REDD+ PROJECT FEASIBILITY STUDY THROUGH FOREST MANAGEMENT SCHEME IN DIEN BIEN PROVINCE

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SUMMARY

The feasibility study was conducted in Muong Phang, Na Nhan, and Na Tau communes, Dien Bien district, Dien Bien province. Based on GIS data and the satellite images of the forest coverage anlysis in three points of time in the past (1990, 2000, and 2010) and the results of the survey on the tree volume, tree growth, and tree increment in 6 typical plots of plantation, 15 typical plots of natural forest, and the socio-economic analysis three scenarios were proposed for the project area to the year 2040. Most of the natural forest in the project area were poor and rehabilitation forest. There was big area of bare land that was potential for forest rehabilitation and regeneration, both natural and manmade regenerations. Mean annual increment of plantation ranged from 3.83 m^3/ha/year (*Vernicia montana)* to 11.27 m^3/ha/year (*Pinus massoniana)*. The volume of natural forest ranged from 11.6 m^3/ha to 554.1 m^3/ha. From the current forest coverage, the scenario, and the estimated biomass value change in future, used the method of IPCC to estimate the greenhouse gas (CO_2) emissions/reduction. The Carbon stock was about 2,182,000 tons CO_2 for scenario 1; about 1,592,000 tons CO_2 for scenario 2; and was about 1,275,000 tons CO_2 for scenario 3 for the project area.

Keywords: Feasibility study, REDD+, plantation, natural forest, rehabilitation, and regeneration.

I. INTRODUCTION

Reducing Emission from Deforestation and Degradation, conservation, sustainable forest management, and enhancement of forest carbon stocks (REDD+) becomes a popular global issue that could be seen as the adequate solution to mitigate the consequence of the climate change. REDD+ not only focuses on reducing emissions but also involves, at least measuring the area deforested and degraded, deriving the related emission on the basis of knowledge of pre-existing carbon stocks.

Forested developing countries still convert forest to other land uses and degrade forests through logging activities (mostly). The costs of emissions forests are not only the host country themselves but global externality. A mechanism is therefore needed to provide sufficient incentives to developing countries to reduce emissions from the forest sector.

The Government of the Socialist Republic of Vietnam has paid great attention on responding to climate change, in genera1, and in Reducing Emission from Deforestation and forest Degradation (REDD), in particular. The National Target Program (NTP) to respond to climate change was approved by the prime minister on 2/12/2008. Additionally, the National REDD Action Program was approved on 27/6/2012.

On 20 June 2012, the Ministry of the Environment, Japan (MOEJ) and Global Environmental Center (GEC) have selected and adopted 29 Feasibility Studies (FS) on New Mechanisms. In 2012 Bilateral Offset Credit Mechanism Feasibility Study proposed by Sumitomo Forestry Company was selected as one of the FSs. The location was Dien Bien province based on the results of a site survey and was recommended by the Vietnam Forestry University (VFU), Ministry of Agriculture and Rural Development (MARD) and Japan International Cooperation Agency (JICA).

II. STUDY AREA AND METHODS

2.1. Study area

Three communes: Muong Phang commune, Na Nhan commune, and Na Tau commune in

Dien Bien district, Dien Bien province were selected as the model site of Northwest region of Vietnam.

2.2. Method

Digital forest cover map of three communes (Muong Phang, Na Nhan, and Na Tau) were collected and analyzed for site survey.

Based on GIS data analysis in three points of time (1990, 2000, and 2010) and survey in 06 typical plots (500m2 (20m x 25m)) for plantation and 15 plots (1000m2 (25m x 40m)) for natural forest to establish reference scenario and forecast future emission volumes. Based on the growth of trees and forest class to estimate the changes in cumulative volume in the context of REDD+ activities.

Based on the scenario that proposed by study team and the interview result to analyze the major factors that reduce forest size and quality. In three target communes selected 6 typical villages (2 in each village) to organize village meeting. Six households in each village (total 36 households) with different types were interviewed to collect their opinion on the project as well as the major factors that affect forest in the study area.

