KIPCCF REPORT

DEFORESTATION AND FOREST DEGRADATION IN LOMBOK ISLAND, INDONESIA: CAUSES AND CONSEQUENCES

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REPORT

LOMBOK REDD PROJECT (KIPCCF)

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1. INTRODUCTION

1.1. Study Background

Lombok is the main island in the Province of West Nusa Tenggara (NTB). According to the Ministry of Forestry (2009), the total forest area in this province is 1.02 million hectares, which can be classified based on its function into conservation forests (86,775 ha), protection forests (421,854 ha), limited production forests (334,409 ha), production forests (126,278 ha) and hunting park (52,250 ha). **Table 1.1** shows the demographic situation of all regencies in the NTB province.

Table 1.1. Demographic Situation of all Regencies in West Nusa Tenggara Province

No.	Regencies	Number		Area	Population	Regional Original Income (PAD)
		District	Village	(km^2)	(inhabitants)	(Rp)
1	West Lobok	10	88	1,863.40	829,777	518,818,386,522.91
2	Central Lombok	12	124	1,208.40	856,675	642,343,910,055.00
3	East Lombok	20	150	1,605.55	1,080,237	815,735,588,617.00
4	Sumbawa	24	166	6,643.98	420,750	571,246,283,485.76
5	D o m p u	8	76	2,324.60	217,479	407,724,141,334.53
6	B i m a	18	178	4,389.40	420,207	629,245,171,917.00
7	Sumbawa Barat	8	63	1,849.02	101,089	436,517,657,021.00
8	Mataram City	6	50	61,30	375,506	472,006,024,122.11
9	Kota Bima	5	38	207,50	132,292	357,209,683,620.00

Source: BPS NTB (2010)

There have been a number of recorded disturbances that threatened the forests in the Province of West Nusa Tenggara. The deforestation rate in the Province of West Nusa Tenggara was about 58,000 ha per year, consisting of 22,000 ha in forest area and 36,000 ha in non-forest area ("APL"). Most cases of deforestation in this province occurred in secondary forests, where more than 53,000 ha had been degraded annually (Ministry of Forestry, 2008).

In order to prevent further destruction of forests in Lombok Island, it is very important to identify the causes of both deforestation and forest degradation. By understanding

these causes precisely, proper strategies to combat deforestation and forest degradation in Lombok Island can be formulated.

1.2. Objectives

The objective of this research is to identify the causes of deforestation and forest degradation in Lombok Island, Province of West Nusa Tenggara, Indonesia.

2. AN OVERVIEW TO DEFORESTATION AND REDD IN INDONESIA

2.1. Deforestation

Deforestation and forest degradation are the results of a very complex confluence of actors, interests and circumstances. Such drivers range from the changes in global markets that affect the demand for timber, or agricultural products to the need of local communities for land to use in subsistence agriculture. A diverse set of changes in, for example, growth of timber demand, technology, access to roads and transport, prices of agricultural inputs, industrial development and fluctuating labor markets at the local and national levels, can have both negative and positive impacts on the rate of deforestation (Chomiz et al., 2006 in Badiozamani, 2007).

Deforestation has a significant impact on the global carbon cycle. According to IPCC, land-use change produced 1.6 Gt C during the 1990s – approximately 20-25% of global greenhouse gas emission for this time period (Watson *et al.*, 2000 in Schlamadinger and Johns, 2007). They also explain that referring the report of FAO, while deforestation is declining in developed countries, in developing countries, where the world's most carbon rich forest ecosystems are located, deforestation rates are generally increasing. Despite the many biodiversity, climate, and cultural benefits they provide, forest in developing countries are also losing ground to the pressures of shifting agriculture, population growth and the unsustainable exploitation of forest resources (Geist and Lambin, 2002 in Schlamadinger and Johns, 2007).

The actors engaged in deforestation and degradation also vary significantly from region to region, even from one locale to another. For example, deforestation and degradation in Latin America is mostly a result of agriculture and non-sustainable extraction of timber, with 45% of land-use change being the conversion of forest to large-scale

permanent agriculture and charcoal harvesting, accounting for about 60% of land use change there (FAO, 2001 in Badiozamani, 2007). Traditional tools of rural development such as creating access to capital and securing land tenure can also have either positive or detrimental effects on forest conservation depending on whether the primary markets available are for forest or agricultural products (Merry *et al.,* 2002 in Badiozamani, 2007).

In case of Indonesia, the dynamic changes in government policies aiming at improving the economic condition of the country have affected the rate of deforestation and subsequently relevant ecological and livelihood aspects (Nawir *et al.,* 2007). She also notes that forest management policies include: prioritizing the agricultural expansion (during 1950s to 1975), realizing permits for commercial logging concessions (during 1975 to 1990s), and focusing on forest management outside state forest (during 1990s to 1997). Since the economic crisis that hit the Indonesian economy in 1998, rates of deforestation and land degradation have increased due to forest conversion to meet local needs for land-based income alternatives (Nurrochmat, 2005; Nawir *et al.,* 2007).

Nawir *et al*. (2007) recommend that driving factors behind deforestation and land degradation have become progressively more complex covering various aspects. The driving factors of deforestation are both direct and indirect. The main direct causes are logging operations, illegal logging and unmanageable intensive reoccurring fires, mainly during long dry seasons. The indirect causes include market failures (e.g. under pricing of timber), policy failures (e.g. the 20-year logging permit granted to concessionaires as a disincentive for enrichment planting), and other socio-economic and political issues in a broader sense. Since the mid-1990s up to the present, besides repeated forest fires and mismanagement of logging concession areas, complex problems include the transition period from a centralized to decentralized governance system, forest conversion for other uses (e.g. oil palm plantations), illegal logging and extensive forest encroachment, usually with aims to convert the forest, mainly for agriculture or estate crop development.

