

REDD+ project to reduce emissions from deforestation and increase sequestration through reforestation in mangrove forests in South Sumatra, Indonesia

Source(s):

- [平成23年度地球温暖化問題等対策調査 インドネシア共和国・南スマトラ州におけるマングローブ林を対象とした森林減少・劣化の排出削減と植林による炭素固定機能の強化等を組み合わせたREDDプラス事業の案件組成調査 \(Japanese\)](#)
- (*2 Summary English translation of above source)

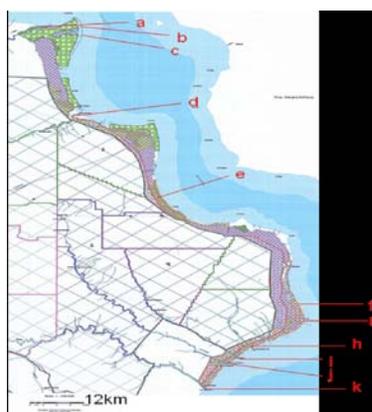
Project location

The site selected for the study is a 66,500 ha area of protected forest that stretches 170 km along the coast of the Ogan Komering Ilir (OKI) Regency located in the Province of South Sumatra, Indonesia. 105,159 ha of protected forest is present in the OKI Regency, whose entire Eastern coastal region is covered by an expanse of Mangrove forests. The selected site is located within these forests, south of the Sugihan River (2°24'58.31"S 105°33'42.36"E) and north of the Lumpur River (3°25'11.00"S 105°53'6.20"E). In the view of the Forestry Department in OKI Regency, given that the Mangrove forests in the aforementioned remaining area on the southern side have been destroyed to the point that there are barely any woodlands left, there are concerns that these forests may not fall under the definition of REDD. Therefore, this area has been excluded from the selected site (p.32, 56; *2p.5).

Based on maps provided by the local government, the project site was identified through satellite images and field surveys using GPS. Of particular note is that it is apparent that the coastal line in the northern part of the selected site has gravitated approximately 300m towards the coast in the 18-year period between 1989 and 2007 due to the succession of Mangrove forests. During the 30-year span of the project, it will be necessary to track changes in the selected project site caused by such extensions of coastal lines (p.126). Project developers are also looking into expanding the existing selected (project) area to the entire protected forest region (105,159 ha) (p.57; *2 p.10).



Map 1: Selected Project Site (p.27)



Map 2: Map of REDD+ Selected Project Site (p.33; *2p.7)

Selected Project Region and Geographic Coordinates (p.34; *2 p.8)

	River Name	Location
a	Sungai Sugihan	2°24'58.31"S 105°33'42.36"E
d	Sungai Batang	2°38'36.83"S 105°38'4.24"E
-	Sungai Janun	
g	Sungai Kong	3°14'09.7"S 106°04'31.2"E
h	Sungai Pedada	3°18'52.80"S 105°58'57.50"E
i	Sungai Kuara Duabelas	3°20'15.53"S 105°57'11.85"E
j	Rubung Hitam	3°21'26.30"S 105°55'47.60"E
k	Sungai Lumpur	3°25'11.00"S 105°53'6.20"E

Forest area and types

- In the project site, besides the Mangrove forest, there is *Avicennia* forest, *Nypa fruticans* Wurm forest, grassland, and bare land (pp.35-44).

