Merang REDD Pilot Project

Sources: *Merang REDD Pilot Project Website*

Material supplied by GTZ through pers. comm. (*2)

MRPP presentation file August 2010 *(*3)*

Tier 3 Biomass Assessment for Baseline Emission in Merang Peat Swamp Forest (*4)

Project location

The Merang peat dome forest is located in the Lalan Production Forest (*Hutan Produksi Lalan*) in Bayung Lencir sub district of Musi Banyuasin District, South Sumatra Province, Indonesia.
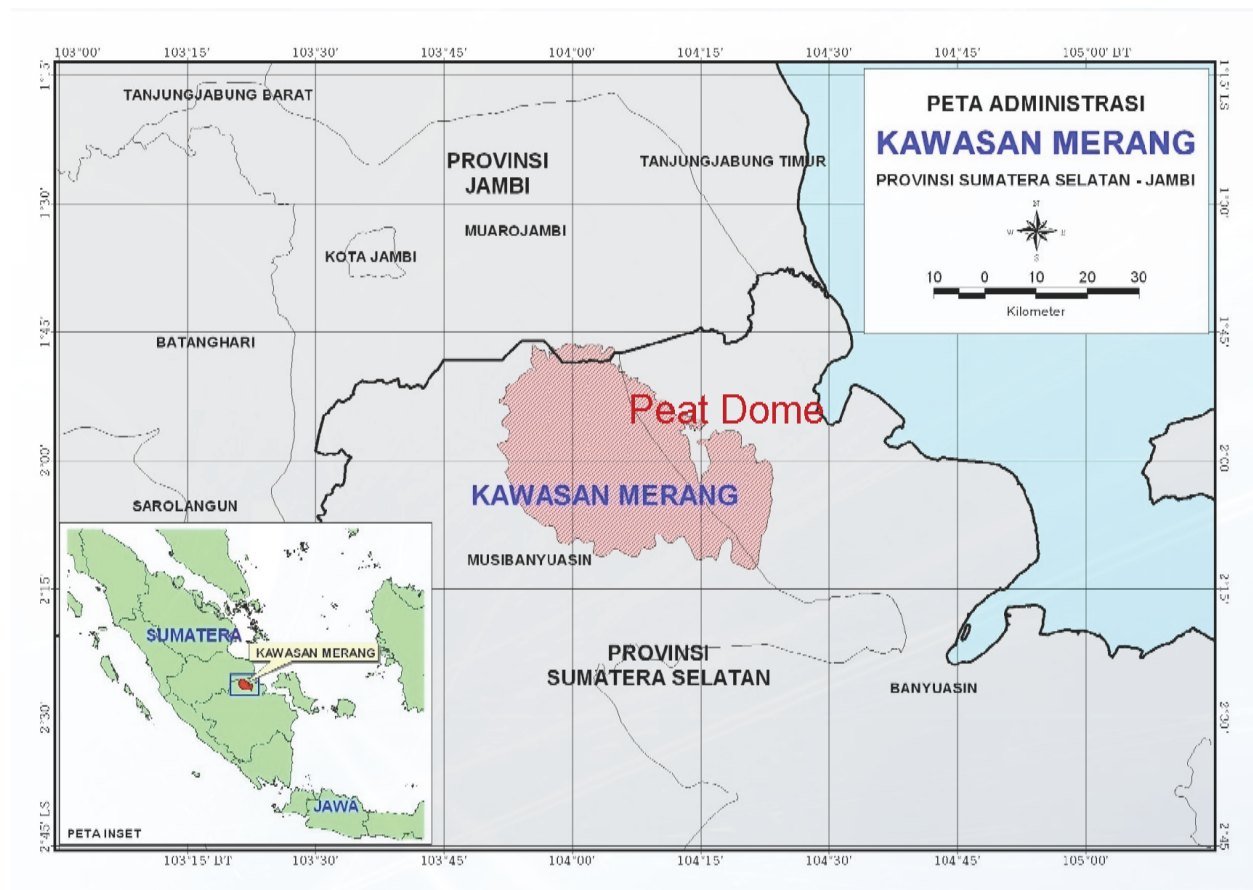
Source: *LAPAN's activities in supporting wildlife and carbon management in peat-forest in Indonesia Project*

The dome is located precisely between the Medak and Kepayang rivers. The nearest village to the Merang peat dome forest is Muara Merang Village. The distance from Palembang (the provincial capital) to the village is approximately 225 km or about 4-5 hours by car or boat. Rivers are the main access for villagers to go to neighbouring villages, the nearest small city, or to the forest. The nearest

city is Bayung Lencir which is about 2 hours by boat. Some private companies (oil and oil palm plantations) have built some road networks to a nearby Bakung sub-village.