The change in carbon stock through project activities in all project area was used to estimate the C credit for the project (IPCC, 2006).

III. RESULTS

The current situation of forest in three communes

The result as in the following table:

Table 1. The situation of forest in three communes in three communes

Unit: ha

Forest situation	Muong Phang	Na Nhan	Na Tau
Natural area	**9,159**	**7,693**	**7,443**
A. Forest	**2,975**	**2,420**	**3,775**
I. Natural forest	**2,966**	**1,823**	**3,193**
1. Timber forest area	***2,966***	***1,779***	***3,193***
- Rich forest	0	0	0
- Medium forest	41	0	443
- Poor forest	58	141	370
- Rehabilitation forest	2,867	1,637	2,380
2. Bamboo forest	***0***	***0***	***0***
3. Mixed bamboo forest	***0***	***44***	***0***
4. Limestone forest	***0***	***0***	***0***
II. Plantation	**9**	**597**	**582**
1. Closed-crown plantation	9	597	582
2. Bamboo plantation	0	0	0
B. Other forestry land	**3,652**	**4,313**	**2,208**
1. Young plantation	109	0	0
2. Rubber tree plantation	0	0	0
3. Bare land with regeneration tree (Ic)	703	636	499
4. Bare land without regeneration tree (Ia, Ib)	1,596	2,182	1,101
5. Limestone mountain without tree	0	0	0
6. Shifting cultivation	1,244	1,494	608
C. Non- forestry land	**2,532**	**961**	**1,460**
1. Agricultural land- Shifting cultivation	490	565	724
2. Other agricultural land	2,042	396	736

(Dien Bien Sub-DOF, 2009)

According to this table, there was no rich forest in the project area; there were only 41 ha and 443 ha of medium forest in Na Nhan and Na Tau communes respectively. The rest of natural forest was poor forest. The bigest forest area in three communes was rehabilitation forest that ranged from 1,637 ha in Na Nhan commune to 2,867 ha in Muong Phang commune. There was no natural bamboo forest, mixed bamboo forest, and limestone forest in the project area. The closed- crown timber plantation were 9 ha, 597 ha, and 582 ha in Muong Phang, Na Nhan, and Na Tau communes respectively. Other forestry land was still big in this area. There was only 109 ha young plantation that was newly planted with it crown was not closed yet. Bare land with regeneration tree (Ic) were 703 ha, 636 ha, and 499 ha in Muong Phang, Na Nhan, and Na Tau, respectively. This area was potential for rehabilitation forest. The bare land (Ia, Ib) in three communes were available for afforestation/reforestation activities. The largest area was in Na Nhan commune with 2,182 ha and Na Tau had smallest bare land with 1,101 ha. The shifting cultivation of agricultural land in three communes was from 490 ha to 724 ha. This sloppy land was degrading because of soil erosion and non fertilizer cultivation. This was also potential land for afforestation activities.

The growth of plantation

The growth of plantation in project area was collected through 500 m^2 typical plot (20m x 25 m) for 6 species.

Table 2. The result of plantation growth inventory

No	Species	Planted year	Density (tree/ha)	DBH (cm)	H (m)	Volume (m^3/ha)	MAI (m^3/ha*yr)
1	*Vernicia montana*	1994	340	21.5	11.9	69.0	*3.83*
2	***Pinus masoniana***	1978	300	40.2	21.0	383.2	**11.27**
3	*Cunninghamia lanceolata*	1978	400	23.2	17.6	152.2	4.48
4	*Dendrocalamus barbatus*	2003	260 clump/ha	3.8	6.4	7647.3 kg/ha	849.7 kg/ha*yr
5	*Manglietia conifera*	1978	800	18.8	13.4	195.5	5.75
6	*Cassia siamea*	1998	880	15.5	13.5	96.0	6.86

In six surveyed species, *Pinus massoniana* was the most suitable species for plantation in the project area. The highest mean annual increment was *Pinus massoniana* with 11.27 m^3/ha/yr. Meanwhile, the lowest MAI was *Vernicia montana* with only 3.83 m^3/ha/yr. In general, the growth of tree in plantation in this area was relatively not so high because of hard topographical conditions (high elevetion and infertile soil). When implementing plantation project in this area we need to think about this issue. Choosing the tree species that can adapt well in high elevation and infertile soil may be the key activity. In addition, improving soil condition methods such as sloppy land cultivation and fertilizer applying also should be considered.

