Government of Central Kalimantan

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Master Plan for the Rehabilitation and Revitalisation of the Ex-Mega Rice Project Area in Central Kalimantan






CARBON FINANCE IN THE EX-MEGA RICE PROJECT AREA IN CENTRAL KALIMANTAN

Technical Report No. 16

JANUARY 2009

Euroconsult Mott MacDonald and Deltares | Delft Hydraulics
in association with
DHV, Wageningen UR, Witteveen+Bos, PT MLD and PT INDEC

Master Plan for the Rehabilitation and Rehabilitation of the Ex-Mega Rice Project Area in Central Kalimantan

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Carbon Finance in the Ex-Mega Rice Project Area in Central Kalimantan

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List of abbreviations

BOS	Borneo Orangutan Survival Foundation
C	Carbon
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CIMTROP	Center for International Cooperation in Sustainable Management of Tropical Peatland, University of Palangka Raya
CO_2	Carbon Dioxide (mass of C: CO2 = 1: 3,67)
CPO	Crude Palm Oil
COP	Conference of Parties
DNA	Designated National Authority
DOE	Designated Operational Entity
GIS	Geographical Information System
gt	giga tonne (100 mt)
ha	hectare
km	kilometer
m	meter
MoF	Ministry of Forestry of the Republic of Indonesia (MoF).
mt	mega tonne (1.000.000 tonnes)
NPV	Nett Present Value
NC CDM	National Commission for the Clean Development Mechanism
PDD	Project Design Document
REDD	Reduced Emissions from Deforestation and Degradation
t	tonne (1000 kg)
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

Tropical peat land is important for the environment and vital for the sustainable livelihood of local people. It represents large carbon stores. With 60 % of the global tropical peat lands, Indonesia is representing most important country with tropical peat lands. The Mega Rice Master Plan Project is initiated to change the management of one of the larger peat land areas in Indonesia in a sustainable direction.

Revenues from reduced carbon emissions may form an important source of finance for sustainable peat land management in the ex Mega Rice Project (PLG) area. Market Based Instruments related to the United Nations Framework Convention on Climate Change, developed under the Kyoto Protocol, can generate revenue in areas where the government decides to implement a forest and peat land conservation, rehabilitation or protection policy. These instruments make it possible to share revenues from Carbon Trade with the local communities and managers of peat land areas.

This paper has been prepared as back ground material for the Master Plan for the Ex Mega Rice Project area in Central Kalimantan. It summarizes the economic instruments in the context of the United Nations Framework Convention on Climate Change (UNFCCC), and provides an economic assessment of these financing mechanisms compared to oil palm plantations as alternative. It lists the major issues that should be addressed in the near future to facilitate the development of carbon finance projects to the ground in Central Kalimantan.

This report has been prepared with financial assistance from the Royal Netherlands Embassy in Jakarta. The opinions, views and recommendations expressed are those of the authors and in no way reflect the official opinion of the Government of the Netherlands.

2 Market Based Instruments

The Kyoto Protocol is an international agreement that aims for countries to cut down on their emission of greenhouse gases (i.e. carbon dioxide, methane, etc.) that are considered to be partially responsible for global warming – the rise in the Earth's temperature. Industrialized countries that ratified the Kyoto Protocol are committed to cutting their combined emissions from 1990 by 5% between the years of 2008 – 2012. Specifically, those countries have agreed to a specific target: so called Annex I countries. For example, countries of the European Union (i.e. United Kingdom, France, Sweden, etc.) cut their current emissions by 8% and Japan cut their emissions by 5%. At least 55 countries (including Canada, UK, as well as countries in South America, Central America, Asia) ratified the Kyoto Protocol by 2002, making it almost legally binding treaty.

Developing countries that have approved the Kyoto Protocol are excused for the first round of the agreement (so called Non-Annex I countries), meaning that they do not have to achieve their targeted emissions reduction because they may be economically inhibited. For example, India and China were exempt from cutting their emissions until after 2012.

Countries that fail in meeting their emissions reduction targets by 2012 (the end of the first commitment period), they "must make up the difference plus a penalty of 30% in the second commitment period" and also "their ability to sell credits under emissions trading" is also suspended.

Since Climate Change is a global problem, it doesn't matter where the emission reduction take place. Therefore Annex I Countries can help Non Annex I countries to implement emission reduction projects. In return for investments in the Non Annex I Countries leading to a more sustainable development, the Annex I countries receive emission credits. These investments in projects reducing carbon emissions can form an alternative finance sources for Non Annex I countries, including Indonesia.

The international agreed rules according which emission reductions projects in Non Annex I countries can be implemented include:

- Clean Development Mechanism (CDM)
- Reduced Emissions from Deforestation and forest Degradation (REDD)
- Selling Emission Reductions on the Voluntary Carbon Market

This chapter provides a general overview over these instruments summarizes the process of developing a carbon finance project and briefly presents the ongoing carbon finance project initiatives in the Ex Mega Rice Project.

2.1 Clean Development Mechanism

The Clean Development Mechanism (CDM) is currently the only internationally recognized carbon trading mechanism between Annex I and Non Annex I countries under the Kyoto Protocol. Industrialized countries with a greenhouse gas reduction commitment invest in

projects that reduce emissions in developing countries in return for Certified Emission Reductions (carbon credits).

Aforestation and reforestation activities are eligible for carbon credits under the CDM regime for areas that were non forested areas in 1989. Some local settlers and migrants began to develop the river banks and the tidal areas in the 1970's and 1980's on a very limited scale. However, the Mega Rice Project was started after 1992. With that, large scale deforestation started. A land cover Map of 1994 for the Ex Mega Rice Project shows that 25-30% of the forest area had already disappeared immediately prior to the implementation of the Mega Rice Project. In order to asses the exact potential of generating carbon credits under the current CDM regulation (with reforestation projects), satellite data from 1990 or earlier should be consulted[1].

Initiatives are ongoing to prepare a methodology acceptable under the CDM mechanisms for mining activities that includes emission reductions through forest and peat fire prevention in degraded peat lands. If that new methodology is accepted, the potentials for CDM projects in the ex Mega Rice Project area will greatly expand.

2.2 Reduced Emissions from Deforestation and Forest Degradation

During the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Bali (2007), an international mechanism was proposed: Reduce Emissions from Deforestation and Degradation (REDD). Emission Credits[2] can be generated by reduction of emission from deforestation and degradation. In order to develop the methodologies and rules of this newly proposed mechanism, pilot projects will be implemented in the period 2008-2012. Full implementation of the REDD financing mechanism will only begin after 2012. The objective of the pilot projects is to built the capacity of the governmental organisations in the field of REDD and to establish the necessary governmental agencies, to establish the rules and regulations for REDD including the development of baseline and monitoring methodologies, and to establish actual trades. Emission reductions that are realised in pilot projects can be approved under the international regulations of the UNFCCC and traded.

Peat restoration is not included yet in REDD. In the current discussion within the government of Indonesia, peat land is eligible for REDD if the land is still forested, and remaining forest vegetation will be protected from deforested and degradation.

[1] Within the framework of this project these data could not be retrieved.