Forest area and types

The Merang peat swamp forest area is the last contiguous peat swamp forest in South Sumatra province. The project site covers approximately 24,000 ha within the Merang peat swamp forest area.

The size of the Merang peat dome forest is about 150,000 ha. It is part of a larger peat swamp area which is linked to Sembilang National Park in the eastern part, Muaro Jambi peat swamp forest in the northern part (adjacent to Jambi Province) and Berbak national park in the northwest.

In a recent analysis of the forest cover in the MPDF, the land was classified as follows:

No	Land Cover	Size(Ha)	Percentage (%)
1	Dense Secondary Forest	3216.65	13.3
2	Medium Secondary Forest	5195.29	21.5
3	Forest Regrowth	2761.16	11.4
4	Open Secondary forest	2292.96	9.5
5	Regrowth-Macaranga	138.94	0.6
6	Regrowth-Gelam	1188.65	4.9
7	Shrubs	1240.58	5.1
8	Grassland	1304.76	5.4
9	Open/Bumt land	3497.88	14.4
10	Water	50.14	0.2
11	*Clouds*	*586.53*	*2.4*
12	*Shadow*	*118.55*	*0.5*
13	Recently logged	2618.87	10.8

The average annual rainfall in the area is 2,454 mm. The average lowest monthly rainfall intensity is 85 mm in August and the average highest is 324 mm in November. Based on the Oldeman climatic classification, the Merang peat dome forest belongs to the B1 zone, meaning that the area has sufficient rainfall intensity.

The biodiversity of the peat swamp forests includes 170 tree species, 50 mammalian species, 80 types of fish, 150 types of birds, and bush, grass and herb folia.

Forest management and use context

The area selected for the project was recommended by the Regent of Musi Banyuasin District (MUBA) and is a former production forest. Legal logging ended in the late 1990s. Where illegal logging is absent the forest could re-grow well (*2).

On September 2009, the Regent passed two decrees approving the Merang REDD Pilot Project (MRPP) and establishing a Forest Management Unit (FMU) that includes the project area. On December 2009, the Forestry Minister approved the Lalan FMU as a model FMU for managing 265,953 ha of various forest concessions and conservation areas. The MRPP was allocated a 24,000 ha plot

within the area of the Lalan FMU.

There are no villages or communities inside the area; however outside villages exist along the major rivers surrounding the area. Some of these villages are under the community development programme of the MRPP. Camps inside the area are usually built up by illegal loggers and trespassers.

The villages of Muara Merang and Kepayang are the most adjacent to the Merang Kepayang peat swamp forest. The table below provides profiles of these two villages.

Description	Village	
	Muara Merang	Kepayang
Area	169,12 km²	132,88 km²
Percentage compared to Bayung Lencir Sub-Distrct	2,98%	2,34 %
Village status	Desa swadaya	Desa swadaya
Potential paddy field areas	1061 ha	600 ha
Potential dry land agricultural areas	15851 ha	12688 ha
Total village area	16912 ha	13288 ha
Population	3036 people	1207 people
Population density	17,9 people/km²	9,0 people/km²
Total men population	1724 people	609 people
Total women population	1312 people	598 people
sex ratio	1,31	1,02
Health care facilities	1 polyclinic	0

Source: Bayung Lencir Dalam Angka 2006

Based on the MRPP socio-economic survey conducted in March 2009, the population composition in the two villages is heterogenous, i.e. composed of locals (majority) and migrants from other districts of South Sumatra and from other provinces. The educational level of the two villages is very low. The villages' health facilities are very limited. Apart from rain water, villagers rely heavily on river water for their domestic needs (drinking, bathing and cooking) which makes them highly vulnerable to potential water borne diseases. Household income is very low. The major source of livelihoods is small rubber/oil palm plantations as well as temporary daily work at the oil palm companies (nurseries, land clearing, weeding, plant tending and fruit harvesting). The wage varies between IDR 32,000 to 42,000 (US$3.3 - 4.4) per day, with 20-22 working days per month. Through a recent government regulation, registered village households expect to obtain 2 ha of oil palm plasma plantation from the oil companies neighbouring their village.

