obtain rights to use the forestland for a 25-year period with probationary rights of five years under community-based forestry management (CBFM or HKM).

Farmers in Sumber Jaya generally grow robusta species of coffee, where shaded coffee and monoculture coffee practices mixed with agroforestry systems are also very common. Conventions to justify land for crop cultivation from the forestry boundary are normally based on the “original control” in the forest clearing and tree crop planting. As commonly practiced in the forest frontier community, the HKM community in Sumber Jaya follows the norms of “first come first serve,” where individuals who opened up the forest in the early 1970s or prior to that date, could legitimately claim “possession” of forestland (not necessarily “rights” or “ownership”) and could grow any crops necessary to generate economic returns. Based on the conservation values strongly adopted by the HKM organizations, members of the organizations closely monitor economic activities within the protection block of the conservation forest, mainly from encroachers and illegal loggers. Each HKM group

in Sumber Jaya has claimed to capture two to three encroachers and illegal loggers within its own group jurisdiction.

Farmers and forest communities in Sumber Jaya have effectively set working rules for growing collective *kebun* (mixed agroforestry gardens). Temporary written rules on “tenure” to use land upstream are adequate for water resources protection and conservation for downstream users. There are some clearly defined and understood rules to obtain the tenure permits, such as joining a farmer group as explained previously, which has internal rules and regulations and a sensible work-plan for five years and longer, developing community-based maps of land boundaries. A very strong law of “no-trespassing” in state forestland is effectively enforced because the institutions of the villagers have strong enough law enforcement mechanisms.

Institutions supporting biodiversity services in Bungo were developed based on the norms and conventions that a right to use the land is generally attainable through forest frontiers, initial planting of cash crops such as rubber, cinnamon, etc. However, the society in Bungo strongly enforces that an absentee landlord of more than 10 years loses the rights to use. The land is then considered common property where everybody in the society controls the use of the land through *adat* leaders. Farmers in Bungo are strongly encouraged to grow both lowland and upland paddy rice. Compared to other land uses, a paddy field is generally regarded as the highest value in the society for food security, even though the cost of labor is increasing substantially. More recently, conversion of land to palm oil is getting more attention because of the attractiveness of future benefits from both small- and large-scale palm oil plantations. Some portions of *adat* or *ulayat* land, where rubber agroforestry systems are regarded as the hottest spots of biodiversity richness, are now threatened to be converted to oil palm plantations because the local government has approved the *ijin prinsip* (initial permit) or investment for oil palm plantation.

Bungo society also strongly enforces that *tanah batin*, a category of land use, cannot be owned permanently. Included in this category is a special designation of upland paddy where the society can control the sustainability of the rice field, land designated for cemeteries, the river for general purposes, and *lubuk* for raising fish and other aquaculture activities. However, land ownership or the rights to use in *tanah nenek* within social or lineage systems in concept can be transferred, although in practice it never happens. Villagers still consider these types of land as a heritage for the sustainability of Bungo society as a whole.

In addition, society in Bungo acknowledges self-ownership and open access of land, which are governed by working rules, a formal rule set by the state and represented by local land administration office. However, the category of open access is very trivial, and is interpreted in many ways in recent days. The rules are written and enforced by the state, up to village level. Informal rules are well defined and enforced, but formal rules are not clearly understood or at least, the villagers are not interested in the nitty-gritty arguments regarding formal land administration issues. Other examples of clearly defined and understood rules include the regulations on land ownership or land certificate, even though the majority of villagers do not hold a paper copy of the certificate. Villagers in Bungo also understood the rules of “no-trespassing” on state land, on conservation forests, etc., even though some villagers

are tapping some resources and non-timber forest products such as honey from the protection forests.

The norms and conventions adapted in Singkarak of West Sumatra support the revival of the sophisticated *nagari* system—a very complex social system that defines and governs land use, and other aspects of daily life -- after being sidelined during the centralistic New Order regime. Land ownership (or more precisely the “right to use” the land) is governed through locally defined conventions within *Kerapatan Nagari*, a decision-making institution preserved since pre-independence. Lake water and other hydrologic systems related to the water networks are considered common property for fishing, irrigation, aquaculture and other life-support activities. Each *nagari* government governs and enforces the norms and conventions for the sake of a prosperous society in Singkarak. In addition, paddy field means food security and prosperity in Singkarak and other areas in West Sumatra. For example “*Bareh Solok*” (the rice from Solok, the district adjacent to Singkarak) is a well-known geographic landmark of West Sumatra and Indonesia.

In terms of working rules and property relations in Singkarak, the *nagari* system acknowledges self-ownership both through societal rules and formal state rules. Formal rules are necessary for investment and business purposes. The rules are written and enforced by the state. As explained previously, informal rules within the *Nagari* system are well-defined and enforced. Society in Singkarak is generally aware of formal rules enforced by the state. Rules on land ownership, and “no-trespassing” to *tabura* (*Taman Hutan Raya* or People-Owned Forest Land) are generally understood and complied with by the local people. Sometimes the complexity of the *nagari* system in governing land uses in rural areas prevents the flow of investment to these areas, especially if the investors are coming from outside West Sumatra.

## **Institutional environment for lifescape co-management**

Some of the existing institutional environments supportive of lifescape co-management seen in Sumber Jaya could be a foundation to establish stronger bonding and bridging social capital and help develop an environmental service market in the area. These are known as *gotong royong* (labor share in common property), *arisan* (capital share periodically on regular basis) and *Forum SDA* (which is formally a farmer group gathering or sharing information to obtain the tenure). More formal collection actions were also found in the region, such as the watershed community forum for conserving natural resources established in January 2004 and endorsed by the local government. There is also ample room for village heads to play important roles in the new set-up of rural autonomy based on the new Act No. 22/1999 and its improved version, Act No. 32/2004.

In Bungo, several societal-based collective actions were found in the study sites such as: *pelerin* (labor sharing in privately owned land); *gotong royong* (a method of labor sharing in common property *berselang* (labor sharing for planting and harvest in rice); *jolo-jolo* (capital sharing for special occasions); and *arisan* (capital sharing periodically on a regular basis). It should be very clear that some formal rules are very important. Formal rules are eroding since *reformasi* (reformation era), but formal

organization is still important for land administration, certification, etc. Even though most of the village heads (Kepala Desa or lurah) have heard of Act No. 22/1999, village heads play important roles in the new rural autonomy.

In Singkarak of West Sumatra, societal collective actions were also commonly found in the soricety. Some traditional formats of collective action were found in the field such as *gotong-royong* and *Gebu Minang* (movement to mobilize resources from the better class of the *Minang* society, living in other parts of country). One should note that the regular village (*desa*) system no longer exists. The *Nagari* system is fully adopted after *reformasi*. In this case, the head of *Nagari* falls under the Kecamatan and administrative authority of the city and district government. Finally, in urban areas or enclaves of *Minang*, basically there are no changes in the *kelurahan* system.

The analysis of institutional environments for lifescape co-management was developed based on the results of indepth interviews with key informants and stakeholders in the field and a survey on 37 respondents in two villages of Simpang Sari and Gunung Terang in Sumber Jaya and 47 respondents in several hamlets (*kaums*) of Nagari Paninggahan in Singkarak. Synthesis of institutional mechanisms in Bungo was based mainly on indepth interviews with resource persons and key informants in the field and literature on natural resource management, biodiversity, rubber economy and land use practices of the rubber agroforestry system.

### **1. Level of dynamics of norms and conventions**

The level of norms and conventions adopted by the society living around the watershed is very much determined by the characteristics and historical figures of the community. For example, the migrant character of community in Sumber Jaya leads to a majority feeling (62%) that everybody can have access to grow crops in forest land. This figure is different from the perception of the people living in Lake Singkarak watershed, who believe that the land—including forest land—is controlled by the traditional *ulayat* system, from *kaums* to *nagaris*. Only 5% of respondents in Singkarak believe that individuals could have access to forestlands to grow crops. According to information from key informants, the figures in Bungo fall between those found in Sumber Jaya and in Singkarak. In this case, the role of farmers' groups as a significant agent in growing crops in forestlands is not as important as their function to improve social cohesiveness in the community.

The majority of respondents in Sumber Jaya (78%) are members of local organizations such as farmers' groups (more precisely CBFM of HKM group). In Singkarak, 72% of respondents do not belong to any local organizations. These seemingly contradictory findings could be explained by the fact that growing crops in the forest is not accepted by the government, even though the local authority is no longer adopting repressive measures. People want "more freedom" in growing cash crops such as multistrata coffee and tree crops in the protection forests, assuming more sustainability principles are adopted in these farming practices. In this case, the main reason farmers in Sumber Jaya join these organizations is to obtain more secure property rights in land use practices, particularly in response to the recent rules and regulations about HKM and/or policies of social forestry in general. Regarding the understanding of rights, benefits, and responsibility in joining the farmers'

association, the majority of respondent in all RUPES study sites were confident about their decision to join at least one local association or farmers' organization.

## **2. Respected and enforceable working rules**

Unlike the findings of institutional mechanisms of norms and conventions, people in the three RUPES locations have a similar tendency to respect more formal working rules related to sustainable resource management. The relationship between individuals and farmers' group with local government officers is perceived to be "good" by 65% of respondents in Singkarak, by 31% of respondents in Sumber Jaya, and possibly by most of people in Bungo. The majority of respondents in Sumber Jaya (61%) chose the answer of "fair," instead of "good" such as in Singkarak. This is probably due to cultural differences. Respondents in Sumber Jaya are mostly migrants from Java (80%), whereas all respondents in Singkarak are native Sumatrans (*Minang* ethnic group).

Similar results are also found regarding the impression of the local government's performance. The majority of respondents in Sumber Jaya (60%) claim that their performance is "fair," while those in Singkarak (92%) say the performance is "good." However, more than 34% of respondents Singkarak suggest a "bad" performance of local agency dealt with forestry, and only 17% of respondents in Sumber Jaya were confident enough to say that the performance of forestry officials is "bad." The problems of illegal logging and the fact that these people have witnessed a significant amount of illegal timber being transported outside the area, are among the factors contributing to the "bad" impression. One should note that this finding could be verified with the actual outcome of natural resources quality in the study sites, which might determine the level of respect for formal working rules relevant to environmental services development in Indonesia.

## **3. Estimated transaction costs of co-management**

The components of transaction costs that could be estimated include: (1) costs of initiation/information searching, ranging from the costs of group establishment, lobbying costs, obtaining permits, etc.; (2) costs of coordination/organization, consisting of the costs of overhead, regular meetings, and opportunity foregone to attend meetings, etc.; and (3) costs of enforcement, including the costs of guarding the crops from encroachers, "parcel maintenance," dispute settlement, etc. It should be noted that the range of these costs components varies significantly, implying different perspectives among respondents in Sumber Jaya. One possible cause is that the respondents cannot distinguish between "production costs" such as crop watching and parcel maintenance to improve productivity or to prevent encroachers from entering the parcels, and the real "transaction costs" such as the time allocated to guard the crops from encroachers. Another possible cause is that the time allocation being reported is actually overestimated, as commonly found in farm-budget analysis, where the revenues are normally underestimated, while expenses are usually overestimated. Nonetheless, the estimated costs are calculated using the time allocated to perform such activities multiplied by the actual wage rate in Sumber Jaya, allowing the opportunity costs foregone for HKM members to attend meetings,



plus additional transport costs from their residences to the meeting room. For a more rigorous quantitative analysis, the total costs of participation in the meeting as a component of coordinating costs could be extrapolated from the proportion of farmers participating.

**Table 1.** Transaction Costs of HKM Groups in Sumber Jaya (Rupiahs (Rp) per household).

	Components of Transaction Costs	Total Costs (Rp)	Percentage (%)
1	Costs of initiation/information		
	(a) Group establishment	119,590	23.75
	(b) Lobbying costs	39,583	7.86
	(c) Obtaining permit	191,944	38.12
	Sub Total	351,118	69.72
2	Costs of coordination/organization		
	(a) Overhead	23,190	4.61
	(b) Regular meeting	24,938	4.95
	(c) Opportunity forgone to attend meeting	87,824	17.44
	Sub Total	135,952	27.00
3	Costs of Enforcement		
	(a) Guarding crops from encroachers	4,000	0.79
	(b) Kebun or parcel maintenance	6,521	1.29
	(c) Dispute settlement	6,000	1.19
	Sub Total	16,521	3.28
	Total Transaction Cost	503,591	100.00

Source: Calculated from field observations.

Efforts to reduce high transaction costs become relevant in the policy reforms agenda because high transaction costs could represent a non-efficient economic organization and policy formulation process and implementation procedures. The estimated transaction cost in HKM group in Sumber Jaya is about Rp 504,000 per household (about US\$55 at the current exchange rate). This is considered expensive, given that the average annual income of farm households is about Rp 1 million or less. Simplified and clear procedures, predictable costs of application, and the time required for approval could obviously reduce the important components of transaction costs that have to be borne by household members of HKM organization. In addition, the roles of intermediaries such as NGOs (national and international) are extremely important to reduce transaction costs, especially if the HKM is to serve as a reward mechanism for the poor living upstream who have adopted sustainable resource management, contributing to good ecosystem services for the watershed. Finally, the reforms should be directed at increasing the capacity of local government on forestry and watershed management, such as empowering forest guards and local policemen could reduce the transaction costs of monitoring the group existence.

For the sake of formulating reward transfer mechanisms for RUPES actions, a dynamic analysis of transaction costs in establishing, running and enforcing the HKM group should be studied in the future. A snapshot analysis of transaction costs, which this study provides, is an important initial step, but cannot capture the dynamic relationship between economic transactions and policy decisions. Therefore, more rigorous analysis of the group dynamics and expected farm income in certain planning cycles is important to refine the formulation of policy reforms for rewarding upland farmers or poor resource managers in Sumber Jaya or other countries with similar characteristics. For example, proper dissemination is very important in improving the level of understanding about Government Regulation No.34/2002 on Forestry Land-Use and Forestry Management Planning, Government Regulation No.35/2002 on Reforestation Funds, and the newly passed Government Regulation No.44/2004 on Forestry Planning.

Even though this study does not employ transaction cost analysis for biodiversity services and carbon services, a participatory approach in implementing conservation practices of biological diversity would benefit poor farmers who have for years maintained the rubber agroforestry system or jungle rubber. Local smallholders are generally not aware that the maintenance of the existing rubber agroforestry system has contributed to the preservation of biodiversity. A high level of involvement of rubber-shareholders—the smallest quintile of income groups in the village—in this biodiversity conservation has revealed that providing proper rewards to these people would increase the opportunities to improve their livelihood. In this case, local governments and civil society alike should strengthen the capacity of poor shareholders and smallholder rubber farmers as a form of reward transfer from the buyers to the sellers of biodiversity services. Potential buyers such as conservation organizations or even multinational corporations need to be convinced that “the market” for biodiversity service would work well if transaction costs, to mediate the interests of the poor sellers and these rich buyers, were low. Developing reward transfer mechanisms in carbon sequestration services could be approached by community involvement in reforestation and afforestation in the catchments area of Lake Singkarak to increase the water quality of the lake. The policy reforms should be directed towards land rehabilitation of the catchments area of Singkarak, at the same time empowering local people benefiting from water and forest resources.

