A VERIFIED CARBON STANDARD (VCS) VERSION 3, PROJECT DESCRIPTION (PD)

AVOIDING UNPLANNED DEFORESTATION AND ENHANCING CARBON STOCK IN MERU BETIRI NATIONAL PARK, EAST JAVA, INDONESIA

By
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VCS VERIFIED CARBON STANDARD **PROJECT DESCRIPTION**: *VCS Version 3*

A VERIFIED CARBON STANDARD (VCS)_VERSION 3, PROJECT DESCRIPTION (PD): AVOIDING UNPLANNED DEFORESTATION AND ENHANCING CARBON STOCK IN MERU BETIRI NATIONAL PARK, EAST JAVA, INDONESIA

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Meru Betiri National Park area is located in Jember and Banyuwangi districts. Originally, it was assigned as a wildlife reserve to protect the endangered species of *Panthera tigris sondaica* (Javan Tiger/*Harimau Jawa*). The National Park covers an area of ± 52,681 ha[1] consist of various land types such as mountainous, hilly areas, lowland areas, coastal, and mangrove. The National Park has tropical rainforest ecosystem and is rich in biodiversity (more than 500 identified plant species). It is divided into five designated zones, namely core zone, intact forest zone, utilization zone, rehabilitation zone, and buffer zone.

The project activity aims to avoid unplanned deforestation and enhance carbon stock within the Meru Betiri National Park area. In order to achieve it, planting activities inside the rehabilitation zone will be conducted. Meanwhile, activities aimed to improve economic condition of local community will be implemented outside the rehabilitation zone as a way to support the sustainability of the planting activity.

Implementation of the project will involve various stakeholders, e.g. local community, NGOs, local government, the Ministry of Forestry, as well as ITTO for support in development of project design.

A study conducted by NGO KAIL in March-July 2012 classified tree density in the rehabilitation zone into six categories (Table 1). The planting activity has been targeted to reach the type 5 tree densitysince it is the one considered as providing highest economic benefits to local community.

Table 1. Categorization of tree density in MNBP's rehabilitation zone

Type	Number of Trees/ha	Description
Type 1	0	No trees, only food crops
Type 2	< 50	A few trees + food crops
Type 3	51 – 100	Rather dense + food crops
Type 4	101 – 150	Dense + food crops
Type 5	151 – 200	Dense + herbal/medicinal crops
Type 6	> 200	Dense, no crops

Trees to be planted in the project area are *Petai* (*Parkia spaciosa*), *Durian* (*Durio zibethinus*), Avocado (*Persea americana*), *Melinjo* (*Gnetum gnemon*), Jackfruit (*Artocarpus*

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[1]There are several versions of MBNP's total area. The Ministry of Forestry Decree No. 277/Kpts-VI/1997 stated total area 58,000 ha (including waters and the current enclave area). The numberused in this document is a result of recalculation process on MBNP 2010 satellite image—excluding waters and enclave area—, which was done in collaboration between CERIndonesia and the Forest Research and Development Agency. Objective of the recalculation was to get an updated data.

heterophilus), and *Pakem* (*Pangium edule*). Selection of trees is based on discussions with stakeholders especially the local community.

1.2 Sectoral Scope and Project Type

Scope of the project is to avoid unplanned deforestation (AUD) and enhance carbon stocks of forests that would otherwise be deforested. The project is a single project (not a grouped project).Illustration of the project scope is presented in Figure 1 below.

E - Avoided Deforestation of Degrading Forest
+ Carbon Stock Increase (optional)

Notations

- ——— Historical carbon stocks
- - - - - Projected carbon stocks (Baseline)
- ——— Project scenario carbon stocks
- Emission reductions always claimed
- Emission reductions optionally claimed
- ○ Mandatory *ex ante* measurements
- ○ Optional *ex post* measurements (for optional emission reduction credits)
- ● Mandatory *ex post* measurements

Figure 1. Illustration of project scope

1.3 Project Proponent

Proponents of the proposed project are listed below

Name of Entity(s)	Roles and Responsibilities
1. The authority of Balai Taman Nasional Meru Betiri, hereafter called MBNP	Main project proponent. Responsible for: (i) coordinating all project participants in the implementation of project activities, (ii) managing project activities, (iii) implementing carbon measurement and reporting, (iv) managing project verification process, and (v) distributing benefit from project activities
2. Non-Government Organization: LATIN and its local representative organization (KAIL)	Responsible for (i) assisting MBNP in designing project activities and addressing permanence and displacement of emission, (ii) facilitating community in implementing project activities and managementof leakage
3. Farmer Groups working in the rehabilitation area; many are inactive) hereafter referred to as Kelompok *Tani Rehabilitasi* (KTR[2])	Responsible for implementing project activities

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[2]Note: In each of five villages there has been KTR (*Kelompok Tani Rehabilitasi* – Rehabilitation Farmers Group) and SPKP (*Sentra Penyuluhan Kehutanan Pedesaan* – Rural Forestry Extensions Center). KTR was initiated by community and KAIL, while SPKP was established by MBNP Authority. Both groups aim to rehabilitate the degraded forest and increase the income of local communities.

4.	ITTO and *Seven and i Holdings Company*	Project Investors
5.	FORDA (Forestry Research and Development Agency) – Ministry of Forestry	Responsible for coordinating the research needed in development of PDD

1.4   Other Entities Involved in the Project

The district governments of Jember and Banyuwangi will be involved in wider scope of the project, such as in the following aspects:

- Assistance for farmers to gain market access for their agroforestry products (both raw material and processed one)
- Field assistance or extensions to empower local community (e.g. cultivation, establishment of cooperative, etc.)
- Improvement of public facilities, namely quality of roads and public transport for villages located in remote areas
- Assistance for farmers to gain access for initial investment if they want to expand their agroforestry business

1.5   Project Start Date

The project was started on January 1st, 2010.

1.6   Project Crediting Period

The crediting period is 20 years starting from January 1st 2010 to December 31st2030.

1.7   Project Scale and Estimated GHG Emission Reductions or Removals

The project is estimated to generate annual GHG emission reductions or removals of less than 1,000,000 t CO_2e during the project crediting period, therefore the project scale is "Project". See Table 1 for a more detailed information.

Project	X
Mega-project	

Estimated GHG emission reductions or removals were calculated from (i) reduced emission as a result of the reduction of deforestation rate, and (ii) GHG removals from carbon stock enhancement activities. The two aspects were calculated separately then cumulated in final calculation.

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Table 2. Estimated GHG emission reductions or removals during project period

Years	Estimated GHG emission reductions or removals (tCO2e), (Scenario)
2011	29,714
2012	29,716
2013	29,724
2014	29,734
2015	29,771
2016	29,852
2017	30,039
2018	30,444
2019	31,261
2020	32,781
2021	34,947
2022	38,927
2023	44,473
2024	51,442
2025	59,290
2026	67,103
2027	73,776
2028	78,298
2029	80,010
2030	78,768
Total estimated ERs	910,073
Total number of crediting years	20
Average annual ERs	45,504

1.8   Description of the Project Activity

Project activity aims for intervention that will convert some part of rehabilitation zone which currently fall in type 1—3 (equal to 1,750 ha out of [total] 2,535 ha rehabilitation land), to type 5—6. Description of the types can be seen in Table 1.

To guarantee sustainability and success of the program, there is a need to ensure economic benefit for local community, therefore giving them incentive to continue preserving the forest. The economic benefit can be obtained through the conversion of tree density from type 1—3 to type 5—6. Findings of tree census conducted by local NGO KAIL in rehabilitation zone of Curah Nongko Village shows that type 1 can generate an average annual income of IDR 12,630,000,while type 5 can generate annual income of up to IDR 30,749,200[3].

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[3]KAIL tree census also found that type 6 provides lower income for farmers compared to type 5. Aside from its higher canopy density, which hinder farmers to practice mixed cropping (means fewer products generated),the lower income is also caused by the selection of tree species selection. Most of type 6 was dominated by Trembesi (non-fruits).

To achieve its objective, the project will utilize strategies as presented in Figure 2 below

Project Strategies
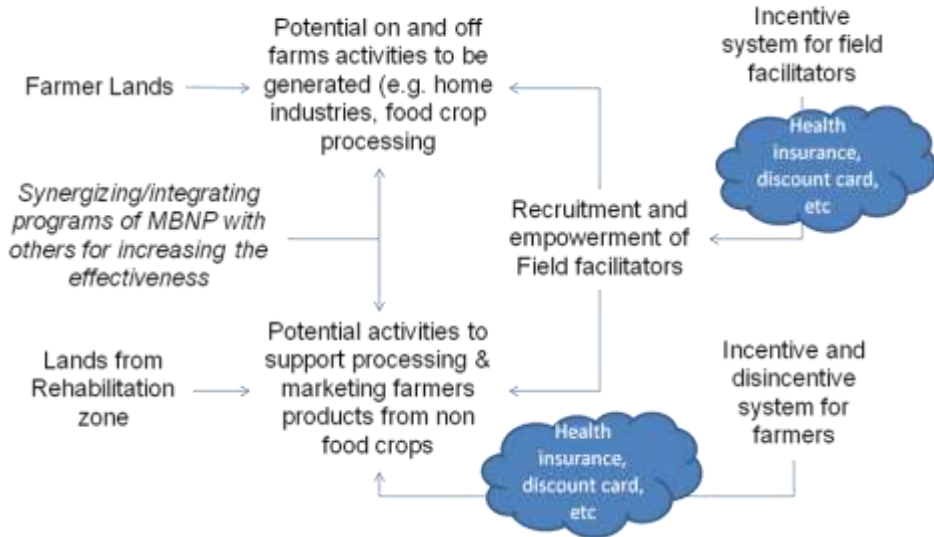
Figure 2.Proposed project's strategy.

There are three important actors within this strategy: local community, local NGO, and MBNP authority. Local community plays role in on-site rehabilitation, local NGO plays assistance role, and MBNP Authority plays monitoring and supporting role. To ensure sustainability of the rehabilitation activity, economic based activities related to non-timber forest products will be embedded in it to secure economic benefit for local community in the long term.

1.9   Project Location

Project activities are located in Meru Betiri National Park, geographically located at 113° 38' 38" – 113° 58' 30" East and 8° 20' 48" – 8° 33' 48" South. The area lies in Jember and Banyuwangi districts, East Java Province .
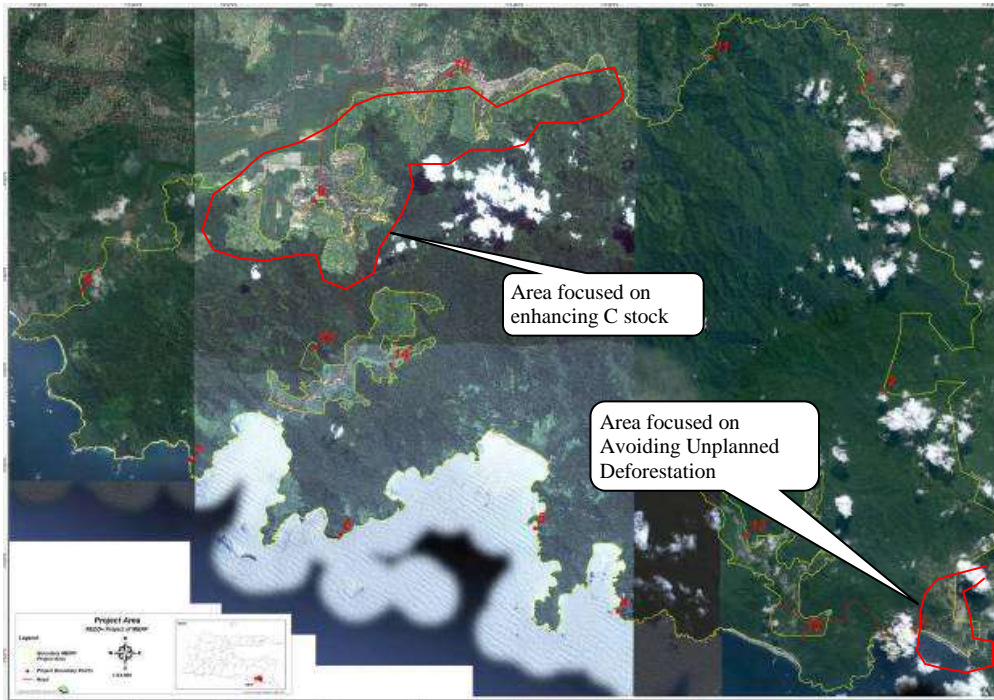
Figure 3. Project Location

1.10 Conditions Prior to Project Initiation

Chronology of the establishment of Meru Betiri National Park is as follows:

Date/Period	Description
21st June 1982	Based on Minister of Agriculture's decree No. 529/Kpts/Um/6/1982, Meru Betiri Wildlife Reserve area was expanded to also include the area of Bandealit and Sukamade plantation (2.155 Ha), a Forest Production area (teak, approximately 4.000 ha) belonged to PERHUTANI and coastal area (845 Ha).
23rd May 1997	Based on Ministry of Forestry's decree No. 277/Kpts-VI/1997, Meru Betiri is designated as a National Park with total area of 58.000 Ha, located in two districts area namely Jember District (37.585 Ha) and Banyuwangi District (20.415 Ha).

In the period of 1993-1995, LATIN (a national NGO based in Bogor) in collaboration with Bogor Agricultural University (IPB) conducted a research activity in MBNP. Objective of the research activity was to reforest the deforested area inside MBNP. It took 1 year to get the permit from MBNP Authority to conduct the activity. Meanwhile LATIN staffs based in Jember had been intensively approaching and raising awareness among community surrounding MBNP. The planting program finally started in 1995 in 7 ha area of MBNP rehabilitation zone.

The National Park experienced loss during political transition period in 1998. At the time, teak looting occurred, conducted not only by local inhabitants but also outsiders. The loss caused changes when later on the formerly teak forest was converted into agroforestry. According to the methodology applied for the project, the changes can be considered as "temporary un-stock".

Another major threat faced by MBNP is deforestation caused by farmers who live in five villages along the national park's border (Wonoasri, Curah Nongko, Andongrejo, Sanenrejo dan Curah Takir), where rehabilitation zone exists. A significant number of farmers (4,664 persons) turned piece of land (in average 0.25 ha/farmer) inside the rehabilitation zone into agroforestry. They also harvest forest products to generate additional income. Other threat comes from local villagers who illegally harvest from MBNP for housing or firewood. This activity creates area within MBNP (mostly in the rehabilitation zone), which can be categorized as "temporary un-stock".

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The following table provide list of regulatory framework for implementation of the proposed REDD project.