Though household income is low, local villagers are not attracted to become what they call "pembalok" or "anak kapak", i.e. illegal logging laborers under the illegal logging mafia system. Most of the loggers are from Muara Merang village or its sub-village and some are immigrants from the Ogan Komering Ilir

district of South Sumatra province. Sawmilling and illegal logging practices at the Merang Kepayang peat swamp forest and it surroundings (Upper Merang, Buring, Tembesu Daro, Beruhun and Kepayang rivers) are conducted particularly by migrants.

It was found that there is a strong potential for conflict on land tenure issues among local villagers, oil palm companies, timber estate concessions and state forest lands. The villages are practically isolated, surrounded by oil palm plantations, timber estate concessions and state forest lands. Most likely, there will be no room for those villages to grow and develop properly. Driven by land needs for village development, the Muara Merang village is proposing a "Village Forest" (*Hutan Desa*) concession at Pancoran hamlet, and the Kapayang village is proposing a "Community Timber Estate Concession" (*Hutan Tanaman Rakyat*) at Nuaran hamlet. Both proposals are addressed to the Minister of Forestry.

Rates and drivers of deforestation and degradation

The forest is mostly degraded, either in the form of shrubs, bushes, and tree cover < 10% (about 8,931 ha (37%)) or degraded primary forest and secondary forest (about 15,161 ha (63 %)). The major causes of degradation are fire, logging (both legal and illegal logging) and canal digging for log transportation.

1. Fire

Fires have been reported by the locals since the 1960s. Fires in 1982, 1987, and 1997 were particularly severe because logging changed the ecological conditions of the wet peat dome ecosystem into a drier one. Moreover, illegal loggers worsened the situation by digging small canals through the forest, which drained out the dome during the dry season. Carelessness associated with discarding cigarette butts or loggers' cooking fires were believed to be the sources of ignition.

2. Illegal logging/Canal digging

The closing of the forest concession (HPH) in 2000 led to unmanaged and unprotected forest resources and triggered illegal logging activities. Both locals and immigrants from other districts were attracted to cut timber from the Merang peat dome forest. Local authorities (*Dinas Kehutanan* – district forest departments) have neither significant will nor capacity to combat illegal logging. Recent illegal logging activities are taking place in the 25,000 ha of the planned peat dome project at Beruhun River and will be a big challenge for the project.

Illegal loggers make use of rivers and tributaries to get access for timber extraction. Wherever accessibility is nonexistent, they dig and build canals in the peat soil. The canals could be 2-30 km long with 1-2 meters depth and 1-3 meters width. These canals increase the peat drainage and are causing carbon emissions from peat decomposition   (*2). There are more than 100 ditches or small canals in the Merang peat dome forest built by illegal loggers for extracting timber to the main rivers.

3. Others: Conversion into monoculture

Plantation developers seek to find new locations with low risk of land tenure problems. When most mineral soils are occupied, peat forests are the best choice. In 2007, the Ministry of Forestry issued a decree for PT Rimba Hutan Mas (Sinar Mas Group) to convert 67,000 ha or peat swamp forest in the Merang peat dome forest for timber plantations. The companies PT Pakerin and Bumi Persada Permai (Sinar Mas Group) have already begun to convert the peat forest, though both did not operate inside the Merang peat dome forest. PT Sumber Hijau Permai (Sinar Mas Group) started its operation in 2004 adjacent to Sembilang national park, which is partly inside the peat lands. According to provincial forestry staff, the company PT Tiesco seems to have advanced negotiations with the Ministry of Forestry, and thus they have high chances of securing the area north from PT Rimba Hutan Mas (see table and map below for details).