[2] Carbon Credits are units of greenhouse gas reductions generated from projects (in countries that do not have emission reduction commitments under the Kyoto Protocol), verified by external, UN-accredited third party verifiers, and issued by a regulatory body of the UN. Credits can be used for compliance with Kyoto Protocol obligations

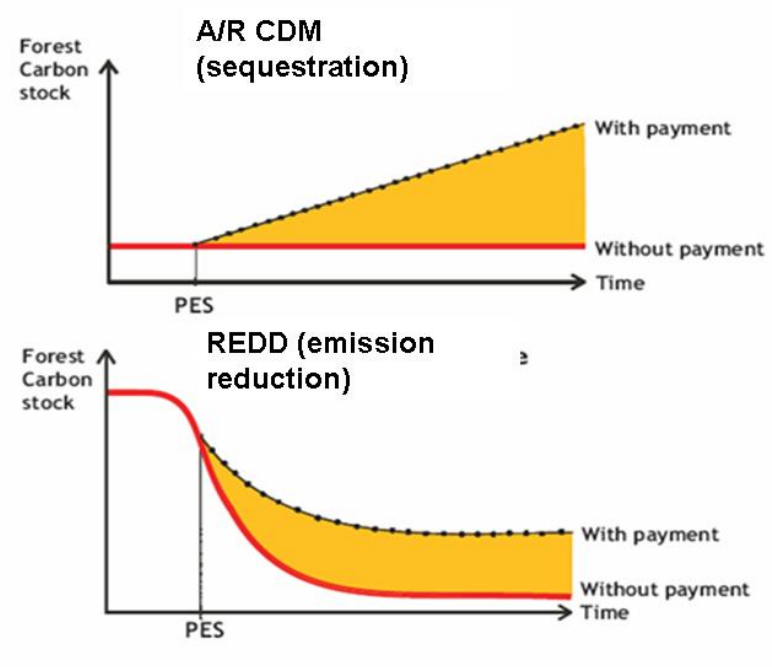

Figure 1: CDM and REDD

Figure 1 above pictures a schematic presentation of the difference between REDD scheme and currently accepted (aforestation and reforestation) CDM projects. The red line presents the “business-as-usual” situation or the base line against which the effect of carbon projects will be assessed. The black dotted line describes the effect of the carbon project, starting in point “PES”. The yellow surface represents the volume of the potential carbon credits.

Potential efforts for Carbon Credits therefore will focus on stopping land use allocation of forested (peat-) land for other purpose such as oil palm plantation and timber plantation, and protection forest from fire. Pilot projects will have to prove if and how degradation of peat soils and protection of peat soils from wild fires can be included under the scheme. For the development of pilot projects for REDD in Indonesia funding is available from bilateral and multilateral donors (for example KfW, AusAid, World Bank).

The baseline of a REDD project assumes ongoing deforestation that will be stopped or slowed down by the REDD project (the black dotted line in figure 1). The CDM project assumes a increase of carbon stock in forest land as a result of a reforestation or aforestation project that would not have taken place without the CDM mechanism.

2.3 Voluntary Market

In the voluntary market carbon credits are purchased by companies or institutional investors from projects that generate carbon emission reductions against generally recognized but voluntary standards. These voluntary emissions are not officially approved under the United Nations Framework Convention.

The main reason for companies to buy credits in the Voluntary market is awareness of their corporate social responsibilities. The advantage of the Voluntary market is that the procedures for monitoring and verification of the credits (see also paragraph 1.4) are simpler and faster. The disadvantage of the credits in the Voluntary market is that the prices are generally much lower that those in the official Carbon Market. Therefore they generate less revenues for the rehabilitation and management of peat land forest than projects that generate credits that can be sold on the compliance market (according the REDD or CDM mechanism).

An example of voluntary markets is the Rainforest conservation project from Flora and Fauna International with Cool Earth in Aceh (www.coolearth .org).

2.4 Process for Development of Carbon Finance Projects and Important Definitions

A carbon project will generally go through a number of steps. This paragraph briefly summarizes these steps according to the CDM procedure. Although the procedure for REDD is not established yet, it is most likely that the same steps will be the same. Projects in the Voluntary market are comparable as well, although the tasks and responsibilities of the National Designated Authorities will be replaced by those of internationally recognized organizations.

Step 1: Project formulation.
At the start of the project a project design document (PDD) will be developed. The PDD describes the project activity, the methodology used to determine the *baseline* including the project boundaries and *leakage* risks, *additionallity* of the project, the *monitoring methodology* used and the monitoring plan, a calculation of reductions, the environmental impacts of the project and comments of the stakeholders of the project. The project design document should also describe the "*permanence*' of the emission reductions.

For a better understanding some of the technical definitions are explained below:

For the definition of a *baseline* deforestation rates or peat land degeneration rates determine how much the Ex Mega Rice area will benefit from the project. The approach likely to be favoured is an average historical deforestation or degradation rate which is assumed to continue into the future. The base line should take into consideration that deforestation or peat land degradation rates can slow as forests are depleted or accelerate as the area experience faster economic development. The alternative is to predict future deforestation and degeneration rates, but this is also difficult due to 'extrasectoral' drivers like the effectiveness of the forest protection policy or transmigration policies etcetera.

The case of baselines is very complex, as there are so many factors that influence these projections. All realistic baselines rely on predicting a future - a future that will never eventuate if there is successful project intervention. At the end of the day, the baselines will have to be motivated and criticized, possibly in a public hearing.

Leakage is the terminology for a situation in which project or national level carbon gains are lost due to increased deforestation or degradation somewhere else. Leakage could be defined at all levels, within one district, within one province or within a country.

A carbon finance project activity is considered *additional* if anthropogenic emissions of green house gas emissions by sources are reduced below those that would have occurred in the absence of the carbon project activity. Where forestry is already viable, the carbon would be sequestered or conserved without the need for carbon payments. The Project design document will have to prove the additionallity of the project.

A m*onitoring methodology* should be approved by an internationally recognized independent organization. In the case of CDM projects this is the CDM executive board. At this moment 23 methodologies have been approved for CDM projects. One methodology will be submitted very soon to monitor emission reductions from fire prevention in tropical peat land forests.

Carbon sequestration is subject to risks like fires or diseases, and in the long term woody biomass or peat gradually deteriorates. The project design will have to prove how the investment will lead to a *permanent* increase of the total amount of carbon stored.

Step 2: Project approval

After a project design, the PDD will have to be approved by a national designated authority (DNA).

In Indonesia a DNA for CDM is already in place, this is the national Commission for the Clean development Mechanism (NC CDM). As Indonesia's DNA, the NC CDM is responsible for issuing national project approvals. Its Indonesian title is Komisi Nasional Mekanisme Pembangunan Bersih (Komnas MPB). It was established through government decree by the Ministry of Environment (Decree no. 206/2005) in 2005, to which it is still attached.

The Ministry of Forestry is working on the establishment of a Designated National Authority for REDD. In the Voluntary market buyer and seller of the carbon credits will have to agree which independent authority should approve the project design.

Step 3: Validation and Certification of emission reductions

The final step in the process of Carbon Finance Projects is the validation and verification fo the actual emissions. In the case of CDM this is the responsibility of the Designated Operational Entity (DOE). In recent CDM projects in Indonesia KPMG, DNV and TÜV Süd have been DOE.

In the validation process of emission reductions, the DOE will assess whether all stakeholders been accounted for, whether environmental impact of the project have been assessed and whether the approved baseline and monitoring methodology has been applied. If the emission reductions have been validated, the DOE will verify and certify the emission reductions on a periodical (monthly or yearly) basis. After verification of the

reductions, the DOE will issue certified emission reductions (CER) that can be transferred from the seller to the buyer.

2.5 Current Carbon Market Project Activities in the Ex Mega Rice Project Area

Reducing carbon emissions in peat land forest areas can originate from three major sources that are interrelated: degradation of peat (oxidation), deforestation (mechanical clearing/logging) and wild fires (affecting peat as well as forest).

Drainage of peat lands lead to CO_2 emissions from oxidation decomposition of peat. Drainage of peat lands usually takes place for transportation purposes (logging) or the conversion of forest land to production forest/plantations (acacia or oil palm). Plantations on peat lead to an inevitable loss of substrate that constantly brings the surface nearer to the water table. This has two consequences. The first is that new drainage excavation has to be carried out regularly to maintain the optimum water table for oil palm or acacia growth and productivity. The second is that the peat surface progressively approaches the landscape water table. When all peat disappears the underlying substrate (potential acid sulphate or quartz sand), may be unsuitable for cultivation or be (semi-) permanently flooded.