Policy/ Regulation	Description
Act Number 5/1990	Conservation of Natural Resources and the Ecosystems
Act Number 6/1994	Ratification of the United Nations Framework Convention on Climate Change
Act Number 41/1999	Forestry
Act Number 17/2004	Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change
Government Regulation No 6/2007	Forest and Forest Management Planning, and Forest Utilization
Government Regulation No 3/2008	Amendment of Government Regulation No 6 of 2007 on Forest, Forest Management Planning, and Forest Utilization
Government Regulation No 28/2011	Management of Conservation area. Particularly on utilization on non timber forest products
Minister of Forestry RegulationP.20/Menhut-II/2012	Implementation of the Forest Carbon Trading Project
Directorate General Forest Protection and Nature Conservation (PHKA) Regulation No. P.7/IV-Set/2012	Application and assessment procedures for registration and organization of DA REDD+ in conservation area

During the early stage of the project, there was hesitancy from MNBP to include community in it, especially in implementing the planting activity within conservation area. As formerly no planting activity was allowed to take place in conservation area. However, the rule has been revised and replaced by Government Regulation No. 28 of 2011 on Management of Conservation Area.

Important points on Government Regulation No. 28 of 2011that support the implementation of the proposed REDD project are:

- Chapter 1, article 1, paragraph 9;
  National Park is Conservation area which has the native ecosystem, managed by zoning system designated for the purpose of research, science, education, support cultivation, tourism, and recreation.
- Chapter 2, article 4, paragraph 2;
  Conservation area consists of: (a) National Park, (b) Forest Park (c) Nature Parks
- Chapter 3, article 12;
  The Conservation area such as national park is managed by central Government by establishing Management Unit under Ministry of Forestry.
- Chapter 3
  Article 13;
  Activities on the Conservation area include: (a) Planning, (b) Protection, (c) Preservation, (d) utilization, (e) Evaluation of functionalities.
  Article 25
  Preservation activities include: (a) management of plant and animal and their habitat, (b) establishment of wildlife corridors, (c) ecosystem restoration, (d) area closing.
  Article 29
  Point (2): Ecosystem Restoration activities include: (a) Nature mechanism, (b) Rehabilitation, (c) Restoration.
  Point (4): Rehabilitation activity is implemented by planting and enrichment of native species.
  Point (5): Restoration activity is implemented by maintaining, protecting, planting, and enriching native species, as well as animal.
  Article 35:
  Point (c) National Park is feasible for Carbon storage and sequestration activities

Based on the abovementioned points, it is clear that implementation of the proposed project is applicable for conservation area such as MBNP.

1.12 Ownership and Other Programs

1.12.1 Proof of Title

The land status of the project area is National Park which is controlled and managed by Ministry of Forestry (MoFor). The MoFor assigned "National Park Office" (*Balai Taman Nasional*) to manage the national park. Meru Betiri National Park has been officially established since 1997 by regulation "SK Menteri Kehutanan No. 277/Kpts-VI/1997", and automatically at the same time Meru Betiri National Park Office has been established. Please see separated file titled: TN Meru Betiri.pdf for copy of the regulation.

Meru Betiri National Park Office will be the main Proponent holding the permit for the REDD implementation project in Meru Betiri National Park. Local community surrounding the project area who represented by "*Kelompok Tani Rehabiltasi*" (farmer groups) will be involved as an active project participants who take care of all the trees, and monitor the planting and maintenance implementations. The Memorandum of Understanding between Meru Betiri National Park Office and *Kelompok Tani Rehabilitasi* about the implementation

of REDD+ project which involves local farmer groups was signed in 2012. Please see Appendix 4.

1.12.2 Emissions Trading Programs and Other Binding Limits

Based on the Ministry of Forestry Regulation No. 20/Menhut-II/2012 article 8 point 5, 51% of GHG emission reductions or removals generated by the project will be used to for national target needs, the remaining 49% can be traded to foreign country. The project proponent has options to sell the carbon credit to domestic buyer or international buyer.

1.12.3 Participation under Other GHG Programs

The project will only be registered under VCS standard.

1.12.4 Other Forms of Environmental Credit

The project will only follow and registered to VCS standard.

1.12.5 Projects Rejected by Other GHG Programs

The project has not been registered to other forest carbon standard. The project will only be registered under VCS standard.

1.13 Additional Information Relevant to the Project Leakage Management

N.A
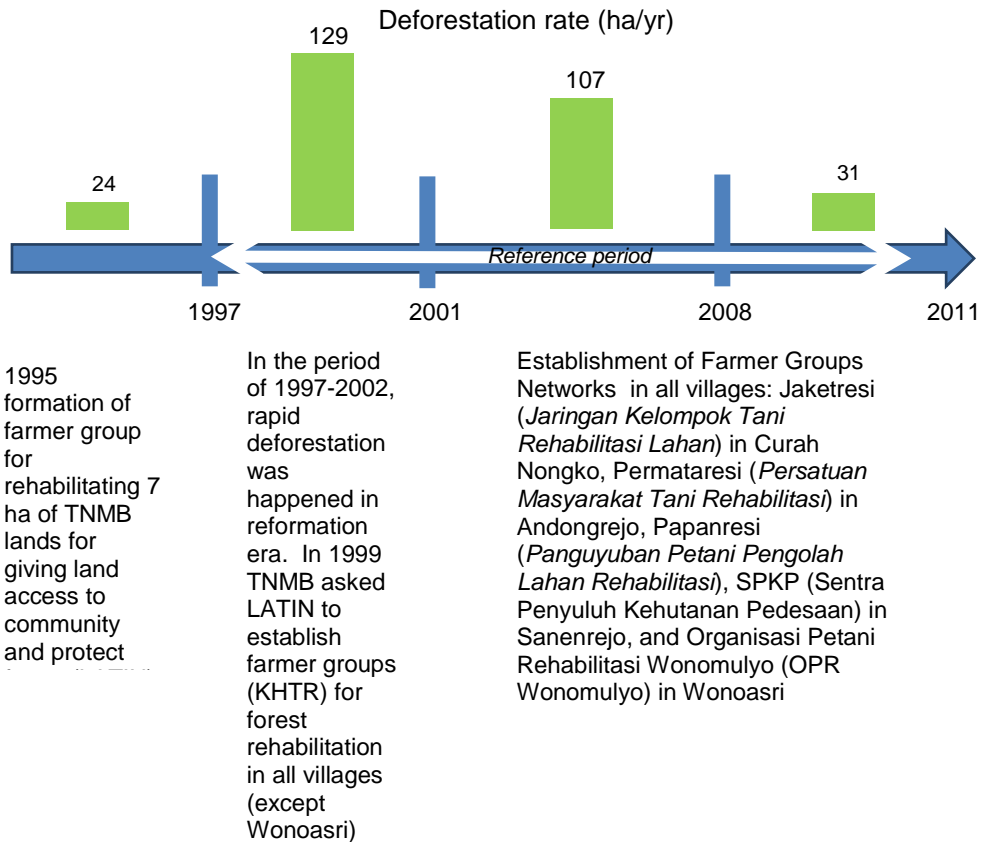
Figure 4.Historical deforestation rate in MBNP

Based on the data presented in Figure 4 which consistently shows a decreased trend, it is predicted that there will be no leakage occurs during REDD implementation. Moreover, the fact that rehabilitation zone belongs to MBNP Authority and the local community is granted special permission to utilize it, will prevent local community to do deforestation. In addition to strict law regarding deforestation, the community will lost their permit in rehabilitation zone.

Other reasons that support the projection are:

a. Based on a report from the MBNP Authority and input from local NGO KAIL, it was discovered that after involving local community in reforesting and maintaining rehabilitation zone, deforestation rate in MBNP is decreasing. Since implementation of the REDDproject will provide economic benefit to local community from harvesting and selling of non timber forest products or mainly fruits, it will provide incentive for them to keep the sustainability of forest.

b. Based on the interview at community level (with Head of Wonoasri Village and Secretary of Sanenrejo Village) and assessment of land topography, it was found that it is difficult to shift the agriculture activities to other forestland area since the remaining forestland is located at extreme topography ($> 40^{0}$).

c. Other possibility is shifting the agriculture activities to forest area behind the hill, which is quite far and should be done in-group, otherwise the wild animal will destroy the new opened farm. In such case the cost to cultivate this land is very high and the agricultural activity will not be profitable anymore. It will discourage people to shift their agriculture activities to other forest area.

d. The commodities cultivated by the farmers are regular food crop and not having a huge amount of market demand. Therefore the possibilities of having this agriculture activities shifted somewhere else is quite small since there is no market driven.

Thus, based on the abovementioned considerations, leakage management is not needed for the proposed REDD Project.

Commercially Sensitive Information

During discussions with local villagers, the use of "carbon trading" or "REDD-type ofproject" terms was consciously avoided. It is intended to avoid creating "project mentality" among villagers which will cause the tree planting will mainly be driven by the urge to get money.

Moreover, there is no guarantee that the carbon credit generated from this project will generate money due to uncertainty in demand for carbon credits generated from such projects.

However, MBNP Authority and local NGO KAIL have socialized the basic concept of carbon trading mechanism and REDD (reducing emission from deforestation, reducing emission from forest degradation, improving forest carbon stock, and conserving forest carbon stock) during their communication and assistance with local community prior to project's initiative.

We consider this approach as not violating Free Prior Informed Consent Principle. Moreover, the fact that local communities are granted with opportunity to manage agroforestry inside MBNP rehabilitation zone to get additional income is an incentive on its own.

Further Information

Even though there is no leakage projected in the future, there are some activities that potentially lead to forest degradation that possibly occur despite project implementation. It is because local communities need the resources and livelihood for everyday living. Therefore, it is important to think and be prepared with some supported program—as mitigation effort.

This mitigation programs is categorized as off rehabilitation zone activities in project strategies. Please see Table 3 for more detailed information.

Table 3. List of activities leads to forest degradation and proposed mitigation program

No.	Activities Lead to Forest Degradation	Proposed Mitigation Program

1	By implementing carbon stock enhancement program in rehabilitation area, the chance for villagers to cultivate food crops will be reduced over time (average estimation: after 15 years) due to increased tree canopy coverage. Considering the population growth and no new/additional agriculture land available, it is possible that there will be a serious pressure upon food production. To deal with it, villagers may go inside the conservation area (natural forest) of MBNP to harvest rattan, fire woods, and wild animals (e.g. endemic birds), and sell it to get cash for buying food. This will create pressure on MBNP biodiversity.	a. Birth Control Campaign Program
		b. Food Security Program
		  - campaign and education for women group about food diversification
		  - increase home garden utilization - farmers school using demonstration plot
		  - rice subsidy for the best managed rehabilitation land
		c. Commercial tree selection for carbon enhancement program to provide alternative livelihood for villagers
		d. Develop small scale added value home industry to provide alternative livelihood for villagers

2	To fulfill the need of wood for housing, villagers may go inside the conservation area (natural forest) of MBNP to cut the tree. It is easier to cut the tree inside the forest due to limited number of forest rangers or National Park Authority Patrol (compared to cut the tree from rehabilitation area where unintended monitoring is easily done by local NGO and peer farmers).	a. Allocate a piece of village owned land (*tanah bongkor*) as timber plantation, collectively managed by villagers. b. Develop timber plantation business for some farmers who own private land outside rehabilitation area.
3	To fulfill the need of bamboo for agriculture cultivation and/or instant cash, villagers may go inside the conservation area (natural forest) of MBNP to harvest it.	a. Incorporate bamboo cultivation in carbon enhancement program on rehabilitation area/home garden b. Develop timber plantation business for some farmers who own private land outside rehabilitation area.

Currently, there is one example of mitigation/prevention measure initiated by local NGO KAIL in 2012. They call it "Smart Card Scheme". In this scheme, farmers who can cultivate tree (in rehabilitation land) up to 5—6 typology (see Table 1) will get a form of reward called "Smart Card" which entitle them to discount when they shop in selected stall in Curahnongko Village. The monitoring and measurement on the growth of the planted trees in each plot of rehabilitation land is conducted in collaboration with KTR (*Kelompok Tani Rehabilitasi*). The fund to support the program was collected by LATIN/ KAIL from personal donation and grant from small donors.

Co-Benefit for Local Community

The proposed project will create co benefit for local community, namely in the field of social, economic and environmental. The overall co benefit is presented in Table 4.

Table4. Co Benefit (Social, Economy, and Environment)

Social	Economic	Environment
Existing Condition		
• Less intensive assistance from MBNP and local NGO for farmers • Few women empowerment program	• Income mainly from crops harvest • Few additional income from selling raw harvest from agroforestry	• Water scarcity • Degraded forest • Seasonal forest animal invasion • Flood and land slides
Projected Condition		
• Potential women empowerment through home industry for agroforestry products • More intensive assistance from MBNP &local NGO for farmers • Certainty for farmers in maintaining rehabilitation zone	• Additional income from agroforestry products such as fruits • Potential additional income from home industry	• Improved quality of the forest • Improved hydrological system • Expanded grazing/roaming range of forest animals

2   APPLICATION OF METHODOLOGY

2.1   Title and Reference of Methodology

Approved VCS Methodology VM0015 Version 1.0, Sectoral Scope 14: Methodology for Avoided Unplanned Deforestation.

2.2   Applicability of Methodology

This project applies VCS Methodology VM0015 Version 1.0 since it gives option to consider the effort in avoiding unplanned deforestation and carbon stock enhancements in MBNParea that otherwise would be deforested. However, credits for reducing GHG emissions from avoided degradation are excluded from the calculation. Only credits for forest carbon stock enhancement will be calculated.

The methodology has no geographic restrictions and is applicable globally under the several conditions. These conditions and the applicability of the methodology to the MBNP project are elaborated in Table 5.

Table 5. Applicability of Methodology

Condition	Applicability
Baseline activities may include planned or unplanned logging for timber, fuel wood collection, charcoal production, agricultural, and grazing activities as long as the category is unplanned deforestation according to the most recent VCS AFOLU requirements.	The project area is within Meru Betiri National Park which is very restricted for other land use outside conservation. All activities that lead to deforestation are illegal and unplanned. Forest degradation is mostly driven by land clearing activities for agricultural practices and/or unplanned timber and other forest products harvesting.
Project activities may include one or a combination of eligible categories defined in the description of the scope of methodology (Refers to table 1 and figure 2 in Approved VCS Methodology VM 0015 Version 1.0 Sectoral Scope 14 document).	The project activity is categorized as avoiding deforestation of degrading forest and increasing forest carbon stock within the project area.
The project area can include different types of forest, such as, but not limited to, old-growth forest, degraded forest, secondary forests, planted forests and agro-forestry systems meeting the definition of "forest".	The project area consists of primary forest and agroforestry which are categorized as forest land. Indonesia has announced national forest definition and has submitted it to UNFCCC. According to it, forest is land with area of>= 0.25 ha, has crown cover of>= 30% and the average tree height is >= 5 meters.
At project commencement, the project area shall include only land qualifying as "forest" for a minimum of 10 years prior to the project start date.	The project area only covers forested land (primary forest and agroforestry land). The condition of the project area is qualified as "forest" for 10 years prior to the project's starting date. It was proven by analysis on 2001 and 2010 satellite images.