No	Company	Ministerial Decree	Ha
1	PT. Pakerin	226/Kpts-II/1998; 27 -02-1998	43.380
2	PT. Sumber Hijau Permai	500/2639/IV/2002; 27-12-2002	30.040
3	PT. Bumi Persada Permai	SK.337/Menhut-II/2004;7-09-2004	59.345
4	PT. Rimba Hutan Mas	285/Kpts/VI/2007; 4 -06-2007	67.100

Source: Dinas Kehutanan Sumsel, 2007
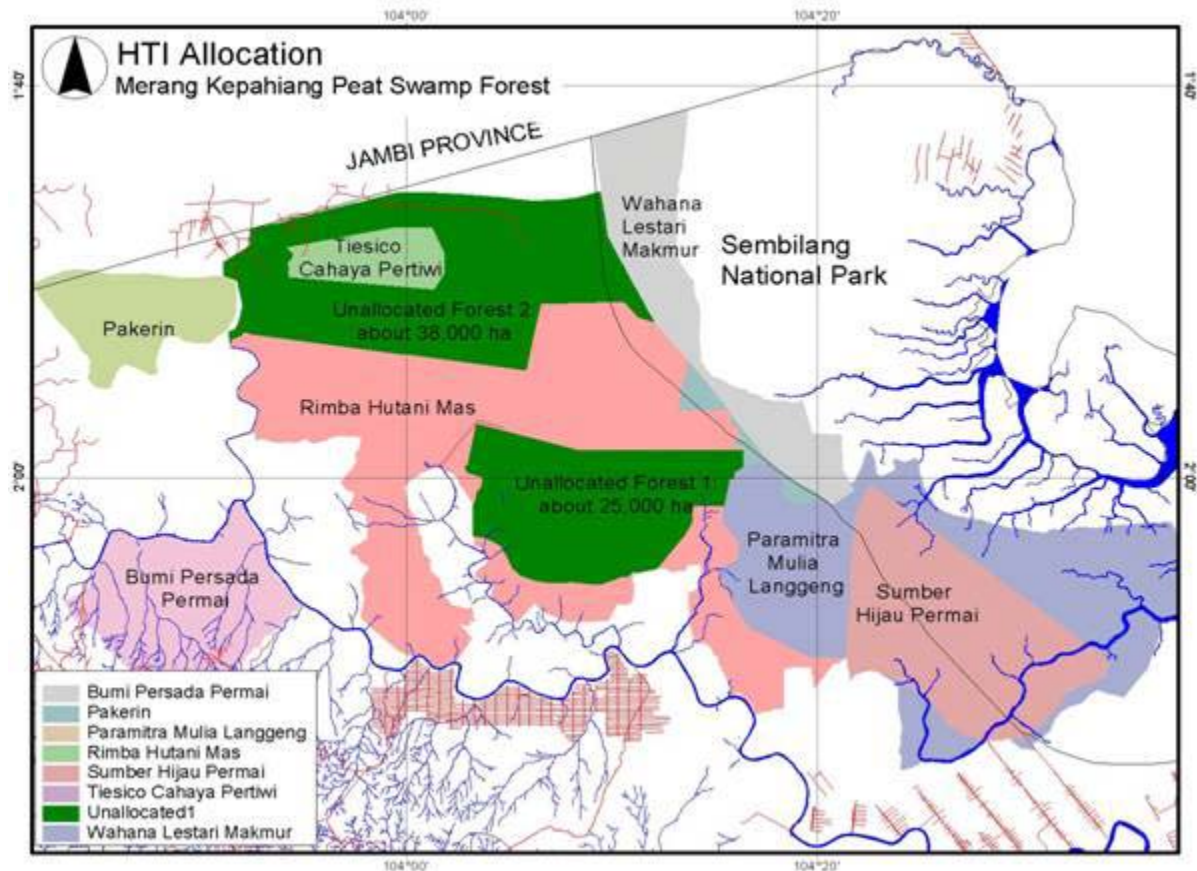
Based on ITTO classification, the degradation of the MRPP area is classified into three degradation categories:

1. Degraded primary forest

Peat swamp forest (primary forest) where the initial cover has been adversely affected by the unsustainable harvesting of trees. Density of pole and trees are currently about 400 trees per hectare.