According to Sunderlin *et al.* (2000) the impact of previous economic crisis on natural forest cover was significant as there was a broad tendency for farmers to compensate for lost agricultural income with income from the forest in a broad sense (i.e. not just NTFPs but timber as well). Increased exploitation of timber was motivated not just by economic constraints but also by decreased presence of government forestry and security personnel in natural forest areas. Clearing of land increased dramatically in the second year of the crisis, and this was mainly associated with the aim of establishing export tree crops, either because of their attractive price (e.g. pepper and cocoa), or for reasons related to long-term income security (e.g. rubber). During the crisis export, tree crops expanded faster than food crops in terms of numbers of households expanding production and in terms of the planned ultimate use of newly cleared land. Their data provide conclusive evidence of a causal link between price changes and forest clearing decisions. The qualitative data provide strong evidence that political change and, specifically, decreased policing of forest boundaries in the aftermath of the fall of Suharto, played a strong role in encouraging colonization of protection forest areas. It remains to be determined, however, how these two factors compare in their influences on forest-cover change, and how they interact.

Further, Nawir *et al.* (2007) reported that highly degraded forest areas are often produced in the aftermath of inconsistent policies. The discontinuity of rehabilitation policies in assigning the state rehabilitation programme to state-owned companies (e.g. Inhutani I to V), well reflects this. After only three years of implementation, the programme was put on hold and then simply left hanging with no clear hand-over provided. The Ministry of Forestry then handed over approximately 5.5 million ha of returned logged-over areas to the provincial governments but with no budget. With no funding and very little in the way of human resources, these areas quickly became 'open access' and were subject to illegal logging.

2.2. REDD Market, Financing and Distribution Mechanism

There is still uncertainty about the form that a REDD market will take in Indonesia. The form will depend on international discussions which may take several years to resolve.

It is expected that future REDD markets in Indonesia could involve large financial flows, although it is impossible to put a firm figure on the size of a future emissions market; estimates vary from USD1-18 billion per year depending on the assumptions used. Considering the size of Indonesia's forest resources and the scope of its industry, the portion of this market that can be expected to accrue to this country in REDD credits after 2012 is very significant. This is the first time when financing of this level could be made available for key forestry reforms and sustainable forest management (IFCA, 2007). Another concerns of IFCA is whether the geographical scale for the calculation of the baseline and accounting are likely to generate larger financial flows and reduce overall risks compared to sub-national ones, but they could involve higher transaction and implementation costs, and greater inefficiencies to REDD could be preferable to increase learning before 2012 and to increase the range of REDD options available to sellers and buyers.

The objective of a REDD payment distribution mechanism is to support policies and measures that reduce deforestation and degradation through transfer of revenues from international REDD funds or carbon markets to (or within) national levels. REDD may only work if an appropriate balance is found between efficiency and equity, embedded within a system that is accountable and transparent, focusing on long term sustainability goals and improving the ability of stakeholders to engage with the system. Based on an analysis of existing experience with regulatory, fund and market-based forest management in Indonesia, IFCA's preliminary findings indicate that performance will have to improve significantly for REDD to work.

The new institutions may be required where the existing arrangements cannot accommodate REDD. These will include fund managers for receiving and redistributing funds; registries for tracking emissions reductions credits; legal institutions for adjusting existing laws, enforcing REDD laws and resolving disputes; monitoring and verification entities for ensuring that emissions reductions are real and achieved in environmentally and socially acceptable ways; implementing administrative organizations for handling contracts and logistics; and the sellers of carbon themselves who may need to organize internal redistribution mechanisms.

Separating regulatory from fund management and trading roles will be crucial in order to increase accountability. The allocation of rights, responsibility and authority between local, national and independent entities for the regulation and sale of REDD credits, and for payment distribution, needs to be addressed. Amongst others, this requires capacity building of decentralized institutions and access to legal processes will be crucial in order to avoid corruption and distortions in the system.

2.3. Important Strategies for REDD Implementation in Indonesia

The legal and policy framework already exists through which Indonesia could exercise a significant reduction in future carbon emissions. Key pieces of enabling legislation include:

- Government Regulation: 6/2007 on Forest management and utilization;
- Forestry Ministerial Decree: 159/Menhut-II/2004 on Restoration of degraded ecosystem in production forest areas;
- Presidential Instruction: 4/2005 on Illegal logging;
- Presidential Decree: 32/1990 on Prohibiting development on peat >3m deep;
- Presidential Instruction: 2/2007 on Rehabilitation of the ex-Mega Rice Project in Central Kalimantan;
- Economic and Industry Ministerial Decree: 14/2001 on Integrated Water Resources;
- Government Regulation: 4/2001 on Forbidding the use of fire; and
- Forestry Ministerial Decree: 260/1995 on Guidelines for fire control and prevention.

This existing legislative and policy framework works to support some of the enabling conditions necessary to guarantee the permanence of emissions reductions. This includes efforts to review the Protected Area (PA) Estates, consisting of all Conversion Forests and Protected Forests to ensure clarity, consistency and capacity between the national and local governments concerning planning and enforcement of protection from illegal activities causing degradation and deforestation (IFCA, 2007).

Current law and policy also supports a range of measures with potential to generate REDD payments. This includes:

1. Improving natural forest and plantation forest management systems following the international guidelines for Reduced Impact Logging (RIL), to which Indonesia is signatory.
2. Developing wood-chip plantations and estate crops on already cleared or highly degraded land, in line with existing policy.
3. Focusing extractive timber operations and conversions for plantations and estate crops on mineral soils.
4. Controlling peat land development and management, in line with existing regulations. This includes limits on development of deep peat, hydrological management and fire control.
5. Engaging local communities in conservation and sustainable management of Conservation Forests, Protected Areas and Production Forests and to ensure that they become major beneficiaries of GOI's plans for establishment of new forest and oil palm plantations on degraded forest lands (IFCA, 2007).