### **Concluding remarks: Reforms required**

The following elements for policy reform and advocacy for better lifescape co-management in the RUPES sites and similar locations are based on lessons learned from the institutional analysis in the study. These could serve as an entry point to observe more closely the interplay between individuals, institutions and markets. What is clear is that the absence of incentive and disincentive systems, clear rewards and punishments for individual decisions could be a serious obstacle to develop more respected value systems for better lifescape co-management in the future.

## **1. Integrated social forestry development**

Integrated social forestry development keeps appearing in public policy debates as conflict between the communities living within or around forest areas and the state apparatus or workers of forest concession companies. Several programs and projects on participatory forestry management have been initiated, especially after the fall of President Soeharto, but the outcome of these projects has not been tangible in terms of sustainable forest resource use. The newly formal collective action to govern the principles of social forestry is Minister of Forestry Regulation (*Peraturan Menteri Kehutanan*) Number P.01/Menhut-II/2004 on social forestry. This regulation is an umbrella of several programs on participatory forestry management such as the well-known *Hutan Kemasyarakatan* (HKM), *Pengelolaan Hutan Berbasis Masyarakat* (PHBM), *Pengelolaan Hutan oleh Masyarakat* (PHOM), *Hutan Rakyat*, which all could be translated as community-based forestry management (CBFM).

This new umbrella policy could be seen as a comprehensive approach that covers ideology, strategy and implementation, especially to support broader decentralization principles, which involves empowering local people. The government should facilitate the process of strengthening local institutions, improve local people's capacity for business management, and assure sustainable and participatory forestry management. The main principles adopted in social forestry include: self-sustained benefits; partnership (integrated, gradual, sustainable); and local-specific and adaptive policy. The social forestry policy is implemented through the steps of setting-up "the pre-condition" at the local level to accumulate commitments from local, provincial, and central government, and to improve rules and regulations towards integrated social forestry development.

To develop mechanisms for watershed services such as in Sumber Jaya, the specific incentives and disincentives for communities who support protection, control and supervision of natural resources management (article 17 of Decree 31/2001), could be a basis for further investigation. Whether or not these opportunities for poor people around state forests to obtain a right to manage the state forest could be considered as a payment transfer, a more rigorous analysis on indicator and criteria should be conducted. Community participation in sustainable forestry management among those living around the forest area is an entry point for developing environmental service markets. One might argue that the government (at the local, provincial or central level) could serve as a buyer of environmental services at the local scale, because the government has an interest in implementing successfully the policy of integrated social forestry. Meanwhile, the upland poor living around the protected forest could serve as sellers of environmental services by practicing land rehabilitation and reforestation. Therefore, the details of permit issuance, rights to manage forests and empowerment strategy for improving the capacity of these local people should be on the agenda for policy reform in the future.

## **2. Participatory conservation of biological diversity**

Participatory conservation practices for biological diversity (biodiversity) in Bungo are significantly relevant to formulate better reward mechanisms for those conserving the rubber agroforestry system or the jungle rubber for years. Local smallholders are

generally not aware that the maintenance of existing rubber agroforestry system has contributed to the preservation of biodiversity. A high level of involvement by rubber-sharetappers—the smallest quintile of income group in the village—in biodiversity conservation has revealed that providing proper rewards to these people would increase the opportunities to improve their livelihood. Because these poor people are also engaged with several norms and conventions at the local level, involved with societal collective actions, and important determinants of more formal collective actions on biodiversity conservation, developing participatory approaches to encourage the long-term permanent jungle agroforestry systems would be an option.

The practice of sharetapping is commonly found in Bungo, where the tappers could provide labor, but control only limited capital, and the landlords or rubber owners experience a lack of labor to tap the latex by themselves. The common share for the results from latex is usually 75% for tappers and 25% for owners for old jungle rubber. A share of 50-50 is also found in a variety of clonal rubber, because of its high yield or latex productivity. Arrangements regarding who has to burden of production costs between the tappers and the owners are generally not written, instead they are based mostly on verbal agreement. Sometimes psychological factors and feelings of dependence or patron-client relationships between the two have caused inflexibility in the labor market of sharetapping. Therefore, efforts to build the capacity of these sharetappers, to provide opportunities to improve their welfare would be an important step towards more systematic reward mechanisms for those who have contributed to the conservation of biodiversity such as in rubber agroforestry systems. The local government of Bungo should play an important role in capacity building of poor sharetappers, instead of simply giving permissions to mining industries and oil palm plantations that would threaten biodiversity services.

### **3. Public-private partnership for water-resource management**

Public-private partnerships for water resource management at local and provincial levels could start operating a steering committee of the BPDS (Executing Agency of Lake Singkarak Management), which has been established to improve the quality of water resource management at the catchment area of the lake. The BPDS is a concept developed by stakeholders of Lake Singkarak to coordinate and implement water management of the lake, land rehabilitation of the catchments, and more importantly to perform afforestation and reforestation of degraded areas of the catchments as a basis for initiating carbon projects under CDM.

Strong local collective actions, sophisticated *nagari* institutional arrangements, *adat* and *ulayat* systems of land use within the catchments area and some formal laws and regulations could be seen as important driving forces for developing environmental services markets in Singkarak. Even though existing laws and regulation do not clearly refer to rewarding the upland poor for their services in rehabilitating watersheds, some principles found in Act No.34/2000 on tax and retribution of local government and Act No.7/2004 on water resources could be developed further. According to Act No.34/2000, the regional government has determined the maximum tax rate for utilizing the surface water and subsurface water is 20% [article 3, paragraph (1)d]. Revenues from this water tax shall be divided among local government (no less than

70%) (article 2A, paragraph (1)c]. In addition, the provincial government of West Sumatra has announced Local Government Regulation (Perda) No.4/2002 as a tax for surface and subsurface water. This regulation shall be supported by similar regulations at local level to encourage water conservation and rehabilitation of damaging catchments area of the watersheds.

At the national level, the newly passed Act No.7/2004 also strongly encourages conservation of water resources to maintain sustainability of carrying capacity, catchments services and the functions of water resources in general (Chapter III, particularly article 20 and 21). Regarding the management of water quality, such as the issues in Singkarak watershed, is also explicitly mentioned in the law, to maintain the quality of water inflow, including water infrastructures (article 23). However, the arrangement for water quality maintenance and controlling water pollution has to be formulated in a separate government regulation. Similarly, the management of water resource conservation within protection forests, forest reserves, national parks, and coastal areas shall be governed by specific rules and institutional arrangements (article 25).

In short, this partnership could serve as a steering committee, and act as a bridge between local stakeholders, provincial government and the central government concerned with the reward transfer for environmental services. The immediate challenge is how the interests and commitments shown by local stakeholders to rehabilitate the catchments area of Singkarak could be rewarded properly, especially to empower local people who are most dependent on water resources and forest resources, and to improve their livelihoods for a better future. Such mechanisms of reward transfer involving steering committees have been adopted in some cases of environmental services, such as in Cidanau in the province of Banten. The mechanisms of water retribution charged to the downstream water users in the City of Cilegon are to be forwarded to upstream providers through the neighboring local governments of Pandeglang and Serang. Forest managers in these upstream districts serve as providers of watershed services, while some units in the local governments act as intermediaries for the market of environmental services (Santoso 2004 personal communications). Despite some effective payment mechanisms using the methods such as “government transfer,” more comprehensive analysis, monitoring and evaluation are needed to provide objective and accurate information for developing mechanisms in other cases of environmental services.

#### **4. Catchments rehabilitation for Clean Development Mechanism**

Institutional arrangements for reward mechanisms in Singkarak are somewhat complicated, not only because of the sophistication of *nagari* governance system and *ulayat* resource management, but also because of the potential carbon projects for clean development mechanism. As Indonesia just passed the new Act No.17/2004 to ratify the Kyoto Protocol, several authoritative bodies have yet to be established, such as the key organization known as Designated National Authority (DNA). The DNA is an independent institution, representing government agencies and other stakeholders, and the entity responsible for making CDM projects in Indonesia work successfully. The government of Indonesia through the Ministry of Environment has

been in the process of finalizing the DNA, with assistance of the German Agency for Technical Cooperation (GTZ).

The Kyoto Protocol specified legally binding commitments by most industrialized countries to reduce their collective greenhouse gas (GHG) emissions by at least 5% compared to 1990 levels by the period 2008-2012. With the goal of reaching these targets at the lowest possible cost for countries that have committed to reductions, the Kyoto Protocol created two “flexibility” mechanisms: GHG emissions trading and CDM. The CDM is intended to be an opportunity for developing countries that did not accept binding emissions reductions at Kyoto as part of GHG mitigation.

Finally, the strategy to implement reward transfers to the poor or simply payment mechanisms should be initiated with public-private partnerships in each of the three RUPES sites. A regular coordination meeting among stakeholders concerned with specific services should be held regularly. A community forum on natural resource management could serve as a facilitator and arena in the policy exercise directly and indirectly related to RUPES development at the national level and site levels. The main agenda of this public-private partnership would be to establish criteria on how to implement the reward mechanism system. The partnership could serve as a steering committee and act as a bridge between local stakeholders, and provincial and central government for the reward transfer for environmental services. The immediate challenges are to build on the interests and commitments shown by local stakeholders to rehabilitate the catchments area, to empower local people who are most dependent on water and forest resources, and to improve their livelihoods.

## Acknowledgement

The paper is developed from RUPES Working Paper on “Constraints and Opportunities and Steps for Institutional Reform in Providing Rewards for Environmental Services in Indonesia.” World Agroforestry Center (ICRAF), Southeast Asia, Bogor, Indonesia.

## References

- Arifin, B. 2004a Constraints and Opportunities on Development of Environmental Service Markets: Lessons from Institutional Studies of RUPES in Indonesia”. Paper to the International Conference on Compensation Mechanisms of Ecological and Environmental Services. Beijing, China, 26-27 October 2004.
- Arifin, B. 2004b Institutional Reforms in Providing Reward Mechanisms for Water Use in the Catchments Area of Sumatra, Indonesia. Paper to the 14<sup>th</sup> Stockholm International Water Symposium. Stockholm, Sweden, 16-20 August 2004.
- Arifin, B. 2005 Constraints and Opportunities and Steps for Institutional Reform in Providing Rewards for Environmental Services in Indonesia Working Paper. World Agroforestry Center (ICRAF) Southeast Asia, Bogor.
- Benda-Beckmann, v.F. and Keebet 2001 Recreating the Nagari: Decentralization in West Sumatra Working Paper No. 31. Max Planck Institute for Social Anthropology, Halle-Saale.

- Boer, R., Bulek, A. and Djisbar, A. 2004 Challenges and Opportunities to Implement RUPES Program at Singkarak Lake. Paper to Roundtable Discussion on Hydrological Impacts of Forest, Agroforestry and Upland Cropping as a Basis for Rewarding Environmental Service Providers. Padang, Indonesia, 26-28 February 2004.
- Bromley, D.W. 2003 Sufficient Reason: Volitional Pragmatism and the Meaning of Economic Institutions. University of Wisconsin-Madison, Madison.
- Coase, R. 1998 The New Institutional Economics. *American Economic Review* 88(2):73-74.
- Furubotn, E. and Richter, R. 1997 Institutions and Economic Theory: the Contribution of the New Institutional Economics. University of Michigan, Ann Arbor.
- Grootaert, C. 1999 Social Capital, Household Welfare, and Poverty in Indonesia, Policy Research Working Paper 2148. World Bank, Washington D.C.
- Hodgson, G.M. 1998 The Approach of Institutional Economics. *Journal of Economic Literature* 36: 166-192
- Knack, S and Keefer, P. 1997 Does Social Capital Have an Economic Pay-Offs? *Quarterly Journal of Economics* November 1997:1251-1288
- Kuperan, K., Mustapha, N., Abdullah, R., Pomeroy, R.S., Genio, E. and Salamanca, A. 1998 Measuring Transaction Costs of Fisheries Co-management. Paper presented to the Seventh Biennial Conference of the International Association for the Study of Common Property (IASCP). Vancouver, Canada, June 10-14, 1998.
- Landell-Mills, N. and Porras, B. 2002 Silver Bullet or Fools' Gold: A Global Review of Markets for Forest Environmental Services and Their Impacts to the Poor. The International Institute for Environment and Development (IIED), London. 249 p.
- Mburu, J., Birner, R. and Zeller, M. 2003 Relative Importance and Determinants of Landowners' Transaction Costs in Collaborative Wildlife Management in Kenya: An Empirical Analysis. *Ecological Economics* 45: 59-73.
- Menard, C. (ed.) 2000 Institutions, Contracts and Organizations: Perspectives from New Institutional Economics. Edward Elgar, London.
- Narayan, D. 1999 Bonds and Bridges: Social Capital and Poverty, Policy Research Working Paper 877. The World Bank, Washington, D.C.
- Olson, M. 1982 The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities. Yale University Press, New Haven.
- Ostrom, E. 1994 Constituting Social Capital and Collective Action. *Journal of Theoretical Politics*, 4(6): 527-562.
- Ostrom, E. 2000 Collective Action and the Evolution of Social Norms. *Journal of Economic Perspectives* 14(3): 137-158.
- Pagiola, S., Bishop, J. and Landell-Mills, N.(eds.) 2002 Selling Forest Environmental Services: Market-Based Mechanisms for Conservation and Development. Earthscan, London.

- Shelanski, A.H. and Klein, G.P. 1995 "Empirical Research in Transaction Cost Economics: A Review and Assessment". *The Journal of Law, Economics and Organization* 11(2): 335-361.
- Suyanto, S., Leimona, B., Permana R.P. and Chandler, F. 2004 "Review of the Development of Environmental Services Market in Indonesia, Draft manuscript, April 2004. World Agroforestry Centre, Bogor.
- Van Noordwijk, M., delos Angeles, M., Leimona, B., Chandler, F. and Verbist, B. 2003 "Rewarding Upland Poor for the Environmental Services they Provide: Rationale, Typology, and Critical Questions to be Answered, Draft Lecture Note 14. World Agroforestry Centre, Bogor.
- Van Noordwijk, M. 2004 "Criteria and indicators of watershed functions and analysis of impacts of land use change. Paper to Roundtable Discussion on Hydrological Impacts of Forest, Agroforestry and Upland Cropping as a Basis for Rewarding Environmental Service Providers. Padang, Indonesia, 26-28 February 2004.
- Williamson, O. 1998 "Institutions of Governance. *American Economic Review* 88(2): 75-58.
- Woolcock, M. and Narayan, D. 2000 "Social Capital: Implications for Development Theory, Research, and Policy. *World Bank Research Observer* 15(2): 51-62.