2. Secondary forest

Gelam and Tembesu species re-grow on land that was largely cleared of its original forest cover. This commonly develops naturally after repeated fires. Density of pole and trees are about 300 to 400 trees per hectare.

3. Degraded peat swamp forest land

Former forest land that is severely damaged by the excessive harvesting of wood, poor management, and repeated fire. Forest cover is less than 10% and density of pole and trees is less than 300 trees/hectare, shrub, and bushes.

Project proponents

Executing agency

- Ministry of Forestry of Indonesia

Assigned agency to conduct the project

- District Forestry Agency of the Musi Banyuasin District
- Provincial Forestry Agency of South Sumatera in cooperation with Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH Indonesia

Implementation timeframe

2009-2011 (*3)

This is the period of initial support from the German Government

Project goals

- Overall project goal: Contribution of sustainable management of the natural resources in Indonesia particularly in peat lands and the reforestation of degraded peat lands in South Sumatra.

- Overall project objective: Contribute positively to the sustainable natural resource management in peat lands and reforestation of degraded peat lands in South Sumatra.

- Project purpose: Protection of the last natural peat swamp in South Sumatra and its biodiversity.

Implementation activities

The major project components are biodiversity protection, community development, rehabilitation and preparation for REDD (*2).

The project aims to achieve 4 results and various activities are planned for each of these.

1. Identify, measure and monitor peat lands, forest carbon, biodiversity and rehabilitation area

(See section below of monitoring)

2. Preparation of implementation of rehabilitation and develop management structure of peat lands area

This set of activities includes the development and establishment of the management structure of the FMU, which will be a production forest FMU, or KPHP. The indicators for the activities are:

- Establishment of a management structure for the FMU for the Merang peat lands area
- Participation of all relevant stakeholders

- Development and implementation of at least one appropriate, innovative and sustainable approach for rehabilitation

The peat swamp forest rehabilitation activities also include seedling production, village nursery development, reforestation by local communities and hydrological restoration by canal blocking. The plans include:

- Village nursery development – 2 village nurseries in Muara Merang and Kepayang, both providing 100,000 seedlings.
  - Training and technical assistance has already been offered to these villages.
  - Seedlings will be bought by MRPP for ~ IDR 1,000 per seedling.
- Canal Blocking: The objectives of canal blocking are to restore the hydrology in the area in order to support the rehabilitation program, to prevent fires and to give direct benefit to local communities through income generating activities like fish farming, etc.

3. Integrated fire management and illegal activity measures are applied through community participation and sustainable natural resource management

The objective of the fire management plan is to ensure that stakeholders in the area, including the FMU and the community forest rangers are adequately trained and equipped to reduce the impact of fires in the project area and surrounding forests. The area is divided into 3 zones, namely Buring, Tembesu and Kepayang.

- Buring zone

At present there is significant illegal logging activity in this zone, but it has a relatively low risk of fire occurrence.

- Tembesu zone

The Tembesu zone is located in the center of the project area. It is the most fire prone zone, due to previous and current extensive illegal logging. The primary channel in the Tembesu zone is a man made extension of the Tembesu River. The Tembesu River was originally only about 1 km in length but because of the channel it is now more than 20 km in length. This channel has led to a gradual reduction in the water table of the adjacent dome area resulting in a drier, fire-prone ecosystem.

- Kepayang zone

Kepayang zone is located in the eastern side of the project area and, as a whole, has a moderate risk of fire occurrence. Illegal logging is an activity that continues to take place in the Kepayang zone and the surrounding area.

The project proponents believe that it is very important to adopt a Community-Based Fire Management (CBFiM) approach to achieve effective management. CBFiM is an approach to fire management in which local communities are actively engaged in the development and in some instances implementation of fire management strategies designed to prevent, control or utilize fires in ways that will improve their livelihood, health and security (Johnson 2010).

Fire patrols are conducted within the project area. A typical fire patrol is conducted by a community forest ranger with instruction from the forest manager or MRPP technical advisor.