Blocking drainage canals in the peat lands can help restoring the hydrological status of the peat lands and slow down the emissions. Restoring the hydrological conditions will accelerate the recovery of natural vegetation.

Deforestation in the peat swamp forests takes place for reasons of wood production (logging) and the development of agricultural production (land use change). Conservation of the remaining peat swamp forest and planting of trees could account for emission reductions. Replanting native species in burnt areas and on degenerated deep peat area's helps to restore the hydrological conditions further. Newly planted tries will also increase carbon sequestration.

The third major source of carbon emissions is fire. Fire management with priority for fire prevention will decrease emissions both from above ground and under ground stored carbon.

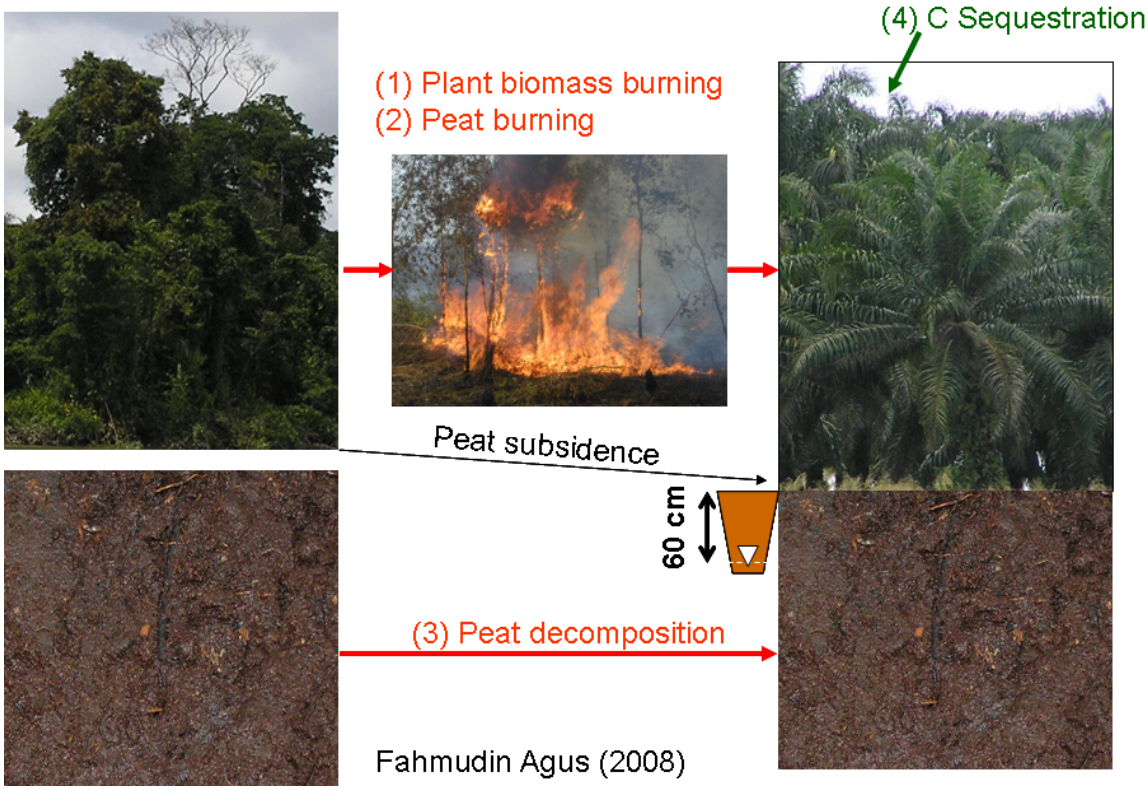

Figure 2: Summary of the possible driving forces for increase carbon emissions

Currently there are three project ideas for market based instruments in the Ex Mega Rice Project Area in Central Kalimantan. The project locations are indicated in figure 3. Possible efforts for emission reductions in these projects in Central Kalimantan include peat land conservation through canal blocking and reforestation by Wet Lands International and Center for International Cooperation in Sustainable Management of Tropical Peatland, University of Palangka Raya (CIMTROP), fire prevention (by CIMTROP and the Borneo Orangutan Survival Foundation (BOS), forest conservation and prevention of Land Use Change (by BOS).

The project defined by BOS is located in Blok E of the ex mega rice project in Central Kalimantan and includes two components: emission prevention from land use change and emission prevention from wild fire. The project includes a designated Oil Palm Production Scheme (PT Indo Global) of 16.000 ha and timber plantation of 2000 ha. .
The project horizon is 30 years. The driving forces for emissions in the project area include: Clearing forest for oil palm through fire (resulting in a loss of 50 cm peat), and peat oxidation due to lowering the ground water table with 80 cm. For wild fires an average oxidation of 40 cm of peat is assumed per fire event.

The project area is about 100.000 ha with the estimate of reducing emission is 38.2 million ton CO2 from stopping land use change or about 71 ton CO2 per year per ha and 86.8 million ton CO2 from fire prevention or about 35 ton CO2 per year per ha. Issues of land tenure and institutional setting haven't been solved yet.

Wetlands intends to start a pilot project in Blok A (+/- 50.000 ha). The general assumption in this project include: blocking a canal reduces emissions in the peat with a certain annual amount. Fifty cm elevation of the water level roughly avoids 60 tons of emission per ha (without take into account the reduced wild fire effect).

After blocking Wetlands wants to start rehabilitation for the forest in a “bio rights system” type of approach. Through small loans, local communities are replanting trees and built and maintain the dams for canal blocking. If the survival rate of newly planted trees is below 80%, the loan has to be returned, or the activities have to be repeated. If the trees grow/dams are maintained the loan becomes a grant.