# Gender and Climate Change in Indonesia

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## Abstract

*Gender, like poverty, is a cross-cutting issue in climate change and needs to be recognized as such. There is a need to be strident to overcome the uninformed view of many involved in climate change that climate change is neutral, and real life examples are needed to make the alternative case clear and convincing.<sup>1</sup>*

*The Forest Resources Management for Carbon Sequestration (FORMACS) Project was a 3-year project implemented in the Nunukan District of East Kalimantan, Indonesia, with funding from the Canadian Climate Change Development Fund. Since these funds are Official Development Assistance (ODA) funds, and administered by the Canadian International Development Agency (CIDA), the Project was subject to the CIDA's Policy on Gender Equality. Thus, principles of gender equality and gender mainstreaming were integrated into project design, implementation, monitoring and evaluation. The present article highlights lessons-learnt during the implementation of this climate change project.*

## Introduction

The United Nations is formally committed to gender mainstreaming within all UN policies and programs (United Nations General Assembly Resolution 57/182). In spite of this institutional commitment, gender mainstreaming has not been achieved in relation to climate change. Generally, there are gender differences in the level of participation and involvement. For example, the proportion of women in government delegations at the UN climate change negotiations fluctuates between 15 and 25%, and documents resulting from these negotiations tend to be gender

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<sup>1</sup> Gender and Climate Change, <http://www.gencc.interconnection.org/about.htm>

neutral; that is, tend not to provide gender disaggregated data or outline the different impacts which climate will have on men and women. Discussions on gender and climate change at COPs have largely been restricted to side events, and this is far short of the requirement for gender mainstreaming throughout the process, including negotiations, development of policies and technical guidelines, and documentation.

Indonesia is committed to gender mainstreaming, and progress is being made. However, at the national level, there are gender differences in the level of participation and involvement, with men dominating at meetings and in decision-making related to climate change. Documents produced in relation to climate change are mainly gender-neutral, and institutional structures and mechanisms to address climate change are being developed without adequate inputs from women. There are policy and legal barriers to gender equality (for example, Indonesian Marriage Law, inheritance regulations, and taxation law), which must be addressed in order to promote gender mainstreaming, in all aspects of life, including those related to climate change. Gender and climate change needs to be put on the national agenda, especially in relation to gender and vulnerability, gender and mitigation, and gender and adaptation.

This article outlines the lessons learned at the local level during the implementation of the *Forest Resources Management for Carbon Sequestration* (FORMACS) project. This three-year project was funded under the Canada Climate Change Development Fund through the Canadian International Development Agency (CIDA). The project has strived for gender equality as required by CIDA policy, and a gender strategy was developed during the design phase and implemented. A number of gender considerations, similar to those proposed by Wilson (2004), were documented and integrated into project planning and implementation. In spite of this commitment to gender equality, true gender equality could not be achieved during the life of the project. A much longer period of involvement would be necessary to overcome the local socio-cultural barriers to gender equality, as well as a number of policy and legal barriers at the national level.

At all levels, men and women have different roles, responsibilities and decision-making powers. This has consequences in the climate change process that make it important to integrate gender sensitivity and principles of gender equality into all mechanisms, policies and measures, and the tools and guidelines. A number of recommendations are provided in order to promote gender equality and gender mainstreaming in the climate change process at the international, national and local levels. More details will be provided in a future publication on “Gender and Climate Change in Indonesia”, which is presently in production.

## **Gender and the climate change debate**

As background for the development of the gender strategy for the project, a review was carried out in relation to gender and climate change, involving a computer search and review of published documents. The review clearly showed that the United Nations (the global organization for both gender equality and climate change issues) is committed to gender mainstreaming within all UN policies and programs (The

United Nations General Assembly Resolution 57/182). As mentioned above, in spite of this institutional commitment, gender mainstreaming has not been achieved in relation to climate change. Dennison (2003) notes, *“the UN-based environmental movement, and specifically the international climate change negotiation process, has essentially ignored gender issues by assuming gender-neutrality”* and *“the international climate change negotiation process has remained in contravention of these principles by assuming gender-neutrality and by failing to engage in required gender analysis...this failure has not only resulted in the process coming up short on gender equity principles, but also has had, and will continue to have, injurious effects on the process in terms of efficiency and effectiveness”*

As noted by Wilson (2004), development initiatives, whether through multi- or bilateral or NGOs have already produced vast compendiums of practical toolkits and methodologies that could mitigate negative gender impacts, and enhance positive gendered capacities through a cacophony of sectoral or thematic interventions. Thus, *“It is clearly not the absence of empirical and technical knowledge that obfuscates the inclusion of gender as a key issue within the climate change debate”* (Wilson 2004).

This purported gender-neutral approach is highly detrimental, since climate change is an issue that cuts across all aspects of sustainable development, and must be addressed within the context of sustainable development. Specific conventions, such the United Nations Framework Convention on Climate Change, cannot be implemented as stand-alone initiatives but must be part of an integrated strategy for sustainable development. Thus, the principles of sustainable development must be applied to all aspects of climate change including mitigation and adaptation. This includes the need for gender equality and gender mainstreaming within the climate change process/debate. As noted in the Beijing Platform for Action, paragraph 41, *“The advancement of women and the achievement of equality between women and men are matters of human rights and conditions for social justice and should not be seen as a women’s issue. They are the only way to build a sustainable, just, and developed society. Empowerment of women and gender equality are prerequisites for achieving political, social, economic, cultural, and environmental security among all peoples.”*

How to address the absence of gender mainstreaming in the climate change debate/process has become a major concern, and a topic of discussion at side events to the Conference of the Parties (COPs) associated with the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. For example, the issue of adaptation is emerging as an important and extremely urgent aspect of Climate Change policy and projects and was a focus of the COP10 discussions. Since it is agreed that vulnerability and adaptation are largely social issues (as opposed to purely biophysical and technological), it is surprising that the issue of gender is not yet playing a more explicit role in adaptation studies, projects and policy. Because of the feminization of poverty (70% of the 1.5 billion people living in poverty on US\$1/day or less are women), other existing gender inequalities, and men’s and women’s gendered roles in society and in the division of labour, there are gender differences in climate change impacts and in adaptive capacities. These differences should be acknowledged in the adaptation process to avoid further increases in gender inequality and to ensure the successfulness of adaptation policies and measures. Thus, to be

successful, adaptation policies and measures within both development and developing countries need to be gender sensitive.

## **Mainstreaming gender in climate change in Indonesia**

In October 1999, the People's Consultative Assembly (MPR) for the first time identified gender equality and gender equity as national development objectives in the government's new Broad Guidelines for State Policy (GBHN) 1999-2004. In the early part of 2000 the Ministry for Women's Empowerment drafted a Presidential Instruction (Number 9, 2000) in relation to gender equality and mainstreaming. This decree begins by defining some key concepts required for gender equality (gender, gender equality, gender equity, gender mainstreaming, gender-based analysis and women's empowerment) and goes on to declare that:

- All government instructions at the central and regional levels are required to carry out gender mainstreaming in all policy and program planning, implementation, monitoring and evaluation processes.
- Each planning unit in each organization will develop and implement the tasks and functions of gender mainstreaming, supported by appropriate human resources.
- To support the implementation of gender mainstreaming by all government departments, data must be collected and sorted by sex.
- Gender-based analysis on all development policies, programs, projects, acts, regulations and budgets is required. If a gender bias is revealed, interventions are required.
- Matters not yet stipulated within this Presidential Decree will be arranged further in the form of a mainstreaming guide that shall be decreed by the State Ministry for Women's Empowerment.

In Indonesia, the Ministry of the Environment is the lead institution for Multilateral Environmental Agreements, including those related to climate change:

- UNFCCC signed in 1992
- UNFCCC ratified through Act No. 6/1994
- Kyoto Protocol signed in 1998
- Kyoto Protocol ratified through Act No. 17/2004 (October)

In support of this Indonesia has produced a number of policy documents including:

- Agenda 21-Indonesia (1997)
- First National Communication on Climate Change (1999)
- National Strategy Study on Clean Development Mechanism in Indonesia (2001)

Although Agenda 21-Indonesia recognizes the need to involve women in strategies and initiatives for environment and development, the First National Communication on Climate Change and the National Strategy on Clean Development Mechanism in Indonesia are gender neutral. As with the global climate change debate this is unacceptable given Indonesia's commitment to gender mainstreaming, and the fact that the lack of gender mainstreaming will negatively affect the efficiency and effectiveness of the response to climate change.

The Ministry of the Environment is presently engaged in a number of capacity building activities, including (Bratasida 2005):

- National Strategy Study (NSS) on Energy Sector (to explore the technical potentials and costs of GHG emission reduction projects);
- National Strategy Study (NSS) on Forestry Sector (to explore issues and challenges in sink or land use, land use change and forestry);
- Certified Emission Reduction Unit Procurement Tender (CERUPT) – Carbon Project Investment;
- National Committee for Climate Change (NCCC) (to raise awareness to all stakeholders);
- National Capacity Self Assessment (NCSA) (to assess the capacity of national stakeholders).

Also, the Ministry of the Environment has also developed an action plan (Bratasida 2005), which includes:

- CDM Carbon Sequestration in Indonesia: Preparation of PDD for A/R CDM-ADB
- GHG Emission Reduction from Industry in Asia Pacific (GERIAP) – World Bank
- DNA establishment – Germany
- CDM website development
- Bilateral CERs Purchase Agreement (BCPA) – The Netherlands
- Second National Communication – UNDP
- Integrated Capacity Strengthening on CDM – IGES (Japan)

It is important that gender mainstreaming is incorporated into all these capacity building activities and the action plan outlined above. This can best be done with working together with the Ministry for Women's Empowerment.

Indonesia is in the process of establishing a National CDM Authority (Designated National Authority). The proposed structure (Bratasida 2005) includes:

- National Committee on Climate Change
- Board
- Stakeholder Consultative Forum
- Local Government
- Private sector

- NGOs
- Local community
- Secretariat
- Technical Committee
- Experts

To be effective, this DNA needs to ensure the equitable participation of women from each participating group listed, and include technical expertise from the Ministry for Women's Empowerment. It is especially important to have gender-focused civil society organizations (NGOs, community-based organizations or CBOs) involved, in order to help provide disadvantaged women with a voice at the climate change debate/negotiations at the national level in Indonesia. With decentralization, gender equality in climate change needs to be extended to the provincial and district levels, and social capital needs to be developed to allow poor men and women to participate in a fair and equitable manner.

Indonesia is committed to gender mainstreaming, and progress is being made. However, at the national level, there are gender differences in the level of participation and involvement, with men dominating at meetings and in decision-making related to climate change. Documents produced in relation to climate change are mainly gender neutral, and institutional structures and mechanisms to address climate change are being developed without adequate inputs from women. There are policy and legal barriers to gender equality, which must be addressed in order to promote gender mainstreaming, in all aspects of life, including those related to climate change. Gender and climate change needs to be put on the national agenda, especially in relation to gender and vulnerability, gender and mitigation, and gender and adaptation.

## **Energy, poverty and gender in the Indonesian context**

For most women in Indonesia, and particularly poor women living in rural areas, CDM is a totally unknown concept, as is the need to reduce atmospheric carbon. Women do, however, have a strong interest in energy technology. For example, studies clearly show that women, as well as men, have a strong desire for electric lighting to replace kerosene or candles and to power appliances. This is true within the home, where electricity allows leisure activities (e.g. TV, reading in the evening) for all, and makes general housekeeping tasks easier (light in cooking area, small processing appliances, electric iron, sewing machine, rice steamer, etc.). It can potentially open the way for many small enterprises for women in the area of food production and marketing and in other productive fields. In the public arena, electricity may have even more value to women. Street lighting makes moving about at night possible, and opens opportunities for women to participate in a variety of social and political activities including evening training programs and community meetings. Where electricity is available, there are often central services for grain processing (rice husking, maize milling, etc.) which women clearly value very highly. Electricity can also be a key factor in the provision of improved water supplies, which has regularly been shown

to be very high on most women's list of priorities. Thus, provision of electricity is one of the main energy priorities of women (Skutsch 2004).

Most of the rural households in Indonesia, and many other countries, use biomass fuels (wood, charcoal, agricultural waste), for their cooking needs. Even electrified households do not usually use electricity for cooking because of the cost. Biomass fuels when used with traditional combustion technology have a highly detrimental effect on the users' health (inhalation of smoke, accidents with fires), and women are most affected because of their domestic roles. Moreover, in rural areas, these fuels are usually gathered (at no cash cost, but with many hours labor), again mainly by women and children, which compounds the drudgery associated with these fuel systems (strained backs and necks from carrying firewood loads up to 40 kg) (Skutsch 2004). The traditional domestic technologies used in connection with biomass fuels are inefficient and inconvenient. Thus, many rural women would prefer an alternative to biomass as the main cooking fuel, or at least to the traditional technologies (Skutsch 2004).

In the past, energy policies were focused mainly on urban and industrial development, increasing supplies of electricity through construction of large, centralized power plants and long-range electrical distribution lines, and on procuring sufficient supplies of liquid fuels. The needs of rural households, farmers and small businesses were generally less of a priority. Recently, however, a combination of social, environmental, and market pressures have led to the development of new perspectives on energy policies that are promoting greater attention to the social dimensions of energy decision-making, including the disparate gender impacts of national energy priorities (UNDP 2000).

Lack of energy services hinders people's efforts to move out of poverty and seriously constrains their ability to improve their living conditions, or even to meet their subsistence needs. People without modern energy services must spend more of their time and physical energy on survival and, therefore, have fewer opportunities to pursue educational and income-generating activities (UNDP 2000). As noted above, *"limited access to energy is a problem that has a disproportionate effect on women, especially in rural areas. It is most often women who expend large amounts of time and physical effort to supply fuel for their households and productive needs, using their own labour to carry heavy loads over increasingly long distances, at great risk to their health and safety. Other health hazards arise from the fact that women do most of the cooking. They and their children are exposed to large amounts of smoke and particulates from indoor fires and suffer from a number of respiratory diseases. Greater attention to the needs and concerns of women in these areas could help governments promote overall development goals, like poverty alleviation, employment, health, and education through improved energy policies"* (UNDP 2000).

Madon (2003) looked at the impacts of rural electrification on poverty and gender in Indonesia, while Ramani and Heijndermans (2003) provided the following recommendations for better addressing issues related to energy, poverty and gender. They noted the role of the government in poverty and gender, through policy, is of overriding importance because the poor are largely excluded from the market process. The following recommendations can help bring about the kinds of change expected

from all other stakeholders:

- Create an enabling environment;
- Make use of “smart subsidies;”
- Lower tariffs and connection costs.

Several strategic shifts are recommended in the way energy is perceived by the development community and how, in turn, the energy community views its developmental responsibility:

- Emphasize livelihood and income-generating opportunities;
- Blend energy with complementary inputs under integrated projects;
- Include fuels, in addition to electricity;
- Enhance the scale and tailor the marketing strategies of alternative energy technologies to the poor’s conditions;
- Promote demand management and appliance efficiency together with supply solutions.

In order to promote empowerment and gender equality, the following recommendations will give more of a voice to the poor, including poor women, who are affected and will allow for more actions based on informed decisions:

- Decentralize planning processes and delivery mechanisms;
- Further explore the gender dimension of energy poverty through better data and analysis.

The following recommendations will help institutions provide an economic and social environment more conducive to determining effective livelihood strategies and be better able to offer organized assistance to the poor when confronted by natural, economic, or social shocks:

- Promote institutions for financial, technical, social, and organizational *intermediation*;
- Undertake a comprehensive training needs assessment for policy formulation, planning, and implementation of a pro-poor, gender-sensitive energy strategy;
- Carry out training and capacity-building activities for, among others, multilateral and bilateral energy development finance agencies, national finance and micro-credit institutions, governments and sectoral agencies, the private sector, nongovernmental organizations (NGOs), research and training institutions, and rural communities and poor women.