Forest management and use context

- In 1997, the Indonesian government decreed that the preservation of Mangrove ecosystems is a national concern, and established the "National Strategy for Mangrove Ecosystem Management" (NSMEMI) to that effect (p.94).
- Protected forests in OKI Regency were established by the Minister of Forestry in 1986. People who had migrated as a result of transmigration that took place between 1978 and 1979 (before the establishment of protected forests), were already residing there. These early inhabitants consist of ethnic Javanese, followed by ethnic Bugis (people originating from the southern part of the island of Sulawesi) who arrived separate from the transmigration program. The ratio of ethnic Javanese to ethnic Bugis is approximately 1:1. Both ethnicities coexist in a single village, and are not segregated. However, in the majority of cases, each group forms clusters and on opposite sides of a river. No strife exists between the two peoples, and as all residents of the village are treated equally, there is no ethnic discrimination or disparity between them (p.46).
- Prior to the establishment of protected forests, this area was a coastal protected forest (Hutan Lindung Pantai) that safeguarded the coast. Subsequently, following an enactment by the Minister of Forestry, it was converted to a government-stipulated protected forest (Hutan Lindung). The purpose of establishing protected forests was to prevent deforestation and protect the woodlands. While this establishment of protected forests was enacted by the Minister of Forestry, the management, protection, rehabilitation, etc. of those forests falls under the jurisdiction of the local government, as does the responsibility for coastal resources. However, it is a difficult task for local governments to cover the costs of improving, maintaining and managing protected forests. As a result, the disappearance and degradation of woodlands in 65% of protected forests continues unabated. Furthermore, residents in the vicinity are unable to recognize the boundaries of the protected forests, and this has led to deforestation by residents even after the woodlands have been established as protected forests. Consequently, efforts are underway to place boundary markers for the purpose of ensuring widespread awareness of the forest boundaries and enabling protected forests to be distinguished from the business-owned industrial forests located inland. These efforts involve erecting concrete pylons 100m apart from each other. Boundary demarcations running from the north side of the protected forests to their south side have also been implemented, with approximately 8km remaining to be demarcated. Boundary demarcation for the entire area is scheduled to be completed in 2012, while demarcation for the 66,500 ha area representing the selected project site has already been completed (p.51; *2 p.9).

Community forests such as Hutan Adat, Hutan Desa and Hutan Masyarakat do not exist within the

protected forests at this point in time (p.51).

- Protected forests are distributed along the eastern coastline of OKI Regency and contained within that coastal area are many rivers. In settlements around the estuaries of relatively large rivers, local communities have been formed around village chiefs, or Kepala Desa. Under Indonesian law, while residing in protected forests is not allowed, local populations have formed settlements without permission (p.34). Key rivers with settlements are, listed from the northernmost downward, the Sugihan River, the Batang River, the Janun River, the Kong River, the Pedada River, the Kuara Duabelas River, the Rubing Hitam River, and the Lumpur River. The size of the settlements, which is proportionate to the size of the river, range between several hundred to several thousand inhabitants. Within the selected project site, a total of approximately 10,000 inhabitants are currently present (p.34). Among the settlements in the project site, those located at the Janun River are the smallest (approximately 30 households), whereas those located at the Lumpur River are the largest (over 1,000 households) (p.45; *2 p. 8). The majority of these inhabitants subsist on fishing (sea fishing and aquaculture), and collect swiftlet nests as a subsidiary business (p.34).
- Each settlement has a village chief. These village chiefs are elected in a referendum, and are responsible for resolving problems within the village, negotiating with external parties, etc. Additionally, issues that the village chief cannot single-handedly rule on or problems affecting the entire village are decided through a discussion involving the participation of a “wise men village council” called a Tokoh Masyarakat (p.46).
- Village chiefs reserve the authority to issue a KTP (Kartu Tanda Penduduk), the resident’s certificate serving as the basis of the nation’s residence registration system, to inhabitants of the settlements or inhabitants born in those settlements. Such authority is delegated to village chiefs in regions with inconvenient access based on the judgment of the local government acting in place of the national government. Even if they should inhabit a protected forest where residence is not permitted, residents in possession of a KTP are recognized as official residents (p.46).
- A point of contradiction is that the Provincial Governor has publicly acknowledged the presence of village chiefs despite the fact that residing in protected forests is not legally permitted (p.46). Local governments, while possessing the power to legally force the removal of inhabitants within protected forests, have not exercised that power (p.34). Due to this region’s lack of land routes and its inconvenient access consisting solely of water routes, the resulting difficulties in monitoring and managing the region have inhibited the execution of those functions. Moreover, certain people are of the view that forcibly removing or relocating inhabitants of that region who have established settlements and lived there for many years is unethical. As such, there are no alternative plans in place now or for the future. The actions and response of the local government consist of a policy to forego forcible removal and instead establish special settlement zones within the protected forests and to convert the land classification for these areas from protected forest to residential districts, while having the areas physically remain within protected forests. Procedures are currently underway to alter this land classification for three villages (Desa) that are self-governing and possess a village chief publicly acknowledged by the Provincial Governor. The villages are Sungai Batang in the Air Sugihan District, and Rubung Hitam and Sungai Pedada in the Selapan District (pp.45-46).
- A concern for this project is verifying the possibility of being a developer with the Secretary-General of the Ministry of Forestry in Indonesia based on the contents of the 2009 Ministry of Forestry Ordinance No. 36. The area of implementation for this project lies within government-stipulated protected forests, whose administrative and jurisdictional authority lies with the local OKI Regency government. No objections have been raised against a joint partnership between the project developer and the OKI Regency Bureau of Forestry. Moreover, the implementation of the REDD+ Project will be in the form of a joint venture with the local OKI Regency Bureau of Forestry, which possesses administrative and jurisdictional authority over the