The value of carbon credits is determined by a market depends on its quality and quantity. The extent to which Indonesia is prepared to invest in ensuring the highest quality for its potential REDD Carbon Trade will, to some extent, depend on what the country, its institutions and it industries, and people can expect to gain.

Land use activities that result in deforestation include large and small plantations of oil palm, rubber, cocoa, and coffee, as well as small land clearing for other smallholder activities, including swidden agriculture. Logging in forest concession results in forest degradation, and it often precedes plantation development. Each of these activities bears their own opportunity cost, in which carbon prices need to match and ideally outweigh if REDD is to provide a viable alternative. At the lower end are smallholders of cassava, rice fallow, rubber and timber, demanding a break-even carbon piece of USD 0.1-0.7 USD/ton of avoided CO_2 emission. At the higher end is oil palm, demanding a break-even carbon price of USD 21.6/ton (IFCA, 2007).

2.4. Supporting strategies for reducing forest loss in the natural production forests

A national REDD framework will not fundamentally change the ways to achieve sustainable forest management, but it may give the additionally political will, financing, and focus to make the necessary transitions happen more quickly.

1. Improving forest logging concession (HPH) management

   The present system of managing licensed forest logging operations in Indonesia, through constant application of an extremely detailed set of regulations, laws and provisions governing forest operations, is complicated. There are alternatives, based on a certification process of scheduled inspections, carried out by skilled independent teams, which can evaluate performance of logging and apply sanctions or incentives accordingly. These systems, combined with reduced impact logging methodologies and performance bonding, will provide a more effective regulatory and incentive environment to maintain control over sustainable management of logging concessions. The ministry of forestry is currently considering a mandatory verification process which has features based on the voluntary certification model.

   Strong incentives for sustainable management: improving forest retention in HPH concessions will have a significant value under a national REDD strategy, and performance based incentives should go to those that create that value through improved management. Incentives can be directly tied to carbon outcomes, or indirectly connected based on proxy measures.

2. Establishing improved governance in “open access” forest. Strengthening community-based forest management.

   Approximately a third of the area of the production forest zone is what is known as “open-access” forest – areas which are occupied by neither HPH concessions, nor HTI zones. These forests can be heavily encroached, and are also vulnerable to the activities of illegal loggers. Some open-access forests with very low forest cover may not be suitable for either HPH management or generation, and should be considered for HTR small-scale community plantations or HTI concessions.

3. Reducing demand for and supply of illegal logs as a driver of forest degradation

The level of illegal logging has declined significantly in recent years, due to market issues and an enhanced logging interdiction program by the ministry for forestry and the national police. Illegal logging operations do not necessarily cause deforestation immediately, but it is highly likely that they do cause degradation, and if they are present in large enough numbers, then this, combined with overuse of the forest resource as a whole, will ultimately cause deforestation. Reducing demand for and supply of illegal logs as a driver of forest degradation can be performed through:

a. Continuation and improvement of the large and ongoing operation to interdict illegal logging operations in Indonesia. Some issues of coordination between the national police and the ministry of forestry need to be addressed, in this regard.
b. A supporting approach would be for the government to subsidize the transition of wood product industries to produce higher value-added products, such as framing, molding, furniture manufacturing and carving, which are suggested in the ministry forestry revitalization roadmap. These industries would in aggregate use significantly less volume than the two dominant sectors are doing now, and would be able to pay international prices for the logs used. It is estimated that the net costs of this subsidy and adjustment process would be close to zero, because of improved forest value. But to avoid any underestimation of REDD costs, a net adjustment/ subsidy cost of %100 million per annum has been adopted in this analysis.
c. An adjustment scheme for sawmills and plymills will be controversial, fiscally and politically. However, Indonesia has experiences with industry adjustment in many sectors, and providing the benefit to exiting and re-structuring operators which is set at reasonable compensatory levels will be possible. Management of this program should probably rest with ministry of industry and trade.

In the policy point of view, there are several important things should be remember, namely:

a. REDD will only work if an appropriate balance is found between efficiency and equity, embedded within a system that is accountable and transparent, focuses on long term sustainability goals and improves the ability of stakeholders to engage with the system.
b. Existing experience with regulatory, fund and market-based forest management in Indonesia indicate that performance will have to improve significantly for REDD to work.
c. REDD transactions with international buyers/funders could take a number of forms to ensure efficiency, accountability and investor confidence.
d. Allocation of REDD payments to different actors will have to address trade-offs between efficiency and fairness, possibly through redistributing funds from areas with high deforestation rates to those with low rates. Vertical distribution of funds should relate to the 'added value' of each level offered in producing the carbon commodity.
e. REDD payments can be made upfront or disbursed over time. To encourage compliance and increase permanence, disbursed payments might be preferable for the buyers.
f. Whether payments are most suitably made in cash or in non-cash forms will depend on the stakeholders and the specific context.
g. Existing institutions will have to be strengthened and new institutions may need to be established for REDD. Separating regulatory from fund management and trading holes will be crucial in order to increase accountability. It may increase efficiency if the central government adopts a role as a regulator of the system, rather than as a seller. Strong legal institutions and access to legal processes will be crucial I order to avoid distortions in the system such as elite capture.
h. REDD mechanism are likely to entail high risks, which will have to be well managed in order to attract investors. Use of processes to ensure transparency and accountability, such as the BLU will be crucial for strengthening financial processes. Risk of non-permanence can be more easily managed when there is a national accounting system that includes insurance 'buffer'. Clear liability arrangements, use of third party verification processes, voluntary standards and tools for addressing

land conflict could be stipulated by the central government. Built in collaborative learning processes could help improve REDD implementation through time.

i. Trade-offs between complexity and access to funds will need to be carefully managed to ensure equitable access to REDD by different stakeholders and feasibility of the system as a whole.