There is a need for an energy, poverty, and gender assessment (EPGA), to be carried out within the framework of designing new rural energy-electrification programs. The social benefits of rural energy-electrification programs and projects on health, education, safety, or housework are not easy to quantify—hence the need for simple impact assessment tools to guide public financing for rural energy-electrification. The following recommendations address these needs:



- Develop and implement an energy, poverty, and gender assessment (EPGA) methodology;
- Develop and implement tools to measure the specific impacts of energy on poverty and gender, specifically;
- Reduction of consumption of and expenditure on kerosene and candles, and other electricity substitutes;
- Gender-disaggregated time-savings caused by different energy options, and the allocation of these savings to various productive and reproductive tasks;
- Extent of household income growth from home-based micro-enterprises and community-scale enterprises;
- Rate of penetration of common appliances and devices according to income, type of energy, and duration of access.

Energy *per se* is an insufficient condition to resolve problems of poverty and gender inequity. Although energy strategies certainly need to become more pro-poor and gender-sensitive, their impact on poverty and gender can be ensured only when the following other factors are present (Ramani and Heijndermans 2003):

- Complementary infrastructure, such as roads, communication facilities, water supply, access to markets, and credit;
- Production equipment and livelihood assets;
- Good governance in the form of pro-poor policies, institutions, and delivery mechanisms;
- Integrated “bundled” projects that combine energy services with the above;
- The promotion of private initiative for energy supply;
- Greater focus on income generation, especially through micro-enterprises.

## Clean Development Mechanism (CDM) – LULUCF

Skutsch (2004) reviewed the results of COP9 in relation to CDM and land use, land use change and forestry (LULUCF) from a gender perspective, and noted “the question of what these LULUCF decisions mean in **gender** terms has hardly been addressed by anyone... The gender question that needs to be addressed here in, are the technologies that are likely to be promoted under CDM, and particularly under LULUCF projects under CDM, going to provide environmental, economic and social benefits that meet the particular needs of women.”

In order to deal with this question, it is first necessary to work through a number of underlying issues (Skutsch 2004), as follows:

- What kinds of energy technology do most women actually need and want?
- What have been the difficulties in the past in delivering these technologies?
- To what extent can CDM and its current LULUCF opportunities be used as a vehicle to overcome these difficulties and resolve women’s energy problems?

- Why is CDM/LULUCF so limited in this respect and what are the prospects that it could be altered to be more accommodating, in the future?

The first two questions were addressed above in the section on energy, poverty and gender, and the latter two are addressed in this section on CDM.

The CDM mechanism is designed to reduce atmospheric carbon dioxide by reducing emission through renewable energy or conservation measures to reduce consumption, or by increasing sequestration rates, at sites in developing countries, mainly through finance from industrialized countries that have reduction quotas to meet. Such efforts have to be additional to any activities that would have been undertaken by the country in the normal course of events. Skutsch (2003) provides the following example to illustrate the principle, *“if for example a developing country has planned to expand the grid to certain rural areas and supply it with thermally produced electricity, a project which substitutes solar or micro-hydro electricity could in principle qualify for CDM status. However, it is only the additional costs that will be funded, i.e. the difference between the cost of providing conventional grid electricity and the cost of using the renewable alternatives. If there are no concrete plans (with local finance) for grid expansion, a solar or micro-hydro alternative cannot expect to be approved as a CDM, and certainly not the entire costs. It will be evident from this that CDM does not offer a lifeline for the finance of rural electrification for the benefit of the unconnected half of the world population and for the women in particular.”*

Biomass fuels and cooking technology (such as that generally used in rural areas of Indonesia) fall under the category of Land Use Land Use Change and Forestry or LULUCF. In Indonesia, it is estimated that about one-third of net CO<sub>2</sub> emissions (156 MT) comes for LULUCF, mainly deforestation (State Ministry of Environment 2001). There was considerable debate at the Conference of Parties regarding the inclusion of LULUCF into CDM since carbon uptake is only temporary. For this and other reasons, the Conferences of the Parties decided that only two forms of sink would be allowed at least in the first commitment period (2008-2012): afforestation and reforestation. To qualify for CDM areas must have been devoid of trees (or below specified maximum cover since 1990. It excludes any sort for forest management that involves existing forest. In other words, *avoided deforestation* cannot be claimed under CDM at present.

Under CDM, forests are considered only as sinks, and not as part of an energy system in which some savings of carbon might be made. While, in theory, short rotation tree plantations could be planted to supply fuel for urban areas (and still claim temporary carbon credits for the period in which the carbon was held in live form), experience has generally shown that is an expensive way of producing wood for domestic cooking needs, even if the gain from the sales of the carbon credits offsets this somewhat. There is also competition from “free” fuel gathered from the remaining unmanaged forest.

Economic plantations are generally large-scale, company- or government-managed (for economic efficiency), tend towards monocultures, and alienate other uses. While some plantations may be planted on “wasteland” (misnomer since all lands generally have use in the rural economy), most will be placed on better quality

lands in order to ensure reasonable carbon uptake rates, i.e. tree growth rates. Also, to protect the carbon absorption function, all threats (fire, illegal cutting, grazing) will be minimized by keeping unauthorized people out (even gathering of dead wood may be prohibited). For this reason, such plantations have been characterized as “carbon cemeteries” (Skutsch 2004). Although women are often involved in the nursery and planting stage, there will be few permanent jobs for women once plantations have been established and are under long-term management. Community-based natural resources management may provide more benefits for women, but the transaction costs are high in relation to CDM, and the benefits will mainly come from the production of timber and other products for sale and not from the sale of carbon.

CDM has closed the door on the one type of LULUCF solution that might begin to address the central energy problem for the majority of the population of the developing countries – systems that encourage local level management of forests to avoid further deforestation, to increase sequestration in existing forests, and to produce sustainable firewood supplies on a much increased scale (Skutsch 2004). However, for such systems, the key will be supporting policies and legislation, and secure access and users’ rights to the forest/land, and not outside finance from CDM-like mechanisms. Recent changes in the Forest Laws in Indonesia open the door for community-based forest management (CBFM). There are however barriers to women’s participation in CBFM. These may be gender-biased national laws, such as the marriage law in Indonesia, and gender-biased religious and cultural barriers to equal participation by women in access and control of resources, etc. Thus, community-based LULUCF projects being designed under CDM or other mechanisms need to address these gender issues, and facilitate the development of the necessary social capital required for the equitable participation of women.

On the demand side related to biomass fuel for cooking, it would seem that improved stoves, which by burning more efficiently will save on dwindling stocks of biomass fuels, would be a good candidate for CDM finance. However, this is not the case under current regulations. Fuelwood is considered a renewable resource, and burning it is just part of a cycle. In theory, what is burned will be replaced by other trees, and the effect on atmospheric carbon will be neutral. The question of whether it is in fact being used in a *sustainable* manner, is not addressed. By this argument, replacement of wood burning stoves by, for example, gas or kerosene cannot qualify for CDM finance either, since they actually increase the amount of carbon in the atmosphere by switching users from “carbon-neutral” wood to fossil fuels (Skutsch 2003). Thus, current policy related to CDM and LULUCF offer no or very limited opportunities for the improvement of cooking technology and fuel supplies. Thus, it is unlikely that poor rural women will gain any significant benefits from CDM in relation to cooking technologies and fuel supplies.

Thus, as concluded by Skutsch (2004), *“it may well be argued that solving women’s energy needs is not the point of the CDM. Its primary object is, basically, reducing carbon dioxide levels in the atmosphere as cheaply as possible, while contributing to ‘sustainable development’ in developing countries. However, women’s energy needs may be considered one aspect of sustainable development, and given that energy is central to the carbon dioxide question, and that biomass fuels for cooking are central to the energy problem in*

*developing countries, the lack of focus on this is unacceptable. To argue that biomass fuels are carbon neutral is spurious. CDM needs to be reformulated to allow this major energy question to be addressed. There are many possibilities within a CDM-type of arrangement, particularly relating to management of forests and avoidance of deforestation, by which rationalization of the biomass fuels market could be tackled. This would result in increased sequestration and decreased consumption of wood and charcoal, and in carbon savings at competitive costs.”*

## **Striving for gender equality in a climate change project**

The Forest Resources Management for Carbon Sequestration (FORMACS) Project is used here to illustrate how a gender perspective can be used to facilitate the development of social capital in traditional communities, in order to promote gender equality in natural resources management and make programs more effective and sustainable.

The overall goal of the FORMACS Project was: “*Forest dwelling (Dayak) communities in Kalimantan (Nunukan district) achieve a sustainable household livelihood security that maintains C stocks and increases C sequestration.*” An integrated approach (Figure 1) was used to achieve the following six expected outputs:

1. Project Advisory Board (PAB) consisting of partner institutions and stakeholders leading to increased awareness of carbon sequestration, project purpose, and participation in project planning.
2. Village profiles, from baseline survey and participatory rural appraisal (PRA), used to identify priority livelihood needs and for the preparation of land use plans for communities, including CBNRM and Agroforestry/LEISA, and active CBOs for project activities.
3. Village boundaries defined, mapped and officially recognized for villages, based on traditional concepts of land ownership, and used as the basis for village land use maps.
4. Increased institutional and local capacity leading to the development of a management system for key forest resources, which is officially recognized by national, provincial and district governments, and that improves livelihood security and increases carbon sequestration.
5. Increased institutional and local capacity leading to the identification and adoption of suitable agroforestry/LEISA technologies through participatory technology development (PTD), that results in improved household livelihoods and increased carbon sequestration.
6. A reliable and verifiable carbon monitoring and accounting system developed and endorsed by PAD, and field-tested in the Project area..

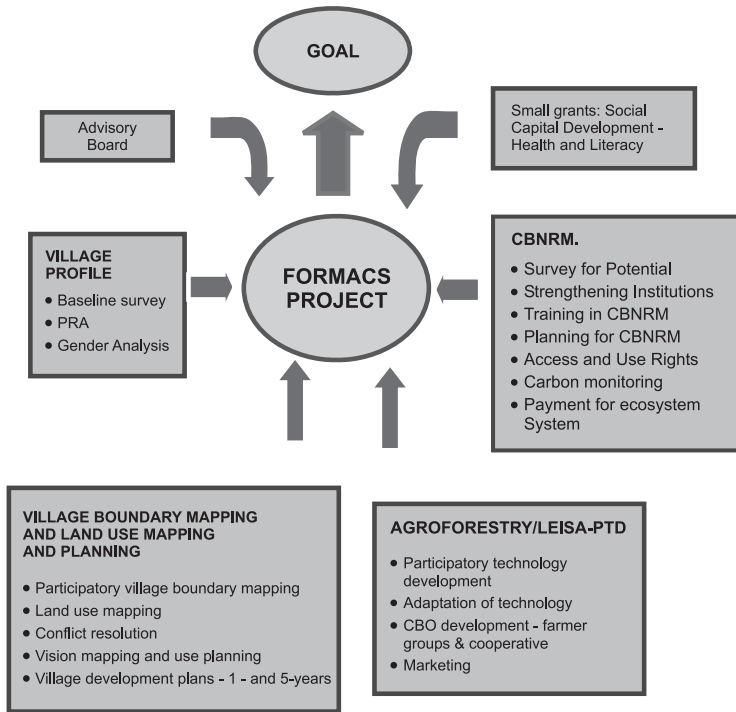
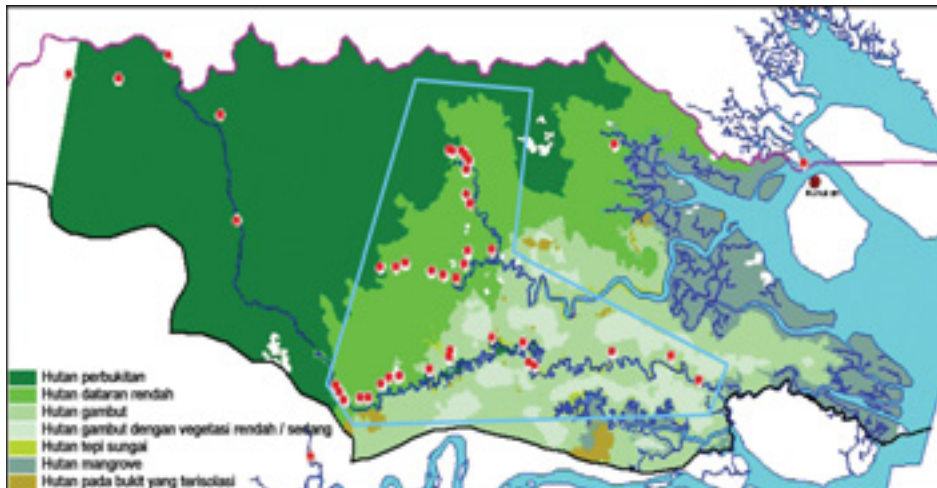


Figure 1. Integrated approach and project framework of FORMACS project



VEGETATION	AREA(Ha)
Hill and Mountain Forest	407,007.97
Lowland Forest	175,262.41
Peatswamp Forest	158,658.76
Peatswamp Forest with low to medium vegetation	54,238.30
Forests on isolated rock	9,226.45
River Bank Forest	6,628.95
Mangrove Forest	103,659.28

Figure 2. Map of FORMACS project

The project was implemented in 38 traditional *Dayak* (Agabag) communities located along the Sembakung and Sebuku Rivers in Nunukan district of East Kalimantan (see Figure 2). Nunukan district was chosen as the site for a climate change project, since it is of global importance for both climate change mitigation and adaptation:

- Ecosystem diversity from coral reefs to montane forests;
- Rich species diversity – each ecosystem having unique flora and fauna;
- Rich genetic diversity – important for adaptation to climate change;
- Rich agrobiodiversity – traditional varieties of important food crops: rice, cassava, bananas, fruit trees;
- Important carbon pools and sinks: mangroves, peatswamps, tropical forests (Table 1).

**Table 1.** Carbon pools and sinks of mangroves, peatswamps, tropical forests.

<b>NUNUKAN DISTRICT AS CARBON POOL/SINK</b>			
<b>Vegetation Type</b>	<b>Area in Nunukan District</b>	<b>Estimated Tonnes of Carbon per Ha</b>	<b>Total Carbon in Vegetation Type</b>
<b>Hill and Mountain Forest</b>	407,008	175	71,226,400
<b>Lowland Forest</b>	176,262	200	35,052,400
<b>Forest on Rock Outcrop</b>	9,226	100	902,093
<b>River Bank Forest</b>	6,629	200	1,325,800
<b>Peat Swamp Forest (5 m deep peat)</b>	158,262	5,700	902,093,400
<b>Peat Swamp Forest with low to medium vegetation (5 m deep peat)</b>	54,238	5,700	902,093,400
<b>Mangrove (top 2 m only)</b>	103,659	1,440	149,268,960
<b>Total</b>	886,474		1,469,025,653

As a result of the large area of peat swamp and mangrove forest, Nunukan district serves as a huge pool/sink for carbon, which is of global importance for mitigating climate change. In addition, there is enormous species and genetic diversity that will be of global importance when adapting to climate change. Monitoring did not show any significant change in carbon during the life of the project.