protected forests. As such, the project developers were informed that the central government only need to be furnished with a report, and does not need to issue a permit. However, where the creation of credit is concerned, it is necessary to submit an application to obtain the relevant permit from the Ministry of Forestry (p.18).

- Following confirmation from the Ministry of Forestry in Indonesia, the project developers were informed that implementation of this project proper would not require the new submission of an permit application due to the project being a joint-development endeavor with the OKI Regency Bureau of Forestry. As for the applicable implementation scheme, the project will be carried out as a joint venture with OKI Regency,

Rates and drivers of deforestation and degradation

- In the view of the OKI Regency Bureau of Forestry, the two main factors driving deforestation and degradation are forest fires and illegal logging resulting from the development of aquaculture ponds (p.51). In addition to logging conducted by inhabitants of protected forests, illegal logging is also conducted by inland inhabitants outside protected forests and the people of the Lampung River.
- According to information provided from the OKI Regency Bureau of Forestry, 60% to 70% of the 66,600 ha of Mangrove forest serving as the selected project site within OKI Regency has already been destroyed, and the remainder is in a critical state. Project developers consider that if no countermeasures are taken, the Mangrove forests will probably disappear in their entirety. The destruction of woodlands within the protected forests, which began around 1998, is cited as having been initially caused by a fire caused by unknown actors. However, one can speculate that this was likely attributable to intentional burning carried out for the purpose of aquaculture farms.
- Since the houses have raised-floor houses above the sea, going to and from the protected forests invariable requires the use of a boat. As such, areas where deforestation takes place are limited to those that can be accessed by boat. Deforestation is therefore prominent in the vicinity of settlements (p.35; *2 p. 8).
- The distribution of aquaculture is skewed. Almost no aquaculture can be found in the northern part of the selected project site, whereas it becomes gradually more frequent as one heads south. These aquaculture farms are located within protected forests, and the majority was formed as a result of illegal logging (p.48). Soil in the southern part is ideal for aquaculture farms, whereas the soil in the northern part is not. While inhabitants are capable of determining whether or not soil is suitable for aquaculture, they are unable to do so until they clear the forests and cultivate the soil. As such, in cases where soil is not suitable for aquaculture, farms are abandoned in an incomplete state. Another cause for the concentration of aquaculture farms in the southern part in particular is the presence of cultivators from the Lampung River, which borders OKI Regency on the south. Aquaculture in the eastern coast had been robust by virtue of the Lampung River being located in close proximity to the island of Java; however, ocean waves and beach erosion have made aquaculture difficult in coastal areas. Consequently, there is a recent history of cultivators heading north and entering the protected forests of OKI Regency in search of new land (p.53).
- The application of manmade animal feed, spraying of antibiotics, application of pH adjustors (lime) and so forth are conducted in the aquaculture farms. Leftover animal feed and deposits of chemicals and lime cause muddy sludge to build up at the bottom of the ponds, rendering them unusable in about five years. The aquaculture farms are abandoned in slightly less than five years following cultivation. Inhabitants then cultivate new neighboring Mangrove forests and enlarge their aquaculture farms (p.58).
- In the past, Lampung River people settled in the OKI Regency from the neighboring state of Lampung with the intention of developing aquaculture. While less than favorable aquaculture