4. Carbon trading and management concept are developed and promoted

The project plans that payments will be received for environmental services such as carbon

sequestration and emission reductions, as well as biodiversity protection. The FMU/MRPP would receive conditional payments for these environmental services.

Some activities already conducted

- An illegal logging workshop was held in November 2009. Representatives from the Ministry of Forestry, the Head of the Local Parliament, and the provincial and district forestry services participated, and, through a joint declaration, committed to tackle illegal logging, especially in the forest production area of Merang Kepayang.
- Baseline studies
  - Study on stakeholders' intervention history carried out in the Merang Kepayang peat swamp production forest
  - Survey on socio-economic situation of Muara Merang and Kepayang villages
  - Survey of illegal activities in the MRPP area   (see *3)
- Precondition, village meetings and workshops
  - Village workshop on challenges and opportunities of sustainable land use in Muara Merang and Kepayang villages
  - Village workshop on gender awareness in same villages
- Thematic training for KMPH (*Kelompoki Masyarakat Peduli Hutan*, or Community Forest Rangers KMPH)
  - Management and group dynamics
  - Basic training
  - Fire management training
- Fire patrols using small boats and hand tools provided by the project
- Construction of illegal logging monitoring posts on the banks of the Merang and Kepayang rivers

Actors' roles and responsibilities

No further information.

The partners of MRPP are listed as: Ministry of Forestry; Forest Research and Development Agency; Directorate General of Forest Protection and Conservation; Directorate General of Production Forest Management; Governor's Office; Bupati MUBA's Office; Universities; MUBA District institutions; Forestry Services and Sections; BAPPEDA (Regional Body for Planning and Development); BAPEDALDA (Local Environmental Impact Management Agency); some NGOs; other relevant donor assisted projects.

Community participation

The MRPP has been using a stakeholders participatory approach for creating its annual work plan.

In line with global regulations and guidelines, MRPP is strengthening coordination with major stakeholders to ensure the project fulfils global requirements. Stakeholder participation from all levels was arranged from the start of MRPP.

An integrated community development for forest protection approach has been adopted, consisting of

1. Community Forest Rangers (KMPH)

To conserve, protect and rehabilitate the Merang Kepayang peat swamp forest, the MRPP has developed an approach and strategy of promoting sustainable natural resource management that

includes active community participation. Community participation is expected particularly in the fields of forest protection (from illegal logging and fire threats), conservation and rehabilitation through the establishment of KMPH. As of July 2009, 2 15 member KMPH units have been established (namely, KMPH Tembesu of Bina Desa hamlet, and KMPH Petaling of Kepayang village).

With this approach/strategy, the project tries to promote and facilitate active community participation in almost every aspect of project activities on sustainable forest management in the project area. To achieve active community participation, capacity and competency interventions from the project as well as from related stakeholders are essential. Training (forestry techniques, appropriate agricultural technologies, etc.), public awareness raising, facilitation and provision of alternative income generating activities, and strengthening group institutional capacities are essential. These activities have been, and are to be provided, as part of capacity and competency development under the project.

2. Income generating activities (IGA)

IGAs are being provided as a field example of appropriate alternative income generation. This hopefully can be up-scaled/replicated by other villages to reduce illegal logging activities, and act as an incentive for active members who voluntarily joined the KMPH.

The process of IGA selection and implementation is:

- KMPH participatory meeting to select agreed IGA to be conducted
- Competent IGA agricultural technology specialist conducts assessment of existing technology to identify further enhancement/intervention needed for IGA implementation
- IGA module planning/proposal
- IGA module implementation

The project is currently supporting poultry as an alternative income generating activity for members of two KMPH.

Project financing

The proposal of the MRPP was, inter alia, prepared based on the supporting studies financed by EU-MRPP 2008. These studies are; "Threat Analysis to Forest Coverage in Peat Swamp Forest in South Sumatra" by Gernot Rucker; "Biodiversity Assessment in the Merang Peat Dome Area" by Matthias Waltert; "Carbon Stock Estimation in Peat Swamp Forest Area of Merang – Kepayang" by Florian Moder et al., and others.