2.5. Overall Economic Situation for REDD

This part will discuss the overall economic situation for REDD consisting of potential economic benefits of REDD and ecosystem restoration proposals.

2.5.1. Potential Economic Benefits

The study describes a phased REDD strategy for protected areas which includes additional interventions to: a) stabilize protected areas, thus, reducing forest cover loss to zero over five years and b) restore available land to natural forest cover. The actions described in the study for stabilizing protected areas are: a) up-front investment related to needs assessment and strategy and planning; b) Increasing management capacity trough increased funding for management units up to an ideal budget level and refinement of strategies for protected areas management; c) Increasing efforts aimed at collaboration with communities, NGOs, government stakeholders; d) key investments in institutional development (especially for protection forests). Five year estimated costs are USD 494 million for conservation forests and USD 647 million for protection forests (IFCA, 2007).

It is important to note that the cost estimates are probably overstated since they assume that all areas require the same level of investment. In fact, there may be many areas that are self-protecting based on remoteness, where investment may be lower or delayed, to reduce the cost of the program. The present value of reducing forest loss to zero within five years in both conservation and protection forests would be USD280 million assuming a price of USD4/ton CO_2, and USD701 million at a price of USD10/ton

CO_2. Given the extremely low recorded forest cover change used in this analysis, investment in reducing forest loss trough a REDD mechanism in protected areas does not appear to be viable as a stand-alone option. The prices at which the interventions listed are likely to be economically rational as a stand-alone investment are USD11.50/ton CO_2 for a protection forests strategy and USD37/ton CO_2 for a conservation forests strategy (IFCA, 2007).

Protection forests are more economically viable than conservation forests for REDD according to this analysis because the historical emissions are higher and therefore, potential revenues from stopping emissions are higher. The wide range of values for forest loss in protected areas makes this analysis extremely uncertain. If the forest loss figures from landsat 1997-2003 rather than MODIS 2000-2006 are the basis for estimating potential revenues, the break-even price is USD3.50/ton CO_2 for the conservation forests strategy and USD6/ton CO_2 for the protection forest strategy. Applying the BAU scenario based on rising trend of losses from protection forests (high case) indicates a break-even price of USD 3.50. Clearly, the choice of baseline for the conservation and protection is both extremely important and extremely challenging. Better data is needed, and political judgment is required (IFCA, 2007).

2.5.2. Ecosystem Restoration

Beyond elimination of losses of forest cover within protected areas, restoring and rehabilitating forest within protected areas would have significant climate change mitigation benefits as well as creating opportunities for beneficial impacts on local livelihoods. It is estimated that more than 6.5 million hectares may be available for rehabilitation, either to natural forest cover or for establishment as agro forests. The carbon benefits of this are estimated at approximately 2.8 billion tons CO_2, over 20 times greater than the carbon emissions reductions anticipated from stabilization alone. As there are no legal commercial alternatives, the opportunity costs for restorations are the costs of the management intervention and the costs of altering or moving local land uses which are within the reserve (IFCA, 2007).

The scale of opportunity for restoration may be very large, depending on the current use of the land within protected areas and available for restoration, and would be in line with the management goals of protected areas. The main assumption of the IFCA teams has been that REDD will utilize a gross accounting system in which re-growth is not credited. Seeking an accounting system allows for crediting of re-growth in areas intended to be forested (e.g. protected areas) that were GHG performance. Connecting the restoration with a REDD system rather than the CDM allow significant reduction in transaction costs (IFCA, 2007).

3. METHODOLOGY

3.1. Site and research period

This research was conducted in Lombok Island, by interviewing stakeholders representing various institutions in Mataram City, Central Lombok and East Lombok areas. Deep interviews with local people were conducted with 100 respondents in the districts of Kopang, North Batukliang and Sikur. The whole process was carried out from August to October 2010.

3.2. Specific terms of research

This research main purpose is to identify causes of deforestation and forest degradation, with the following specific terms:

1. Deforestation is a permanent change of a forested area to a non-forested area, due to single or combined factors.
2. Forest degradation is decreasing quantity of forestland cover within certain period, due to single or combined factors. Since this REDD project will be conducted mostly in protection forests, the term forest degradation refers to decreasing quantity of forestland cover and stands, even only a tree, due to human activities.
3. This research takes the form of a survey research, to identify the causes of Deforestation and Forest Degradation (DD) in Lombok Island.
4. The methodology employs both desk study and field survey in order to explain why and how deforestation and forest degradation were happening.
5. Focus of this research is to study deforestation and forest degradation within the last ten-years (1990-2009).
6. This research is conducted to identify the main drivers for development in Lombok Island, e.g. agriculture, tourism, construction, etc.

3.3. Data Collection

This research on identifying causes of deforestation and forest degradation was conducted in two parts: desk and field research. It is a descriptive-empirical research and its aim is to describe and explain the phenomena under consideration based on cross-sectional primary and secondary data. Primary data were collected through personal and group interviews with various stakeholders, decision makers, and experts, as well as by fact finding and field observations. Secondary data were taken from laws and regulations, official reports, statistical bureaus, and other relevant data sources. Sampling focused on selected relevant research area(s) in Lombok Island where deforestation rates were high.

Field research was designed to obtain a sharper and better picture of the condition, which would support the arguments and findings, possibly identify any exceptions from general conclusion in conditional cases. Field research was done in order to secure a more reliable conclusion and enable a more relevant recommendation. After completing the field research, it is expected that the researcher could understand various social aspects, such as motives and perceptions of stakeholders, resources and capacities of stakeholders to undertake local forest management, the nature of social arrangements, and the influences of macro-economic and political factors to deforestation in Lombok. A field research is useful for measuring the effectiveness, consistency and acceptability of certain policy.