results caused these settlers to abandon their culture farms, in recent years, demand for culture ponds has risen, motivating people to settle in the village of Kong from Lampung State once more (p.43). Additionally, the Bureau of Marine Fisheries is advocating aquaculture in the region adjacent to the protected forests (p.44).

- A portion of the aforementioned Mangrove forests disappeared as a result of a fire conducted in 2009 by an inland-based industrial forestation company. This caused Mangroves located within protected forests to be burned to the ground over a wide area (p. 41).

Project proponents

YL Invest Co.,Ltd.

Implementation timeframe

30 years (p.120)

Timing of project commencement established as 2014 (p.121)

Project goals

- The goal of this project is to protect the remaining natural Mangrove forests, which constitute approximately 35% of the entire selected project site, while simultaneously regenerating the remaining 65% of the area, which consists of degraded land, by replanting Mangrove forests. Through this project, the developers will focus on the following three methods and examine both the application of existing methodologies and the possibility of developing new methodologies: (1) reducing CO₂ emissions through protecting forests (Reducing Emissions from Deforestation and Forest Degradation, or REDD); (2) the natural regeneration of degraded land and development of existing forests, which constitute elements under REDD+ (Improved Forest Management, or IFM); and (3) the enhancement of CO₂ sequestration functions through forestation activities (Afforestation/Reforestation, or AR) (pp.92-93).
- Through both curbing the deforestation of protected Mangrove forests and introducing forestry and fishery technology that enables a symbiosis between aquaculture and Mangroves, the project developers seek to realize improved stability of the lives of local inhabitants alongside the REDD+ project (p.1).

Implementation activities

- Maintenance and management of existing Mangrove forests

Monitoring and patrolling of illegal logging: Local inhabitants of protected forests shall be made collectively aware of what areas constitute protected forests and of the fact that illegal logging is prohibited. The establishment of rules within villages concerning the prohibition of illegal logging is to be jointly conducted with village chiefs and other residents. In order to curb illegal logging by external parties, signs will be erected with the intention of ensuring widespread awareness of the prohibition of deforestation in the protected forests and of the boundaries of the forests. Additionally, a forest policy (Polisi Hutan) to enforce the above will be put in place (p.57; *2 p.11).

- Forestation activities in bare grounds and woodlands in mid-degradation

The planting of Mangrove forests shall be conducted in order to regenerate the woodlands. (p.58; *2 p.11)

- Forestation activities in bare grounds and culture ponds

Silvi-fishery technology for enabling woodlands and aquaculture to coexist shall be introduced, and the revitalization of forest cover and stability of the lives of residents will be promoted. "Silvi-fishery" is a

coined term derived from a combination of “silvi,” which means “forest,” and “fishery,” and refers to technology that represents a fusion of woodlands and aquaculture (pp.58-59). A water route with a width of approximately 5m will be constructed in the inner circumference of the aquaculture ponds, with an embankment to be formed in the center part. Mangroves will then be planted and cultivated in the embankment portion located in the center part of the aquaculture pond. When Mangroves defoliate, plankton that serve to break down the fallen leaves are generated. Shrimp then prey on those plankton and grow, thus eliminating the need to apply manmade animal feed, etc. Additionally, due to the water quality and soil remediation capability of Mangroves, the inside of the aquaculture farms represent a suitable environment for the growth and development of shrimp (p.63; *2 p.11).

- Recruitment of local people

Residents who own aquaculture ponds will be recruited for land development and the planting of Mangrove forests following the conversion of existing ponds to silvi-fishery cultivation methods. A corresponding amount of cash income can be anticipated as a result. However, for residents who do not possess aquaculture ponds, as they have no means to obtain such cash income, a need exists to give them priority assignment to the maintenance and management of existing forests and other duties (pp.70-71).

