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## Strengthening the social dimension in research related to natural resources management

### Key issues

The United Nations Framework Convention on Climate Change (UNFCCC) has opened the way, via the Kyoto Protocol, to seek globally the most cost effective way to reduce carbon emissions or enhance terrestrial carbon sinks. Industrialised countries may thus achieve part of their emission reduction target by afforestation and reforestation projects in the tropics. The mechanisms offered by the Kyoto Protocol are unique in their attempt to provide global environmental benefits via local project implementation in a global carbon market.

A study on the possibility of carbon projects in the tropical peat lands of Central Kalimantan resulted in the following findings:

- A large carbon offset potential exists in the peatlands of Central Kalimantan
- The Clean Development Mechanism (CDM) rules, when applied strictly, exclude large parts of Central Kalimantan for carbon offset projects
- A major risk for carbon management in peatlands is uncontrolled fire: other risks may be rooted in the institutional setting and local stakeholder involvement
- Various (mostly uncoordinated) international initiatives (both public and private) to facilitate carbon offset projects exist
- Financial Institutions are moving in on the carbon market; the land use sector has only recently emerged in this market
- The institutional setting at the national and regional level is not clearly defined yet
- The role of the voluntary market is important in marginal areas where carbon services and rural development are strongly linked



## 1. Background

Human activities have increased the concentrations of greenhouse gasses in the atmosphere, primarily due to the combustion of fossil fuels, but also through changes in land use and land cover. The resulting changes in climate and climate variability pose a major threat to the functioning of human and natural systems. The impacts of future changes are expected to fall disproportionately on the developing countries (IPCC WGII, 2001).

As a first step towards reduction of greenhouse gas emissions to the atmosphere, the Kyoto Protocol was signed in 1997. In this protocol, 39 industrialised countries committed themselves to reduce their greenhouse gas emissions to at least 5% below 1990 levels during the period 2008 to 2012.

The Kyoto Protocol outlines three types of market-based mechanisms: emissions trading, Joint Implementation (JI) and the Clean Development Mechanism (CDM). Emissions trading allows the 39 governments committed to collective reductions under the Protocol to trade the right to pollute among themselves. Under this scheme, due to start in 2008, a country may choose to buy emission credits from another country that has managed to reduce its emissions below its Kyoto targets.

The CDM has two main objectives:

1. To assist developing countries who host CDM projects to achieve sustainable development.
2. To provide developed countries with flexibility for achieving their emission reduction targets by allowing them to take credits from emission reducing projects undertaken in developing countries.

The CDM mechanism provides developing countries with an additional source of income through an environmental service: carbon management. The market as it is now emerging is still in its infancy. As for any market, prices will depend largely on supply and demand relations and the risks involved. The possibility of getting paid for carbon management is expected to stimulate environmental protection and conservation and is expected to be beneficial for social circumstances as well. The implementation of the trade mechanisms and how this will benefit the local poor will differ per region.

## 2. Central Kalimantan

This study focuses on Central Kalimantan on the Indonesian part of the island Borneo. Large parts of this region are covered by peatlands, originally covered by peat swamp forests. In 1996 the Mega Rice Project (MRP) was initiated, aimed at increasing the self-sufficiency of Indonesia's food production. To reach that goal, one million hectares of peat swamp forest was planned to be converted into rice fields. Between January 1996 and July 1997, more than 4000 km of drainage and irrigation channels were constructed. As a consequence, the forests became accessible, leading to large-scale illegal logging activities and deforestation.

The fastest and easiest way of clearing the land is by means of fire. In Central Kalimantan large scale-forest fires erupted as a result of large-scale drainage and associated logging activities in peatbogs of the Mega Rice project area. During the 1997 fires the estimated carbon emission to the atmosphere was between 0.81 and 2.57 Gt amounting to 13-40% of the mean annual global carbon emissions from fossil fuels for 1997 (Page *et al.*, 2002). Other trade off's are illegal logging activities undermining local biodiversity and an increase of poverty.

## 3. Incentives Environmental services

Payments for environmental services such as payments for carbon can play a role in achieving wise use of peatlands in poverty trapped regions, such as Central Kalimantan. Besides interesting from a carbon perspective the area is also a hotspot of biodiversity, serving amongst others as an important habitat for the orang utan. Environmental services can become a significant source of local income while contributing towards preventing climate change as well as conserving globally important biodiversity.

## 4. The carbon potential

Capturing carbon in the vegetation and soil (i.e. sequestration) cannot only be achieved by restoration of the natural forest vegetation, but also via oil palm plantations in the deforested area, provided that, as a result of this activity, no negative effects on the carbon balance occur elsewhere. Calculations for an oil palm plantation with an assumed rotation of 15 years, show a maximum carbon stock of about 60 ton per ha. For *Acacia mangium* the estimated above ground carbon stock after 10 years is also approximately 60 ton per hectare.