Condition	Applicability
The project area can include forested wetlands (such as bottomland forests, floodplain forests, mangrove forests) as long as they do not grow on peat. Peat shall be defined as organic soils with at least 65% organic matter and a minimum thickness of 50 cm. If the project area includes a forested wetlands growing on peat (e.g. peat swamp forests), this methodology is not applicable.	There is no peat within the project area.

2.3   Project Boundary

Reference region for spatial boundary of the project is following the official boundary of the Meru Betiri National Park as stated in a publication by The Directorate General for Forest Planology. Meanwhile, project area refers to the National Park's rehabilitation zone within its conservation area (Figure 5).
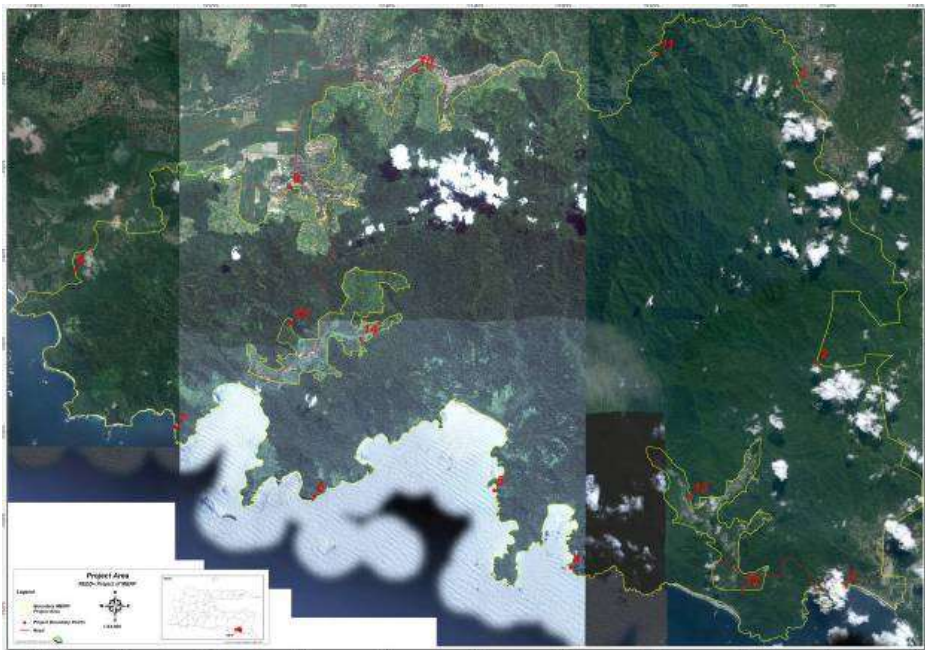
Figure 5. Project area

Geographical points of the reference region are listed below:

Point ID	Longitude	Latitude	Point ID	Longitude	Latitude
1	113.9217	-8.3685	8	113.6486	-8.4389
2	113.9296	-8.4740	9	113.7302	-8.4078
3	113.9403	-8.5578	10	113.7778	-8.3637
4	113.8361	-8.5513	11	113.8691	-8.3573
5	113.8072	-8.5221	12	113.9011	-8.5598
6	113.7392	-8.5244	13	113.8815	-8.5245
7	113.6869	-8.4985	14	113.7567	-8.4647
			15	113.7305	-8.4589

The leakage belt will not be defined in this project activity, since it is projected that there will be no leakage caused by implementation of the proposed project (for reasons as described in section 1.13: Leakage Management). Furthermore,the forest area outside the project boundary is under private estate plantation, which has a good management and involving local community to protect the forest area.

The following Table 6 and 7 presents identified relevant GHG sources, sinks and reservoirs for the proposed REDD+ project and its baseline scenarios.

Table 6. Carbon pools/sink

Carbon pools	Included?	Justification
Above ground	Yes	Carbon stock change in this pool is considered significant under the planting program
Below ground	Yes	Optional and recommended but not mandatory
Dead wood	No	Carbon stock change in this pool might benot significant
Litter	No	Not to be measured according to VCS Program Update of May 24th, 2010
Soil organic carbon	No	As mineral soil, carbon stock change in this pool might benot significant

Table7. Sources of greenhouse gases

Source		Gas	Included?	Justification/Explanation
Baseline	Biomass burning	CO_2	No	Counted as carbon stock change
		CH_4	No	No CH4 resources such as Peatland in the project area
		N_2O	No	Considered insignificant according to VCS Program Update as of May 24th, 2010
		Other	-	-
	Livestock emissions	CO_2	No	Not a significant source
		CH_4	No	Not a significant source
		N_2O	No	Not a significant source
		Other		
Project	Biomass burning	CO_2	No	Counted as carbon stock change
		CH_4	No	Not a significant source

Source		Gas	Included?	Justification/Explanation
		N_2O	No	Considered insignificant according to VCS Program Update as of May 24th, 2010
		Other		
	Livestock emissions	CO_2	No	Not a significant source
		CH_4	No	Not a significant source
		N_2O	No	Not a significant source
		Other		

2.4   Baseline Scenario

On 1982 MBNP area has been extended to the northern part, covering teak plantation area of "PERHUTANI" (a state-owned timber state company). Based on satellite image data, it is known that the teak plantation still remains in the beginning of 1997 with total area of approximately 1,600 ha. Later on, during 1997 to 2001, there were rapid changes: the whole area of teak plantation was converted to agroforestry. Although there were changes on vegetation types, the land status still considered as a forest because there are tree-replanting activities after the teak trees has been logged.

Baseline activities and project activities may include harvesting of timber, fuel-wood collection and charcoal production. Since many activities related to agriculture expansion occur in MBNP and give significant effect to deforestation, agriculture activities are included in the baseline.

Analysis on historical land use and land cover change
Land cover changes has been analyzed on lands with no changes in its category and lands converted to a new land cover category, as presented in Figure 6 below.
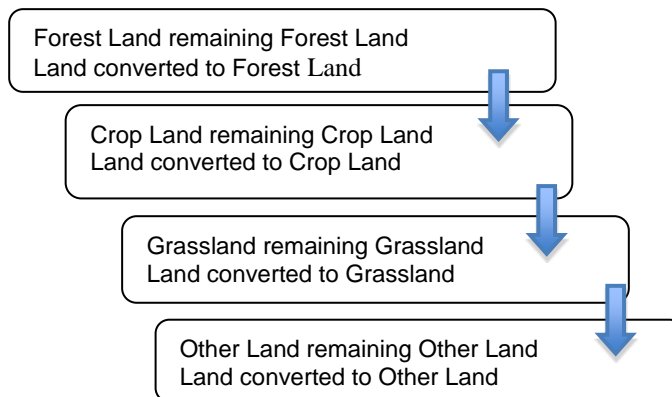
Figure 6. Steps of land cover changes analysis**.**

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Analysis on land cover changes were conducted using data from 2001 to 2010. The changes represent what was happened during that period in terms of community activities. The result of land cover changes on 2001-2010 is provided in Table 8.

Table 8. Land cover changes within period of 2001-2010

Land cover changes		Area (hectare)
LC2001	**LC2010**	
Forestland	Cropland	276
	Agroforestry	517
	Grassland	6
Total		799

Forestland (natural forest) converted to non-forestland (Cropland and Grassland) from 2001 to 2010 is about 282 ha. Thus, annual rate of deforestation is about 28.2 ha/year. For the next ten years 2011-2020 and 2021-2030 the trend is projected to continue under deforestation rate of 27.8 ha/year, and 27,4 ha/year.

Assessment on carbon stock

Carbon stock assessment in the area within MBNP was conducted by MBNP Authority according to guideline provided in Appendix 3 of this document. There are 40 plots distributed within MBNP used for carbon stock assessment (See Figure 6). These plots, which will also be used as Permanent Sample Plot (PSP), represents forestland, cropland, agroforestry, and grassland land cover categories.

Figure 7. Permanent sample plots inside MBNP area

18
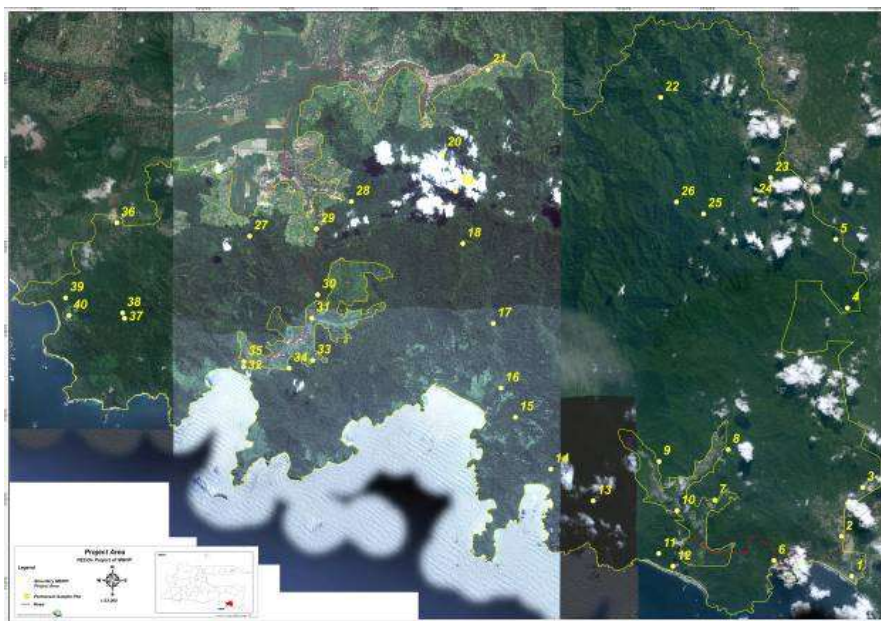
By following the selected guideline of carbon stock assessment, each land cover category within MBNP will have carbon stock value as presented in Table 8. These values represent carbon stock at maximum capacity (it is projected that there will be no significant increment). The only exception is for agroforestry category, as carbon stock for this category still have the potential to increase.

Table 9. Carbon stock for each land cover category

Land Cover	Carbon Stock (tC/ha)
Forest land	148.7
Grass land	7.2
Crop land	2.9
Agroforestry (existing condition, not the optimum condition)	28.7

The values presented inTable 9 were used in the emission calculation.

Analysis on agents, drivers, and underlying cause of deforestation and its future development

Series of discussions and interviews with local communities were conducted since the project's initiation, in order to identify the drivers of deforestationand/or increase of forest cover. On the discussions, it was found out that main actors in decreasing or increasing forest cover is local communities from five villages around MBNP, namely Wonoasri, Curah Nongko, Andongrejo, Sanenrejo and Curah Takir. Their daily activities such as collection of fire woods, hunting of forest animals, and harvesting of forest products to earn additional income, as well as occasionalland clearing for agriculture and (most likely illegal) tree logs for sale or housing renovation cause deforestation in the National Park. On the other hand, the also conduct agroforestry activities that lead to increase of forest cover.

For agroforestry activities in average farmers ownlarger agriculture land on areas outside MBNP compared to the area inside rehabilitation zone that they occupied. The proportion is more or less 30%-70%. Itindicates that their income from agroforestry in rehabilitation zone is smaller than those from agriculture land outside MBNP. According to the farmers, they can generate net income of IDR. 4,000,000/year, only from crops products such as peanut and corn they cultivate in rehabilitation zone. Regardless of its small value, farmers still need the additional income and thus they keep practicing the agroforestry activity inside the National Park.

Since the rehabilitation zone is located next to primary forest, local communities existence can lead to two possibilities in the future. First, they will become a huge threat thatdestroy the forest if there is no intervention and second they can be an important actor to increase the forest cover. Summary of analysis is presented in Table 10.

Table 10. Agents, drivers and underlying causes of deforestation

Agent of Deforestation	Drivers	Underlying Cause
Local inhabitants from five villages around MBNP: - Wonoasri - Curah Nongko - Andongrejo - Sanenrejo - Curah Takir)	Wood harvesting for building/renovating houses	- Forest is the cheapest wood source available - They do not have enough money to buy wood for housing - Lack of law enforcement from National Park Authority due to lack of forest rangers
	Wood harvesting for firewood	They do not have money to buy other fuel source
	Needs for additional income	No alternative sources of income
	Land clearing for agriculture	Villages are located in areas far from other economic activities thus agriculture is the only accessible employment. Since most farmers have no enough money to purchase lands to expand their farming area, land clearing in forest area is their only option.

Identification of existing rehabilitation activities

Identification of existing rehabilitation activities was conducted to find out if there was any measure conducted on the proposed project site and what are the result as well as continuation of the measure. Since the proposed project is located in conservation area, such measure is likely to be initiated by the National Park's authority (see Table 11)

Table 11. Rehabilitation activities conducted by MBNP Authority

2002	2003	2004	2005	2006	2007	TOTAL
400	375	300	150	703	607	2,535

Source: MBNP Authority, 2012

Table 10 shows that within the period of 2002-2007, MBNP Authority was able to replant the entire 2,535 ha of rehabilitation zone (with planting distance of 5m x 5m, or 400 trees/ha). This result is then used to assume that MBNP Authority is able to conduct planting activity with rate of 422.5 ha per year.

However, the result was not satisfying since based on an assessment conducted by MBNP in 2010, survival rate of the rehabilitation activity is only about 31 % or 124 survived trees per hectare.[4]

There are several factors that influenced the success of the rehabilitation, such as:

- The seeds were provided directly by MBNP Authority. According to farmers the seeds were not suitable with the farmers' request. The farmers prefer to plant fruit tree species rather than forestry species (such as Trembesi, a non-fruiting species, which is not able to generate additional income)
- The farmers feel reluctant to plant the trees. They are worried if they will not be able to do agriculture practices once the trees were growing up due to canopy density.
- Planting schedule was not considering local climate (particularly the beginning of rainy season), sometime the seeds were provided within dry season.
- There is no support system/program to anticipate when there is a water scarcity. Thus integrated water management system is needed for the success of the proposed project.
- Farmers are lack of capital to do proper maintenance (e.g renting water pump, applying fertilizer)
- There was no regular maintenance and evaluation program from government. The fund was usually only disbursed for planting program and nothing for the maintenance.
- Limited extension workers/field assistances to assist farmers. The farmers needed to be assisted and to be convinced that a good agroforestry system will give more benefits rather than cropping activities.

The percentage of survivals were also differs between villages. The following Tableshows standing trees on the rehabilitation zone based on its surrounding village.