The other focus of the project was assisting communities to achieve sustainable household livelihood security, and principles of gender equity used to work towards gender equality in this climate change project. The following is a summary of the steps carried out by the project while striving for gender equality:

- Review of CIDA's Policy on Gender Equality;
- Including gender analysis in the rapid rural appraisal (RRA) used in the preparation of the Concept Paper;

- Using Results-Based Approach in the preparation of the Project Implementation Plan (PIP), involving stakeholder participation, including women;
- Integrating gender into project budgeting, to ensure funds for gender mainstreaming within the project – gender as a cross-cutting theme within budget;
- Developing a gender equality strategy as part of the PIP;
- Recruitment of staff – gender balance (with women in key decision-making positions);
- Training of staff in Participatory Rural Appraisal (PRA), including gender analysis;
- Baseline survey – gender-disaggregated data and analysis;
- Facilitated PRA in each community, aimed at participation of women and men;
- Development of community self-help groups or community-based organizations (CBOs): farmers' groups, including men and women;
- Establishment of gender team to identify and overcome gender barriers;
- Gender specialists, including project staff, local gender-focused NGOs, CIFOR and CARE Canada;
- Gender workshops involving men and women;
- Cross-visits of mixed groups, men's groups and women's groups, to learn about technical aspects of sustainable agriculture and CBNRM, but also the initiatives of women groups aimed at empowerment;
- Women-specific initiatives: focus group discussions, child and maternal health, literacy, support groups to develop women's human resources and social capital;
- Involving women in the development of local (*Agabag*) cultural identity through preparation of an Agabag-Indonesian-English Dictionary, ethnoecology study, handicraft study, etc.;
- Facilitating changes in attitudes regarding gender roles, so women-specific initiatives become family initiatives, i.e., the responsibility of both men and women;
- Sustainable agriculture (LEISA), agroforestry and community-based natural resources management initiatives, involving both men and women;
- Promoting participation of women in customary councils (decision-making), and in village government (first step to local democracy). Using democracy in national and district elections as an example of women's role in decision-making. At national and district elections, men and women have same right to vote and each vote has the same value
- Participation of women from communities in National Symposium on Community Participation in Natural Resources Management in Indonesia, which included Gender in National Resources Management in Indonesia as a major focus;

**Box 1. Underage marriage a barrier to development and gender equality**

The Agabag marry at a very young age, mostly around 10 to 15 years old, sometimes as young as 8. The marriage is arranged by parents and requires a large bride-price. As a result, the husband has a sense of ownership over wife since bride-price was paid. Thus, wife tends to have little or no role in decision-making in the family or in the community. Girl is required to take on adult role before reaching maturity (that is, while still a child), and is responsible for food production, firewood gathering, fetching water, looking after in-laws and husband. Married girls drop out of school before completing primary school (often grade 3) in order to take on role of wife, and is often functionally illiterate. These immature girls have babies before their minds and bodies are ready, and there are high rates of abortion, infant mortality and maternal mortality. Child mortality is generally more than 500 out of a thousand. Because the girl leaves her family and become the property of her husband she cannot inherit land or property, which is passed down to sons. Thus, women have little control of land or natural resources. Women are traditionally not allowed to participate in meetings and extension services (outside men present), and are not allowed to leave village without being accompanied by husband or other family member. This limits their access to information and to markets.

As a result of the gender equality strategy, changes have been facilitated. Men and women are now more aware of gender issues and the negative aspects of gender inequities in the communities (for example, death of children, population stagnation and decline while other ethnic groups are increasing in numbers and political strength, lower productivity and lower family incomes). Thus, by the end of project, women were allowed to participate in meetings and extension services, take part in cross-visits outside the community without being accompanied by male family members, men were helping with gardening, food processing, gathering firewood and fetching water, which were previously exclusively women's roles, women were allowed to take part in national symposium, and the traditional leaders and council have raised the minimum age for marriage to 17 which is in line with national law (although underage marriages still take place, but less frequently). Through participation, the social capital of both women and men has increased, and the communities are better prepared to take part in sustainable agriculture, agroforestry and community-based natural resources management initiatives aimed at livelihood security, and also climate change mitigation and adaptation.

- Advocating/lobbying for changes within the Ministry of the Environment and Ministry for Women's Empowerment for gender mainstreaming;
- Participatory monitoring and project evaluation, involving both men and women;
- Lessons-learned publications prepared with participation of communities, both men and women.

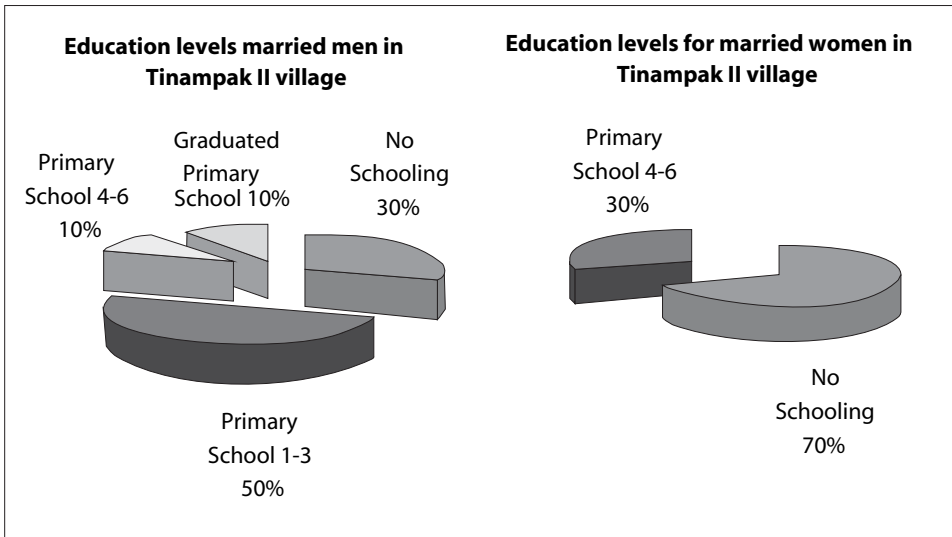
Designing and implementing a climate change project based on CIDA's gender equality policy resulted in positive changes in relation to gender equality in target villages as outlined in Box 1 and these changes contributed to the overall success of the project in relation to the maintenance of carbon pools and carbon sequestration through participation of women in LEISA/agroforestry and community-based natural



resources management initiatives. Table 2 and Figure 3 illustrate the low level of education and reproductive health of women in target communities. Box 2 shows an underaged married couple.

**Table 2.** Miscarriages, Infant Mortality and Child Mortality for One Group of Women in Sekililan Village.

No.	Name of Respondent	Number of Times Pregnant	Number which Died	Number of Natural Abortions	Number of Children Living	Comments
<b>RESPONDENTS FROM SEKILILAN VILLAGE</b>						
1.	<i>Elisabet</i>	5	3	0	2	<i>One died at 4 months (unknown cause), one died within one day (born blue), and one died after 1 month (breathing problems).</i>
2.	<i>Ibu Bagio</i>	8	5	0	3	<i>Deaths: 1 year, 6 months and 3 within 1 month of birth. Cause of deaths unknown.</i>
3.	<i>Lidu</i>	6	3	0	3	<i>Deaths at 3 years (typhus), at 4 months (dengue fever), and at 2 months (accident).</i>
4.	<i>Ibu Marten</i>	5	1	1	3	<i>Miscarriage 2 months into pregnancy, one died at 1.5 years from fever.</i>
5.	<i>Yustina Yalis</i>	4	0	1	2	<i>Miscarriage at 5 months (attributed to excessive drinking of local alcoholic drink during pregnancy)</i>
6.	<i>Nudia</i>	8	4	1	3	<i>Deaths at 7 months (measles), at 6 months (diarrhoea), at 1 month (fever) and 1 year (turned blue)</i>
7.	<i>Saina</i>	2	0	1	1	<i>Miscarriage, mother ill at time.</i>
8.	<i>Magda</i>	3	1	0	2	<i>Died at 9.5 years old, disabled from birth)</i>
9.	<i>Baita</i>	5	2	1	2	<i>Death a 3 months (coughing), death at birth (premature 7 months) and miscarriage at 3 months.</i>
10.	<i>Sabet</i>	8	2	2	4	<i>Miscarriage at 2 months, death at birth (internal bleeding), and death at birth (premature).</i>
11.	<i>Lusia</i>	4	3	0	1	<i>Death at 1 year (diarrhoea), still born (twins)</i>
12.	<i>Sidap</i>	4	2	0	2	<i>Died at birth (both premature).</i>



**Figure 3.** Graft showing the education levels of married men and married women in Tinampak II Village – illustrating the low levels of education for both men and women and the gender gap in education.

**Box 2.** Underaged married couple with their child – becoming parents at a young age.



Designing and implementing a climate change project based on CIDA's gender equality policy resulted in positive changes in relation to gender equality in target villages as outlined in Box 1 and these changes contributed to the overall success of the project in relation to the maintenance of carbon pools and carbon sequestration through participation of women in LEISA/agroforestry and community-based natural resources management initiatives. Figure 3 and Table 2 illustrate the low level of education and reproductive health of women in target communities. The Photo shows an underaged married couple.

## Conclusion

Organizations and governments involved in climate change are generally officially committed to gender mainstreaming, and practical toolkits and methodologies already exist for gender mainstreaming and for integrating gender into programs and projects. The limiting factors appear to be lack of knowledge, cultural barriers (within organizations, governments and individuals) in relation to gender equality, and lack of institutional and political will.

Recommendations coming out of COP10 side events are a good starting point for gender mainstreaming in relation to climate change (Skutsch et al. 2004):

- Global and national studies on the gender-differentiated impacts of global Climate Change with a focus on gender differences in capabilities to cope with Climate Change adaptation and mitigation are urgently required. These need to be published as case studies and made widely available.
- A gender analysis of all budget lines and financial instruments regarding Climate Change should be undertaken.
- Gender-sensitive criteria and indicators should be developed and applied in the UNFCCC and Kyoto Protocol mechanisms and instruments, starting with instruments related to adaptation and vulnerability as this is the area in which gender differences are most crucial and most visible.
- In the course of the revision of the guidelines for the National Communications under the UNFCCC, the inclusion of the gender dimension should be ensured. [This means that all statistical social data should be disaggregated by gender, and in the reporting and evaluation of policies and measures, within both adaptation and mitigation, gender dimensions should be assessed].

Finally, as illustrated by the FORMACS project case study, it is possible to design and implement a climate change project using a gender perspective, and achieve major benefits in relation to sustainable livelihoods, climate change mitigation and adaptation, and make progress in relation to gender equality at the same time. However, three years is not long enough to ensure the institutionalization of livelihood initiatives, the development of social capital, or to achieve gender equality. A much longer process is required. Thus, climate change programs/projects should be long-term (5-10 years), in order to achieve meaningful and sustainable results in relation to climate change, sustainable development and gender equality.

## References

- Bratasida, L. 2005 Multilateral Environmental Agreements: Indonesian Preparedness on Climate Change Convention. Paper to the Workshop on Carbon Sequestration and Sustainable Livelihoods. Bogor, Indonesia, 16-17 February 2005.
- Canada Americas Capacity Building Initiative (CACBI) 2005 Gender and Social Equity in CDM Projects. Clean Energy and Climate Change: The Opportunity for the Clean Development Mechanism (CDM). <http://www.delphi.ca/cacbi/en/cdm.html>
- Canadian International Development Agency (CIDA) 1999 CIDA's Policy on Gender Equality. Canadian International Development Agency.
- Canadian International Development Agency (CIDA) 2000. Accelerating Change: Resources for Gender Mainstreaming. Canadian International Development Agency.
- Dennison, C.E. 2003 From Beijing to Kyoto: Gendering the International Climate Change Negotiation Process. 53<sup>rd</sup> Pugwash Conference on Science and World Affairs, Advancing Human Security: The Role of Technology and Politics. Halifax and Pugwash, Nova Scotia, Canada, 17-21 July 2003.
- Genanet (2005). A Healthy Climate? Gender Justice and Climate Protection. [http://www.genanet.de/uploads/media/Healthy\\_climate\\_english\\_01.pdf](http://www.genanet.de/uploads/media/Healthy_climate_english_01.pdf)
- Gender and Climate Change, <http://www.gencc.interconnection.org/about.htm>
- Government of Indonesia 2000 Gender Mainstreaming in the National Development. Instruction of the President of the Republic of Indonesia, Number 9 Year 2000 Concerning Gender Mainstreaming in the National Development, The President of the Republic of Indonesia.
- Madhuchanda Mukhopadhyay (n.d.). Gender Mainstreaming in Extension in Indonesia – Decentralized Agricultural and Forestry Extension Project (DAFEP). World Bank. [http://www.worldbank.com/wbi/.../Materials/May7Session1/Madh\\_paper.pdf](http://www.worldbank.com/wbi/.../Materials/May7Session1/Madh_paper.pdf)
- Madon, G. 2003 Energy, Poverty and Gender. Energy, Poverty and Gender. Impacts of Rural Electrification on Poverty and Gender in Indonesia. Volume 1: Facts, Analysis and Recommendations. The International Bank for Reconstruction and Development/World Bank, Washington DC. <http://www.worldbank.org/astae/enpogen/e-countrystudies/4-madon/4-madonvol1.pdf>
- Masika, R. (ed.) 2002 Gender, Development, and Climate Change. Oxfam, Oxford
- Ramani, K.V. and Heijndermans, E. 2003 Energy, Poverty and Gender. A Synthesis. The International Bank for Reconstruction and Development/World Bank, Washington DC. <http://www.worldbank.org/astae/enpogen/g-summaryreports/8-ramani-heijndermans/8-ramani-heijndermans.pdf>
- Skutsch, M. 2002 Protocols, treaties, and action: the 'climate change process' viewed through gender spectacles. *Gender and Development* 10(2): 30-39. [http://www.energia.org/resources/papers/skutsch\\_climate\\_gender.pdf](http://www.energia.org/resources/papers/skutsch_climate_gender.pdf)
- Skutsch, M. 2004 CDM and LULUCF: what's in it for women? A note for the Gender and Climate Change Network. <http://gencc.interconnection.org/skutsch2004.pdf>

- State Ministry of Environment, Republic of Indonesia 1997 Agenda 21 – Indonesia. Jakarta.
- State Ministry of Environment, Republic of Indonesia 1999 Indonesia First National Communication on Climate Change. Jakarta.
- State Ministry of Environment, Republic of Indonesia 2001 National Strategy Study on Clean Development Mechanism in Indonesia. Jakarta.
- UNESCO 2004. Measures taken and progress achieved in the follow-up to and implementation of the Fourth World Conference on Women and the special session of the General Assembly entitled “Women 2000: gender equality, development and peace for the twenty-first century”, especially in mainstreaming gender perspectives in entities of the United Nations system. Report of the Secretary-General. UNESCO Commission on the Status of Women Forty Eight Session (1-12 March 2004). Item 3 of the Provisional Agenda: Follow-up to the Fourth World Conference on Women and to the special session of the United Nations General Assembly entitled “Women 2000: gender equality, development and peace for the Twenty First Century”
- United Nations 2000 The Feminization of Poverty. Women 2000. Gender Equality, Development and Peace in the Twenty-first Century. Fact Sheet No. 1. <http://www.un.org/womenwatch/daw/followup/session/presskit/fs.1.htm>
- United Nations 2002 Gender Mainstreaming: An Overview. Office of the Special Advisor on Gender Issues, Department of Economic and Social Affairs, United Nations, New York.
- United Nations Development Programme (UNDP) Energy and Atmosphere Programme 1999. Gender and Energy: How Is Gender Relevant to Sustainable Energy Policies? October 22. Draft.
- United Nations Development Programme (UNDP) 2000 Energy and the Environment: The Clean Development Mechanism. In: Special Topics Relating to Energy and Sustainable Human Development. United Nations Development Programme. <http://www.undp.org/seed/eap/html/publications/2000/SEStrategy/Chapter3.doc> (10 February 2005).
- United Nations Development Programme (UNDP) 2000 Gender and Energy: How is Gender Relevant to Sustainable Energy Policies. In: Special Topics Relating to Energy and Sustainable Human Development. United Nations Development Programme. <http://www.undp.org/seed/eap/html/publications/2000/SEStrategy/Chapter2.doc> (10 February 2005).
- Wilson, L. 2004 Gender and Adaptation Technical Paper Outline. <http://www.gencc.interconnection.org/wilson2004.pdf>