3.4. Interviews

Primary data were gathered from interviews with key persons and households. There were two types of questionnaires used in the interviews as follows:

1) Semi-structured questionnaire, which was targeted for key person interviews. This questionnaire provides only general guidelines of the question's topics with emphasis on qualitative data. The key person's interviews were conducted through personal discussions using open questions to understand the perceptions

of various stakeholders on regional autonomy. Interviews were carried out with some relevant stakeholders and decision makers.

2) Structured questionnaire, which was used for household surveys. This provides detailed questions using both close-questions and open-questions. Such a structured interview (household survey) was used to get information about the socio-economic conditions and perceptions of the rural community in Lombok Island towards forest utilization, deforestation, and forest degradation.

Key person interviews were aimed at gathering the perceptions of formal and informal leaders in the research site. As a qualitative research, it adopted purposive sampling, in which samples were represented by different stakeholders or target groups. A sampling-plan was made, according to the results of previous interviews with institutions' key persons to determine sampled persons. However, interviewed person for each interview was selected using a 'snowball method'.

According to Bryman (2001), a snowball method refers to sample selection, upon which the further interview partners are selected by considering the recommendation of the former interview partners. A quota control was used to limit the number of interview partners in certain institutions. It is important to ensure that each important stakeholder (or focus group) was represented. The final choice of whom to be interviewed is left to the interviewer's judgment. Kirk and May (1997) holds that to design a quota sample the researcher must know at least approximately the conditions of the target group according to the research objectives.

In a snowball interview, besides considering the recommendation of previous respondent, the selection of institutions and key persons in which and with whom the interviews are conducted is based on the relevance to the research topic and the principle of the representativeness (**Figure 3.1**).

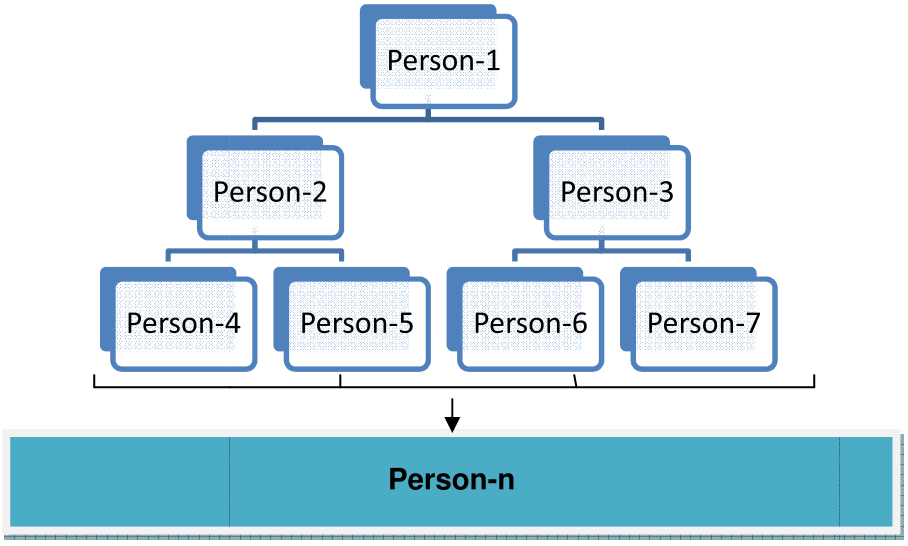

Figure 3.1: Choosing Respondents by Snowball Method

Key person interviews were conducted in Mataram - the capital city of West Nusa Tenggara Province, in the regencies of Central Lombok, East Lombok and West Lombok (also including North Lombok). In Mataram, key person interviews were conducted at the Provincial Forestry Service office of West Nusa Tenggara by interviewing four respondents, each is in charge of distribution of forest products, forest planning, programming and budgeting. In addition to interviews with key persons in West Nusa Tenggara Provincial Forestry Service office, interviews were also conducted with key persons from NGO-Transform, an institution engaged in natural resources management and community assistance, as well as interviews with two respondents from WWF, an international NGO that concentrates on nature conservation and biodiversity.

In Central Lombok Regency, interviews were conducted with eight key persons from the Forestry and Estate Service of the Chief of Forestry and Estate (forest administration) and other key persons in charge of reforestation and land rehabilitation, and forestry planning affairs. In addition to the key person in the Forestry and Estate Service, interview was also conducted with two field officers (forest rangers) from Gunung

Rinjani National Park who worked in the forests around Telon Ambon Hamlet of Wajageseng Village.

Key person interviews in East Lombok Regency were conducted with eight key persons from the Forestry and Estate Service office of the Chief of Forestry and Estate (forest administration) and other key persons in charge of circulation of forest products, reforestation and land rehabilitation affairs as well as licensing and plantation forestry. In addition to the key persons in the Forestry and Estate Service, interview was also conducted with respondents in charge of plant cultivation within the Agricultural Service. Three officers at Gunung Rinjani National Park who were based in East Lombok Regency were also interviewed.

In West Lombok Regency (including the expansion area of North Lombok Regency), interviews were conducted with two key persons from the Forestry and Estate Service, who are in charge of reforestation and rehabilitation of degraded land and social forestry (**Table 3.1**).