Table 12. Standing trees on the rehabilitation zone

No	Village	Farmers group	Rehabilitation area (ha)	Percentage of planted trees (%)*
1	Wonoasri	25	650	61.91
2	Curahnongko	17	430	23.50
3	Andongrejo	28	650	19.74
4	Sanenrejo+Curahtakir	36	805	18.77
	Total		2,535	Average = 31%

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[4] The number is then compared with the result of Gerakan Rehabilitasi Lahan dan Hutan (GERHAN) or Forest and Land Rehabilitation Movement in West Java as reference. The survival rate of GERHAN in West Java is 26% (Boer, 2012)This program is intended to restore forest damage occurred in recent years. Currently, deforestation reached 1.18 million ha / yr, but the ability to rehabilitate are far below. This is mainly due to the limited budget that can be allocated to this activity. The legal basis for GERHAN is Presidential Decree number 89 of 2007 whereby the Minister as Chairman of the Implementation Coordination Team and Forestry Minister as Administrator.

* Planting space 5m x 5m (1ha = 400 trees)

(Source: survey on rehabilitation zone, MBNP Authority 2010)

According to Table 11, highest number of standing trees are exists within Wonoasri area, this is because most farmers in Wonoasri have alternative economic activities such as working in plantation companies located nearby their village. Their village's location is also closer to the center of subdistrict, providing easier access to market etc.

2.5 Additionality

Additionallity of the proposed project is assessed using VT0001: Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities Version 3.0.

The following four steps were applied:
- STEP 1. Identification of alternative land use scenarios to the AFOLU project activity;
- STEP 2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or
- STEP 3. Barriers analysis; and
- STEP 4. Common practice analysis

Step 1. Alternative Land Use Scenario

The main land use scenario in Meru Betiri National Park is conservation. The area within MBNP including rehabilitation zone is very restricted for other land use outside conservation. The single land use is regulated by Act Number 5 of 1990 on Conservation of Natural Resources and the Ecosystems, and Government Regulation No 28 of 2011 on Management of Conservation Area. Thus, based on this analysis, the proposed project shows no additionality.

However, considering the baseline situation, in which:

- tree density is 124 trees/ha, success rate of replanting program of 31.89%;
- the schedule of seeds distribution from government's aid was way behind planting season;
- lack of field assistants; and
- farmers are in general lacking in capital to implement proper seedling maintenance (such as renting water pump to water the land, apply fertilizer, etc).

*The government funding was only allocated for seedling, not maintenance*Clearly, there is a need of intervention to achieve sink (forest carbon stock) enhancement. Without intervention from the proposed project, it will be difficult to increase average number of trees per hectare in rehabilitation zone of MBNP.

Moreover, it is projected that most likely there will be no new replanting program in near future. It is because the funding from National Government for replanting/species enrichment program has been fully disbursed and the program is considered finalized. This

is the basis argument to see the proposed project activity as additonality, while the current situation is selected as baseline scenario.

Step 2. Investment Analysis

To determine whether the proposed project activity, without the revenue from the sale of GHG credits is economically or financially less attractive, a simple economic calculation was conducted on agroforestry business in rehabilitation zone by planting scenario. The result is presented in Table 13[5].

Table 13. Economic calculation of proposed project by planting scenario*

Baseline	Success Rate	Investment Cost ** (US$/year)	Net Present Value (NPV) – US$***			Internal Rate of Return (IRR)	Estimated income from CER (US$)****
			6.8%	7%	8%		
Scenario 1 160 trees/ha	37.5%	575,444	33,529,664	32,974,828	30,397,03	1%	3,701,190
Scenario 2 200 trees/ha	45%	665,339	34,776,633	34,189,199	31,461,34	8%	4,535,440
Scenario 3 300 trees/ha	75%	760,833	38,849,397	38,169,669	35,015,84	19%	6,621,075

Note:

* calculation was done for rehabilitation zone which is fall under type 1—3 (or equal to 1,750 ha)

** for 6 consecutive years components: cost of labour, seedlings, fertilizers, pump rent for watering the land, fee for field assistance

*** NVP is calculated for fruit harvesting period of 20 years. Small discount factors is selected considering that this project can be categorized as a social investment

**** the income is calculated based on the multiplication of potential CO_2 emission reduction with CER price per ton CO2e. The assumption of CER price is 5US$ per ton CO2e.

From Table 13, it is found out that the cost of planting program is still smaller than the annual income. It is supported with the positive value of NVP[6]. The IRR itself was calculated only from the selling of fruits; excluding the income from carbon trading. Even though the recorded IRR are quite low (below 21% threshold of feasible regular business), the income from carbon trading can be considered as interesting financial benefit that the proposed project can bring to local community.

Based on analysis in step 2, it is concluded that the proposed project is likely to be financially attractive. Then the project activity cannot be considered additional by means of financial analysis. Therefore barrier analysis (step 3) is conducted to prove that the proposed project activity faces barriers that do not prevent the baseline land use scenario(s) from occurring.

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[5] For a more detailed calculation, please see separated file titled Economic_Meru Betiri_Dollar.xls

[6] The net present value (NPV) and internal rate of return (IRR) are two most-used measures for evaluating an investment.

Step 3. Barriers Analysis

Based on economic calculation, the existing planting activities and added value chain (which is further developed with the proposed project) has positive impact in optimizing livelihood of local communities in MBNP. Thus, it is actually cannot be categorized as additionality since it is profitable.

However, there are some barriers that made the business are not well developed up to know, such as:

  a. No clear agreement between MBNP Authority and local communities regarding utilization of rehabilitation zone as agroforestry. It causes insecure feeling for local community. They are afraid that once the tree is growing they will be chased out from rehabilitation zone and cannot harvest the fruit.

  b. Farmers do not have access to capital to support and develop the business. It is almost impossible for them to lend the money from the bank since they do not have collateral.

  c. Other source of financial support is government funding, namely "Hutan Kemasyarakatan Scheme" from Ministry of Forestry. However due to (i) difficult bureaucracy, (ii) institutional obstacle, and (iii) high transaction cost, only 1% of the funding has been disbursed to society.

Thus, based on the result of Barrier Analysis, the proposed project can be considered as additional.

Step 4. Common Practices Analysis

For the last 10 years (prior to the project's starting date), MBNP Authority has conducted several rehabilitation activities (replanting and/or species enrichment program). For more detailed information please see Table 10 Rehabilitation activities conducted by MBNP Authority.

Table 10shows that since 2002 to 2007, MBNP Authority was able to plant the trees in entire 2,535 ha of the rehabilitation zone (with planting distance of 5m X 5m, or 400 trees/ha). It means that MBNP Authority is able to conduct planting activity with rate of 422.5 ha per year. Based on rapid assessment conducted by MBNP in 2010 the survival rate is only about 31 % or 124 trees are survived in 1 (one) ha of land.

This result is also supported by the finding from KAIL tree census conducted in MBNP rehabilitation zone in 2012. The recorded survival rate is 31.89%. The quantitative result of each typology is presented in Figure 7.
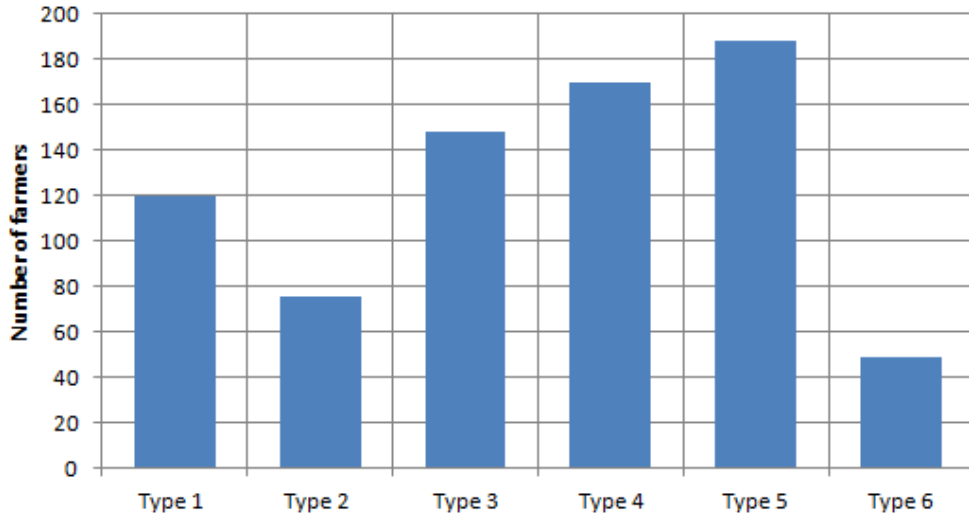
Figure 7. Permanent sample plots inside MBNP area

The main differences between the proposed planting activities under the proposed project and government program lay on:

- the maintenance program
- availability of field assistances
- tree species selection

Based on analysis on current government planting program, these are three crucial factors that may lead to the improvement of the planting program. Therefore the proposed project will set a funding allocation to cover the maintenance program. It will also ensure adequate number of field assistance to help local communities. And lastly, the tree selection species will be will be directed to fruit trees that can generate additional income for local communities.

Thus, based on common practices analysis, it can be concluded that the proposed project activity is not the baseline scenario and, hence, it is additional.

2.6 Methodology Deviations

N.A

3   QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1   Baseline Emissions

Historical emissions

Historical GHG emissions are calculated from the land cover changes matrix (Table 14) and the matrix of carbon stock for each land cover category (Table 9). Stock difference method will be used for calculation. GHG emissions that can be claimed based on the selected methodology are only emissions from deforestation practices, while emissions from forest degradation cannot be claimed. Land cover changes that categorized as deforestation is only forestland converted into non-forestland (cropland and grassland).

Table 14. Land cover changes area matrix, 2001 to 2010 (ha).

Years/ Land Cover		2010				
		Cropland	**Agroforestry**	**Forestland**	**Grassland**	**Total**
2001	**Cropland**	403	0	0	0	403
	Agroforestry	0	2,018	0	0	2,018
	Forestland	276	517	47,637	6	48,436
	Grassland	0	0	124	1,700	1,824
	Total	679	2,535	47,761	1,706	52,681

Source: Spatial analysis by CER Indonesia, 2012.

Forestland (natural forest) changedinto cropland and grassland during 2001 to 2010 is about 282 ha, in which 276 ha was changed into cropland while 6 ha were changed into grassland. Thus, the annual deforestation rate is about 28.2 ha/year.

In order to identify the GHG emissions from those land cover changes, the carbon stock of each land cover classes presented in Table 20 should be referred.

To calculate total GHG emissions from deforestation practices during 2001 to 2010 within MBNP, we used fundamental carbon emission calculation from deforestation and forest degradation published by REDD sourcebook (GOFC-GOLD). The formula is described below.

$$\Delta C = \frac{(Ct2 - Ct1)}{(t2 - t1)}$$

Where:

ΔC = annual carbon stock change in pool (t C/yr)

Ct1 = carbon stock in pool in at time t1 (t C)

Ct2 = carbon stock in pool in at time t2 (t C)

Note: the carbon stock values for some pools may be in t C/ ha, in which case the difference in carbon stocks will need to be multiplied by an area.

GHG emissions (t C) = [Deforestation area, forestland converted to cropland, ha (from 2001 to 2010) X carbon stock change, t C/ha, forestland >< cropland] + [Deforestation area, forestland converted to grassland, ha (from 2001 to 2010) X carbon stock change, t C/ha, forestland >< grassland]

= 276 ha x (148.7 - 2.9)t C/ha + 6 ha x (148.7 – 7.2) t C/ha

= 40,240.8 t C + 849 t C

= 41,089.8 t C ≈ 150,662.6 t CO_2e

Annual GHG emissions = 41,089.8 t C : 10 years

= 4,108.98 tC/year

= 15,066.3 t CO_2e/year

Total GHG emissions from deforestation practices in 2001 to 2010 within MBNP national park is about 150,662.6 t CO_2e or annually 15,066.3 CO_2e/ year. This number is quite significant, considering that MBNP is a National Park in which by law is a protected area with restricted access and a strictly prohibited land use aside from conservation.

Projected emissions

Emission projection in the next ten years (2011-2020) within the project area were assessed using land cover change probability, which was estimated from the transition of land cover from 2001 to 2010. The trend of changes in each land cover classes was used to define the change probability in the future. The calculation is presented in Table 15below

Table 15. Transition probability matrix

2001/2010	Cropland	Agroforestry	Forestland	Grassland	Total
Cropland	403/403 = 1.000	0.000	0.000	0.000	1.000
Agroforestry	0.000	2,018/2,018 = 1.000	0.000	0.000	1.000
Forestland	276/48,436 = 0.0057	517/48,436 = 0.011	47,637/48,436 = 0.984	6/48,436 = 0.0001	1.000
Grassland	0.000	0.000	124/1,824 = 0.068	1,700/1,824 = 0.932	1.000

The transition probability of each class is calculated by the total area of current land cover (for instance cropland = 276 ha) divided by the total area of previous land cover (for instance forestland = 48,436 ha). In this case, in the next 10 years, the change probability of forestland converted into cropland is 0.0057, while forestland converted into grassland is only 0.0001. See Table 14 for more detailed information.

In BAU case in the year of 2020, from 47,761 ha of forestland, 0.57 % will be converted into cropland or equal to 272.2 ha, while 0.01% will be converted into grassland or equal to 5.9 ha. The calculation is presented in Table 16below.

Table 16. Projected land cover change area in 2011—2020 (ha)

2011/2020	Cropland	Agroforestry	Forestland	Grassland	Total
Cropland	679.0	0.0	0.0	0.0	679.0
Agroforestry	0.0	2,535	0.0	0.0	2535
Forestland	0.0057 * 47,761 = 272.2	509.8	46,973.2	0.0001 * 47,761 = 5.92	47,761
Grassland	0.0	0.0	116	1,590	1,706
Total	951.2	3,044.8	47,089.2	1,595.9	52,681

By using the same approach in calculating GHG emissions from deforestation in 2001 – 2010; in BAU case, the annual GHG emission within MBNP on year of 2011 to 2020 is about 14,856 t CO_2 e/year. The result is presented in Table17.

Table 17. Emission in 2011 to 2020 (t CO2e, annually)

2011/2020	Cropland	Agroforestry	Forestland	Grassland	Total
Cropland	0.0	0.0	0.0	-0.0	0.0
Agroforestry	0.0	0.0	0.0	0.0	0.0
Forestland	14,549	0.0	0.0	307	**14,856**
Grassland	0.0	0.0	-6,017	0.0	-6,017
Total	**14,549**	**0.0**	**-6,017.3**	**307**	**8,839**

The same processes were used in forecasting the emission from deforestation in 2021-2030. And thus, the annual emission for year 2021-2030 is about 14,647 t CO_2-e/year. See Table 17 for more detailed information.