The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety accepted the proposal and committed to finance the MRPP project as a grant scheme up to 1,433,454.00 Euro, for the project period of 2008-2011.

Benefit sharing (*2)

The project plans that payments will be received for environmental services and that the FMU/MRPP would receive conditional payments for these.

The targeted users of the environmental services, who would provide the payments, are most likely carbon buyers from voluntary and/or compliance markets, and other investors with corporate social responsibility policies.

There is no precise information on benefit sharing, other than the mention of benefits that would accrue

to local communities from alternative livelihoods generation, etc.

Emissions and removals with and without project (*2)

In 1989, 95% of the project area was covered by natural peat swamp forest and it is estimated that the project area stored about 6.5 million tons of carbon. Deforestation and degradation have decreased the carbon stock to about 3.8 million tons.

The project area is located in the center of the peat dome with around 1-6 meters peat depth. It is assumed that the average peat depth is 3 meters; the total amount of carbon stored in the peat soil is thus estimated to be about 4 million tons.

Data from previous studies:

- Wetlands and IPB conducted a study in 2003 which estimated that the Merang and Kepayang peat swamp forest (210,000 ha) has an average peat depth of 150 cm storing 0.5 gigaton of carbon.
- A study under the South Sumatra Forest Fire Management Project using 3D peat dome modelling based on peat drillings and DEM SRTM (Shuttle Radar Topography Mission, Digital Elevation Model) estimated 0.1 gigaton of carbon in 140,000 ha with an average peat depth of 208 cm (Mott 2006).
- Ballhorn (2007) estimated that with a size of 125,000 ha and average peat depth of 250 cm, the Merang peat dome forest holds 0.2 gigaton of carbon.

Baseline data were derived from satellite-based land cover information from 1989-2007. Using the stock difference method, from 1989-2007 it was estimated that about 9.7 million tons of CO2e had been emitted from deforestation and degradation. It was estimated that peat fires in 1997, 2004 and 2006 contributed to about 2.9 million tons of CO2e emissions. When the MRPP is implemented, it could potentially save about 540,000 tons CO2e/year. This is excluding peat fire emissions, which are estimated to be ~700,000 tons CO2e/year. The estimates are conservative due to the exclusion of emission from peat decomposition after drainage.

The following information is from Solichin, M. Lingenfelder, and K.H. Steinmann (undated) "Tier 3 Biomass Assessment for Baseline Emission in Merang Peat Swamp Forest"

The study used Landsat interpretation from year 2008 for stratification. The Number of plots for biomass inventory was calculated for each stratum, according to the size of the stratum, potential carbon stock, as well as variation among plots within a stratum. A total of 45 plots were randomly distributed within 8 strata in the project area. We used nested plots with combination of square and rectangle sub plots. The smallest sub plot 2 m x 2 m for measuring litter and undergrowth, 5 m x 5 m sub plot for sapling with 2< diameter at breast height (DBH) < 10 cm, the 10 m x 10 m sub plots for poles with 10 < DBH 20 cm, the 20 m x 20 m sub plot for small trees 20< DBH < 35 cm, while the largest sub plot (20 m x 125 m) for large trees with DBH > 35 cm. We also measure carbon stock from dead organic matter. We use smallest sub plot to measure litter. For dead wood and dead trees, we follow the diameter range used for trees. Detail methodology for carbon inventory has been documented in project guideline (Solichin, 2009). In addition to that, we collected peat depth information in the field. We drilled every 200 m along transect towards the plots for peat depth information. Peat depth information from 125 points was compiled simultaneously.

We also calculate frequency, density of each tree species found in the plots. Basal area was calculated to estimate the dominancy of a species in using horizontal space. Percentage of each value was added to develop Important Value Index (IVI) to give pictures on existing forest structure. We developed a

small program for calculation and better reporting for IVI and carbon stock from each stratum.

To estimate tree biomass, we used locally develop biomass equation for two main land cover types in our project area, forest and non forest. Fifty trees were felled, fractioned into stem, branches, twigs and leaves. Each fraction was weighted in the field. Equation generated by Brown (1997) was used to give comparison on biomass stock estimation in project area. For below ground biomass estimation, we use equation from Cairn *et al* (1997), which is quite conservative.