The growth of natural forest

Table 3. The result of natural forest growth inventory

No	Density	DBH (cm)	H (m)	Volume (m^3/ha)
1	550	*25.0*	14.4	247.8
2	440	13.0	10.1	42.4
3	630	14.6	10.8	95.4

No	Density	DBH (cm)	H (m)	Volume (m^3/ha)
4	600	12.9	10.6	54.3
5	380	16.0	10.16	45.9
6	610	18.3	11.2	101.6
7	610	19.6	**21.9**	268.9
8	600	24.7	18.8	384.3
9	440	22.5	17.4	310.5
10	520	12.9	9.5	38.7
11	400	18.0	10.4	57.8
12	**670**	23.7	19.9	***554.1***
13	430	19.5	17.7	147.9
14	640	19.9	16.5	302.2
15	**300**	*11.5*	**6.8**	***11.6***

The density of timber tree in natural forest ranged from 300 trees/ha (plot 15) to 670 trees/ha (plot 12). The mean DBH was highest in plot 1(25.0 cm) and lowest in plot 15 (11.5 cm). The mean tree height was from 6.8 m to 21.9 m. Most of the plots had low to medium volume. Some were really low as in plot 15 (only 11.6 m^3/ha) or relatively high as in plot 12 (554.1 m^3/ha). Plot 15 had lowest growth in 15 surveyed plots.

Local people's situation and opinions about forest

Stationery and questionnaires were prepared for site survey. Questionnaires were about the household capacity to join the project, the activities from farmer on forest, the attitude and opinion of farmer about project.

Household interviewing results are as following:

The percentage of poor people in the area was high. The labor in the area was relative high but low quality and lack of job so local people need to have more job to improve their income. Local people knew about the advantage of plantation and forest protection but they did not have enough funds to plant tree and protect forest. They welcomed the project and hope it could help them to increase their living conditions, eliminate hunger and reduce poverty. The demand of timber of local people for house construction was still high. It was one of the main reasons that local people get in the forest to cut tree illegally. The agricultural productivity in the area was relatively low, especially upland rice and other shifting cultivation products because of soil degradation. New cultivation technology, methodology, and new seed/seedling variety should be introduced to improve agricultural productivity.

In the area, the forest and forest land were already allocated to local community. A group of farmers was issued a Redbook but in fact they did not know exactly where their land is. It is an obstruction for implementing project in future and potential for social conflict when this land has benefit on it. To solve this problem we need to check and verify the forest and forest land allocation for whole project area.

The payment for forest protection activity was relatively low, only two hundred thousand VND per ha per year (about 10 USD). This payment need to be increased to attract more people who involve in forestry activities. In addition, local people were not good at non-timber forest products exploiting and using, planting tree activities. They need to be trained these skills in future.

Individual interview result:

- Ethnic group: Thai (100% in 4 interviewed villages, 17.5% in one village); H'mong (100%

in one interviewed village, 80.7% in the other); and Kinh (only 1.8% in one interviewed village).

- Income mostly comes from agriculture and livestock, some from forestry and others.

- Popular products are rice, edible canna, corn, cassava, plum, coffee, vegetable, water buffalo, cow, pig, chicken, and duck those are sold directly to the merchant in the village or in the district market.

- There was community forest with both natural forest and plantation. All of the interviewed villages have regulation for forest protection. The negative effects on the forest are unattended livestock grazing, slash and burn cultivation, firewood collection, and illegal logging for construction purpose.

- Popular timbers in the area are *Schima wachii, Quecus tree, Michelia mediocris,* and *Manglietia conifer*

- Non timber forest products are edible canna, bamboo shoot, banana, and *Phyllodes placentaria* (for cake wrapping).