- Capacity building (pp.59-60)

Local government capacity building activities will cover use of remote sensing technology; woodland security for the purpose of controlling illegal logging; ascertaining the current situation and implementation of local field surveys through regular meetings with residents of protected forests; strengthening of management networks by establishing woodland management organizations that unify government and private parties for the purpose of strengthening ties with the local community (p.59).

Formation of workgroups (Kelompok) among local communities: By conducting management of woodlands in protected forests as well as by engaging them in forest work and management and cultivation of woodlands, the benefits obtained through the revitalization of the woodlands can be experienced by communities in their everyday life, for example, in the form of increased fish catches. This in turn will pave the way for heightened motivation among the inhabitants themselves.

An organizational framework is formed in each settlement with a village chief at its center and a wise men’s council as an advisory body. By incorporating the presence of Kelompok within that framework, a better organization for preserving woodlands will be established. “Kelompok” refers to labor units consisting largely of young men who engage in work with the permission of the village chief. Kelompok participate in workshops, etc. held by the local government to expand their knowledge. Afterwards, in addition to performing a role as work leaders, they facilitate the transfer of knowledge and technology to local residents. While the approach of Kelompok is currently expanding across all of Indonesia, it has yet to penetrate OKI Regency. As such, for the purpose of implementing this project, it will be necessary to institutionalize them.

Actors’ roles and responsibilities

YL Building Co., Ltd.	Main actor in project implementation (p.67, 131)
OKI Regency Bureau of Forestry	Joint implementer (p. 74, 129)
JACO CDM	Specialist on MRV (p. 130)

Community participation

See section “Implementation Activities”

The following matters were agreed with the OKI Regency Bureau of Forestry (p.68; *2 p.13)

- **Transparent and fair accountability**

Explanations regarding the project shall be conducted in a manner that is easy to understand for provincial and state governments, as well as for local and surrounding residents. Active participation in briefings will be promoted and venues for stating opinions, questions, etc. will be provided in accordance with the principles of the Non-Binding Agreement Based on Initial Information (Persetujuan Atas Dasar Informasi Awal Tanpa Paksaan).

- **Respecting the rights and will of local residents**

Decisions made in the project shall invariably incorporate the opinions of local residents and be examined jointly. The rights of abode and land use of residents, as well as their rights of decision as they pertain to participation in project operations, shall be respected and guaranteed to the fullest extent.

The following Matters were agreed with village chiefs (pp.68-69)

- **Transparent and fair accountability**

Explanations shall be provided to residents as a whole in an equitable and easy-to-understand manner. Questions will be explained in an easy-to-understand manner until the satisfaction of residents has been reached. In cases where it is difficult to communicate with residents directly, response shall be channeled through village chiefs. Moreover, venues and means for residents to directly state opinions and questions to project implementers shall be established as needed.

- **Placement of Kelompok**

A Kelompok shall be placed in each individual village. This Kelompok shall be organized according to methods that conform to the pertinent village's rules, with the village chief to personally assume the role of Kelompok leader and engage in the organization and alignment of the Kelompok for that particular village. The selection of the individuals to comprise the Kelompok shall be conducted by giving residents equal opportunity irrespective of self-selection and multiple terms and free of gender and age discrimination.

- **Respecting the rights and will of local residents**

(Same as that under matters agreed with the OKI Regency Bureau of Forestry)

The project implementers shall have no coercive power with regards to land use in the areas inhabited by residents, and said usage will be left to decisions made by residents and/or in accordance with the rules of the village. However, the village should be prepared to accept opinions and suggestions made by the project implementers.

- **Sharing of equal opportunities and benefits with residents**

The Kelompok led by the village chief shall provide equal, transparent opportunities for actual labor in the project to residents without any gender or age discrimination. Moreover, the partitioning of areas for forest management, forestation, etc. shall be conducted based on discussions between the Kelompok and the residents, and shall be clarified through the methods that involve the least dissenting opinions and/or posterior risk factors. The sharing of benefits (wages) that apply to actual labor shall be conducted fairly and without discrimination in accordance to the nature and amount of work performed.