# Reviving Traditional NRM Regulations (*Tara Bandu*) as a Community-based Approach of Protecting Carbon Stocks and Securing Livelihoods

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## **Abstract**

*One of the difficulties of implementing community-based forestry carbon sequestration projects in developing countries is that of protecting the forest and the established plantations from destructive elements such as fire, animal grazing and arbitrary cutting. Without strong natural resource management (NRM) regulations in place and enforcement support from the communities, such projects are doomed to fail.*

*In Timor Leste, the Canadian International Development Agency (CIDA)-funded and CARE-implemented Community-Based Natural Resource Management for Carbon Sequestration in East Timor Project (CBNRM-ET) started its implementation in 2002 in 12 villages. The goal was to maintain carbon stocks and increase carbon sequestration through the development of community-based resource management systems that will simultaneously improve livelihood security. The challenge of achieving this goal is weighed against the backdrop of environmentally destructive practices existing in the project sites: slash and burn agriculture system; fires everywhere; open animal grazing; arbitrary logging; and fuelwood gathering. Coupled with these are the lack of clear land tenure and the limited capacity of the government to implement natural resource management regulations.*

*With intensive environmental awareness and community capacity building, the villages responded by reviving the traditional institution called tara bandu. Tara bandu is a form of traditional law and has been proven to be an effective institutional tool in the protection of the forest, wild animals, water sources, sacred places and property*

*rights of the people. While it has only been revived recently, it is showing its potential as an effective means of protecting the environment. The establishment of tara bandu is a bottom-up approach that mobilizes communities and creates an ownership of NRM regulations at the community level. But like any other legal instruments, it has room for further improvement.*

*This paper aims to present the lessons learned from establishing tara bandu and discuss its potentialities in protecting carbon stocks and livelihood. It also points out some weaknesses, for future improvement of this traditional institution.*

## Introduction

The United Nations Framework Convention on Climate Change (UNFCCC) has the objective of stabilizing atmospheric greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system. It specifies that this level should be achieved within a timeframe sufficient to allow ecosystems to adapt naturally to climate change, ensuring that food production is not threatened, and to enable economic development to proceed in a sustainable manner.

The Kyoto Protocol to the UNFCCC (1997) strengthens the international response to climate change. Two objectives are specified, namely: (a) to assist non-Annex 1 parties to achieve sustainable development while contributing to the ultimate objectives of the Convention, and; (b) to establish quantified emission limitation and reduction commitments by Annex 1 countries and subsequently facilitate achievement of these targets through a number of mechanisms. Article 12 of the Protocol specifically defines the Clean Development Mechanism (CDM), whose purpose is to assist non-Annex I countries to achieve sustainable development while at the same time assisting Annex I countries in achieving compliance with their quantified emission reduction commitments under Article 3.

The recognition that land use, land use change and forestry (LULUCF) practices could be both carbon sources and sinks led to their inclusion in the Kyoto Protocol. The land use and forestry management practices offer various options for mitigating greenhouse gas emissions. These options aim at: (a) management for carbon emission avoidance through averting deforestation or logging and forest conservation; (b) management for carbon sequestration through silviculture treatment, protecting secondary forests and other degraded forests and natural or artificial regeneration; and (c) management for carbon substitution through transfer of sustainably grown forest biomass C into products rather than using fossil-fuel based energy and products. While it is widely recognized that all three options have the potential for reducing carbon emissions, CDM includes only afforestation and reforestation as the eligible LULUCF practices (COP7 Decisions).

Forest and tree plantations, including the soil where they grow, are carbon sinks. As trees grow, they absorb carbon dioxide (a major greenhouse gas) from the atmosphere. This means that the more trees are planted the more carbon stocks will be established which will increase carbon sequestration. The reversal is cutting and burning trees indiscriminately and without observing sustainable practices, in which

case the carbon is being released back to the atmosphere as greenhouse gas that causes global warming.

Climate change affects food security and it is the developing countries that will be most affected. This is the reason why some greenhouse mitigation options have been geared towards addressing both environmental degradation and poverty alleviation. This includes CBNRM systems, including agroforestry practices. The Intergovernmental Panel on Climate Change (IPCC 2000) has compiled evidence that some agroforestry systems may sequester three times more carbon from the atmosphere than do the same areas of croplands and grasslands, and also at least 60% as much as the same areas of newly planted forests. A preliminary study of carbon baseline accounting in the Hardia forest in India suggests that the carbon accumulation rate increased by up to 3 metric tonnes per year in the agroforestry system than in assisted regenerated forests (Profeenberger 2001). Also, the adoption of agroforestry practices increases soil fertility through recovery of organic-based nutrient cycle through replenishment of soil organic matter, about half of which is carbon. Thus, by increasing carbon stores above ground in trees on farms and below ground in soil organic matter, agroforestry produces global benefits (ICRAF 1997). Most of the agroforestry systems have been practiced in tropical countries all over the world. Thus, it is presumed that the same level of carbon sequestration can be achieved in the implementation of agroforestry systems in Timor-Leste. It is along this concept that the Community-Based Natural Resource Management for Carbon Sequestration in Timor-Leste (CBNRM-ET) has been implemented.

CBNRM is a system that looks at the land, water, forests and indeed the ecology in a holistic manner while allowing people to define their needs, goals and aspirations, determine a vision in life and act in ways of their choosing. The key concepts are community, resources management, including, among others, resource access and management, viable organization, strong leadership, skills, strict implementable guidelines and appropriate technology (Fellizar 1993). However, a basic issue confronting CBNRM carbon sequestration projects is the ability of the communities to pursue a more holistic approach to NRM. There is always the difficulty of project start up, particularly when the communities have been practicing destructive farming systems as part of their livelihood. The communities may be willing to cooperate and able to establish a more sustainable NRM practices through demonstration farms or model farms, but the fundamental question is whether they are able to maintain and protect what has been established. Most often, what is lacking is concrete and strong NRM regulations to sustain established community NRM systems which will protect carbon stocks and community livelihood.

This paper looks at how the CBNRM-ET overcome the problem of lack of NRM regulations and build on the opportunity to promote the establishment of *tara bandu* or NRM traditional laws at the target villages



## The CBNRM-ET

The CBNRM-ET is a 3.5-year project being implemented by CARE International Timor Leste and funded from the Canadian Climate Change Development Fund being administered by CIDA. The Project started in October 2001 and set to be completed by end of March 2005. The goal of CBNRM-ET is to maintain carbon stocks and increase carbon sequestration through the development of community-based resource management systems that will simultaneously improve livelihood security. This is to be achieved by building institutional and community level capacity to sustainably manage natural resources in upland communities of Laclubar subdistrict in Manatuto district and Remexio subdistrict in Aileu district, both in the Central region of Timor-Leste, to maintain existing carbon sinks, increase carbon sequestration, and improve livelihoods.

CBNRM-ET's carbon sequestration and livelihood strategies include: agroforestry, small-scale community reforestation, woodlot establishment, pasture/grazing improvement, carbon baseline assessment, awareness campaign, capacity building and establishment of local NRM regulations. The activities are not meant to achieve carbon credits because agroforestry, which is the project's main developmental activity, is not yet included under CDM activities. Moreover, Timor Leste is not yet a Party to the UNFCCC. It has no national system in place to estimate GHG emissions and sinks, and has not developed national policies and criteria for approval of CDM projects. Nevertheless there is some semblance of CDM, which is an investment by Annex 1 country (Canada) to a potential non-Annex 1 country (Timor Leste). The implementation of the project is also potential for increasing the limited in-country awareness and capacity on climate change issues and address national- and local-level issues pertaining to rural livelihoods, natural resources and natural resource management which have been clearly recognized as priority concern. Specifically, deforestation and destructive natural resource management systems have been seen as the overarching environmental concerns. Hence, there is a clear opportunity to simultaneously address global and national-level concerns. Such efforts will focus on awareness promotion and the development of institutional capacity while simultaneously implementing field level projects that provide opportunities for C sequestration and development/adoption of methodologies for future C sequestration projects under the clean development mechanism.

## The project environment: Timor Leste's natural resource management system

Timor-Leste, a new nation emerging out of prolonged civil strife and war, is among the poorest in Asia. About 44% of the rural population, or about 270,000 people, live below the national poverty line. About 64% of the rural poor suffer from inadequate food security. A survey done in 2000 found that cash income of about 60% of households is less than US\$0.15 per day, and for 40% it is less than \$0.07 per day (ADB 2000). The IMF reports that 50% of the population lives below the internationally established US\$1.00 per day. The per capita income has declined from US\$304 in 1999 to about US\$210 after the referendum (ETTA *et al.* 2001).

Timor-Leste has a total land area of 1,460,938 ha and a population of about 850,000. With this population, the land and population ratio is about 1:1.7. Given the annual population increase of 2.56%, the land and population ratio may reach 1: 1.1 by 2020. The majority of the population resides in rural areas, operating diversified, subsistence-oriented farming systems. The lack of viable livelihood options among the rural people of Timor-Leste has contributed a lot on the deteriorating condition of the country's forest resources.

As a newly independent country, Timor-Leste's initial priority undertaking for the last four years has been focused on rehabilitating the country's socio-economic-political structures which were devastated during the post-referendum conflict in 1999. It has to grapple between the priorities of addressing the basic needs of its people and learning to sustainably manage its resource base against the backdrop of poverty, scarce financial resources and limited institutional capacity.

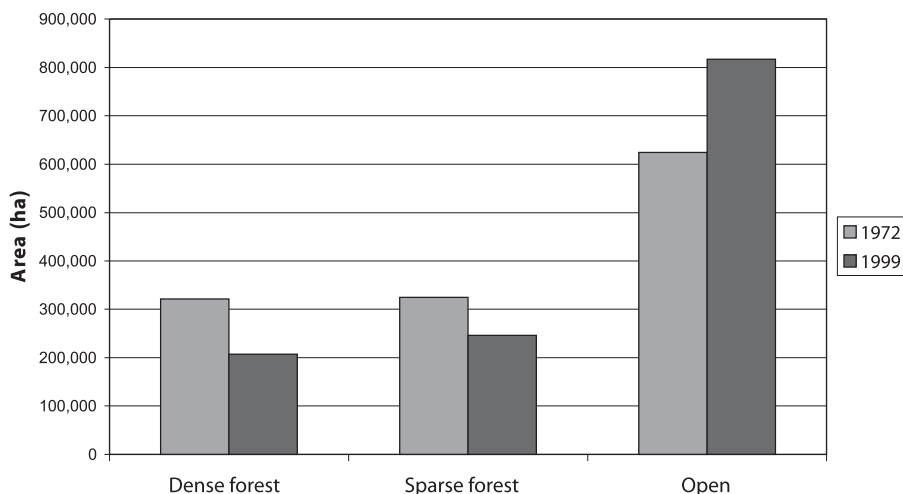
CBNRM-ET has been implemented against the backdrop of existing environmental natural resource management problems in Timor-Leste. such as deforestation, forest fire, shifting cultivation, fuelwood gathering and illegal cutting/ logging of trees.

## **1. Deforestation**

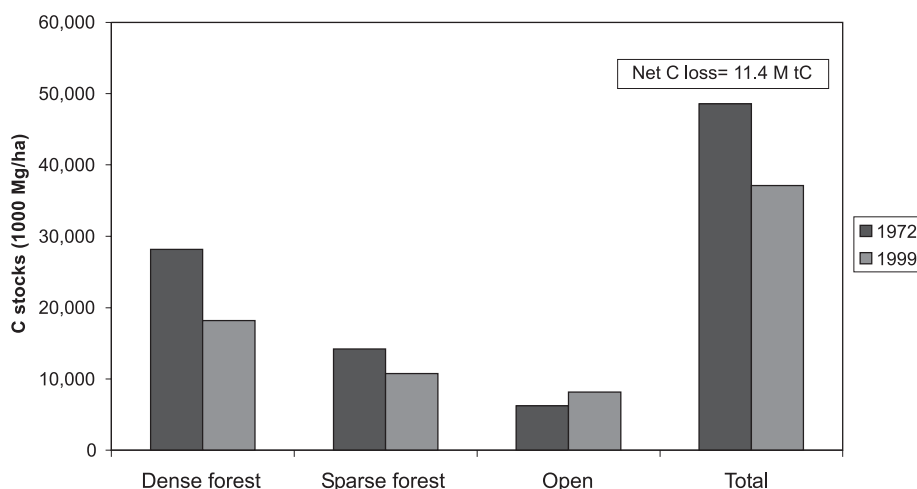
Based on satellite image analysis, the remaining dense forests of Timor-Leste comprise about 200,000 ha or only 10% of the country's total land area, while sparse forests cover a little less than 15% (Sandlund *et al.* 2001). From 1972 to 1999, about 200,000 ha of forests were lost to deforestation which is s equivalent to 1.1% per year, 4x higher than the global average (Figure 1). Within this period, it is estimated that about 114,000 ha (35%) of dense forest was lost and 78,000 ha (24%) of sparse forest was destroyed. The most alarming of which was an increase of more than 200,000 ha of open areas. Translated into carbon stocks values using IPCC default values, the net carbon stocks loss has been 11.4 M tC from 1972-1999 which may have gone to the atmosphere as carbon emission (Figure 2). The primary causes of deforestation have been: forest fire, shifting cultivation, fuelwood gathering, indiscriminate cutting/ logging of trees and extensive grazing.

## **2. Forest/land fire**

The repeated land clearing and burning for shifting cultivation, burning for hunting, burning for fuelwood drying, and burning for regenerating areas for extensive grazing are seen as key factors in promoting degradation of the monsoon forests of the dry northern coast and conversion to open grasslands and badlands. Forest fire occurs predominantly in areas where grasslands and the dry forest abound. Data on areas damaged by fire is incomplete but based on 1994 data, a total of 60,301 ha have been damaged by fire within this year alone (MAFF 2004). With this data, the intensity of the problem can be judged as high considering the small size of the country. More generally, however, it is now thought that the majority of primary forest has been lost and that scrub forest, savannah and grassland make up as much as three-quarters of the land.



**Figure 1.** Change in forest cover and open area in East Timor from 1972 to 1999 (Source data: Sundland *et al.* 2001)



**Figure 2.** Decline in carbon stocks in East Timor's forest lands from 1972 to 1999

### 3. Shifting cultivation

About 75% of Timor-Leste's population of 850,000 lives in the rural areas and most of these populations are engaged in upland farming in the form of shifting cultivation. It is indeed apparent that this practice contributes a lot to the poor condition of the forest resources. Each family has two to three farm areas, with a total area between 1-3 ha, mostly located on sloping areas, along the river or creek within the watershed areas and mostly planted to corn, cassava, beans and some vegetables. Most of the people practice uncontrolled burning for clearing and cleaning their farms, which often damage nearby farms and forest areas. Cultivation period only lasts for three

years, after which they will again clear new areas. There is also no incentive for them to implement soil and water conservation measures.