We use stock different approach to estimate baseline emission in project area. Since there is no longer pristine peat swamp forest in project area, we use the stature of carbon stock in the adjacent Berbak National Park that represents pristine peat swamp forest.

Results

| Stratum | Area (ha) | Stem density (tree ha^{-1}) ($\geq$ 10 cm DBH) | Biomass and Organic Matter | | | | | Total C Stock (ton ha^{-1}) |
| | | | Biomass | | Dead Organic Matter | | | |
			Tree Above Ground Biomass (ton ha^{-1}) $\pm$ t.SE	Tree Below Ground Biomass (ton ha$^{-1)}$	Dead wood (ton ha^{-1})	Dead trees (ton ha^{-1})	Litter (ton ha^{-1})	
Dense LoF	3142	360	254 $\pm$ 70	23.7	1.84	13.16	0.11	138
Medium LoF	5950	392	223 $\pm$ 56	21.1	2.09	6.09	0.16	119
Forest regrowth	4393	232	70 $\pm$ 28	7.6	4.52	4.35	0.1	41
Secondary forest - Mahang dominated	139	600	108	11.2	0	0	0.26	56
Shrubs	1308	52	15 $\pm$ 21	1.4	3.37	15.29	0.07	17
Recently logged	3802	77	38 $\pm$ 21	4.5	4.84	6.87	0.09	26
Burnt land	3534	40	22 $\pm$ 28	2.7	3.6	23.49	0.26	24
Grass/fern land	1305	0	0	-	0.58	0	0.09	-

*Leakage issue: A certain amount of leakage will still occur and has to be defined for REDD. (*3)

Monitoring

The information below is relevant to both monitoring as well as improving estimates of emissions and removals with and without the project

- Baseline monitoring for carbon stock change in Merang peat swamp forest

Improvement of the methodology for carbon stock estimation is being conducted. A study on allometic equations that will increase the accuracy of tree-based carbon estimation is underway. A carbon inventory is being developed using stratification and sampling plots. The intention is that this approach will comply with Tier 3 methodology (*2).

- Landscape assessment

Due to variation in forest use and threats, different carbon stock will occur in different vegetation types across the landscape. It is important to have landscape-scale land cover assessment using remote sensing. At this point, it is actually possible to calculate merchantable volume of carbon using Tier 1 or Tier 2 methodologies.

The former South Sumatra Forest Fire Management Project and MRPP have conducted monitoring

using remote sensing techniques. Landsat images are available from 1989-2008. SPOT 4 and SPOT 5 images with 10 meter resolution are also available for some part of the area. High resolution Quickbird images from the year 2007 with 0.6 m resolution were purchased to identify tree coverage, logging damage and canal distribution (*2).

- Plot measurement

A land cover map derived from satellite images should be used for area stratification. Additionally, peat depth information should give more information on stratification for carbon stock. Plots for biomass inventory will be distributed at each stratum.

- Tree-based biomass quantification

It will be much more convenient to estimate tree biomass based on local allometric equations developed from similar forest types. The MRPP is conducting a study on allometric equations in peat swamp forests to get a higher level of precision in carbon calculation. The nearest forest type which has been studied for allometric equation is Jambi lowland secondary forest. Local allometric equations based on harvesting methods are being developed.

Reporting

No data

Verification

No data

Risks and risk management

Detailed investigation on loggers' motivation, socio-economics, as well as potential participatory solutions is of crucial importance prior to beginning the project.

Progress and plans

A second proposal was forwarded in September 2009 to the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety with a budget request of ~700,000 Euro with a focus for networking and knowledge management (*2).

Other aspects of progress in terms of activities already conducted are described above.

Links:

Project-related documents

Merang REDD Pilot Project Website

Others

Florian Moder et.al (2009): South Sumatra Forest Fire Management Project(SSFFMP) Draft Report

Gernot Rücker (ZEBRIS GbR)(2008):Threat Analysis to Forest Coverage in Peat Swamp Forest in

South Sumatra(South Sumatra Forest Fire Management Project)