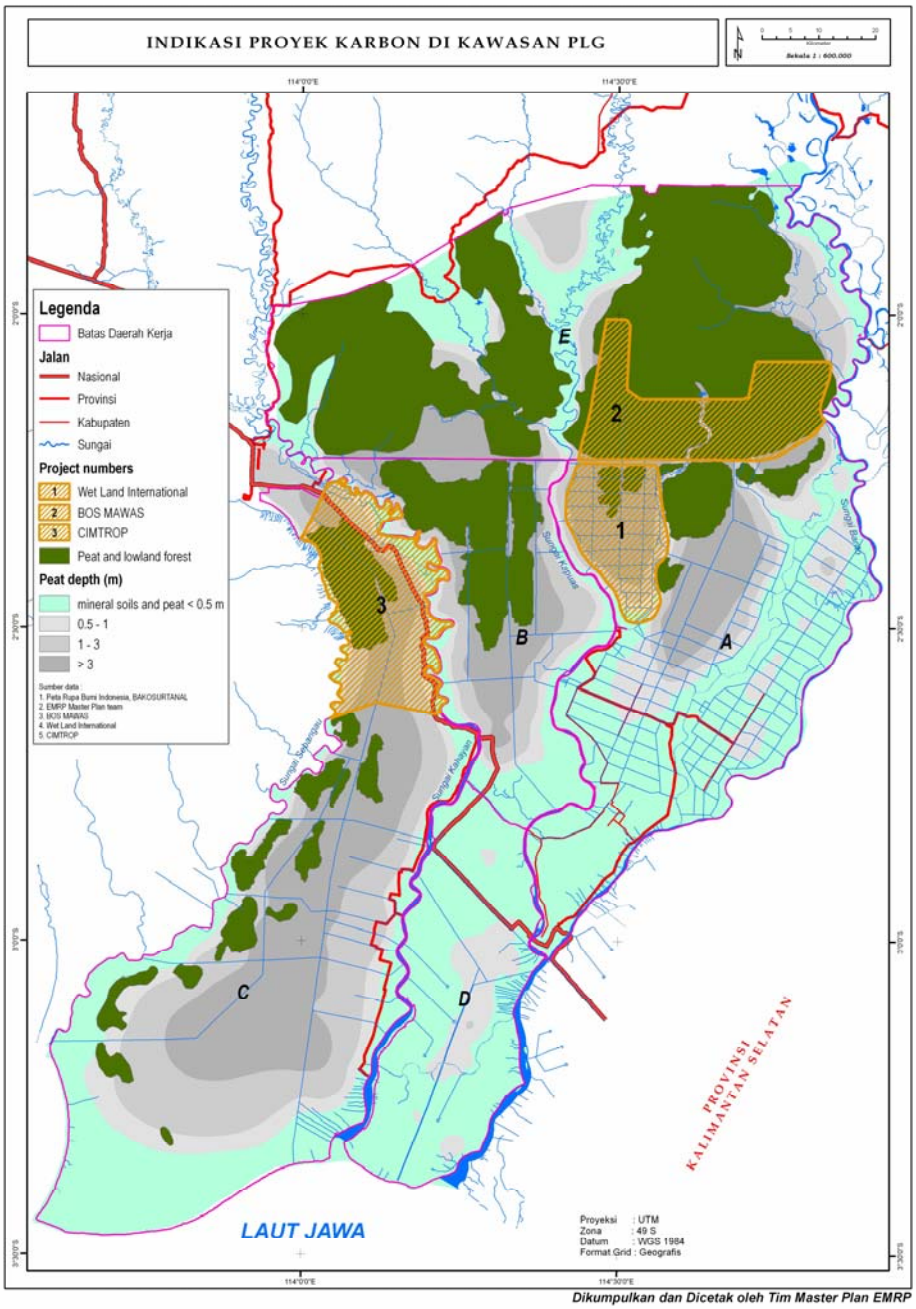

Figure 3.4: Indication of Carbon Project Locations in the Ex Mega Rice Project Area

CIMTROP is developing a site in BLOCK C together with Climate Care. The area is 66.000 ha of which 18.000 ha is covered with forest. The main threat for this site is fire. The project want to develop TSA (Tim Serbu Api) or fighter fighting teams, actively involve local communities in participatory prevention, suppression of fires and rehabilitate burned areas. The members of TSA receive income from the project. This fee materializes from community based income generating activities that the project will initiate such as the establishment of restaurants, garage and a car wash or fishing.

In the wet season the TSA will be involved in rehabilitation of the burned areas through reforestation schemes and canal blocking activities. The University of Palangka Raya will be involved in developing the monitoring methodologies and tools, and the establishment of a baseline.

3 Economic Analysis of Carbon Trading and Oil Palm

This chapter includes the economic analysis of the revenue from carbon trading against the revenue of oil palm.

3.1 Background on Oil Palm in Kalimantan

The oil palm industry in Indonesia is mainly developed by large-scale (Private and State enterprise) companies. In 2006, the total area planted with oil palm in Indonesia amounted to almost 6 million ha (See Figure 3). Around 45 % of all Indonesian oil palm plantations are owned by private firms. Four Indonesian companies: Sinar Mas, Astra, Salim and Raja Garuda Mas, controlled around 68 % of the privately owned oil palm plantations (Cohen and Herbert, 1997); State enterprises control only around 11 % of all oil palm plantations, and the rest of the oil palm area is in the possession of smallholders.

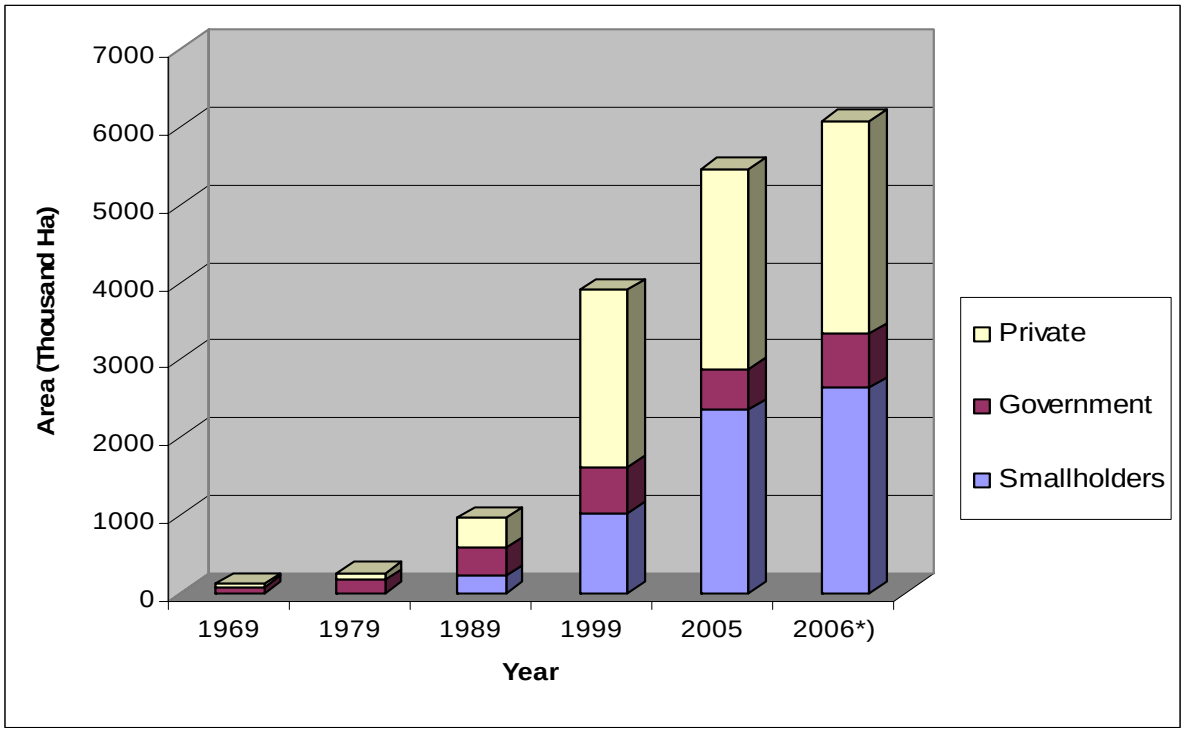

Figure 3: Oil palm plantation area in Indonesia

Unlike rubber and coffee that were developed on a smallholder basis, the involvement of smallholders in oil palm is low. Before 1979, there was no smallholder involvement in oil palm plantation at all, while, in 1979, the area of smallholder oil palm was only 3,000 ha or 1 % of the total oil palm area. Since the early 1990s, the involvement of smallholders in oil palm has considerably increased to 2,636,000 ha or 43 % of the total oil palm plantation

area in 2006. Most of the smallholder activities were arranged under the NES (Nucleus Estate and Smallholder) scheme.

Figure 4 shows the distribution of oil palm plantation by island in Indonesia. The largest area of oil palm plantations is located on Sumatra. In 2006, the oil palm plantation areas in Sumatra amounted to almost 4.583 million ha or 75 % of the total oil palm area in Indonesia. The second biggest area of oil palm plantation, 1.268 million ha or 21 % of the total, is located in Kalimantan.