#### **4. Fuelwood gathering**

It is estimated that 93% of the energy consumed by the country's population is generated using wood. The demand for fuelwood was at an average of 1.27 million cubic meters per year between 2000-2003 (JICA 2002). The high demand for fuelwood has led to fuelwood selling as business for some urban people and one of the sources of cash income for some rural people. And the high dependence of the country on fuelwood as a source of energy for cooking has contributed significantly to deforestation. The cutting of trees alone reduces the density of trees per area plus the practice of burning the area to hasten the drying of trees destroys almost all the vegetations in the area.

Coupled with the physical enormity of NRM problems in Timor-Leste is the lack of institutional support mechanism to deal with the problems. There is no clear land tenure and there is no clear boundary of forest areas. There is inadequate forest regulations and lack of capacity to enforce forest laws.

#### **5. Lack of clear land tenure and clear boundary of forest areas**

The government of Timor-Leste is still on the process of developing the system on land classification. Because of the absence of the system and supporting criteria, it is difficult to identify the forest area that belongs to the government. There are often conflicting claims between the government and the local community. The lack of clear boundary makes it difficult for the Forestry Department to exercise its management authority over the government forest area as well as to prohibit cutting of trees in these areas for household and commercial use. Also, at present there is no existing document of titles of private ownership. Private titles to land are acknowledged through oral tradition. Often, ownership includes forest areas.

#### **6. Inadequacy of forestry regulations**

The forestry regulations in Timor-Leste appear to be inadequate. To date, there are only two forest regulations in place. All these regulations were issued during the transitional administration of United Nations in East Timor (UNTAET). These regulations include Regulation 17/2000 on the Prohibition of Logging Operations and the Export of Wood from East Timor, and Regulation 19/2000 on Protected Natural Areas. The provisions in these regulations are too broad, thus it needs strengthening by subregulations and implementing guidelines. Considering the complexity of the problems affecting the forest resources, these regulations are not enough to cover everything. The insufficiency of regulations resulted in rampant illegal forestry activities. There is also a lack of clear process, lack of awareness of the local people on the regulations and the highly centralized mechanism in the issuance of permits, which accelerated the problem.

## **7. Insufficient number and capacity of human resources**

At present, there are only 30 regular staff working on forestry matters and most of them are not educationally prepared. Twelve of these staff are assigned in the National Office and 18 are assigned in the district. They perform both the administrative work and field activities as technician, forestry extension officer and forest guardians at the same time. The ratio between district staff and forest area is far beyond the standard: one staff to cover as much as 61,848 ha of forest. Coupled with this is the lack of available facilities and equipment.

## **Overcoming the existing project environment**

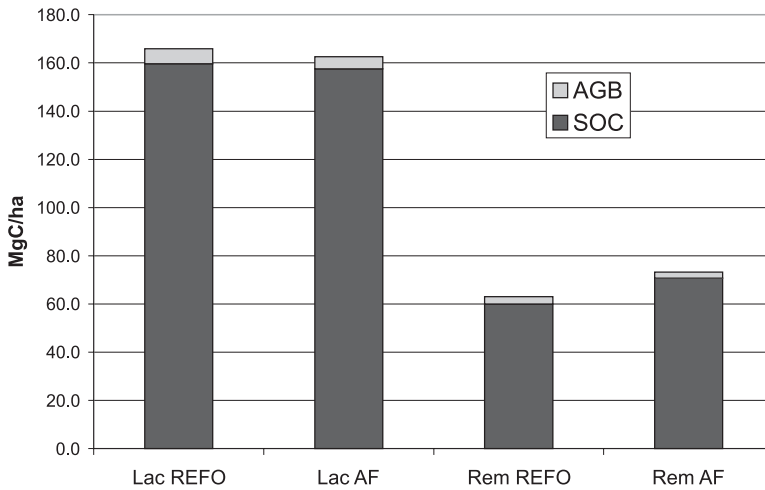
CBNRM-ET is being implemented in 12 *sucos* (villages): five in Laclubar subdistrict, Manatuto district (namely: Batara, Fatumakerek, Funar, Manelima and Orlalan) and seven in Remexio subdistrict, Aileu district (namely: Acumao, Fadabloko, Fahisoi, Faturasasa, Hautuho, Maumeta and Tulatakeu). Eight of the *sucos* belong to the 50 poorest *sucos* while the rest belong to the next 50 poorest *sucos* (ETTA *et al.* 2001).

When the implementation of CBNRM-ET was started in 2002, the project sites in Laclubar and Remexio subdistricts were typically characterized by environmentally destructive practices as described above. Slash-and-burn agriculture had been common. Fires caused by the villagers had occurred everywhere on private land, communal land and state forest during the dry season. Animals were grazing everywhere eating all vegetation they could reach. People gathered fuelwood and cut trees everywhere for both personal and commercial use. These destructive practices had destroyed carbon stocks that could have effectively absorbed carbon dioxide from the air before reaching the atmosphere. They had also damaged seedlings and saplings that could have otherwise started natural regeneration.

One other important issue was that the people still retained a dole-out mentality, having recently been recipients of extensive emergency relief operations just after the 1999 conflict. Thus, for any work that they did there was an expectation of monetary compensation or food dole-outs. Initial community mobilization was thus conducted with greater sensitivity to their needs.

The target areas for developmental activities were focused on areas that have been converted to open and degraded areas through a cycle of burning or shifting cultivation. As such, the result of CBNRM-ET's carbon baseline in the project sites, shows that only between 5.2 to 6.2 Mg C/ ha are stored in above-ground biomass in Laclubar sites while between 2.5 to 3.0 Mg C/ha in Remexio sites compared to the soil C, which is between 157.5 to 159.7 Mg C/ha in Laclubar sites and between 60.1 to 70.7 Mg C/ha for Remexio sites (Figure 3). Different results for Laclubar and Remexio sites is due to rainfall pattern wherein Laclubar gets two rainy seasons annually while Remexio has only one rainy season.

For the last three years of project implementation, CBNRM-ET has achieved modest progress in pursuing its environmental and livelihood improvement goals despite harsh conditions prevailing in the area. CBNRM-ET started with its agroforestry and reforestation activities by establishing, mobilizing and building the capacity of farmers' groups. A total of 78 farmers' groups involving 639 members have



**Figure 3.** Carbon Stocks in Above-ground Biomass and Soil in CARE Project Sites

been mobilized for development activities such as raising seedlings and agroforestry, while the entire community was engaged in community reforestation. The development of 577 ha of agroforestry farms, including 109 ha of demonstration farms in 20 sites has produced some results, while the 60-hectare community reforestation is showing potential growth. Focus of CBNRM-ET was initially on long-term tree crops to increase carbon sequestration, which has a long gestation period. A combination of short-, medium- and long-term crops has lately been introduced in agroforestry demonstration farms to provide more livelihood options. The farmer-participants are starting to achieve an increase in food security from below subsistence level to some surplus as a result of short-term crops. The farmers' schools have trained a core of farmers group and are now delivering extension services to other farmer groups. And importantly, while it has involved a long community process, all 12 villages have established *tara bandu* or traditional law, which promulgates natural resource management regulations. With the *tara bandu* in place, the established plantations are well protected. Without *tara bandu*, the intended results from the abovementioned development activities could not be achieved.

## Revival of Tara Bandu

During the first planting season of CBNRM-ET in FY 2002-2003 (April 2002-March 2003), a total of 347 ha of plantation was established (222 ha agroforestry and 125 ha reforestation). However, the plantation had been affected by *El Nino* at that time. Equally devastating was the damage caused by open animal grazing and burning. These reduced survival rate to an average of less than 45% and caused some areas to be abandoned because of a harsh and uncontrollable situation. The following fiscal year (2003-2004), one focus was to replant and improve what had been established the previous year.

CBNRM-ET conducted intensive awareness campaign and spelled out the need to establish local NRM regulations as the efforts of the farmers' groups alone were not sufficient protection of the community natural resources. An entire community effort was required. At that time, the government of Timor-Leste had sought to revive *tara bandu* as part of an effort to protect the natural resources from further decimation and to contribute to sustainable natural resource management as enshrined in Timor-Leste's National Development Plan (RDTL 2002). Its initial results in other districts had begun to show some potential, which prompted the government to promote this traditional institution extensively. CBNRM-ET has supported this effort by facilitating the establishment of *tara bandu* in the project sites.

*Tara bandu* is a form of traditional law that originated during the pre-Portuguese colonial period and continued to be established and enforced during the Portuguese period. *Tara bandu* has been proven to be an effective institutional tool in the protection of the forest, wild animals, water sources, sacred places and property rights of the people. During the Indonesian occupation, however, *tara bandu* was totally abolished and replaced by national laws.

*Tara bandu* means "*Tara*" to hang and "*Bandu*" means prohibition. This aged old tradition is rooted from the animistic belief of Timorese people. According to Andrea (2003) *tara bandu* is organized by:

- Having a village feast.
- Appointing "Maklehat," the highest authoritative person in *tara bandu*.
- Developing the local regulations that covers activities that are prohibited (e.g. burning of forest), duration of the prohibition and punishment/penalty for violation.
- Public announcement of the bandu/prohibition to the community.
- Hanging of "*Horok*" – prohibition and punishment symbols which takes in the form of "*horok inan*," (main symbol), which is placed in strategic location of the protected area and "*horok oan*" (secondary symbol) which is usually placed along the border of the protected area.

The establishment of *tara bandu* involved an extensive community consultation as it affects everybody in the community. The chiefs of the *suco* and *aldeias* and council of elders came together to discuss and agree on the content of the NRM regulations, the prohibited acts and the penalties. NRM regulations include protection of established plantations as well as surrounding forest areas from fire, animal grazing, arbitrary cutting, and other forms of destructive utilization, and promotion of sustainable utilization of community resources. Penalties include payment of animals or cash payment or both. The guiding principle is that the penalty is large enough to deter constituents from committing the prohibited acts. Once the regulations have been agreed upon, an elaborate ceremony will formally establish *tara bandu*, which will announce that the NRM regulations are binding to all subjects.

Following this community process, all the 12 *sucos* covered by CBNRM-ET completed the establishment of *tara bandu*, while two additional *sucos* not covered by CBNRM-ET but adjacent to the project sites, also joined in establishing *tara bandu*

in their areas. All the seven *sucos* covered by CBNRM-ET plus two additional *sucos* in Remexio subdistrict had completed the *tara bandu* process. *Tara bandu* was jointly established in *sucos* Fadabloko and Hautoho on March 15, 2003 and followed on June 16, 2003 by *sucos* Fahisoi, Maumeta and Rilleu (adjacent *suco*). On June 10, 2004, *tara bandu* was jointly established in Faturasa, Tulatakeu and adjacent *suco* of Aicrus and followed on June 30, 2004 in Acumao. In Laclubar subdistrict, *tara bandu* establishment required a long community process. However, all the five *sucos* covered by the project have already completed the ceremony. This was first established in the remotest Suco Fatumakerek on June 23, 2004. Suco Manelima followed last September 4 and Suco Orlalan on September 5, 2004. Subsequently, *tara bandu* was established in Suco Batara on September 14, 2004 and Suco Funar on September 18, 2004.

## Effectiveness of *Tara Bandu*

Changes have been apparent in those *sucos* where *tara bandu* was established. Now, only controlled burning of small patches in farms are being done by farmers. Occurrence of arbitrary animal grazing has been few. Apprehensions of violators have been made by the *Suco* Council, particularly on cases of animal grazing in prohibited areas. Such apprehensions have served notice to would-be violators and effectively deter further violations.

### 1. In Laclubar

CBNRM-ET's monitoring of *tara bandu* enforcement have shown that there were few forest fire during the last dry season and there were no more grassfires. Farmers have practiced controlled burning if ever they used burning for clearing and cleaning their farms. There are also few violations of animal grazing. Specific sites have been determined by *tara bandu* for purposes of animal grazing. Cutting of trees has been limited. Fuelwood gathering has been restricted to be cut in ones household area. If ever done in the forest areas, only felled dry branches are being cut. Hunting of wild animals still exists, but there was restraint in the use of fire.

Some of the violations included the grass fires that occurred near the boundaries of Suco Sananain (non-project site), which has yet to establish its *tara bandu*, and gutted portion of Suco Batara which has already established *tara bandu*. The violator has not been identified.

There was cattle grazing in Waydoholo, Suco Orlalan despite the presence of fence and destroyed about 60% of the 2 ha newly-planted trees. The owner of the cattle was made to pay US\$300 (a value of one cow) and repair the fence. The damaged forest trees (mostly *Casuarina*), however, have recovered because they are resilient species.

There was grazing by buffaloes of farm crops in Maneatun, Suco Manelima. After three warnings to the owner, the affected farmer slaughtered the two buffaloes but shared one half of the meat with the owner. No complaints were made as the proper procedure had been observed.



## 2. In Remexio

Fire occurrence had been reduced. It is mostly confined to controlled burning in individual farms. There is still violation of animal grazing in sites not intended for grazing, but this is more a call of nature since the long dry season rendered little fodder in designated places. Grass fires were also limited. There were no illegal logging reported. Fuelwood gathering though still occurs in forest areas, but only branches are cut.

Some violations included the occurrence of fire that originated from the nearby Laulara subdistrict and went into the demonstration farm in Modolebu, Suco Acumao burning a small portion of the plantation and destroying about 100 seedlings. The land preparation in Modolebu turned out to be an efficient technology in breaking the fire from spreading. Terracing using earth and litter were actually established in the site. All dry leaves and twigs were dumped along the contour, freeing the alleys of any debris. When the fire occurred, only the litters along the contour were burned and thus saving most of the planted seedlings. Of the 13-ha demonstration plot, only about half a hectare was partially burned.

A fire that originated from another suco without established *tara bandu* went into the plantation in Raimerahei, Suco Hautoho burning 2 ha of tree plantation, including coffee plantation and one house. The violator has not been identified.

An owner of cattle in Samalete in Suco Tulatakeu was brought to the police for allowing open grazing and was reprimanded. Such violations have not been repeated.

## Strengths and weaknesses of *Tara Bandu*

The potential strengths of *tara bandu* include:

- The establishment of *tara bandu* is a bottom-up approach that mobilizes communities and creates an ownership of natural resource management regulations. It is a participatory process by the community and imposed on all subjects within the community. It is agreed upon by the community and enforced by the community themselves.
- It is a perpetuation of traditional institution and therefore it has the mandate and support of the community.
- It involves small and specific geographic areas and therefore it is easy to enforce.
- Since it originated locally, it will be easy to amend the regulation to adjust it to new realities.

While *tara bandu* has some potential results, it has its own weaknesses due to its recent revival:

- *Tara bandu* is founded on elaborate ceremony. If the community can not afford to put up the materials for the ceremony, there is a tendency to postpone its establishment until such time that they can provide the necessary ceremonial materials. The sense of urgency of promulgating NRM regulations would thus be defeated.