The potential of becoming an important player on the carbon market is obvious, considering that the 1997 peat fires contributed to 1/3 of the global greenhouse gas emissions in that year. Reducing fire risk is a first step in the conservation of the carbon stored in the peat. The emission from a fire can be as much as 250 ton carbon per hectare (50 cm peat burned is equivalent to 500 ton peat or 250 ton carbon). Assuming that a fire in a wasteland situation will occur once in 5 years, the emission on an annual base could be as high as 50 ton carbon. Fire prevention is cost effective and can be done initially in these tropical peat bogs without improving the hydrologic regime because fire risk is primarily caused by the absence of rainfall and not by drainage (Diemont *et al.* 2002). Although improved water management is not a prerequisite for fire prevention overdrainage should be avoided to grow a profitable crop such as oil palm. Improved water management also decreases carbon emission. For instance a 10 cm mean water table increase decreases carbon emission by 5 ton carbon per ha per year (Wösten *et al.*, 1997, Ritzema & Wösten 2002). Having a profitable land use in place, will also decrease fire risk, because where land is profitable, people take care.

In each of the first 15 years the annual income generated from carbon could be 4 ton carbon by sequestration, 50 ton from fire prevention and 5 ton from improved water management. This could create in deforested peatlands, such as the former Mega Rice Project, an income of 59 ton of carbon, which at a market price of 5 dollar per ton is equivalent to nearly 300 dollars per ha per year.

## 5. The market & financial sector

The CO<sub>2</sub> market is defined by demand for and supply of CO<sub>2</sub> reduction possibilities. The study discusses a number of different initiatives taken by public and private parties.

In general, demand for CO<sub>2</sub> reduction comes from industrialised countries that under the Kyoto Protocol need to reduce their greenhouse gas emissions (Annex 1-countries). Besides these parties, several private corporations (mainly fossil fuel and electricity corporations) are initiating projects to offset their own carbon emissions, either out of corporate green image considerations, or because of the expectation that in the future CO<sub>2</sub> reductions will become more strict.

The suppliers of CO<sub>2</sub> reduction are very diverse, ranging from large multinational energy companies to small local operators, and to governments in the so-called non-Annex 1 countries. Most buyers have sought to acquire reductions generated within their own home country, and only a handful of projects located in developing countries have resulted in successful emissions transactions. Projects located in these countries have greater perceived project risks. Also few developing countries have established adequate institutions to review project proposals and to grant necessary host country approvals.

The financial sector is playing an increasingly important role in the carbon market. Financial derivatives already play a major role in emission reduction transactions, and the role of market participants who function as brokers to match buyers and suppliers or who function as consultants is expected to increase.

The CDM can be applied to (community) projects and potentially contribute to local livelihoods and ecosystem restoration as well. The costs of such a project consist of the costs involved in CO<sub>2</sub> sequestration itself (land management) and costs involved in CDM management (transaction costs). For a project to be successful, several criteria have to be met concerning the national and regional institutional setting. The institutional requirements at national level are partially described in the Kyoto Protocol and include the establishment of a national CDM Authority. Although Indonesia is a signatory to the Kyoto Protocol it has not ratified it and meaningful follow-up related to the Protocol has been delayed.

The study also highlights several key elements of project design related to local institutional settings. A transparent and well-defined project with clearly outlined compensation mechanisms and strong local participation are some of the key elements. Attention should also be given to reducing risks (e.g. from leakage, non-compliance) to the investor in the project. Financial institutions can play a role in reducing risks, e.g. via insurance schemes. However, these institutions have not developed sufficiently yet to play a concrete role in CDM forestry projects.

## 6. Discussion

Currently the carbon market is modelled around the Kyoto Protocol but has taken off without the actual ratification of the protocol. The rules of the Kyoto Protocol are stringent and clear, this has however not hampered the development of alternative or voluntary initiatives. Not only governments but also private businesses and financial institutions are already trading carbon and developing carbon projects. It is mainly in the voluntary arena that we see opportunities for Central Kalimantan, especially when carbon projects can be combined with other objectives like conservation of biodiversity and improvement of the livelihoods of local communities.

The paid activities for carbon should stimulate environmental protection and conservation, linking three large international treaties: United Nations Framework Convention on Climate Change (UNFCCC) to the Convention on Biological Diversity (CBD) and United Nations Convention to Combat Desertification (UNCCD). Positive effects of carbon oriented management on biodiversity, water resources, and erosion are anticipated. This combined with the sustainable development objective of the Kyoto Protocol makes this a treaty with a clear global dimension, but also with a local ecological and social dimension. The implementation of the trade mechanisms and how this benefits the local poor will differ per region.

The recognition of peat soils as carbon reservoirs and the crucial role of peatland management in the global carbon cycle could be a way to create opportunities for managed peatlands. In areas like Central Kalimantan the link to biodiversity and sustainable development is clear and thus strengthens the argument.

Currently the regional income in Central Kalimantan is about 1.3 billion dollar, 50 percent generated from oil palm plantations and forestry, which is declining. Assuming that there is enough willingness to pay for carbon and for biodiversity, the income generated from these income sources could be as high as 300 million dollar from carbon sequestration and prevention of carbon emission for the one million former MRP only. At present value some 600 million euro would be involved over a period of 15 years, which may be increased by other environmental services, such as biorights. Without going into detail, because the willingness to pay has not yet been demonstrated, the conclusion is that environmental services is an interesting proposition for the future of Central Kalimantan. The study was done for Central Kalimantan but the general conclusion may hold for other marginal areas. In these areas payments for carbon credits and other environmental services, however small, may provide a way for land managers to be able to acquire money needed to purchase necessary inputs or invest in local development.

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