Table 18. Emission from deforestation under BAU

GHG Emission from Deforestation practices (T CO2-e)					
Year	GHG Emissions	Year	GHG Emissions	Year	GHG Emissions
2001	15,066	2011	165,519	2021	313,873
2002	30,133	2012	180,375	2022	328,520
2003	45,199	2013	195,231	2023	343,167
2004	60,265	2014	210,088	2024	357,815
2005	75,331	2015	224,944	2025	372,462
2006	90,398	2016	239,800	2026	387,109

2007	105,464	2017	254,657	2027	401,757
2008	120,530	2018	269,513	2028	416,404
2009	135,596	2019	284,369	2029	431,051
2010	150,663	2020	299,226	2030	445,699
Annually every 10 years	**15,066**		**14,856**		**14,647**

The estimated total GHG emissions from deforestation practices under BAU case (based on historical emission approach) in 2010 - 2030 is **295,036 t CO2-e**.

GHG removals under baseline

In BAU case, GHG removals/sequestration also occurred within MBNP. Since 2002, MBNP Authority and the stakeholders have conducted rehabilitation activities within rehabilitation zone (2,535 ha), MBNP Authority plays important role in this matter, since they had budget to do so. The total rehabilitation zone area of 2,535 ha had been planted by trees with spacing distance 5m X 5m, it means in 1 (one) hectare 400 trees are planted. Based on the census conducted by MBNP Authority and stakeholders in 2010 and 2011, only about 31% of trees are survived or average 124 tree/ha. By assuming the 124 trees/ha will keep growing until the crediting period (2030) a number of GHG removals that sequestered by the trees can be estimated. Tree species that survived are described in Table18 below.

Table 19. Information of survived trees

NO	Species	Wood Density, t/m^3	Max DBH, Cm	Age
1	Alpukat *(Persea americana)*	0.5995	41	30
2	Durian *(Durio sp)*	0.57	66	30
3	Melinjo*(Gnetum gnemon)*	0.76	17	30
4	Nangka *(Artocarpus heterophyllus)*	0.61	73	30
5	Pete *(Parkia speciosa)*	0.45	58	30
6	Others	0.5979	46	30

Source: Agroforestry tree Database, ICRAF

Allometric equation:

For calculatting the above ground carbon stock of each tree is using the following allometric equation from Ketterings et al. (2001) [page 208 of 'Reducing uncertainty in the use of allometric biomass equations for predicting above-ground tree biomass in mixed secondary forests', Forest Ecology and Management 146:199~209] as follows.

(Dry Biomass, kg) = 0.11 x ρ x $D^{2.62}$,

where:

ρ   Wood density (g/cm3), which is derived from ICRAF database

              (http://www.worldagroforestrycentre.org/sea/Products/AFDbases/WD),

D   Diameter breast high (DBH, cm).

              Estimation of DBH of the tree species is using equation y = a/(1+b*exp(ct)), where a = maximum DBH, b and c are constanta. The DBH increment of each tree species is describe on Figure8.
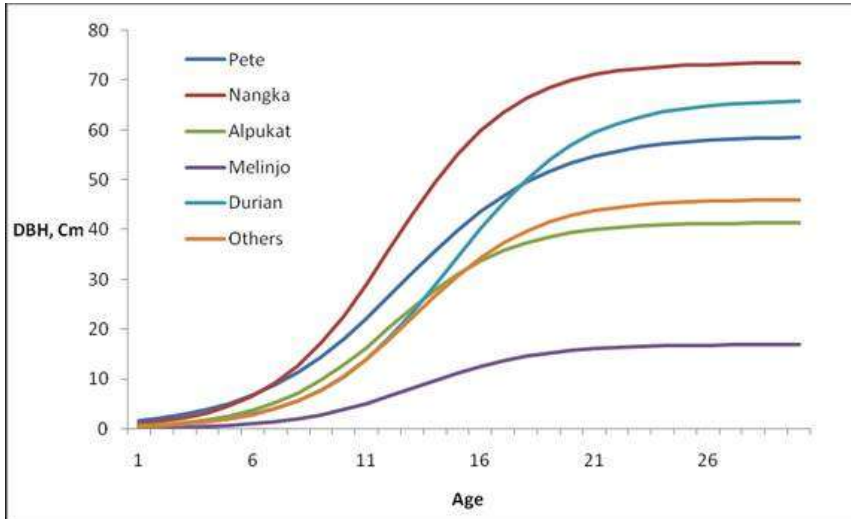
Figure 8. DBH Growth of Selected Tree Species

Total C (carbon) content within tree is 50% of its biomass, conversion from C to CO_2-e = T C * 44/12.

Total gross GHG removals/sequestration by tree planting during crediting period is about 869,386 t CO_2-e. Meanwhile, as stated in previous paragraph, the emission from deforestation practices in BAU case is 295,036 t CO2-e. Thus, total net GHG removals within the project boundary under BAU are about 574,350 t CO_2-e (see Figure 9).
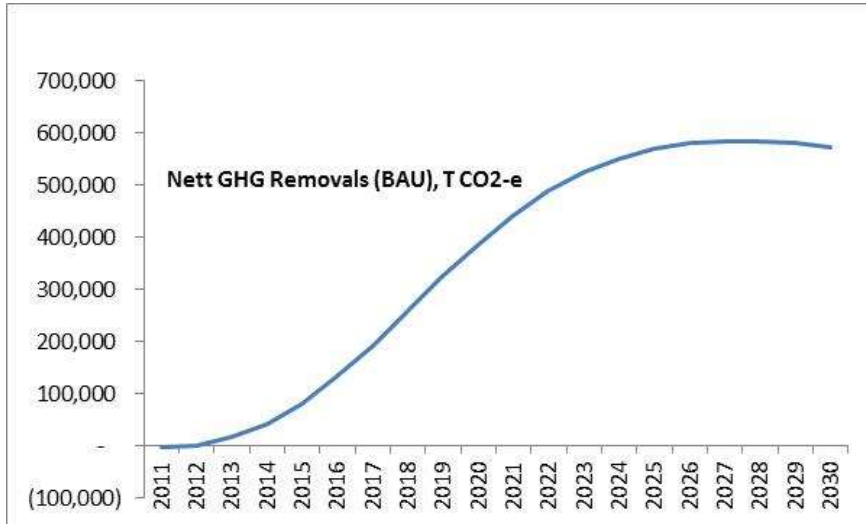
Figure 9. Net GHG Removals/Sequestration Under BAU.

3.2 Project Emissions

GHG emissions reduction by project will be estimated by the stooping the emission from deforestation, plus the GHG removals/sequestration by enhancing carbon stocks (Planting trees);

Estimated GHG emission reduction = avoided GHG emission by stopping deforestation + GHG sequestration by enhancing carbon stocks

GHG Emissions under project scenario

In the proposed project's scenario, all activities that lead to avoid deforestation will be optimized, therefore the emissions from deforestation practices are expected to be zero (see Figure 10).

Table20. Projected GHG emissions when deforestation is no longer occur

GHG Emission reduction (T CO_2-e) by ending deforestation		
Year	**Emissions BAU**	**Emissions Project Scenario**	**Emission reduction**
2011	14,856	0	14,856
2012	14,856	0	14,856
2013	14,856	0	14,856
2014	14,856	0	14,856
2015	14,856	0	14,856
2016	14,856	0	14,856
2017	14,856	0	14,856

2018	14,856	0	14,856
2019	14,856	0	14,856
2020	14,856	0	14,856
2021	14,647	0	14,647
2022	14,647	0	14,647
2023	14,647	0	14,647
2024	14,647	0	14,647
2025	14,647	0	14,647
2026	14,647	0	14,647
2027	14,647	0	14,647
2028	14,647	0	14,647
2029	14,647	0	14,647
2030	14,647	0	14,647
Total	295,036	**0**	295,036

Ending Deforestation
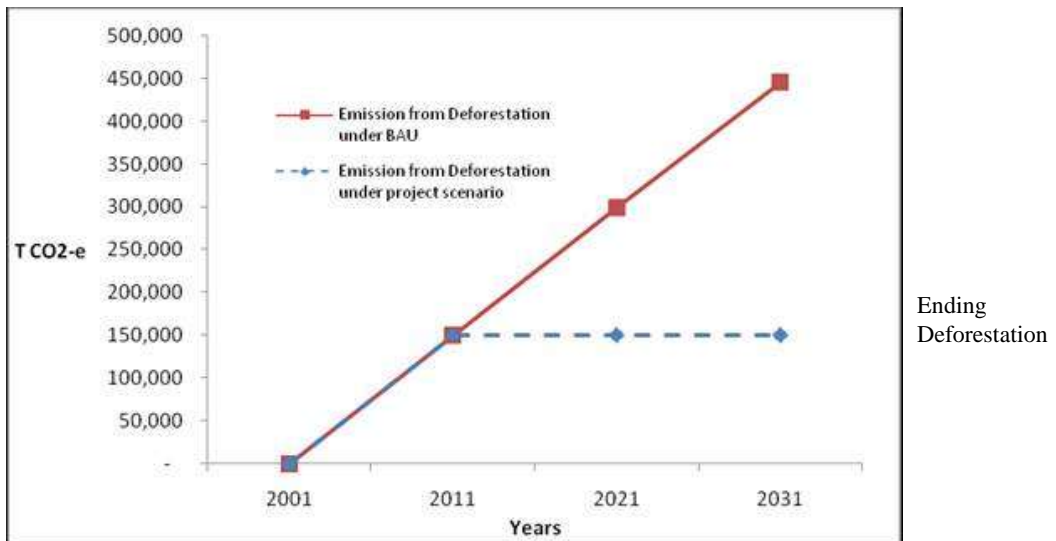
Figure 10. Projected emissions under BAU and project scenario

Estimated total emissions that can be reduced by ending deforestation practices during crediting period is 295,036 tCO_2.e.

GHG removals under project scenario

Aside from avoiding emission from Deforestation, the proposed project also aim at increasing the stock carbon by planting the selected trees within 2,535 ha of rehabilitation zone. A target of 150-200 trees/ha was set for this part of the project.Existing trees within 2,535 ha of rehabilitation zone is about 314,340 trees (Table21).

Table 21. Number of existing trees on rehabilitation zone

Tree Species	Number of trees
Pete	143,083
Nangka	15,919
Alpukat	6,198
Melinjo	402
Durian	535
Others (Kemiri)	148,203
Total	**314,340**

Tree species used in the plantingactivitywas decided based on inputs from stakeholders and also considering the distribution of existing trees. The input from the farmer groups are: *petai, nangka, alpukat, melinjo, durian,* and *kemiri.* However, after assessing the current distribution of tree species in rehabilitation zone, it is suggested to plant *alpukat, melinjo, durian* and others (in this case, to simplify the carbon calculation "others" category is represented by *kemiri*) rather than *pete* and *nangka*. This is to prevent over suply of *petai* and *nangka*—that possibly leads to decreased income for farmers—since those tree species have existed a lot.Distribution of the tree species can be seen in Table 21.

Another important discussion regarding tree species selection is that the tree selection for planting scenario in rehabilitation zone should be dominated by native forestry tree species. It is because rehabilitation zone is an integrated area of Meru Betiri National Park.

Based on the review of MBNP Flora Database (which contains list of native trees of MBNP), the selected species for project planting scheme namely *durian, melinjo* and *kemiri* can be considered as native species. Only alpukat which can be considered as a new species. However, reflecting on the previous re-planting program experience at the field level whre the success of planting activitiesis involvement of local community, preference and request from the community should be considered and therefore*alpukat* (avocado tree) is included in the planting.

Table 22. Tree distribution under baseline and project scenario

Species	124 trees/ha (Baseline)	200 trees/ha (project scenario)
Petai	45%	28%
Nangka	5%	3%
Alpukat	2%	11%
Melinjo	<1%	10%
Durian	<1%	10%
Others	47%	39%

Using the approach and equation from Kettering *et.al* (2001), GHG removals/sequestrations by tree planting under project scenario is projected as described in Table 23.

Table 23. Gross GHG removal / sequestration under project scenario

Year	GHG removals (tCO2e)
2010	0
2011	11,815
2012	19,313
2013	29,355
2014	41,396
2015	54,223
2016	66,189
2017	75,630
2018	81,294
2019	82,729
2020	80,447
2021	75,784
2022	70,447
2023	65,968
2024	63,268
2025	62,466
2026	62,949
2027	63,653
2028	63,454
2029	61,514
2030	57,491
Total	1,189,387

3.3   Leakage

It is projected that the proposed REDD+ project will not lead to any leakage. See 1.13.1 section for more explanation on leakage.

3.4   Summary of GHG Emission Reductions and Removals

Total estimated net GHG emissions reductions/removals (Table 24) are calculated using inputs from:

i.   estimated GHG emissions or removals under BAU scenario. In this case, the project area is a GHG sinker/removal because the GHG sequestration is bigger than GHG emission

ii.   estimated GHG emissions or removals under project scenario. In this case, the project area is also a GHG sinker/removal because the GHG emission will be zero/stopped, and sequestration are occurred due to enhancement of C stock activity

iii.   leakage

   In this case the leakage is zero

Net project emissions/removals (4) = Estimated Project removals (2) − Estimated Baseline Removals (1) - Leakage (3)

Table 24. Summary of GHG removals

Years	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
2010	0	0	0	0
2011	(3,042)	26,672	0	29,714
2012	4,453	34,169	0	29,716
2013	14,488	44,211	0	29,724
2014	26,519	56,253	0	29,734
2015	39,308	69,079	0	29,771
2016	51,193	81,046	0	29,852
2017	60,447	90,486	0	30,039
2018	65,707	96,151	0	30,444
2019	66,325	97,585	0	31,261
2020	62,522	95,303	0	32,781
2021	55,484	90,431	0	34,947
2022	46,167	85,094	0	38,927
2023	36,142	80,615	0	44,473
2024	26,473	77,915	0	51,442
2025	17,823	77,114	0	59,290
2026	10,493	77,596	0	67,103
2027	4,524	78,300	0	73,776
2028	(196)	78,101	0	78,298
2029	(3,849)	76,162	0	80,010
2030	(6,630)	72,138	0	78,768
Total	574,350	1,484,423		910,073

4   MONITORING

4.1   Data and Parameters Available at Validation

Data Unit / Parameter:	**Wood density (WD)**
Data unit:	t/m³
Description:	Wood density of planted trees
Source of data:	ICRAF database
Value applied:	Depend on each species
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	**DBH**
Data unit:	Cm
Description:	Estimated DBH of planted species
Source of data:	Expert judgement CERindonesia
Value applied:	Depend on each species
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	**Root shoot ratio**
Data unit:	-
Description:	Ratio of above ground biomass and root biomass.
Source of data:	IPCC default
Value applied:	0.24
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	**Carbon fraction**
Data unit:	-
Description:	Fraction of carbon on tree dry biomass
Source of data:	IPCC default
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