- There is no concrete monitoring system on the violations. If there is no individual victim, nobody has the responsibility of reporting such violation.
- *Tara bandu* covers only small and specific areas. It does not bind neighboring areas or *sucos* that did not participate in its establishment. Therefore, any violations perpetrated by non-participating *sucos* are not covered by the sanctions. Conflict would likely occur between a *suco* with *tara bandu* and a *suco* with none and whose constituents perpetrated the violation of NRM regulations. Thus, it is necessary to persuade the other *sucos*, particularly those with common boundaries to establish *tara bandu* as well.
- The *tara bandu* process is not gender-sensitive. Decisions and consultations are made by the leaders and council of elders. Timor-Leste being traditionally paternalistic, the leaders and council of elders are more often males. As such, women's perspectives on the proposed NRM regulations are often not considered.
- It only works well in remote areas far from city or district centers.
- *Tara bandu* is partly anchored in animistic and spiritual beliefs. Those with higher level of education in the community, like the youth, may have changed their belief and may not support *tara bandu*.
- It only works in areas where the support of local authorities is strong and the “*bandu*” is taken by local authorities as local ordinance.
- Some people ignore or tend not to believe on the tradition due to economic needs.

## Conclusions

Community-based carbon sequestration activities can only be successful if a concrete mechanism to maintain and protect the carbon stocks and livelihood of the people are put in place to avert unnecessary leakage and attain higher levels of carbon stocks permanency. Lessons learned from the implementation of CBNRM-ET show that the use of traditional NRM regulations is a potential community-based approach for sustainably maintaining and protecting carbon stocks and livelihoods.

The establishment of *tara bandu* in the project sites is beginning to show its potential as an effective natural resource management tool. It is a bottom-up approach that mobilizes communities and creates an ownership of natural resource management regulations. However, to be more effective, it should cover a wider area such as a subdistrict or district-wide level to prevent any leakage from neighboring *sucos*. The best solution is to get those *sucos* to also embrace the *tara bandu* process. Furthermore, at the institutional level, there is a need to support and reinforce local authorities by integrating *tara bandu* in national laws. Also, a concrete monitoring system with well-defined community responsibility should be established to effectively determine compliance with the NRM regulations as well as the proper imposition of penalties on those who violated it. It also requires that an extensive awareness campaign be undertaken to promote the ideals of the *tara bandu*.

## References

- Andrea, C. 2003 *The customary Use and Management of Natural Resources in Timor – Leste*, Oxfam, GTZ and Directorate of Land and Property of Timor-Leste, Dili, Timor-Leste.
- Asian Development Bank (ADB) 2000 *East Timor Rapid Assessment of Economic and Social Conditions*.
- East Timor Transitional Administration (ETTA), the Asian Development Bank (ADB), the World Bank (WB) and United Nations Development Programme (UNDP) 2001 “The 2001 Survey of Sucos: Initial Analysis and Implications for Poverty Reduction”
- Fellizar, F. 1993 *Community-Based Resource Management: Perspectives*. University of the Philippines at Los Banos. Los Banos.
- International Center for Research in Agroforestry (ICRAF) 1997 *Putting Carbon in its Placed: Agroforestry Solutions for Global Warming and poverty in the Tropics*.
- Japan International Cooperation Agency (JICA) 2002. *The Study on Integrated Agriculture Development of Timor –Leste* by Sanyu Consultants.
- Lasco, R. D. 2003 *Baseline Carbon Stocks Assessment and Projection of Future Carbon Benefits of the CARE-CIDA CBNRM Project Sites*, CARE International Timor Leste
- Lasco, R.D. and Cardinoza, M.M. 2003 *The forest ecosystems of East Timor: carbon emissions and potentials for climate change mitigation*.
- Ministry of Agriculture, Forestry and Fisheries (MAFF) 2003 *Strategic Development Interventions in the Forestry and Watershed Sub- Sector of Timor-Leste: A Policy Note*.
- Ministry of Agriculture, Forestry and Fisheries (MAFF) 2004. *Draft Forestry Management Policy and Strategy of Timor-Leste*
- Pofenberger, M. (ed.) 2001A *Case Tudy From Hardia Forest Division, India 2001*
- República Democrática de Timor Leste (RDTL) 2002 *National Development Plan of Timor-Leste 2020*
- República Democrática de Timor Leste (RDTL) 2003 *Timor-Leste, Poverty in a New Nation: Analysis for Action*, Government of Timor-Leste.
- Sandlund, O.T., Bryceson, I., de Carvalho, D., Rio, N., da Silva, J. and Silva, M.S. 2001 *Assessing Environmental Priorities in East Timor, Final Report*.
- The United Nations (UN) 1997 *Kyoto Protocol to the United Nations Framework Convention on Climate Change*.

# Glossary

**Adaptation** - An adjustment in natural or human systems in response to expected climate change. Adaptation can take the form of anticipatory actions, or reactions taken by private or public entities.

**Additionality** - Environmental or emissions additionality refers to the carbon accounting procedures being established under the Kyoto Protocol, whereby projects must demonstrate real, measurable, and long-term results in reducing or preventing carbon emissions that would not have occurred in the absence of CDM activities. Proof of additionality is critical because developing countries do not have legally binding reduction commitments by which to judge changes in national baselines. This makes project baselines essential, as well as the ability for independent verification of a project's real, measurable results.

**Afforestation** - The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding, and/or the human-induced promotion of natural seed sources (Kyoto Definition).

**Baseline** - The scenario that reasonably represents the sum of the changes in carbon stocks in the carbon pools within the project boundary that would occur in the absence of the project activity.

**Carbon dioxide (CO<sub>2</sub>)** – The main greenhouse gas that plays a critical role in regulating the earth's climate. Roughly 3.7 units of CO<sub>2</sub> equal 1 unit of carbon (C), or alternatively, 1 unit of CO<sub>2</sub> equals 0.27 units of C. Other greenhouse gases (*e.g.* N<sub>2</sub>O, CH<sub>4</sub>) are usually expressed as equivalent to CO<sub>2</sub>.

**Carbon pools** - A reservoir of carbon. A system that has the capacity to accumulate or release carbon in units mass. Examples of carbon pools are forest biomass, wood products, soils, and atmosphere.

**Carbon sequestration** - The rate of increment or addition to a carbon stock. Sequestration and stocks are often confused. Old-growth forest with large C-stocks may sequester carbon in a low rate.

**Carbon stocks, sinks, and sources** - A stock that is absorbing carbon is called a “sink” and a stock that is releasing carbon is known as a “source.” In the climate change agreement the sinks that remove atmospheric carbon have to be enhanced and the sources that emit carbon have to be reduced to stabilize atmospheric carbon concentration.

**Clean Development Mechanism (CDM)** - Is a mechanism established under Article 12 of the Kyoto Protocol for project-based emission reduction activities in developing countries. The CDM is designed to meet two main objectives: to assist developing countries to address the sustainable development, and to assist developed countries to meet their reduction commitments.

**Certified Emission Reduction (CER) units** - The tradable unit in a Clean Development Mechanism project, as defined in Article 12 of the Kyoto Protocol. There are two types of CERs that parties could choose:

- a temporary CER (tCER), which expires at the end of the commitment period following the one during which it was issued; and
- a long-term CER (lCER), which expires at the end of the crediting period of the A/R CDM project activity.

**Certification** - the written assurance by a Designated Operational Entity (DOE) that a LULUCF project activity under the CDM achieved the net anthropogenic GHG removals by sinks since the start of the project as verified.

**Commitment Period** - The period under the Kyoto Protocol during which Annex I Parties' GHG emissions, averaged over the period, must be within their emission reduction targets. The first commitment period runs from January 1, 2008 to December 31, 2012.

**Conference of Parties (CoP)** - The CoP is the highest decision-making body in the United Nations Framework Convention on Climate Change (UNFCCC). The meeting of Parties of the Kyoto Protocol (MoP) may be held in conjunction with the CoP.

**Crediting period** - The period for which net anthropogenic GHG removals by sinks are verified and certified by a the designated operational entity (DOE) for the purpose of issuance of CER. Project participants may choose between two options for the length of a crediting period:

- fixed crediting period: a crediting period of a maximum of 30 years without possibility of renewal or extension once the proposed CDM project activity has been registered; and

- renewable crediting period: a crediting period of a maximum of 20 years which may be renewed up to two times (maximum 60 years) provided that, for each renewal, the DOE determines that the original project baseline is still valid or has been updated taking account of new data.

A crediting period shall not extend beyond the operational lifetime of the CDM project activity.

**Deforestation** - Is the direct human-induced conversion of forested land to non-forested land (Kyoto Definition).

**Designated Operational Entity (DOE)** - An entity designated by the CoP and MoP, the DOE is based on recommendation by the EB as qualified to validate proposed CDM project activities as well as verify and certify net anthropogenic GHG removals by sinks. A DOE shall not perform validation or verification and certification on the same CDM project activity. Upon request, the EB may however allow a single DOE to perform all these functions within a single CDM project activity.

**Executive Board (EB)** - Formed by the CoP, the EB reports to the CoP and MoP. Its main role is to supervise the implementation of CDM. The EB can recommend the revision and amendment of modalities and procedures of CDM implementation, approve methodological issues, and recommend the accreditation of a designated operational entity to CoP and MoP.

**Forest** - Is a minimum area of land of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 per cent with trees with the potential to reach a minimum height of 2-5 meters at maturity *in situ* (Kyoto Definition).

**Greenhouse Gases (GHGs)** - Are radiatively active trace gases in the atmosphere that trap infrared radiation. The earth absorbs the sun's short wave, ultraviolet radiation and emits long-wave, infrared radiation to outer space. The absorption of radiation causes warming. How much infrared energy escapes to outer space is strongly affected by the composition of the earth's atmosphere. Clouds (H<sub>2</sub>O) and accumulating gases in the atmosphere, such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxides (N<sub>2</sub>O), and chlorofluorocarbons (CFCs) absorb some of this outgoing infrared radiation.

**Intergovernmental Panel on Climate Change (IPCC)** - Established in 1988 as a special body by the UN Environment Programme and the World Meteorological Organization to provide assessments to policymakers of the results of ongoing climate change research. The IPCC is responsible for providing the scientific and technical foundation for the United Nations Framework Convention on Climate Change (UNFCCC), primarily through the publication of periodic assessment reports.

**Kyoto Protocol to the UNFCCC** - Establishes legally binding commitments for Annex I countries to collectively reduce GHG emissions by more than 5 percent below 1990 levels by 2008 to 2012, and establishes a set of mechanisms—IET,

JI, and CDM—that allow countries to achieve their commitments at the lowest possible cost. The Kyoto Protocol entered into force on 16 February 2005.

**Leakage** - Refers to unexpected carbon losses related to a particular carbon offset project. The leakage may be due to unforeseen circumstances that were beyond the control of a forest conservation or sequestration project. Unforeseen events include extreme weather, political instability, climate change, pests, disease, fire, or cancellation of contracts that lead to logging. Research on leakage suggests that it can be anticipated and avoided through good project design. Where leakage is unavoidable, net carbon estimates can be revised, incorporating leakage effects.

**Land Use, Land-Use Change and Forestry (LULUCF)** - The total of arrangements, activities, and inputs undertaken in a certain land cover type (a set of human actions). The social and economic purposes for which land is managed (e.g., grazing, timber extraction, conservation). The IPCC Special Report on LULUCF discusses the global carbon cycle and how different land use and forestry activities currently affect standing carbon stocks and emissions of greenhouse gases.

**Mitigation** - The human intervention to reduce the source and to enhance the sinks of GHG to achieve stabilization of GHG concentrations in the atmosphere and subsequently a cessation of further warming.

**Permanence** - The longevity of a carbon pool and the stability of its stocks, given the management and disturbance environment in which it occurs. A unique feature of LULUCF projects is the possibility of a reversal of carbon benefits from either natural disturbances such as fires, disease, pests, and unusual weather events; or from the lack of reliable guarantees that the original LUCF activities will not return. However, strategies have been identified that could guard against such reversals such as establishment of contingency carbon credits, insurance, and mixed portfolios of projects.

**Project Proponent** - the entity organizing a carbon offset project, bringing together the requisite components of project designer(s), developer(s) and investor(s).

**Project Developer** - the entity actually implementing and maintaining the carbon offset project.

**Project Designer** - the entity performing the initial assessments necessary to initiate a carbon offset project.

**Reforestation** - Is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989 (Kyoto Definition).

**Sequestration** - The process of increasing the carbon content of a carbon pool other than the atmosphere. There are various opportunities to remove atmospheric CO<sub>2</sub>, either through biological processes (e.g. plants and trees), or geological processes through storage of CO<sub>2</sub> in underground reservoirs.

**Sinks** - Any process, activity or mechanism that results in the net removal of greenhouse gases, aerosols, or precursors of greenhouse gases from the atmosphere.

**Stocks** - The absolute quantity of carbon held within a pool at a specified time.

**Source** - Opposite of sink. A carbon pool (reservoir) can be a source of carbon to the atmosphere if less carbon is flowing into it than is flowing out of it. Any process or activity that results in the net release of greenhouse gases, aerosols, or precursors of greenhouse gases into the atmosphere.

**United Nations Framework Convention on Climate Change (UNFCCC)**

– An international agreement reached in the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil in 1992. The UNFCCC established a voluntary multilateral agreement to reduce industrialized nations' emissions of GHGs to 1990 levels by the year 2000, which has been ratified by 170 countries.

**Validation** – the process of independent evaluation of a proposed CDM project activity under the CDM by the DOE against the requirements of afforestation and reforestation project activities under the CDM as set out in Decision 19/CP.9, its annex, and relevant decisions of the CoP and MoP, on the basis of the Project Design Document (PDD).

**Verification** - Is defined as the periodic independent review and *ex post facto* determination by the Designated Operational Entity (DOE) of the net anthropogenic GHG removals by sinks achieved by a project activity under the CDM since the project inception.



Carbon sequestration projects through land use, land-use change and forestry (LULUCF) activities could demonstrate a win-win situation from the point of view of climate change and sustainable development. Under the current rules of the Clean Development Mechanism (CDM) of the Kyoto Protocol the activities are limited to afforestation and reforestation.

Properly designed, these projects conserve and/or increase carbon stock and at the same time improve rural livelihoods. Such projects have been developed and implemented in a number of countries with different ecosystems and social settings. They do not necessarily comply with the current legally binding carbon market under CDM but demonstrate the participation of the low-income rural communities in sustainable forestry, agroforestry and other natural resource management activities.

This publication is a collection of the lessons learned from a number of case studies ranging from small to large scale projects, from community-based to corporate operations, and from development to conservation activities. Although most projects are still in their infancy stage and many more lessons to be learned it was realized that bundling climate change and community development projects is a practical approach to support sustainable livelihoods. At the same time the strategic approaches to influence the next rounds of climate negotiation were also addressed. These are dealing with issues, such as, avoiding deforestation and adaptation measures for vulnerable ecosystems and communities, who have relatively low adaptive capacity.

Emerging markets for carbon in the context of rural development and organization were identified. This transition has had implications for the development of its institutional arrangements at project management and community levels, which in turn have affected the project's legitimacy and its ability to promote equitable outcomes. It has been demonstrated that purely carbon management-oriented activities are able to convince rural communities and investors to participate. Broader carbon forestry activities have the potentials to be integrated in the sustainable development agenda.