- **Consideration towards gender (p. 72)**

Duties such as seed-gathering for forestation, forestation work and management can be sufficiently conducted by women as well as by people from a wide range of age groups. As such, numerous residents can participate in these duties. When this participation occurs, as work management is left to

the village chief, it is necessary to issue explanations to participants to ensure that no inequalities, etc. arise in work opportunities between the village chief and residents, and elicit their understanding in this regard.

Project financing

In implementing the project, it is necessary for YL Building Co., Ltd. to cover the project's immediate-term expenses. As initial investment for the project is expected to be approximately 10,846,000 USD (forestation expenses only), it is difficult for the organization to shoulder these initial expenses on its own. As this project represents the examination of a new offset mechanism whose systems have yet to be clarified content-wise, the risk surrounding this project is high, therefore it is not realistic to secure standard project finance in the form of a loan. Consequently, YL Building Co., Ltd. expects that the entire portion of investment it will cover will be in the form of an equity (p. 132)

Benefit sharing

N.D.

Emissions and removals with and without project

- Methodologies (p. 92, *2 p. 13)

The protection of existing Mangrove forests in the area of preservation shall be conducted while referring to VCS (Verified Carbon Standard) methodology VM0007 relating to REDD. Assessments of CO₂ absorption volumes resulting from forestation shall be conducted while referring to AR-CDM methodologies by UNFCCC (AR-AMS0003 and AR-AM0014) and J-VER methodologies.

Current biomass stocks

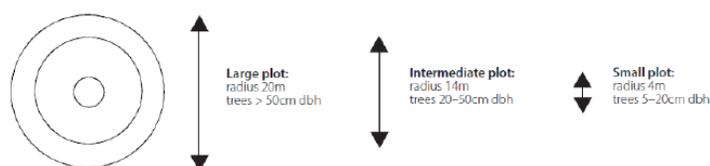
- Sample plots (p. 64)

58 sample plots were established. Species and DBH were recorded. Nested circular sampling plots with radii of 4m, 14m and 20m, for DBH of less than 5cm, 5-20cm and 20-50 cm, respectively, were used.

Stem Diameter	Circular Plot	Square Plot
< 5cm dbh	1m	2m x 2m
5-20cm dbh	4m	7m x 7m
20-50cm dbh	14m	25m x 25m
> 50cm dbh	20m	35m x 35m

[†] stems < 5cm dbh would only be measured in very young forest.

The schematic diagram below represents a three-nest sampling plot in both circular and rectangular forms:



- Selected carbon pools (p.96)

Only aboveground living biomass was measured.

- Allometrics (p.96; *2 p.15)

Chave et al. (2005) $(LN(AGB) = -1.786 + 2.471LN(DBH) + LN(WD))$ was used to derive stand biomass. The biomass estimates obtained were compared with that computed in a simplified fashion under the supposition that each tree was cone-shaped. Chave et al. (2005) $(LN(AGB) = -1.786 + 2.471LN(DBH) + LN(WD))$ was confirmed to be appropriate. (p.109)

- Remote sensing

After verifying data for existing biomass calculated against the distribution of band quantities in 2012 as obtained through PALSAR analysis, the correlation between the existing biomass for the 58 plots and band quantities were clarified. Based on this correlation, the existing biomass was computed for the entire selected site (p.96, *2 p.16).

Reference emissions level

LANDSAT4 TM, LANDSAT 5 TM and LANDSAT7 ETM data were searched for seven periods between 1989 and 2009. Using the oldest data, from June 19, 1989, as the record year, the data for the last 20-years (until August 5, 2009) were analyzed.

Three sets of PALSAR data were obtained for of two periods: 2007 and 2010 (for a total of six sets). As it is impossible to identify Mangroves solely through analyzing PALSAR data, it was necessary to simultaneously analyze both feasibility study results and land use maps from LANDSAT (pp.104-105).