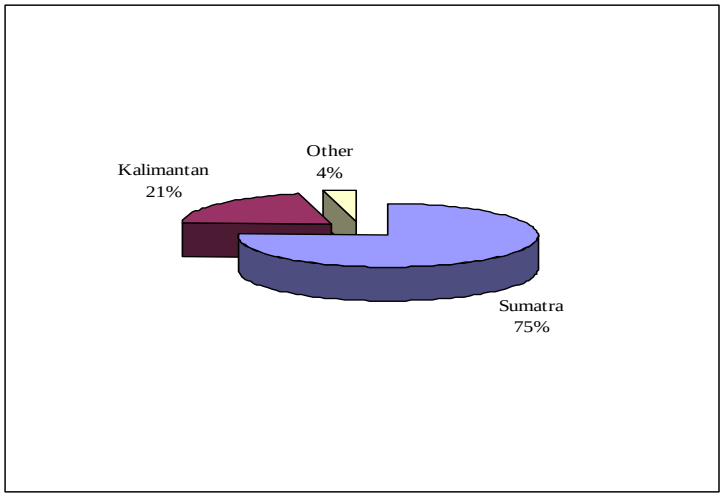

Figure 4: Distribution of oil palm plantation area by island in 1999

Currently, Central Kalimantan Province has the largest area of oil palm in Kalimantan, accounting for 467,000 ha, or around 37 % of the total oil palm plantation area in Kalimantan.

Dramatic expansion of oil palm plantation occurred in the period 1996 to 2006, where the areas has increased from 30,000 ha to 600,000 ha or increase by 1,470 percent. In 1990, the oil palm plantation was only 2,000 ha or the lowest among other province in Kalimantan. The percent of immature trees in 2006 was high (41%) indicating the increase in newly planted oil palm.

Table 1: Oil Palm Plantation by Province in Kalimantan

Province	1990 (000 ha)	1996 (000 ha)	2006 (000 ha)	Change 1990-1996 (%)	Change 1996-2006 (%)	Immature in 2006 (000 Ha)	% of Immature trees in 2006
West Kalimantan	48	211	434	344	106	96	22
Central Kalimantan	2	30	467	1762	1470	192	41
South Kalimantan	7	54	146	625	171	79	54
East Kalimantan	24	41	220	74	432	93	42
Kalimantan	**80**	**337**	**1,268**	**319**	**277**	**460**	**36**

Source: General Directorate of Estate Crops (2006)

Current area covered by Oil Palm plantations in the Ex Mega Rice Project amount up to 391.048 (about 84 % of the total area in Central Kalimantan). An analysis of the Oil Palm concessions in the Ex Mega Rice Project Area with the soil classification map in a Geographic Information System indicates that over 30 % of the current oil palm concessions are located on deep peat. Only some of these concessions have been planted, others are in the process of being planted and some will never be planted.

Table 2: Overlay of Oil Palm Concessions on Soil Classification in the Ex Mega Rice area

	Soil classification (peat depth)					
	> 3m	2-3 m	1-2 m	0,5-1 m	< 0,5 m and mineral soils	No Data
Oil Palm Plantations (ha)	119.564	34.947	45.291	60.336	128.584	2.326

Source: EMRP Master Plan (2008)

3.2 Trend of CPO Price

Figure 3 shows an increasing trend of Crude Palm Oil (CPO) price since 2005. The average price in 2006 was 478 USD per metric ton and it has increased to almost double (782 USD) in 2007. As this study was performed in April-May 2008, in the calculation of opportunity cost we used both average prices in 2006 and 2007.

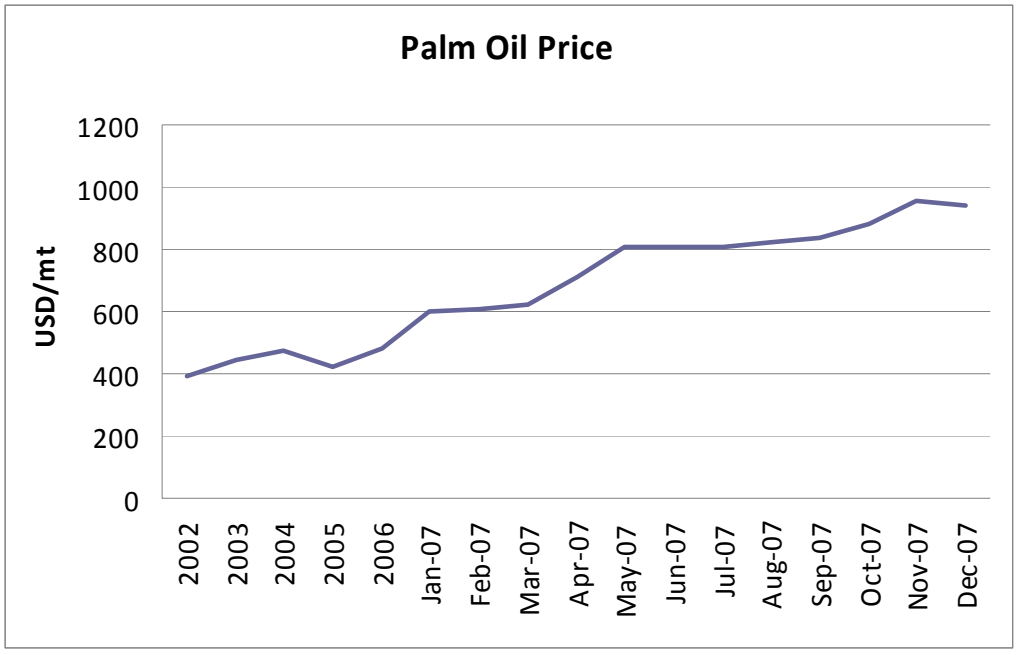

Figure 5.1: Trend of CPO prices (Source: World Bank)

In the summer of 2008 the World Economy came in a global recession. This lead to a decrease in the global demand of CPO and declining CPO prices (see figure 5.2 below).

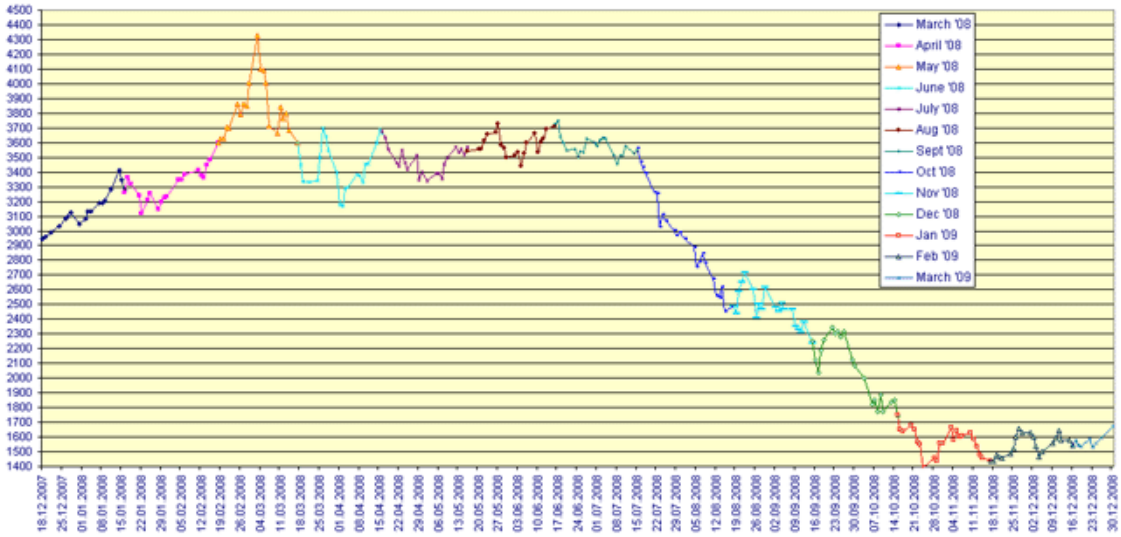

Figure 5.2: CPO prices in 2007 and 2008 (source www.palmoil.com)

In the same period, also the carbon price dropped drastically in the last six months at the Chicago Climate Exchange, North America's Cap and Trade system for six greenhouse gases with global affiliates (see figure 5.3 below).