Table 3.1. List of Interviewed Key Persons

Locatio	Institutio	Number o Key Person	Key Person's Scope o
Mataram	Regional Forestry Office of West Nusa Tenggara Province	4	Forest product distribution (1)
			Forest planning (1)
			Forestry programme (1)
			Forestry budget (1)
	NGO – Transform	1	Natural resource management & community empowerment
	WWF	2	Natural resources & biodiversity conservation (2)
Central Lombok	Regional Forestry & Estate Office of Central Lombok	8	Forest administration (1)
			Reforestation & forestland rehabilitation (3)
			Forest planning (4)
	Gunung Rinjani National Park	2	Forest rangers in Telon Ambon - Wajageseng (2)
East Lombok	Regional Forestry & Estate Office of East Lombok	8	Forest administration (1)
			Reforestation & forestland rehabilitation (2)
			Forest product distribution (2)
			Forestry & estate admissions & services (3)
	Regional Agricultural Office of East Lombok	1	Plant breeding & cultivation (1)
	Gunung Rinjani National Park	3	National Park Administration Section-3 (3)
West Lombok & North Lombok *)	Regional Forestry & Estate Office of West Lombok (& North Lombok)	2	Reforestation (1) Degraded land rehabilitation & social forestry (1)
TOTAL NUMBER OF KEY PEF		**31**	

**) North Lombok is a new regency, officially separated from West Lombok & Mataram City by 2008/2010 since survey was conducted, the forest administration office is still integrated in West Lombok.*

Household interviews were conducted with 102 respondents that consisted of 69 people from Central Lombok Regency and 33 people from East Lombok Regency. In Central Lombok Regency, interviews were conducted in three districts, i.e., North Batuakliang, Kopang, and Praya. Sampled villages in the districts of North Batukliang include Teratak Village, Tanak Beak Village, Aik Berik Village, Karangsidemen Village, Lantan Village and Setiling Village. In the district of Kopang, respondents were sampled from Kopang Village and Wajageseng Village, while in district of Praya, respondents were sampled from the Village of Praya (**Table 3.2**).

Table 3.2. Distribution of Respondents in the Household's Survey

Location	Number of Respondents
North Lombok Rege	
District of North Batuakl	
1. Teratak Village	7
2. Tanak Beak Village	9
3. Aik Berik Village	12
4. Karangsidemen Village	4
5. Lantan Village	7
6. Setiling Village	13
District of Kopa	
1. Kopang Village	2
2. Wajageseng Village	9
District of Pra	
1. Praya Village	6
Sul-Total for Central Lon	**6**
East Lombok Rege	
District of Sik	
1. Tete Batu Village	11
2. Kembang Kuning Village	8
3. Kotaraja Village	10
District of Selo	
1. Selong Village	4
Sul-Total for East Lom	**3**
Total Responde	**10**

3.5. Workshop and Focus Group Discussion

Besides carrying out key person and household interviews, in order to determine the perceptions of the concerned parties, workshops and Focus Group Discussion (FGD) were conducted. The workshop was held in Mataram on 25th of September 2010 by inviting all stakeholders related to forest management and land use in Lombok. The workshop was attended by 32 participants representing 28 institutions, namely: University of Mataram, NGOs, Technical Implementation Units (UPT) of the Ministry of Forestry in Mataram, Forest and Estate Service of West Lombok, Central Lombok and East Lombok, Regional Environmental Agency of West Nusatenggara, Forestry

Research Agency in Mataram, Management of Gunung Rinjani National Park (BTN GRNP) and informal leaders

The FGDs conducted in two regencies, namely regency of Central Lombok on 24th of September 2010 located at "Aula Dishutbut" attended by 21 people who represented all stakeholders, including institutions and community leaders from villages around the forest. In the regency of East Lombok, the FGD was held on 26th of September, at Village Office Hall of Tetebatu which was attended by representatives of institutions or agencies and community leaders concerned with the management and utilization of forests.

The purposes of the REDD workshop and Focus Group Discussion in the Island of Lombok are:

1) Obtaining information on the preparation of local government agencies involved in REDD carbon trading.
2) Acquiring public perception of the meaning of forests, impacts caused by forest, community activities around and in the forest and community expectations for forest management.

The expected benefits of the REDD workshop and Focus Group Discussion in the Island of Lombok include:

1) Available information on the plans and responses of West Nusa Tenggara Provincial Government on REDD schemes as an alternative for community development.
2) Available information on the perceptions, expectations, requests and other forms of community interactions with the forest.

3.6. Data Analysis

To produce a proper analysis, secondary data were necessary to complement primary data and were important as bases to support arguments of the analysis. The main sources of secondary data were government policies related to forest management, forest utilization and land use, comprising of laws and regulations (national and

regional) collected from relevant institutions. Other important sources of secondary data were statistical data, consisting of geographic as well as demographic information. Besides government policies and statistical information, secondary data were also gathered from reports and results of previous studies. This research applied both qualitative and quantitative approaches, which were used together as synergic analyses in order to achieve the research objective.

A comprehensive evaluation discussed and synthesis was made from field survey which also considered desk analysis. This evaluation will answer the following questions:

1) **"What" activities caused deforestation and forest degradation?**

   a. Listing all activities within the forest area
   b. Understanding activities which are potential s "trade off" to forest resources.
   c. Identifying conflict of interests among different sectors in Lombok Island.

2) **"Who" acts (actors) in deforestation and forest degradation?**

   a. Listing all actors or potential actors, who have activities within and surrounding the forest.
   b. Understanding actors who support forestland conversion.
   c. Identifying conflict of interests among actors towards land-use in Lombok Island.

3) **"Where" did deforestation and forest degradation occur?**

   a. Listing all locations of degraded forests in Lombok Island.
   b. Identifying deforested areas in Lombok Island.
   c. Mapping degraded forests and deforested areas in Lombok Island.

4) “When” did deforestation and forest degradation occur?

a. Listing the time frame of deforestation in the respective sites.

b. Identifying the chronology of degraded forests in the respective sites.

c. Understanding the time frame and situation settings of deforestation and forest degradation.