4.2 Data and Parameters Monitored

Data Unit / Parameter:	Forestland Area
Data unit:	Ha
Description:	The Land cover that classified as forestland will be monitored through remote sensing.
Source of data:	Satellite Imagery (Landsat, and etc)
Description of measurement methods and procedures to be applied:	The complete procedure to monitor the land cover changes is describe in the Appendix 2
Frequency of monitoring/recording:	5 years
Value applied:	Area of forestland
Monitoring equipment:	Computer and GPS
QA/QC procedures to be applied:	-
Calculation method:	The complete procedure to monitor the land cover changes is describe in the Appendix 2
Any comment:	-

Data Unit / Parameter:	Deforestation Area
Data unit:	Ha
Description:	The Land cover changes from forested area to non forested area.
Source of data:	Satellite Imagery (Landsat, and etc)
Description of measurement methods and procedures to be applied:	The complete procedure to monitor the land cover changes is describe in the Appendix 2
Frequency of monitoring/recording:	5 years
Value applied:	Average annual historic deforestation rate in the reference region
Monitoring equipment:	Computer and GPS
QA/QC procedures to be applied:	-
Calculation method:	The complete procedure to monitor the land cover changes is describe in the Appendix 2
Any comment:	-

Data Unit / Parameter:	Planted Trees
Data unit:	-
Description:	Number of planted trees within project boundary
Source of data:	Survey/census
Description of measurement methods and procedures to be applied:	The field survey will use a Guideline of field survey
Frequency of monitoring/recording:	Each year
Value applied:	Number of planted trees
Monitoring equipment:	Computer and GPS
QA/QC procedures to be applied:	-
Calculation method:	-
Any comment:	-

Data Unit / Parameter:	Survived Trees
Data unit:	-
Description:	Number of Survived trees within project boundary

Source of data:	Survey/census
Description of measurement methods and procedures to be applied:	The field survey will use a Guideline of field survey
Frequency of monitoring/recording:	each year
Value applied:	Number of survived trees
Monitoring equipment:	Computer and GPS
QA/QC procedures to be applied:	-
Calculation method:	-
Any comment:	-

Data Unit / Parameter:	DBH of survived trees
Data unit:	Cm
Description:	DBH of survived trees within project boundary
Source of data:	Survey/census
Description of measurement methods and procedures to be applied:	The field survey will use a Guideline of field survey
Frequency of monitoring/recording:	Every 2 years
Value applied:	DBH of trees
Monitoring equipment:	GPS, phiband, tallysheet
QA/QC procedures to be applied:	The field survey will use a Guideline of field survey
Calculation method:	-
Any comment:	-

4.3   Description of the Monitoring Plan

Monitoring plan will be carried out periodically. Party responsible for coordinating overall monitoring is MBNP Authority. The lowest level of monitoring will be done directly by the farmer groups in each village that performed at least once a year. Variables that must be obtained from the monitoring activities are:

- Area and location
- Type of crops in each village
- The number of living and dead trees
- Diameter for each type/species

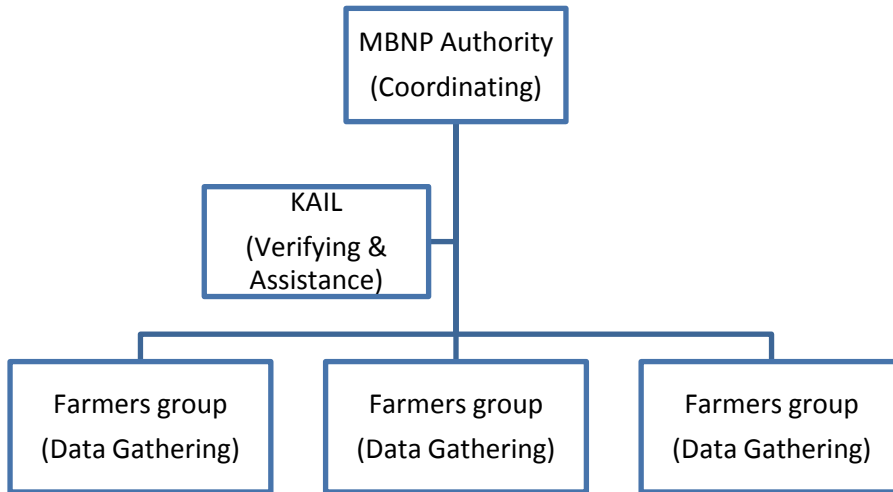*Organizational structure, responsibilities and competencies*

Figure 11. Organizational structure of monitoring process

As seen on the Figure 11, party responsible to coordinate overall monitoring is MBNP Authority. Farmers Group will have responsibilities in monitoring and collecting development data on the field at least once a year. The results of this process will be verified by KAIL before submitted to MBNP Authority. The verified data will be discussed with MBNP Authority for approval through investigation report.Competencies of each party involved in monitoring process are presented in Table 25.

Table 25. Competencies of party involved in monitoring process

Party	Competencies / Rationale
Farmers Groups	Involving farmers in monitoring scheme will be useful since they live closely to the site of project area, so it is easy for them to do monitoring activities at any given times, and report immediately to KAIL and/or MBNP Authority if there is any problem at the field. They also part of the society, so it can avoid any friction or misunderstanding if local context became a challenge in the monitoring proces
KAIL	A local NGO with extensive experience in assisting the community particulary in social forestry. In addition to their long experienced in MBNP, some of KAIL founders are members of local community who care about the preservation of MBNP. KAIL is born as a continuation of LATIN – IPB collaboration project in MBNP in 1992 (see section 1.10 about history of MBNP)
LATIN	An experienced environmental NGO that has long portfolio in forest management activities and in collaborating with various institutions. Latin has already worked in MBNP since 1992. The first activity in 1992 was to develop medicinal plants farming around MBNP to improve the livelihood of local people as well as encouraging the local society to preserve the forest.
MBNP Authority	Consists of government official who has responsibility in managing MBNP area. They have experience in handling activities related to forests and communities. They

	established many activities in collaboration with local society to preserve MBNP and to increase public income.

Methods for generating, recording, storing, aggregating, collating and reporting data on monitored parameters

Based on the results of meetings between MBNP Authority, NGO, and farmer groups, there is an agreement that the monitoring process will be conducted jointly and on participatory basis. Farmer groups are entrusted and assigned to conduct a full survey or sampling based on specified indicator or criteria. KAIL and LATIN will verify the survey results obtained by the Farmers Groups. The verification results will be further discussed with MBNP Authority, community leaders and farmers. If there are things that need to be adjusted, joint meeting between MBNP, NGO & farmer groups will assign farmer groups or NGOs to do the adjustment.

The documentation and e-filing of data gathered from monitoring activities will be conducted by KAIL and LATIN. They will recap the data from farmers group and do data input using their computer.

For preparation and reporting of the verified data, KAIL and LATIN will work in collaboration with MBNP Authority. Joint effort aims to minimize errors in decision-making and MRV process.

To ensure the accountability of the obtained data, an internal audit will be conducted. Internal Audit Team will be appointed from the members of KAIL and LATIN who have skill in monitoring and plants census. Audit Team will be ratified through joint meeting between MBNP, NGO and farmers group. The results of internal audit will be presented at annual collaboration meeting between MBNP, farmers group and KAIL.

If there is a data gap between the reports of farmers 'groups and the verified data, MBNP Authority will coordinate the effort to fix the problem by: (i) request farmers group to re-conducting field measurements (ii) assign KAIL and LATIN to re-verify and (iii) MBNP Authority to improve the report.

5   ENVIRONMENTAL IMPACT

The basic law in conducting Environmental Impact Assessment (EIA) is Minister of Environment's regulation No.5/2012. It is stated in the regulation that EIAs are required if the following conditions exist:

a. Concession Forest, all area scale
b. Timber Plantation, with area bigger than or equal to 5,000 Ha

Since the proposed project is not located in a concession forest and timber plantation, EIA is not required. However, based on field survey, it is noted that the species enrichment program to be carried out by this project has a potential to create domination of certain species. Based on the focus group discussion that were organized in 3 villages, it can be predicted that farmers will choose to plant only commercial tree, such as petai (*Parkia speciosa*), alpukat (*Persea americana*), durian (*Durio zibethinus*), It has been happened during the first planting program in rehabilitation zone in 1999.There were some farmers who planted their plot with only one species.

Homogenous forest is not a good option from ecological as well as economical point of view since it is more vulnerable to pest and disease. Also, when the harvesting time comes, all farmers will have the same commodities thus the selling price can be extremely cheap. It is better to have various tree species, which can provide whole year income for the farmers if the farmers choose to plant species that have different harvest time.

6   STAKEHOLDER COMMENTS

a.   Initial Consultation with stakeholders

Several consultation meetings were made before the implementation of REDD+ program in 2010. There was a meeting in Jember on 13 July 2000, to determine the most applicable scheme for communty and other stakeholders participations to support the sustainability of MBNP and community welfare.

About 60 participants attending the consultation meeting, consisting of main groups of stakeholder namely local community, management of MBNP, Local NGO, Community Leaders and Religion Leaders, University, Local Government and Police Institution.

Results of the consultation meeting were as follows:
-   Head of MBNP made commitment to community to allow them to prticipate of making agroforestry planting in rehabilitation zone with example of rehabilitation demonstration plot of 7 ha that has been planted since 1994, with principle of main plantation (tree species) and agriculture crops including medicinal plants.
-   Community were encouraged to seek main tree plantation seedlings from the forest.
-   There were processes to make Written Agreement

- There were bargaining processes between community and MBNP. Community was accompanied by local NGO (LATIN and KAIL). Community interest related to economic results meanwhile MBNP concerned with forest conservation. However there were commitments from both sides to do something for their interests.
- Important finding related to community awareness. Community realized that the land in MBNP belonged to the state (represented by MBNP) therefore community to obey certain rules
- In implementation of activities, community was represented in groups through the heads of farmer groups.
- There was motivation from farmers due to accompanying by local NGO (Latin and Kail).
- There were significant results of improvement of community income due to their involvement in rehabilitation zone to make agroforestry system.

b. Supporting the assurance of legal aspect for community that utilize rehabilitation zone of MBNP.

Stakeholder meeting was made on 4 October 2011, in Curahnongko village in the house of the one of the farmer groups, to discuss community involvement in the rehabilitation zone especially related to supporting the assurance of legal aspect for community that utilize rehabilitation zone of MBNP

Legal assurance for community to have access of lands that have been rehabilitated through agroforestry is very important. Through legal assurance, community can have guarantee to gain benefits from agroforestry system that has been developed such as fruits, grass and medicinal plants. Effort has been done to facilitate cooperation agreement between community groups in Curahnongko village with MBNP that is going to be developed in other villages in surrounding MBNP.

Through the lengthy process, finally the MOU was signed between farmer groups in Curahnongko village which is joined in a group called JAKETRESI (Network of rehabilitation farmers) with MBNP. This agreement was still in general form and needed to be more specific for particular activities. For instance, rehabilitation activity will be made in more detail agreement by utilizing the results of inventory in rehabilitation zone.

c. Stakeholder Consultation for REDD+

Stakeholder consultation was made on 4 July 2012, in Royal Hotel, Jember, to discuss the role of community to support REDD+ and sustainability of the Meru Betiri National Park (NBNP). There were 40 participants attending the meeting. The participants were representing Meru Betiri National Park Office (Head of MBNP and Head of Sections I, II and III of the MBNP), Jember District Government (Forestry Office and Industry Office), Sub District of Tempur Rejo, Villages of Andongrejo, Sanenrejo, Wonoasri, Curahnongko, Sarongan, Extension Center for Farmers (SPKP) of Wonoasri, Curahnongko and Sanenrejo

villages, community from villages of Andongrejo, Sanenrejo, Wonoasri, and Curahnongko, KAIL NGO Sarongan of Jember

Minutes of the meeting:

- Agreements of all stakeholders to support REDD+ activities, considering Indonesia Government target to reduce emission
- MBNP management and community in surrounding MBNP area agreed to increase/improve survival rate of main tree plantations, through the followings:
  o MBNP Office to provide nursery, seedlings ready for planting, distribution and monitoring

  o Community to make planting, and maintenance of tree plantations

  o There were diseases that attack local tree species of *petai* (*Parkia speciosa*), efforts would be made to control the diseases involving extension officers, Agriculture and Estate Crops Research Center, or Universities

  - Agreement has been made to come back to the initial/previous agreement (MOU), such as:
  o Only to make plantation according to species that have been approved for the national park

  o Species of estate crops were prohibited (such as oilpalm, coffee, rubber)

  o For species that have been planted but do not include in the list of species agreed (39 species), would be left in the field while wait for the further next decision.
- To encourage the implementation of the current existing local wisdom to support sustainability of MBNP.
- Agree to provide important information related to this meeting to other community members especially those who still violate the agreement.

d. Activities with Community

Several activities have been conducted involving community to improve their awareness for the issue of climate change, REDD+ and sustainability of MBNP. Activities related to

community to improve their livelihood showed their active participations in REDD+ activities, and support the conservation program, as follows:

- Accompanying in Wonoasri Village in, September 2013, involving 20 participants to cultivate orchids after training of orchid cultivation.
- Some 400 orchids have been distributed consisting of 400 dendrobium plants.
- In Kebunrejo village, some farmers have been supported with cultivation of catfish and the skills for cultivation.
- This activity could actually provide alternative source of in come to farmers.
- Accompanying to farmers in Curahnongko village related to development of oyster mushroom cultivation.
- Several activities have been carried out involving community to cultivate mushroom as an alternative source of inclome. The activities included training, comparative study, providing equipment, guidance and practice to produce mushrooms.

e. Activities Related to Rehabilitation

MBNP Authority has numerous experiences in carried out rehabilitation activities, whether independently or in collaboration with local communities and NGOs. Cooperation with NGOs has been started since the beginning of 1990. In 1992 the national park was piloting rehabilitation activities. The implementation of the activities is carried out in collaboration with LATIN and IPB. The pilot project aimed to establish the location as much as 7 ha in Curahnongko village. Medicinal Plant Conservation Program is the starting point for the pilot rehabilitation program because most of local people utilizing medicinal plants from MBNP forests.

On 1995, Head of MBNP Authority gave permission to local farmers to cultivate rehabilitation area of 7 ha using mix cropping method (trees and herbal tubers). On 1995, LATIN established Kelompok Tanaman Obat Keluarga (Toga) to strengthen herbal production plant of local society and initiative to develop herbal drink home industry. Numbers of local people who joins this program was 43 households`. All of them originated from Curahnongko village. The land was divided equally among 43 households. To avoid any jealousy, the distribution of the land was done using lottery method.

On 1999, Head of MBNP Authority sign up collaboration with LATIN to develop Farmer Group for Rehabilitation Kelompok Tani Rehabilitasi/KTR). He gave target to LATIN to establish farmers group to work on area of 2.500 ha within 6 months. LATIN was able to establish 104 KTR in 3 months. The number of KTR members are varies between 20 – 30 persons per group. On 2000, they started to replicate this model to other rehabilitation zone. The number and development of KTR are described on Table 26.