After matching the existing biomass of the entire selected site with the woodlands area distribution obtained through LANDSAT analysis, trends in biomass over the last 20 years were computed (p.96).

The analysis shows that forests have been progressively decreasing at a rate of 0.72% per year. Upon setting the commencement period for this project at 2014, project developers computed the forest area as decreasing at a rate of 0.72% each year from 2009 onwards. An implementation timeframe exceeding 30 years has been planned under this project.

Project scenarios

Project scenarios are broken down into the following three elements and computed (pp.119-120).

1) Curbing CO₂ emissions through protecting forests (REDD)

While updating the baseline in ten-year increments as stipulated in the VCS methodology VMD0015, volumes of CO₂ emissions are projected to decline as a result of the biomass in existing forests improved through forest protection following the start of this project. The volume of CO₂ emissions reduced as a result of forest protection is 3,692,623 tons over the 30-year period between 2014 and 2044 (p.121,125; *2 p.16).

2) Absorption of CO₂ by growth of existing forests and spontaneous regeneration (IFM)

It was assumed that all groups of trees would achieve their maximum existing volume (275 ton/ha). While it is difficult to pinpoint the age the existing forests, Report 64 cites Mangrove forests as maturing between 23 and 28 years of age. It is therefore assumed that the existing forests in the selected project site would all become mature forests within the term of the project, which will last up to 30 years. The area of the natural forests obtained by subtracting bare grounds (3,000 ha) and aquaculture ponds (8,359 ha) from total area of the selected project site, which was identified through satellite image analysis, came to 56,683 ha. On this basis, CO₂ reductions resulting from enhanced forest management were assessed as being 9,795,852 tCO₂. After taking into account uncertainty levels, when CO₂ emissions are respectively reduced by 10%, 20% and 30%, assessment values for the volume of emission reductions come respectively to 8,816,267, 7,836,682 and 6,857,096 tCO₂ (p. 123, 125, *2 p. 16).

3) Absorption of CO₂ by forestation

Increases in CO₂ absorption volumes by forestation are handled based on the status of degradation of the land to become a forested area. The project developers estimated biomass of Mangroves utilizing

allometric equations with reference to a small-scale methodology for swamp forests that is found in UNFCCC's AR-CDM (AR-AMS0003). Biomass for 2009 was estimated at 10,714,853 tons (p.116, 121).

It is assumed that forestation would take place on both bare grounds (3,000 ha) and culture ponds (8,359 ha; half of the land in culture ponds is assumed to allow forestation). The following methodology indicated by UNFCCC was applied to volumes of CO₂ absorption resulting from tree groups following forestation.

Annual CO₂ sequestration attestable to groups of planted Mangrove trees comes to an average value of 29.8 tonCO₂/ha/yr, with CO₂ absorption volumes calculated for the 30-year duration of the project assessed at 6,418,473 tCO₂. Annual assessment values for volumes of CO₂ absorbed as a result of forestation under a singular project are classified as small-scale and large-scale projects depending on whether they exceed or fall under 6,000 tCO₂. Each scale has a separate methodology that serves as a reference: AR-AMS0003 and AR-AM0014, respectively.

Forestation activities under this project were judged to fall under a large-scale project due to their assessment values. Under the AR-AM0014 methodology for large-scale projects, base lines and leakage that could be treated as being zero under the AR-AM0003 methodology for small-scale projects have to be assessed. For this project, it will be necessary to assess base lines and leakage when applying the methodology for large-scale projects, which differs from that for small-scale projects as shown above.

Leakage (p.121)

One conceivable form of leakage within this project is the continuance of illegal logging. Mangrove litter contains significant carbon content. As Mangroves grow along tidal areas, carbon runoff due to such litter represents another potential form of leakage. Meanwhile, the use of fuel wood by communities and the consumption of fuel materials in connection with forest management also have the potential to produce leakage; however, such leakage would be small in scale. In the future, should forest management include thinning, it could potentially lead to leakage.