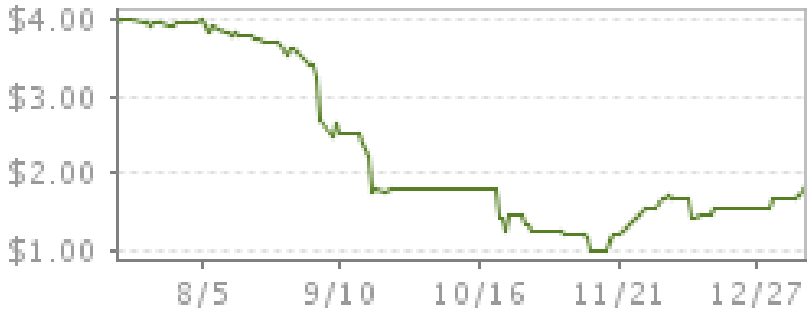

Figure 5.3: Carbon Price CCX from May to December 2008 (source www.chicagoclimatex.com)

The global recession in the summer of 2008 illustrates that any economic analysis is not static but dynamic and should be understood in that way. However the change of the prices will not change the magnitude of our analysis and the conclusions.

3.3 Opportunity Cost of Oil Palm on Peat Land

The decision to avoid deforestation or to deforest for other land use from the economic perspective depends on which activity gives the highest benefit. The carbon market for peat land is realistic if payment for conserving peat land for carbon is significantly higher than the opportunity cost of using peat land for certain agricultural products.

Opportunity cost must be computed per unit weight of carbon emitted in order to have a direct comparison with the certified carbon emission reduction credit. Opportunity costs or the cost for avoided deforestation are estimated based on the profit per unit area per unit time divided by carbon emission per unit area. These opportunity costs are compared with

the current carbon credits to evaluate the feasibility of Reduce Emissions of Deforestation and Soil Degradation (REDD) though a carbon trading mechanism

To calculate opportunity cost of oil palm, we used a data set from ICRAF (2007). The basic data for the calculations are:

- Average yield of oil palm per hectare (FFB): 23 ton/ha
- Labour wage : Rp. 20.000,- per day (2.22 USD per day)
- Discount rate: 11 percent.
- Average price of CPO in 2006 : 478 USD/ton
- Average price of CPO in 2007 : 782 USD/ton
- Average price of FFB in 2006 : 80 USD/ton
- Average price of FFB in 2007 : 145 USD/ton
- Plantation areas: 10.700 ha for 25 years cycle of production.
- Exchange rate: Rp. 9.141 per 1 USD
- Avoiding CO2 emission[3] for not development oil palm: 86 ton CO2/ha/year (Agus et.al 2007).

Yield of oil palm cultivation on peat soil can be higher than on mineral soils if peat soils are managed well. Corley and Tinker (2003) estimated fresh fruit bunch (FFB) yield on peat soil at 30 t/ha or 30% higher than yield on mineral soil. In general, productivity on peat can be higher than on mineral soil but it depends on high inputs. The difference of the productivity between peat soils and mineral soils is not high as long as the management (water & fertiliser) is sufficient. However, the cost of palm oil cultivation is higher in established drainage and more input, especially fertilizer. Although Corely and Tinker use a yield of 30 tons per hectare, ICRAF used a more moderate yield of 23 ton/ha in the dataset to make conservative estimates.

Table 3: Opportunity Cost of oil palm

	Unit	2006	2007
Average revenue per ha per year	**USD**	**1.121**	**2.030**
Average Cost per ha per year	**USD**	**455**	**455**
Average profit per ha	**USD**	**667**	**1,576**
Opportunity cost (cost for avoiding CO2 emission - without discounted)	**USD/ton CO2**	**8**	**18**
Nett Present Value (NPV) per ha for 25 year (discounted)		**2.058**	**5.607**
Average Nett Present Value (NPV) per ha per year (discounted)		**82**	**224**
Opportunity cost per ha per year (cost for avoiding CO2 emission-discounted)		**1,00**	**1,69**

[3] The numbers of avoided CO2 vary a lot in the scientific back ground papers. Agus and al reviewed a number of papers and summarized the result. For the reasons of this analysis we have used this moderate estimation. In current proposals for Carbon Projects in the Ex Mega Rice Area numbers up to 100 ton per ha are used.

Without discounted, the opportunity cost of oil palm plantation in avoiding carbon emission was between 8-18 USD per ton CO2. While if we discounted by 11%, the opportunity cost of oil palm were between 1,00 to 1,69 USD per ton CO2. This opportunity cost of oil palm can be interpreted as the cost or the price of avoiding one ton CO2 by not planting oil palm.

For comparison with carbon market we used the opportunity cost with discounted and comparing with the carbon prices. However, the mode of payment will be an important issue in the comparison. The revenue may vary significantly if payment is done up front, every year or at the end of the project. Table 4 provides the real carbon price if the current price of carbon is 5, 15 or 30 USD per ton CO2, and the duration of the project is 25 years.

Table 4: Real carbon prices

Mode of Payment	Real Price of Carbon per ton CO2		
Payment up front	5,0	15,00	30,00
Payment on a yearly basis	1,68	5,05	10,11
Payment at end of the project	0,37	1,10	2,21

It is most likely that the mode of payment for Carbon Credits will be on a yearly basis. Therefore, for establishing the opportunity cost of oil palm we will use the discounted[4] revenues (1.00-1.69 USD per ton CO2). Revenue from carbon credits will be an attractive alternative from an economic perspective if it is higher than the opportunity cost plus transaction cost.

Payment > Opportunity Cost + Transaction Cost

The transaction costs include all administrative costs needed for the project from the start of the project idea until the hand over of the credits. These include costs of the preparation of the project design document, the establishment of the monitoring strategy, monitoring and verification by independent third parties and the costs of the guidance of the validation and certification process are referred to as transaction costs (please refer to Paragraph 1.4).

If the current carbon price is 5 USD/ton, the real price of carbon, assuming payment on a yearly basis, is 1.68 USD per ton CO2. This indicates that the revenues from carbon at a price of 5 USD / ton are almost equal to the opportunity costs of oil palm at the relatively high historic price of CPO of USD 782 / ton. At the current lower price of oil palm, the real price of carbon at a current price of 5 USD / ton is higher than the opportunity costs of oil palm ***without taking into account the transaction costs***[5]. Without taking account the transaction costs of carbon projects, oil palm and carbon on economic terms offer broadly similar returns under current market conditions (low carbon price, long-term CPO price) and

[4] Discounting is generally used method to present the value of future sales in todays price taking into account the interest rates. Doing so the value of future sales of carbon credits can be compared to todays revenue of oil palm.

[5] See also paragraph 4.1 for an overview of the costs of implementing a carbon finance project.

significant price gains of one commodity over the other would tend to make it economically more favourable. However, if the current price of carbon increases to 15 USD, the real price on yearly basis is 5 USD, and carbon revenues from peatland rehabilitation would be higher than the opportunity cost of oil palm.

3.4 Sensitivities analysis

The change of crude oil price is very sensitive to the NPV. The change of 10 percent CPO price results in 15 percent change of NPV. For a change of the CPO price by 5% to 30%, the sensitivity indicator was 1.30-1.60. This means that one percentage change in CPO prices will result in a 1.30-1.60 time higher percentage change in NPV. With the tendency of increasing of CPO price, the NPV of oil palm or the opportunity cost will be higher.