SWOT analysis result:

- Strong: abundant labor, people have experience in agricultural production, rice field is near water source, there is land for plantation, and people are willing for planting and protecting forest. There is a village forest protection regulation and good market for agricultural products.

- Weak: Rice field is far from the road, temporary irrigation system, lack of fund for forestry activity, lack of knowledge and market information, in shortage of land, low productivity breeding rice, low price. Crops are threatened by disease and rats. Some agricultural areas are far from the water source.

- Opportunity: Some villages are close to the road, there is a canna starch processing factory. Some are targets of New Rural Program. The need for agricultural production is increasing. Rice seed and fertilizer are supported for the farmers. Some rice fields are close to the road.

- Unstable agricultural production price, controlled by merchants, lack of power for building New Rural and market information.

The gaps between situation and future scenario and proposed solution for them:

- The first gap could be the economic of local people and the long-term benefit of the project. High ratio of people in the project site is poor. Local people even do not have enough money to spend for food and other consumption. Meanwhile, the forestry project in general and REDD+ project in particular takes relatively longtime for benefit that people cann't wait. The solution for this problem is to combine some fast growth tree with slow growth species, apply agroforestry cultivation system, and develop non-timber forest products. In addition, local people should be involved in the project activities with reasonable payment. They also can borrow money priorly to implement the project activities such as buying seedling, fertilizer…

- The second gap is the inappropriate policy from local government such as forest and forest land allocation. Local people (local community) have their own red books but infact they do not know exactly where is their land border. This may cause conflict when implementing project. To solve this problem before implementing project we need to verify the land border of local people (community), both on paper and on site.

- The third gap is the education and awareness of local people. The local people's education and awareness are still limited to compare with people in other area. We need to support for education and implement propaganda to improve local people' awareness.

- Finally, the demand of timber for house construction and other resource from forest of

local people is still high. Substitute material and effectively use is the solution for this problem.

Reference scenario

Relevant information was put in questionnaire to collect the data for analyzing major factors that affect deforestation and forest degradation in the study area. The scenario was displayed and explained for the target groups, from the leaders (chef of Dien Bien DARD, Dien Bien sub-DOF, Chairman of Dien Bien District) to local people. Key persons and farmers were interviewed to get their opinion on the reference scenario and collect the data for analyzing the trend of scenario. Group discussion to select appropriate method for analyze the collected data and summarize the commend.

Three scenarios were proposed such as:

The first scenario was proposed as:

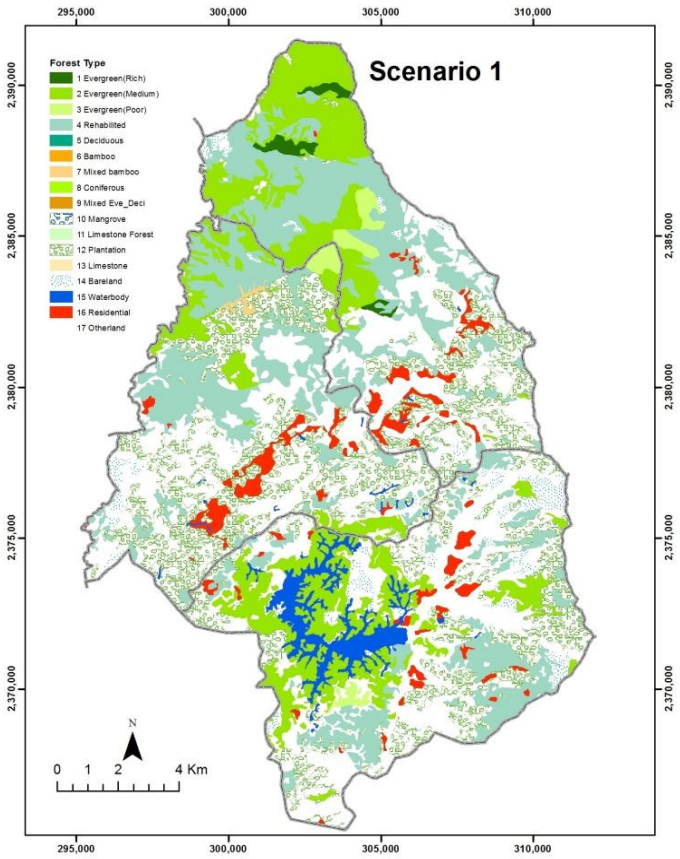

Figure 1. Scenario 1

- Volume of natural forests will increase following natural succession; about 30% of natural forest will be upgraded to richer categories.