Table 26. KTR program

No	Year	Number of members (persons)	Remarks
1	1999	700	The beginning of KTR establishment. It aims to reduce illegal logging and encroachment in MBNP. There were 104 groups.
2	2000	900	The number of members increased due to intensive approach and people feel there is no guarantee to cultivate the land owned by national park
3	2004	1.500	This amount increase but the intensity of activity is reduced because of Latin's assistance is not as intensive as 1995 - 2002
4	2012	-	There is no measurement. It is estimated that the number exceed 1.500 persons.

Up to now, MBNP Authority keeps land rehabilitation activities in collaboration with NGOs and local community. However, there are still some obstacles at the field level. It is mainly because of the vast area of MBNP. There is a mutual awareness among each party that to preserve MBNP forest from activities that could damage the national park they need continuous cooperation with various parties.

APPENDIX 1. DETAILED PROPOSED PROJECT ACTIVITIES

ACTIVITIES	ENABLING CONDITION	Local Communities	Local NGO	MBNP Authority
		Main role: on-site rehabilitation	*Main role: assistance*	*Main role: monitoring, supporting, law enforcement*
1. On rehabilitation zone: cultivation Aim: enhancing carbon stocks in rehabilitation zone				
- Conduct intensive meeting/ discussion with local communities. It can be organized on monthly basis and at the same time becoming a part of monitoring and evaluation procedures - Makes a mutual understanding/ agreement on the project implementation	There should be a clear agreement between MBNP Authority and local community regarding legal status of rehabilitation zone utilization.		Mediator	Main organizer
Promoting agroforestry method to local communities to create balance between conservation, food and other domestic needs.	More field assistance are needed (up to 12 person for 5 villages). The ideal ratio of field assistance and farmers is 1 to 400 (based on FAO recommendation).		Field assistances of local NGO facilitate and provide guidance to local communities in collaboration with MBNP extension staff.	Provide extension staff to work together with field assistance from local NGO
Planting selected species based on the inputs from local communities and MBNP authority to enhance carbon stock. The selected species are Pete (*Parkia speciosa*), Durian (*Durio zibethinus*), Alpukat (*Persea gratissima*), Melinjo (*Gnetum gnemon*), Nangka (*Arthocarpus heteraphyllus*), Pakem (*Pangiumedule*) However, for this REDD+ planting program, Pete	To increase the life chances of planted tree seedling there are three enabling conditions namely: - Set planting schedule at the same time with the beginning of rainy season - Select high quality seedlings (not too young and not too old).	Main implementer (planting and maintenance)	Providing technical assistance	Provide seedling or financial support for local community to produce seedling.

ACTIVITIES	ENABLING CONDITION	Local Communities *Main role: on-site rehabilitation*	Local NGO *Main role: assistance*	MBNP Authority *Main role: monitoring, supporting, law enforcement*
(*Parkia speciosa*) and Nangka (*Arthocarpusheteraphyllus*) will not be used to avoid domination of certain species. Moreover, during the field survey, it is found out that there is an oversupply of these two commodities, indicated by the low price during harvest peak. While Pakem (*Pangium edule*) will be changed to Kemiri (*Aleurites moluccana*) since the last produce harvest in shorter period (more profiTable for farmers)	It is indicated by the height of the seedling (approximately 30-34 cm) - Planting space is 5 m by 5 m			
Establish good water conservation and management system. *Note*: Based on the field survey, it is not enough to rely only on rain and water precipitation to support the growth of planted seedlings.	Considering limited resources available in the community, it is good to use appropriate technology such as hydro ram pump	Main implementer	Providing technical assistance	Provide technical and financial support.
Establish stronger monitoring and law enforcement to enhance forest protection system in MBNP.	Based on the field observation, the number of rangers from MBNP is not adequate to cover the vast area of MBNP. Therefore MBNP Authority should recruit more rangers to enhance the quality of monitoring and law enforcement system.	Local community can be good assistance for MBNP rangers. However, they need to be trained and given some incentives	Mediator	Main responsibility. There are two options to enhance the quality of monitoring and law enforcement system, namely: - recruit more rangers - collaborate with local community

ACTIVITIES	ENABLING CONDITION	Local Communities	Local NGO	MBNP Authority
		Main role: on-site rehabilitation	*Main role: assistance*	*Main role: monitoring, supporting, law enforcement*
2. On rehabilitation zone: Added Value Chain Aim: providing economic benefit for local community to avoid unplanned deforestation in rehabilitation zone				
Develop existing herbal drink (jamu) and jackfruit crackers home industry and its market; preferably but not limited to local market up to district level, to absorb herbal tubers products and jackfruit products from rehabilitation zone.	- Regular supply of herbal tubers - Regular supply of jackfruit - Organize the local community to establish group work to run the business	Main implementer	Mediator, provide technical assistance	Provide technical and financial support
Develop new home industry and its market to absorb products from rehabilitation zone. For example: emping crackers, pakem fruit,	- Regular supply - Organize the local community to establish group work to run the business	Main implementer	Mediator, provide technical assistance	Provide technical and financial support
Establish a cooperative to manage production and marketing of home industry			Mediator	Provide training through cooperation with cooperative agency at Jember district level
Develop networking with other entities to support the home industry. For example: request CSR support from national jamu industry such as Sari Ayu Martha Tilaar or SidoMuncul to provide training and cooperation (pola bapak asuh).		Main implementer	Mediator	Provide technical and financial support
Provide soft loan for local community to diversify and develop their small home	Training to develop skill and capacity of local community	Main implementer	Mediator	Provide technical and financial

ACTIVITIES	ENABLING CONDITION	Local Communities *Main role: on-site rehabilitation*	Local NGO *Main role: assistance*	MBNP Authority *Main role: monitoring, supporting, law enforcement*
business (such as oyster mushroom and fresh water catfish production.	to run the business and do financial management			support
3. Incentive and disincentive scheme (off rehabilitation zone) Aim: create appropriate incentive and disincentive to farmers who achieved the goals of the project, to encourage other farmers to do the same.				
Establish a transparent monitoring, reporting, and verifying system to assess the farmers achievements due to forest protection and forest cover enhancement.	The idea should be well communicated to local communities. It is a good option to include inputs and participation from local community during the preparation process (e.g. define the success indicator for assessment)		Organizer, in collaboration with MBNP Authority	Mediator, in collaboration with local NGO
Mobilize fresh fund/money from respective resources such as private sector (CSR), international donor, local institutions, and individuals.	- There must be a legal institution that organize the local community, for instance cooperative. - The cooperative should be able to perform financial management and business development	Beneficiaries	Organizer, in collaboration with MBNP Authority	Mediator, in collaboration with local NGO
Develop a proper incentives system; such as "Smart card", the benefits for the farmers could be in a form of shopping voucher, education insurance, and health insurance.	There should be a clear financing scheme to make this system sustainable in the long run	Beneficiaries	Organizer, in collaboration with MBNP Authority	Provide technical and financial support
Develop disincentive system. Note: Based on field survey, the strongest disincentive system is related to the right to utilize land in	There should be a clear agreement between MBNP Authority and local community regarding legal status of		Assistance	Main organizer

ACTIVITIES	ENABLING CONDITION	Local Communities *Main role: on-site rehabilitation*	Local NGO *Main role: assistance*	MBNP Authority *Main role: monitoring, supporting, law enforcement*
rehabilitation zone. Thus, the disincentive system can be revoke the right of individuals to use the land in rehabilitation zone (namely cultivate and harvest tree's products)	rehabilitation zone utilization.			

APPENDIX 2. FLORA IN MERU BETIRI NATIONAL PARK

Meru Betiri National Park region is tropical rain forest with varied forest formations which are divided into five types of vegetation namely coastal forest, mangrove forest, swamp forest, rheophyte forest and lowland rain forest. Conditions and spercies of each type of vegetation in the area of Meru Betiri National Park can be explained as follows :

Vegetation Type of Coastal Forest
This vegetation type spreads along the southern coast in the narrow forest group, generally occupy the area around the bay that has flat topography, for example in Permisan Gulf, Meru Bay, Bandealit Gulf , and Rajegwesi Gulf. Formation of coastal forest vegetation consists of two main types, namely the formation of beach potato (*Ipomea pescaprae*), and Barringtonia formation (with height of 25-50 m) on a flat slope beach area and decrease the extent on the steep and rocky beaches. Baringtonia formation consists of keben (*Baringtonia asiatica*) , nyamplung (*Calophyllum inophyllum*) , ketapang (*Terminalia catappa*), pandan (*Pandanus tectorius*) and others.

Pescaprae Formation consists of low-growing vegetationwith type of herbs, mostly creepers such as sweet potato (*Ipomoea pescaprae*) and grass (*Spinifex squarosus*).

Vegetation Type of Mangrove Forest
This vegetation can be found in the eastern part of the Gulf Rajegwesi which is in the mouth of the Sungai Lembu and Karang Tambak, Gulf Meru and Sukamade a forest vegetation that grows in tidal lines. The dominant types of vegetation are: pedada (*Sonneratia caseolaris*) and tancang (*Bruguiera gymnorhiza*). At the estuary of the Sukamade river there are good formationsof palm (*Nypa fruticans*).

Vegetation Type of Swamp Forest
This vegetation can be found behind the Sukamade brackish forest.Types of vegetation found include: mango (*Mangifera* sp), sawo kecik (*Manilkara kauki*) rengas (*Gluta renghas*), Pulai (*Alstonia scholaris*), kepuh (*Sterculia foetida*) .

Vegetation Type of RheophytForest
This vegetation type is found in areas flooded by the river flow and the type of vegetation that grows supposedly influenced by the swift currents of the river, such as valleys of Sukamade river, Sanen River and Bandealit River. Species that grow include glagah (*Saccharum spontanum*), elephant grass (*Panisetum curcurium*) and some short-lived herbs and grasses.

Vegetation Type of Tropical Lowland Rain Forest
This vegetation type is a mixture of lowland tropical rain forest and mountain tropical rain forest. Various flora of lowland tropical rain forests cover almost all of the land surface of Meru Betiri National Park, with a hot climate and quite a lot of rainfall with even distribution. Tropical rain forest in the mountains grow on the altitude of 600-1300 m above sea level . Most of the forest area Betiri Meru National Park is the type of vegetation of lowland tropical rain forest. In this type of vegetation also grows many species of epiphytes, such as orchids and ferns and lianas.
Vegetation species that are often found include: walangan (Pterospermum diversifolium), Winong (*Tetrameles nudiflora*), gondang (*Ficus variegata*), budengan (*Diospyros cauliflora*), pancal (*Aglaia variegata* , rau (*Dracontomelon mangiferum*), glintungan

(*Bischoffia javanica*), ledoyo (*Dysoxylum amoroides*), kapok besar (*Gossampinus heptaphylla*), nyampuh (*Litsea* sp.), bayur (*Pterospermum javanicum*), bungur (*Lagerstromia speciosa*), segawe (*Adenanthera microsperma*), palm (*Arenga pinnata*), duku (*Lansium domesticum*), bendo (*Artocarpus elasticus*), suren (*Toona sureni*), and durian (*Durio zibethinus*). There are also bamboo vegetation such as: bubat (*Bambusa* sp), wuluh (*Schizastychyum blumei*), and lamper (*Schizastychyum branchyladium*). In this area there are also found several types of rattan, including: manis (*Daemonorops melanocaetes*), slatung (*Plectomocomia longistigma*), warak (*Plectomocomia elongata*) and others .

Up to present in the Meru Betiri National Park, there have identified as many as 518 species of flora, comprising 15 protected species and 503 not protected species. Examples of protected species include Balanopora (*Balanophora fungosa*) as a parasitic plant that lives on tree species of *Ficus* spp.and padmosari / rafflesia (*Rafflesia zollingeriana*) as important species only found in this area that dependent on host plants of *Tetrastigma* sp .

There are also species of flora as a raw material for medicine / herbal medicine, which has been identified as many as 239 species. This species can be grouped in seven habitus, namely bamboo, climbing, herbs, lianas, shrubs, bushes and trees. Medicinal plant species in Meru Betiri by parts that can be used, are divided into 19 parts including, the water stems, roots ,stems/wood, seeds, fruits ,flowers, branches/twigs, leaves, gum, bark, leaf, rhizomes, all parts ,tubers ,starch / bitter substances, sap, ash wood, coconut water and top parts of herb.

Several species of medicinal herbs as priority for development include: cabe jawa (*Piper retrofractum*), kemukus (*Piper cubeba*), kedawung (*Parkia roxburghii*), kluwek/pakem (*Pangium edule*), kemiri (*Aleuritus moluccana*), pule pandak (*Rauwolfia serpentina*), kemaitan (*Lunasia amara*), anyang-anyang (*Elaeocarpus grandiflora*), sintok (*Cinnamomum sintok*), and kemuning (*Murray paniculata*).

APPENDIX 3.MINISTER OF FORESTRY'S DECREE NO. 277/KPTS-VI/1997 ON DESIGNATION OF MERU BETIRI AS NATIONAL PARK

MENTERI KEHUTANAN
RI PUBLIK INDONESIA

KEPUTUSAN MENTERI KEHUTANAN
No: 277/Kpts-VI/1997

Tentang

PENUNJUKAN TAMAN NASIONAL MERU BETIRI SELUAS 58.000 HEKTAR, YANG TERLETAK DI KABUPATEN DAERAH TINGKAT II JEMBER DAN KABUPATEN DAERAH TINGKAT II BANYUWANGI, PROPINSI DAERAH TINGKAT I JAWA TIMUR.