Table 5: Sensitivity Analysis

Change of CPO price	5%	10 %	25 %	30 %
Change of NPV	8%	15%	33%	39%
Sensitivity indicator	1.60	1.50	1.32	1.30

In other words, if the Crude Oil Price increases, the Nett Present Value effect indicates that the carbon credits price has to increase even more to be competitive with oil palm. Or, based on the recent sharp declines in both CPO and Carbon Credit Prices: the competitiveness of the carbon market is stronger when the de line of the Crude Oil Price is stronger than the decline in Carbon credit prices.

3.5 Conclusions

From an economic perspective, the costs of sustainable peat land management can be assessed against the opportunity cost of the agricultural production with the highest yield, in Central Kalimantan, which is oil palm.

The current policy of the Government of Indonesia includes discouraging, and eventually preventing any production of oil palm on deep peat. Enforcement of this policy is a command and control issue, and not an economic one. It seems that effective enforcement of this policy is not in place yet.

The opportunity costs of oil palm can be used to express the cost of this policy. With the tendency of rising palm oil prices (until the summer of 2008), the competitiveness of oil palm against emission reduction credits was tipping in favour of palm oil. If all risks of carbon trading (including failure of long term commitments/permanence because of fires on permanence) would be taken into account the business case for carbon trading becomes worse. However, if demand for carbon credits increases as a result of a post-2012 international agreement and recovery of the global economy, it is likely that over the medium-term the carbon price will recover, tipping this in the favour of carbon. In sum, the economics of these two commodities – oil palm and carbon – are such that no clear conclusions can be drawn on economic grounds over the best allocation of land. What is clear, though, is that carbon markets – especially the markets in certified credits, which

currently trade at about USD 15 per ton - offer a significant economic incentive for peatland rehabilitation and reduction of carbon emissions.

The economic assessment doesn't do a full carbon accounting including use of fossil fuel for management, transport, fertilisers, processing etcetera. Only land based emissions are compared. This will inevitable be in favour of the oil palm case. In a full carbon accounting approach, the distinction between the oil that is used for bio fuels or other non-food and food purposes would be needed. Bio fuels offer a substitution for fossil fuel.

The decision to stop the production of oil palm, and to start the rehabilitation of deep peat could very well be guided by arguments such as: biodiversity, soil conservation or forest fire prevention. Carbon finance can play an important role in generating revenues for peat land rehabilitation in the Ex Mega Rice project area.

4 Issues and Recommendations for the Development of Carbon Finance

In the course of the preparation of the master plan in Central Kalimantan, discussions with the local government have taken place, and a workshop has been conducted. This chapter describes some of the issues that have been discussed, and will have to be addressed in the near future to use Carbon Finance opportunities as an alternative source of financing for the rehabilitation of peat lands in the Ex Mega Rice Project.

4.1 Revenue sharing

One of the challenges related to carbon finance is channelling the revenues. Prevented carbon emissions should be treated as a commodity for which each entity that is adding value should be paid.

Carbon revenues of peat land protection or regeneration generated through REDD, CDM or the voluntary market should be allocated for:

1. Payment to project proponents (could be local communities);
2. Covering the costs of the carbon sequestration measures fire prevention, replanting, canal blocking etcetera. The activities could be implemented by local communities. The costs would include compensation for the land owner for choosing for carbon sequestration instead of other economic activities;
3. Preventing leakage or supporting sustainable livelihood pathways with less dependence on emission-causing land use (including spatial planning and enforcement thereof).
4. Organizations (NGO's or others) initiating projects and facilitating the project proponents;
5. Supervision: guarding against leakage (by integrated natural resource management at local scale)
6. Auditing: securing additionality by clear baselines (normally this is done by independent third parties).
7. Monitoring and Certifying credits for their 'Emission Reduction' (CER) by national standards (normally this is done by independent third parties);
8. Setting up a regulatory framework for multi scale governance of emission reduction projects;
9. Verifying Emission Reductions by international standards;
10. Salesmanship to secure buyers and provide investment when and where needed (brokers in emission trading).

Items 1, 6, 7, 8, and 10 are generally referred to as "transaction costs".

In order to ensure that all stakeholders will benefit form the revenues, a distribution mechanism should be determined. This should include institutional conditions that will have

to be met in order to have the mechanism works, and a general idea on what the organizational structures should look like.

As the Government will be the land owner in most cases, it could consider introducing a revenue sharing system that is similar to that of the royalties from mining. Revenues of the mining industry are channelled through the Central Government and distributed to the regional authorities (20% to the province, 40% to the region (Kabupaten) in which the concession is located and 40 % to the other regions within the province).

4.2 Determining roles and responsibilities, leading to structures

Generation of carbon credits could involves many parties: the local population, the private sector, NGOs, and government ranging from national to village levels. Each of them has its own roles and contributions. As the Carbon Market is still immature, these roles and responsibilities are not clearly defined yet and discussions are ongoing. This paragraph should be read in the context of the ongoing discussions. Future structures for Carbon Projects should follow the outcome of these discussions.

The typical role of *Government Institutions* is related to providing the enabling framework. It is therefore highly recommended for the Government of Central Kalimantan to develop a policy statement on the use of Carbon Finance that could serve as an enabling framework for future projects. This statement could answer questions like:

1. Where does the Government want to protect degraded peat lands, and how are they going to finance that?
2. What is the position of the government about sharing revenues of carbon projects with local communities? What kind of instruments does the Government intend to use (royalties, taxations, establishment of a trust fund).
3. If Carbon Finance projects will be developed in the Ex mega Rice Area or other areas in Central Kalimantan: how will they want to be involved in the assessment and approval? Who should be involved? Which criteria will be used in the assessment, of the projects?
4. How does the Government of Central Kalimantan want to safeguarding stakeholders representation in future carbon financed activities?
5. What should be the role of the Government of Kalimantan in Carbon Finance Projects: regulator or project initiator, or both? And how should these roles be separated?
6. What kind of coordinating role does the Government of Central Kalimantan want to full fill (to other provinces, to the national Government, to Kabupaten)?
7. Does the Government want to develop projects/carbon reducing activities themselves?

The figure below describes a possible structure for Carbon Projects with the local Government as proponent of Carbon Emission Reduction Activities:

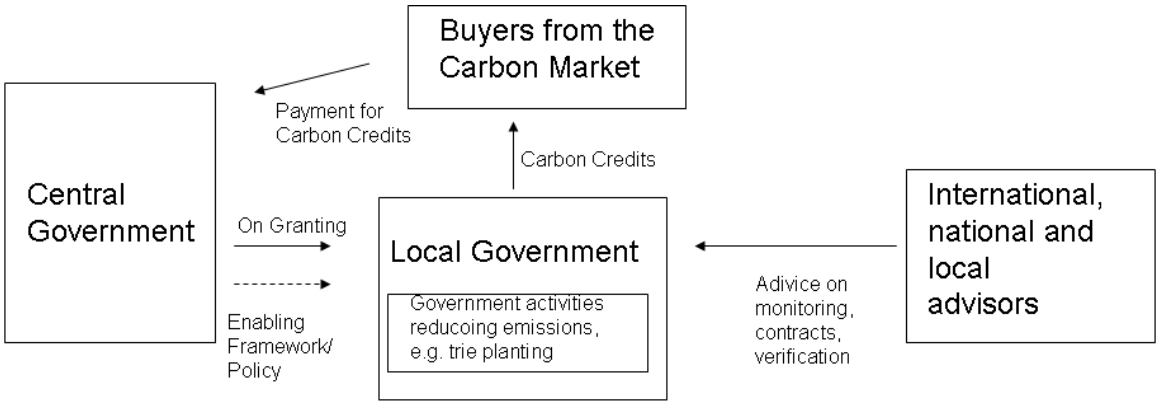

Figure 6: Government as proponent

Local communities could act as project proponents (sellers), but in any will most be stakeholders that should be heard in the project design process.