5) “Why” did deforestation and forest degradation occur?

a. Identifying the structure of wood processing industries

b. Listing policies and regulations concerning forest utilization and land use change.

c. Understanding socio-economic situation and motivation for deforestation and forest degradation.

6) “How” did deforestation and forest degradation occur?

a. Understanding the social order of society.

b. Understanding practices of forest utilization.

c. Identifying practices of land use change and development.

4. CAUSES OF DEFORESTATION & FOREST DEGRADATION IN LOMBOK

4.1. Demography

Distribution of the settlements tends to be concentrated in the centre areas of economic activities. These include areas where the communities were dependent for their livelihoods, such as: areas in the vicinity of forests, fields, rice fields and also at the edges of road that connects villages or districts with other places. In addition to depending on agriculture for their livelihoods, some residents who live in areas near forests also work as artisan, farmers, breeders and others. **Table 4.1** presents the composition of the rural forest communities based on livelihoods.

Table 4.1. Composition of Forest Communities Based on Means of Livelihoods

Classification based on distance of village to forest	District/Village	Mean of Livelihood							
		Emplo-yee	Trader	Farmer	Artisan	Farm Worker	Breeder	Others	Sum
Directly adjacent to forest	A. District of Sikur								
	1. Tete Batu	91	88	1,230	172	1,295	788	-	3,664
	2. Kembang Kuning	35	57	555	91	564	296	-	1,598
	B. District of Batukliang Utara								
	1. Aik Berik	15	200	815	187	1,023	702	-	2,942
	2. Karang Sidemen	21	153	775	226	998	657	1	2,831
	3.Setiling	10	170	615	213	815	487	-	2,310
	4. Lantan	5	103	667	135	856	367	-	2,133
	C. District of Wajageseng								
	1. Telon Ambon	-	-	20	-	100	150	-	270
Not directly adjacent to forest	A. District of Sikur								
	1. Kota Raja	270	305	1,765	133	2,940	12	-	5,425
Total		447	1,076	6,442	1,157	8,591	3,459	1	21,173
Percentage (%)		2.11	5.08	30.43	5.47	40.58	16.34	0.01	100

Source: Village Monograph (2010)

Table 4.1 showed that farmers and farm workers were the most widely livelihoods found among the rural forest communities. People who are farmers reached approximately 6,442 persons or 30.43% of the total population, less than those working as farm workers who were comprised of 8,591 persons or 40.58% of the total population. While the rest of population that work as "non-farmers and farm workers" reached only 6,140 people or 29%. These indicate that community livelihoods within agricultural sector are very high.

The high dependence on agriculture in general would affect the forestry sector. This is because the linkage between agriculture and forestry sector is very high and in some ways is a trade off, especially in terms of land use. Land use in forest areas can be performed through activities such as Intercropping and PLDT (Land Use Under the Stand).

One activity which has become the foundation of the community is community forest. Community forest is concentrated in Rinjani Mountain forests of Central Lombok. The area of the community forest reached a total of 1,809.5 ha with 3,559 people members[1]. Community forest has a very big role to ensure access for rural communities around the forest in carrying out forest utilization activities and other activities as a form of interaction and community participation in utilizing and conserving the forest.

The rural forest community has a diverse educational background. In general, rural communities around the forest had elementary education background or did not complete primary school. However, there are also few people who already enjoy higher levels of education, both in secondary schools and universities. Table 4.2 presents the composition of rural communities around the forest based on the level of education.

[1] Personal communication with a Head of Community Forest in the District of Batukliang Utara

Table 4.2. Composition of Rural Forest Community Based on Education Level

Village	Elementary School	Intermediate School	High School	University/ Academy
Tete Batu	515	869	427	77
Kembang Kuning	158	266	131	24
Kota Raja	2,380	4,016	1,975	366
Aik Berik	915	181	181	65
Karang Sidemen	867	172	172	61
Setiling	224	44	44	16
Lantan	229	45	45	16
Telon Ambon	-	124	75	16
Total	5,288	5,717	3,050	641

Source: Village Monograph (2010)

Table 4.2 shows that the educational background of majority of villagers is intermediate school. Approximately 21% of villagers had high school education and 39% had intermediate school education. Attractions to enter the forest in fulfilling their daily lives would still be high considering the low educational background of the villagers. About 75% of the villagers had elementary and intermediate education levels which certainly not acceptable to work in a formal sector.

In general, people who only had elementary education background are found to reside in remote areas in the vicinity of the forest or areas directly adjacent to the forest. Utilizations of the available natural resources are still limited, mainly due to limited knowledge and information received by the community. Based on the average education level of the community, the quality of human resources in the Village of Kota Raja can be said to be more advanced than other villages. This is reflected in more number of people from Kota Raja that could enjoy higher education level. Of the total number of 10,988 inhabitants in Kota Raja Village, 21% have at least attained high school education or about 2,341 people.

There are several villages that required serious attention in order to develop rural forest community; these are the Villages of Lantan and Telon Ambon. Specifically for Lantan Village, the short distance to forest and lack of agriculture land and relatively low human resources capability, have not resulted in the optimum utilization of available resources.

This condition will certainly produce negative impacts on forest management activities, both in terms of security and sustainability of production.

Sub Villages (Hamlet) of Telon Ambon is directly adjacent to Mount Rinjani National Park. Lack of agricultural land has led some residents to illegally explore the forest. Meanwhile, potential of abundant natural resources are found in Aik Berik Village although their utilization have not been optimum due to lack of information and knowledge of the community. Communities in the southern regions such as Aik Berik and Setiling Villages have acknowledged modern agriculture and tend not to plant tobacco as a major commodity like other villages located in the northern part such as the Villages of West Praya, Sekaroh and others. The reluctance of people in the southern area to grow tobacco could provide opportunities for villagers in the north to collect supply of fuel wood from the southern region for tobacco oven. This is evident from the amount of wood and twigs that are transported and sold outside the village. Some people have started to realize the scarcity of firewood. Therefore, they plant *Calliandra calothyrsus* and other crops along the boundary of the rice fields to produce firewood.