- Existing poor and rehabilitated forest categories will be applied some assistant natural regeneration so about 50% of these areas will be upgraded to medium category by 2040.

- All forest statuses will be well protected by local people.

- All harvested plantation area will be replanted immediately.

- 100% of total bare land located in Loong Luong dam will be planted (~ 85 ha).

- 100% of degraded forest area located in Loong Luong dam will be rehabilitated (~20 ha).

The second scenario was proposed as:

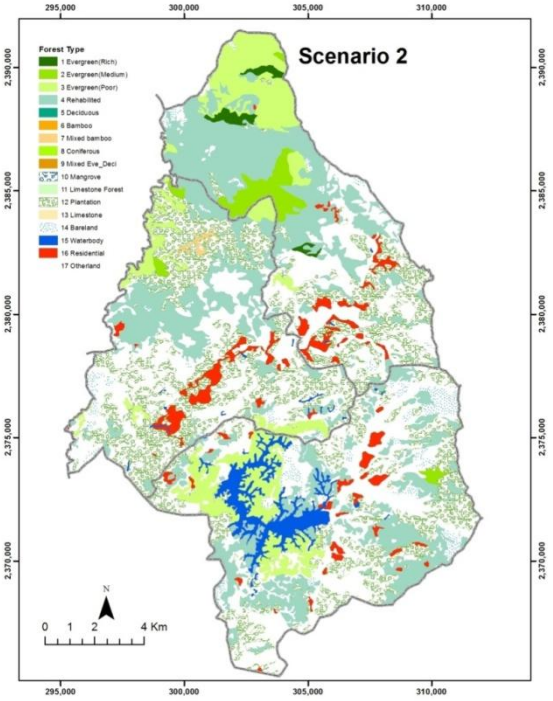

Figure 2. Scenario 2

- Volume of natural forests will increase following natural succession and about 30% of natural forest will be upgraded to richer categories.

- All forest statuses will be well protected by local people.

- 90% of bare land which are easy to access will be planted while bare land in remote area will be rehabilitated.

- All harvested plantation area will be replanted immediately

- 100% of total bare land located in Loong Luong dam will be planted (~ 85 ha)

- 100% of degraded forest area located in Loong Luong dam will be rehabilitated (~20 ha).

The third scenario was proposed as:

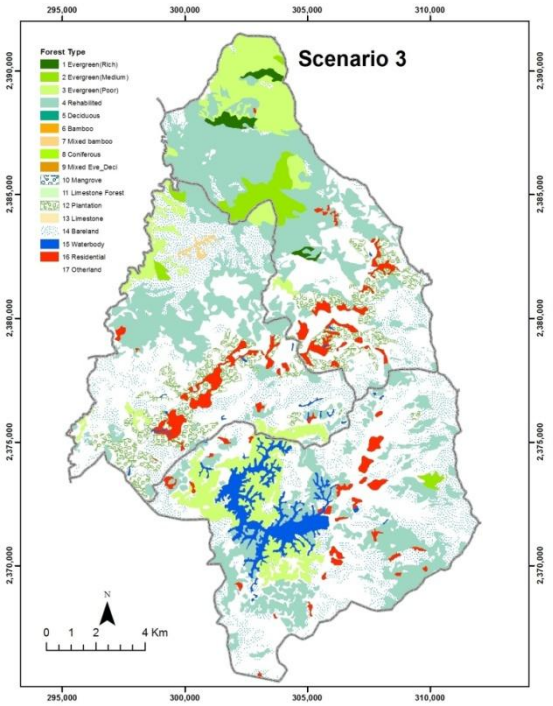

Figure 3. Scenario 3

- Volume of natural forests will increase following natural succession and about 30% of natural forest will be upgraded to richer categories.