Profits from agricultural activities like oil palm accumulate to: the companies, to government (through taxes), and to local communities (wages for the local labor and revenues to plasma/smallholders). Carbon is expected to generate more benefits in the public domain (i.e. government and communities).
The evidence is that in Sumatra smallholder oil palm is working, however this critically depends on the ownership of the mill (access for smallholders). The carbon market should not behave much differently than other value chains. The ownership of the land is one of the key issues.

Land owners of peat lands in the Ex Mega Rice Project include:

- The Central Government (State forest)
- Private persons with a formal title/certificates;
- Private persons owners without official title (for example a letter from the Bupati or historical rights /adat.

In order to ensure that the money reach the right person/stakeholder a distribution mechanism should be determined. This should include developing a view on the institutional conditions that will have to be met in order to have the mechanism works, and a general idea on what the organizational structures should look like.

Considering the human resources of the local communities, the quality of the NGOs, and the governance in Indonesia, as well as the lessons learned from ICRAF work on RUPES (Rewarding of Upland Poor for Environmental Services), one of the initial thoughts on structuring Carbon Projects discussed in Kalimantan is indicated in Figure 7 below.

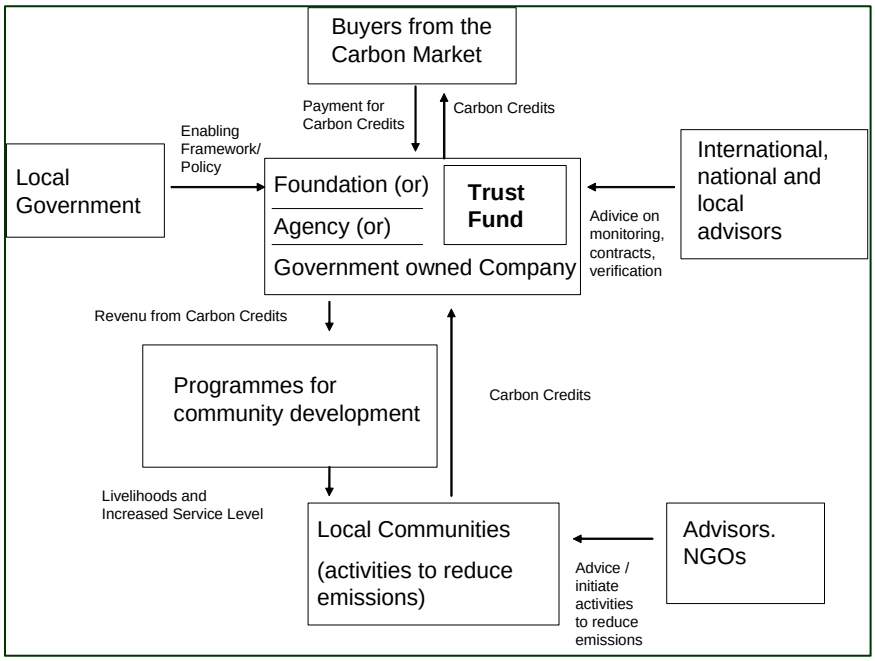

Figure 7: Communities as proponent

The 'Carbon Stock Buyer' has a connection with 'project proponent' through a contract. The agreement with the buyer would cover, among other things, the price of Carbon per ton, the length of agreement, the payment schedule, arrangement for non compliance etc. The agreement with the tenant/tenure covers, among other things, the price of Carbon per ton, the length of contract, the payment schedule, the requirements/conditionality of the ones/group who receives the revenues etc.

An intermediate organization would serve as a partner for the local government and the communities. This intermediate organisation should be independent, formed to integrate the management of forest resources in a province, and has a section to manage the carbon revenues through programmes for the local communities.

The intermediate organisation could consist of representatives of NGOs, the project proponent, and government officials. They represent the institution/organizations involved.

Scientific institutions could play an important role in the scientific work that should be carried out in the field of Carbon Finance Projects. On the technical side monitoring methodologies have to be developed and base line methodologies have to be defined. Besides that, knowledge institutes could play a role in the development of the institutional settings and distribution mechanism.

4.3 Recommendations for future steps

Recommendation 1. Establish a working group and provide for budget
A Working Group (Pokja) for Carbon Projects in Central Kalimantan is not effective yet. In the workshop conducted in Palangkaraya by the Master Plan team on July 16th, the Participants propose that BAPPEDA will take the lead in establishing the working group and will report to the Governor.

Close cooperation with the key stakeholders for REDD is an important basis for progress. A working groups could be instrumental in institutionalising this cooperation. The land owners, concessionaires, local communities (represented by the Development Department of the Province of Central Kalimantan and the districts), the provincial planning authority, and the department of forestry services should continue their effort and will be even more important when cross sectoral issues will have to be clarified.

Therefore, it is recommended to make budget available for the Working Group in the next budget year.

The Working Group could increase their efforts in building local capacity through knowledge sharing. Further more, the Working Group could increase the exchange of information through the organisation of regular meetings with other REDD Task Forces and Working Groups in Indonesia. For example with task forces in South Sumatra, East Kalimantan, Aceh and at the national level in the Ministry of Forestry.

Recommendation 2. Develop a local policy for carbon projects
In the workshop conducted in Palangkaraya by the Master Plan team on July 16th, the participants agree to propose the establishment of a local policy (enabling framework) for Carbon Projects.

Elements in this local policy framework should include (but not be limited to):

- Clear understanding of roles and responsibilities of all stakeholders for Carbon Finance Projects;
- Establishing one focal point that will coordinate all carbon related project activities.
- Ensuring that revenues form Carbon projects will be distributed among stakeholders who add value to the Carbon Credits
    - Some of the revenues from carbon projects should be used for programs that are tailored to the needs of the local communities and could include (o.a.) access to education, water and sanitation services and infrastructure.
    - Carbon projects in Kalimantan Tengah should be pro poor

The Ministry of Forestry is working on the introduction of a 30% taxation on all REDD deals. This taxation would be earmarked for the coverage of the regulatory framework (item 9 in the list of paragraph 4.1), a guarantee fund for unforeseen losses of carbon stocks in REDD project area's (uncontrolled forest fires in an El Nino year), and for local communities. This idea is reflected in the draft regulation on the implementation procedures for reducing emissions from deforestation and forest degradation (REDD) of the Ministry of Forestry.

Recommendation 3. Elaborate on monitoring methodologies

In order to implement REDD successfully in Indonesia, the definition of a credible baseline and to have understandable and reliable monitoring methodologies is of paramount importance. The base line describes the development based on a business as usual scenario.

These data should be used and improved in future studies in Indonesia.

A spatially explicit land use change model should be developed based on an agreed-upon business as usual scenario. Such models exist and have been successfully used in similar project contexts. The agreed-upon base line should answer the question on the most likely future for the Ex Mega Rice Project Area, taking into account conflicting planning documents.

The development of a credible monitoring methodology for carbon in peat swamp areas would include:
- Acquisition of reliable and current planning data and accompanying documentation;
- Improved assessment of potential impact on the carbon stock of forest and peat land fires;
- Assessment of the potential impact on water table, vegetation and carbon stock of drainage for acacia plantation development both in the plantation and close to a plantation;
- Detailed assessment of the peat depth forested peat swamp areas;
- Incorporation of a risk assessment to include foreseeable long-term developments such as a change in commodity prices and projected population development.

Apart from these technical carbon stock related monitoring issues, impact monitoring should be implemented as well. Impact monitoring should asses the effectiveness of the activities to protect the carbon stock, and the effect of the activities within the local communities. An impact monitoring team can build on the existing network and data collected in the Masterplan project.

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