Total avoided emissions and sequestration

The final total values for this project obtained when combining the three CO₂ emission reduction and absorption values is assessed at 16,968,193 – 18,927,363 tCO₂. This feasibility study has illustrated that the reduction and absorption potential under this project comes to approximately 17,000,000 tonCO₂ (p.125).

The amount of credit after a buffer of 25% is subtracted from the above credit total was computed as 12,726,145~14,195,522 tCO₂. See the graph below for details (p.126; *2 p16).

Item	Estimates (tCO ₂)
(1) Forest protection	3,692,623
(2) Spontaneous remission and growth	6,857,096 – 8,816,267
(3) Forestation	6,418,473
Total	16,968,193 – 18,927,363
Estimates after subtracting buffer (25%)	12,726,145 – 14,195,522

Economic Analysis of REDD+ Project (pp.134-135, *2 P21-22)

We assess the viability of the project using the assumed conditions contained in the chart below.

Item	Amount	Unit	Remarks
Selected site	68,042	ha	According to results from satellite image analysis

area			
Selected forestation area	7,180	ha	According to results from satellite image analysis
Project term	30	Year	
GHG reduction volume GHG	16,968,193	t-CO ₂ /30 years	Minimum case
	17,947,778	t-CO ₂ /30 years	Average value
	18,927,363	t-CO ₂ /30 years	Maximum case
Buffered pool	25	%	Average value from existing VCS methodology employed. From a conservative viewpoint, compensation was not taken into consideration.
Unit sales price of credit	10	US\$/t-CO ₂	A unit price of 10US\$ was assumed based on the price range of voluntary credit created out of the REDD+ project.
Initial investment (Forestation expenses only)	10,846,154	US\$	Assumed survival rate of seedlings after planting of 70%
Share percentage	30	%	According to results of hearing with Ministry of Forestry
	50	%	
	70	%	
Depreciation	487,874	US\$/year	5%/20 years/straight-line methods
Rate of wage increase	9.90	%	Average value in last 3 years
Effective corporate tax rate	25	%	

Monitoring

- Climate monitoring

Under the plan for this project, a monitoring frequency of two years was established. This can be attributed to two reasons: to guarantee consistency with inventory reported for Indonesia every two years, and to factor in the creation period of credits generated after monitoring. In terms of the initial growth of forests, while two-year intervals might be considered as being short, the aim behind these intervals is to facilitate the circulation of funds by acquiring credits for periods of strong growth at an early stage (p.128). The monitoring items are position and area of selected project site; position of permanent sample plots; numbers of forested trees and life forms; position and area of debased land; status of simultaneous remission of debased land; information on satellite images regarding stand biomass; DBH; tree height; CO₂ absorption, reduction and sequestration (pp.128-129)

Reporting

At this current stage, no framework or rules for REDD+ have been finalized. Given this situation, it is difficult to conduct monitoring and reporting and issue reports on verification methods. The establishment of a system for reporting will be necessary in which inhabitants gather data and have it reviewed by specialists, etc. in a manner that guarantees that information's transparency and accuracy. In addition to a local review entity to verify monitoring results, local specialists for reviewing monitoring results may also be required (p.131).

Verification

With regards to verification methods, project developers believe that national-level rules within bilateral credit systems will be determined in the future. They expect that verification methods will be adopted that correspond to those rules (p.131).

Risks and risk management

See section on leakage

Progress and plans

- The status of the formation of a consensus with local parties regarding the implementation of a pilot project is as follows (p. 139 *2 p. 24).
 - Indonesia Ministry of Forestry: Agreement reached
 - OKI Regency Bureau of Forestry: Agreement reached
 - Chief of Sungai Batang Village: Agreement reached

Links

Project-related documents

- [YL Building Co., Ltd. Website](#)
- Mangrove REDD+ Project in South Sumatera Province, Republic of Indonesia
- [インドネシア共和国南スマトラ州におけるマングローブ REDD+プロジェクト](#)

Others

- [Energy Supply Association of Australia: Greenhouse Brief 17 August 2011](#)