MENTERI KEHUTANAN,

Menimbang : a. bahwa berdasarkan Surat Pernyataan Menteri Pertanian tanggal 14 Oktober 1982 Suaka Margasatwa Meru Betiri seluas 58.000 hektar yang terletak di Kabupaten Daerah Tingkat II Jember dan Kabupaten Daerah Tingkat II Banyuwangi, Propinsi Daerah Tingkat I Jawa Timur dinyatakan sebagai Taman Nasional Meru Betiri, merupakan perwakilan ekosistem mangrove, hutan rawa, hutan hujan dataran rendah di Pulau Jawa;

b. bahwa Taman Nasional Meru Betiri merupakan habitat tumbuhan langka bunga raflesia (*Raf-flesia zollingeriana*), serta beberapa jenis tumbuhan seperti bakau (*Rhizophora sp.*), api-api (*Avicenia sp.*), waru (*Hibiscus tiliencis*), nyamplung (*Calophyllum inophyllum*) rengas (*Gluta renghas*), bungur (*Lagerstroemia specio-sa*), pulai (*Alstonia speciosa*), bendo (*Arto-carpus elasticus*), serta beberapa jenis tumbuhan obat.

c. bahwa Taman Nasional Meru Betiri memiliki potensi fauna dilindungi yang terdiri dari 29 jenis mamalia dan ± 180 jenis burung, antara lain harimau loreng (*Panthera tigris sondaica*), banteng (*Bos javanicus*), babi hutan (*Sus sp.*), kera (*Macaca fascicularis*) macan tutul (*Panthera pardus*), kucing hutan (*Felis bengalensis*), rusa (*Cervus sp.*), musang (*Paradoxurus hermaphroditus*), dan jenis-jenis burung endemik Pulau Jawa.

d. bahwa Taman Nasional Meru Betiri juga memiliki potensi keindahan alam, budaya, dan keunikan alam yang potensial untuk dikembangkan kepariwisataan.

e. bahwa potensi Taman Nasional Meru Betiri dapat memberikan peranan dan manfaat bagi keseimbangan ekosistem, kepentingan ilmu pengetahuan, pendidikan, kebudayaan, kepariwisataan dalam rangka mendukung pembangunan daerah.

f. bahwa berhubung dengan itu, untuk meningkatkan perlindungan dan pelestarian potensi kawasan serta dalam rangka pengembangannya perlu merubah fungsi Suaka Margasatwa Meru Betiri menjadi Taman Nasional Meru Betiri dengan Keputusan Menteri Kehutanan.

Mengingat : 1. Undang-Undang No. 5 Tahun 1967;
2. Undang-Undang No. 4 Tahun 1982;
3. Undang-Undang No. 5 Tahun 1990;
4. Peraturan Pemerintah No. 33 Tahun 1970;
5. Peraturan Pemerintah No. 28 Tahun 1985;
6. Keputusan Presiden RI No. 58 Tahun 1993;
7. Keputusan Presiden RI No. 96/M Tahun 1993;
8. Keputusan Menteri Kehutanan No. 096/Kpts-II/1984;
9. Keputusan Menteri Kehutanan No. 677/Kpts-II/1993;

Memperhatikan : Surat Pernyataan Menteri Pertanian No.736/Mentan/X/1982 tanggal 14 Oktober 1982.

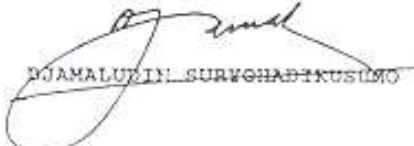## MEMUTUSKAN

Menetapkan :
Pertama : Merubah fungsi Suaka Margasatwa Meru Betiri dengan luas 58.000 hektar yang terletak di Kabupaten Daerah Tingkat II Jember dan Kabupaten Daerah Tingkat II Banyuwangi, Propinsi Daerah Tingkat I Jawa Timur menjadi Taman Nasional Meru Betiri.

Kedua : Batas sementara Taman Nasional Meru Betiri tersebut terlukis dengan bis warna ungu pada peta lampiran keputusan ini.

Ketiga : Memerintahkan kepada Direktur Jenderal Inventarisasi dan Tata Guna Hutan untuk memproses pengukuhan Taman Nasional Meru Betiri;

Keempat : Memerintahkan kepada Direktur Jenderal Perlindungan Hutan dan Pelestarian Alam untuk melakukan pengelolaan Taman Nasional Meru Betiri;

Kelima : Keputusan ini mulai berlaku sejak tanggal dite-
tapkan.

DITETAPKAN DI : J A K A R T A
PADA TANGGAL : 23 Mei 1997

MENTERI KEHUTANAN,

DJAMALUDIN SURYOHADIKUSUMO

Salinan keputusan ini
disampaikan Kepada Yth.:

1. Sdr. Menteri Koordinator Bidang Ekonomi, Keuangan
   dan Pengawasan Pembangunan, di Jakarta;
2. Sdr. Menteri Dalam Negeri, di Jakarta;
3. Sdr. Menteri Pertanian, di Jakarta;
4. Sdr. Menteri Pariwisata, Pos dan Telekomunikasi, di Jakarta;
5. Sdr. Menteri Pekerjaan Umum, di Jakarta;
6. Sdr. Menteri Pertambangan dan Energi, di Jakarta;
7. Sdr. Menteri Pertahanan dan Keamanan, di Jakarta;
8. Sdr. Menteri Negara Lingkungan Hidup, di Jakarta;
9. Sdr. Menteri Negara Perencanaan Pembangunan Nasional/Ketua
   BAPPENAS, di Jakarta;
10. Sdr. Menteri Negara Agraria/Kepala Badan Pertanahan Nasional,
    di Jakarta;
11. Sdr. Ketua Lembaga Ilmu Pengetahuan Indonesia, di Jakarta;
12. Sdr. Pejabat Eselon I lingkup Departemen Kehutanan di
    Jakarta;
13. Sdr. Gubernur Kepala Daerah Tingkat I Jawa Timur, di Surabaya
14. Sdr. Kepala Kantor Wilayah Departemen Kehutanan Propinsi Jawa
    Timur, di Surabaya.
15. Sdr. Bupati Kepala Daerah Tingkat II Jember, di Jember;
16. Sdr. Bupati Kepala Daerah Tingkat II Banyuwangi,
    di Banyuwangi;
17. Sdr. Kepala Balai Konservasi Sumber Daya Alam IV, di Surabaya
18. Sdr. Kepala Sub Balai Konservasi Sumber Daya Alam Jawa Timur
    II, di Jember.

APPENDIX 4. SAMPLE OF MOU BETWEEN MBNP AUTHORITY AND FARMER GROUPS REGARDING REDD+ AND UTILIZATIONOFREHABILITATION ZONE

NOTA KESEPAKATAN BERSAMA

ANTARA

SEKSI PENGELOLAAN TAMAN NASIONAL WILAYAH II AMBULU

DENGAN

JARINGAN KETUA KELOMPOK TANI REHABILITASI (JAKETRESI)

DESA CURAHNONGKO KECAMATAN TEMPUREJO KABUPATEN JEMBER

TENTANG

PARTISIPASI MASYARAKAT DALAM KONSERVASI SUMBERDAYA ALAM HAYATI, PENGURANGAN EMISI DARI DEFORESTASI DAN DEGRADASI, REHABILITASI KAWASAN HUTAN DI TAMAN NASIONAL MERU BETIRI, SERTA PENINGKATAN KESEJAHTERAAN MASYARAKAT

Nomor: 2272 /BTNMB-1/2011

Pada hari ini .... tanggal .... bulan Oktober tahun Dua ribu Sebelas bertempat di Balai Desa Curahnongko Kecamatan Tempurejo Kabupaten Jember, kami yang bertandatangan di bawah ini:

1. Nama   : Ir.Khairun Nisa
   Jabatan : Kepala Seksi Pengelolaan Taman Nasional Wilayah II Ambulu
   Alamat : Jl. Ahmad Yani No 85 Ambulu, Jember

   Dalam hal ini bertindak untuk dan atas nama Balai Taman Nasional Meru Betiri, yang selanjutnya disebut PIHAK PERTAMA.

2. Nama   : Suparman
   Jabatan : Ketua Jaringan Ketua Kelompok Tani Rehabilitasi (JAKETRESI) Desa Curahnongko Kecamatan Tempurejo Kabupaten Jember
   Alamat : Desa Curahnongko, RT 02 RW 10, Krajan 1 Curahnongko, Kecamatan Tempurejo

   Dalam hal ini bertindak untuk dan atas nama Jaringan Ketua Kelompok Tani Rehabilitasi (JAKETRESI) Desa Curahnongko dan atas nama masyarakat Desa Curahnongko Kecamatan Tempurejo Kabupaten Jember yang selanjutnya disebut PIHAK KEDUA.

Kedua belah pihak sepakat melakukan Kesepakatan Bersama dalam rangka meningkatkan Partisipasi Masyarakat dalam Konservasi Sumberdaya Alam Hayati, Pengurangan Emisis dari Deforestasi dan Degradasi Hutan, serta Rehabilitasi Kawasan Hutan di Taman Nasional Meru Betiri, dengan ketentuan sebagai berikut.

Pasal 1

LANDASAN

Landasan perjanjian kemitraan ini adalah:

1. UU Nomor 5 tahun 1990 tentang Konservasi Sumber Daya Alam Hayati dan Ekosistemnya.
2. UU Nomor 23 Tahun 1997 tentang Pengelolaan Lingkungan Hidup.
3. UU Nomor 41 tahun 1999 tentang Kehutanan.
4. UU Nomor 32 tahun 2004 tentang Pemerintahan Daerah.
5. PP Nomor 28 tahun 2011 tentang Kawasan Suaka Alam dan Kawasan Pelestarian Alam.
6. PP Nomor 44 tahun 2004 tentang Perencanaan Kehutanan.
7. PP Nomor 45 tahun 2004 tentang Perlindungan Hutan.
8. PP Nomor 34 tahun 2002 tentang Tata Hutan dan Penyusunan Rencana Pengelolaan Hutan, Pemanfaatan Hutan dan Penggunaan Kawasan Hutan.
9. Peraturan Menteri Kehutanan Nomor P.19/Menhut-II/2004 tentang Kolaborasi Pengelolaan Kawasan Suaka Alam dan Kawasan Pelestarian Alam.

Pasal 2

TUJUAN DAN SASARAN

1. Tujuan Kesepakatan Bersama ini adalah meningkatkan partisipasi masyarakat dalam upaya konservasi sumberdaya alam hayati dan ekosistemnya, pengurangan emisi dari deforestasi dan degradasi hutan, serta rehabilitasi kawasan hutan di Taman Nasional Meru Betiri, serta peningkatan kesejahteraan masyarakat.

2. Sasaran Kesepakatan Bersama ini adalah terpeliharanya keutuhan dan kelestarian sumberdaya alam hayati dan ekosistemnya di Taman Nasional Meru Betiri, serta meningkatnya kesejahteraan masyarakat Desa Curahnongko.

Pasal 3

OBYEK DAN RUANG LINGKUP KESEPAKATAN BERSAMA

1. Obyek Kesepakatan Bersama ini adalah:
   a. Kawasan hutan Taman Nasional Meru Betri, termasuk keanekaragaman hayati dan ekosistem di Taman Nasional Meru Betiri.
   b. Desa Curahnongko sebagai desa penyangga Taman Nasional Meru Betiri

2. Ruang lingkup kemitraan ini adalah:
   a. Penyusunan rencana pengelolaan, rehabilitasi, pemeliharaan, penangkaran flora dan fauna, perlindungan, promosi dan informasi;
   b. Peningkatan kapasitas kelembagaan masyarakat di bidang pengelolaan, rehabilitasi hutan, pengembangan ekowisata, penangkaran flora dan fauna dan pemanfaatan jasa lingkungan.

Pasal 4

KEWAJIBAN DAN HAK

1. Baik Pihak Pertama maupun Pihak Kedua berkewajiban untuk mencapai tujuan Kesepakatan Bersama yang disebut pada Pasal 2.

2. Baik Pihak Pertama maupun Pihak Kedua berhak untuk mencari dukungan dana dan mitra masing-masing dalam upaya mencapai tujuan Kesepakatan Bersama dan apabila telah mendapatkan dana dan mitra agar dapat saling menginformasikannya.

Pasal 5

KEGIATAN YANG DILAKUKAN

1. Pihak Pertama bersama-sama dengan Pihak Kedua akan merumuskan dan menyepakati kegiatan yang akan dilakukan dalam upaya meningkatkan Partisipasi Masyarakat dalam Konservasi Keanekagaraman Hayati dan Ekosistemnya, Pengurangan Emisi dari Deforestasi dan Degradasi Hutan, Rehabilitasi Kawasan Hutan di Taman Nasional Meru Betiri, serta peningkatan kesejahteraan masyarakat.

2. Kegiatan yang sudah dirumuskan dan disepakati pada Ayat (1) di atas, selanjutnya akan dibuat menjadi perjanjian tersendiri, yang akan diselesaikan paling lambat tiga bulan setelah Nota Kesepakatan Bersama ini ditanda tangani.

Pasal 6

PENUTUP

1. Nota Perjanjian Kemitraan ini dibuat sesungguhnya oleh kedua belah pihak dengan disaksikan oleh para pihak lain sebagai landasan hukum dalam pelaksanaan Program Rehabilitasi di Desa Curahnongko.

2. Apabila terdapat kekeliruan atau hal-hal lain yang belum diatur dalam Nota Perjanjian Kemitraan ini, diatur kemudiaan dalam bentuk **addendum** yang merupakan bagian tidak terpisahkan dari Nota Perjanjian Kemitraan ini.

PIHAK PERTAMA,
Kepala Seksi Pengelolaan Taman Nasional
Wilayah II Ambulu

Ir.Khairun Nisa'

PIHAK KEDUA
Ketua JAKETRESI,
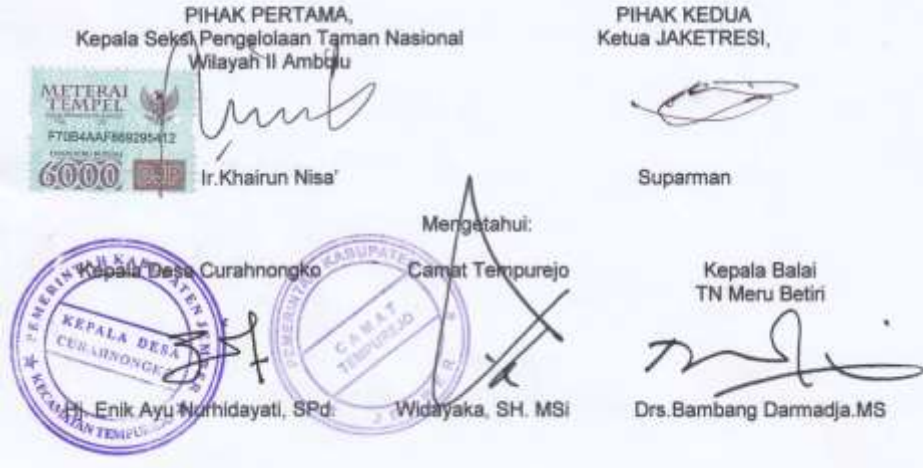
Suparman

Mengetahui:

Kepala Desa Curahnongko

Hj. Enik Ayu Nurhidayati, SPd.

Camat Tempurejo

Widayaka, SH. MSi

Kepala Balai
TN Meru Betiri

Drs.Bambang Darmadja.MS

APPENDIX 5.   REPORT OF GERAKAN REHABILITASI LAHAN DAN HUTAN (GERHAN) OR FOREST AND LAND REHABILITATION MOVEMENT IN EAST JAVA

Year	Reforestation (ha)	Community Forest (ha)	Total (ha)
2003	-	28.376	28.376
2004	55.100	72.611	127.711
2005	2.599	-	2.599
2006	-	45.000	45.000
2007	-	2.433	2.433
2008	-	-	-
2009	200	-	200