- All forest statuses will be well protected by local people.

- Plantation area within 2021-2040 period will be planned similar to 2012- 2020 period (12.25 ha/year).

- All harvested plantation area will be replanted immediately.

- Loong Luong dam has finished.

- A part of other land including rice field will be conversed to residental land.

Quantification of GHG emissions/reduction

Group discussion and literature review were taken to select method for quantifying GHG reduction, data that was collected for estimating the potential GHG reduction in the area.

From the scenario and the estimated biomass value change in future, use the method of IPCC to estimate the greenhouse gas (CO_2) emissions/reduction.

The Carbon stock was about 2,182,000 tons CO_2 for scenario 1; about 1,592,000 tons CO_2 for scenario 2; and was about 1,275,000 tons CO_2 for scenario 3.

Conclusion

Most of the forests in the study area are medium and poor forests. The study area also has big area of bare land that are suitable for rehabilitation and reforestation/afforestation. This area has high potential for $REDD^+$ project.

In six surveyed species, *Pinus massoniana* was the most suitable species for plantation in the project area. The least one was *Vernicia montana*. The density of timber tree in natural forest ranged from 300 trees/ha to 670 trees/ha. The mean DBH was from 11.5 to 25.0 cm. The mean tree height was from 6.8 m to 21.9 m. Most of the plots had low to medium volume, some really low (only 11.6 m^3/ha).

The poor people occupied high rate in the area. Their lives rely much on the forest such as doing swidden, harvesting timber for house construction, and collecting firewood. Most of the land were allocated for local people.

There were 3 proposed senarios with the Carbon stock was about 2,182,000 tons CO_2 for scenario 1; about 1,592,000 tons CO_2 for scenario 2; and was about 1,275,000 tons CO_2 for scenario 3.

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NGHIÊN CỨU KHẢ THI DỰ ÁN REDD$^+$ THÔNG QUA QUẢN LÝ RỪNG Ở TỈNH ĐIỆN BIÊN

Lê Xuân Trường
Trường Đại học Lâm nghiệp

TÓM TẮT

Nghiên cứu khả thi được tiến hành trên ba xã Mường Phăng, Nà Nhạ và Nà Tấu thuộc huyện Điện Biên, tỉnh Điện Biên. Dựa trên việc phân tích số liệu GIS và ảnh vệ tinh về độ che rừng trong 3 thời điểm trong quá khứ (năm 1990, 2000 và 2010) và kết quả khảo sát trữ lượng cây rừng, sinh trưởng và tăng trưởng cây rừng trong 6 ô tiêu chuẩn rừng trồng, 15 ô tiêu chuẩn rừng tự nhiên cùng với việc phân tích điều kiện kinh tế- xã hội đã đề xuất được 3 kịch bản hấp thu khí nhà kính đến năm 2040 cho khu vực dự án. Phần lớn rừng tự nhiên trong khu vực là rừng nghèo và rừng phục hồi. Diện tích đất trống tiềm năng cho tái sinh tự nhiên và tái sinh nhân tạo cũng như phục hồi rừng còn rất lớn. Tăng trưởng bình quân năm rừng trồng từ 3,83 m^3/ha/năm (Trẩu (*Vernicia montana)*) đến 11,27 m^3/ha/năm (Thông mã vĩ (*Pinus massoniana)*). Trữ lượng rừng tự nhiên từ 11,6 m^3/ha đến 554,1 m^3/ha. Từ thực trạng độ che phủ rừng, các kịch bản và ước tính sự thay đổi sinh khối rừng trong tương lai, sử dụng phương pháp của IPCC để ước tính lượng khí các bon nic hấp thụ. Lượng các bon nic hấp thụ vào khoảng 2.182.000 tấn CO_2 cho kịch bản 1; khoảng 1.592.000 tấn CO_2 cho kịch bản 2; và khoảng 1.275.000 tấn CO_2 cho kịch bản 3 của khu vực nghiên cứu.

Từ khóa: Nghiên cứu khả thi, rừng trồng, rừng tự nhiên, phục hồi rừng và tái sinh rừng.

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