The dependence of the communities on the yields from intercropping in Community forest is very high. Based on observations, about 10-15 trucks per day can carry bananas produced by village participants of community forest. These supplies are certainly very good for the economy. However, if forest canopy has covered the growth room of the intercropping crops, yields of banana and other crops will decline. Such decline is a problem for the participants of community forest. If the decline in crop yields of intercropping continues, this would greatly affect the economic culture and community consumption behaviour. Communities can re-enter forests, for the sake of continuity of harvesting their intercropping crops.

4.2. Community Livelihoods

Among the types of livelihoods found in eight study villages, farmers and farm workers are professions that are related to forest, while other professions such as employees, traders, artisans and breeders, do not have high associations with activities in the forest. Details of the number of people or activities related to the livelihoods of forest can be seen in **Table 4.3.**

Table 4.3. Numbers of Rural Forest Communities and Numbers of Forest Related Livelihoods

Classification based on distance of village to forest	Village	Livelihoods		
		Number of People	Number of Forest Related People	Percentage of Forest Related People
Directly adjacent to forest	Tetebatu	2,377	1,426	60
	Kembang Kuning	728	434	60
	Aik Berik	5,800	1,442	25
	Karang Sidemen	5,497	582	11
	Setiling	1,418	559	39
	Lantan	1,449	947	65
	Telon Ambon	461	125	27
Total		17,730	5,515	287
Average		2,533	788	41
Not directly adjacent to forest	Kota Raja	10,988	0	0

Source: Village Monograph (2010), data processed

Table 4.3 shows that rural communities living directly adjacent to forest have very high dependence on forests. Around 778 people or 41% of the population has forest-related livelihoods. Lantan, Tetebatu and Kembang Kuning Villages comprised the highest dependency of people to forests with more than 60% followed by Villages of Setiling, Aik Berik and Telon Ambon with more than 25% and the lowest was found in the Village of Karang Sidemen with only 11%. The high number of forest-related communities in Lantan, Tetebatu and Kembang Kuning Villages is due to the very close distance to the

forests about 200 meters or about 500 meters from the village centre. Furthermore, the majority of the people are living as farmers and farm workers. For Aik Berik Village, the high number of people who interact with forest is because most of the people are farmers of community forest with the largest community forest land area of about 840 ha of 1,809.5 hectares.

4.3. Distribution of Respondents

Interviews were conducted at several research sites, namely in Central Lombok Regency, East Lombok Regency and Mataram City. Locations were selected through purposive sampling by deliberately selecting the locations to identify the perceptions and causes of deforestation and forest degradation. Interviews were conducted using snowball method by asking each respondent to provide some information and asked the respondents to recommend others considered relevant for the next respondent.

Respondents who were interviewed came from different work backgrounds. About more than 50% of the respondent worked as farmers (included farm workers). Most interviews were conducted in the villages of Aik Berik, Setiling, Tetebatu and Kota Raja. Aik Berik Village was given a large portion because according to the information received in the pre-survey, this village is very close to encroachment and illegal logging events that occurred between the beginnings of the year 1990 - 2003 and became head of project for community forest. Setiling Village was selected because it was one of the villages that were active in reforestation in 1980. Tetebatu Village was also considered important because this village is located adjacent to Mount Rinjani National Park and the people livelihoods dependent on forest **(Table 4.4).**

Table 4.4. Distribution of Respondents Based on Livelihoods

Classification based on distance of village to forest	Name of Village	Livelihoods	
		Farmers/farm workers	Non-farmers/farm-workers
A. Directly adjacent to forest	Aik Berik	12	1
	Kembang Kuning	7	1
	Lantan	7	0
	Setiling	13	0
	Telon Ambon	7	0
	Tetebatu	10	1
Total of A		56	3
B. Not directly adjacent to forest	Jerowaru	0	3
	Mataram City	0	1
	Kota Raja	1	9
	Praya	0	6
	Tanak Beak	1	8
	Teratak	0	7
	TNGR	0	5
Total of B		2	39
Total		58	42

Respondents were selected from a variety of livelihoods, as farmers/farm workers and non farmers and farm workers, such as employees (included civil servants), NGOs, head of village/hamlet and traders/entrepreneurs. The diversity of professions that were found in a small area shows that rural communities within the research sites had different interests in forests. Respondents were evenly distributed at the age between 24 to 50 years. There were 71 respondents aged 30-45 years which is the productive age.

Table 4.5. Distribution of Respondents Based on Age

Name of Villag	Range of Age of Respondents (Year)							
	20-25	25-30	30-35	35-40	40-45	45-50	Above 50	Total
Aik Berik	0	0	2	4	3	4	0	13
Jerowaru	0	0	1	0	1	0	1	3
Kembang Kuning	0	2	2	2	2	0	0	8
Mataram City	0	0	0	1	0	0	0	1
Kota Raja	0	1	2	1	3	2	1	10
Lantan	0	0	3	2	1	1	0	7
Praya	0	2	2	2	0	0	0	6
Setiling	0	0	3	6	2	1	1	13
Tanak Beak	0	0	1	3	3	2	0	9
Telon Ambon	0	0	1	2	1	0	3	7
Teratak	0	0	1	2	4	0	0	7
Tetebatu	1	3	4	1	0	1	1	11
TNGR	0	0	0	1	2	2	0	5
Grand Total	**1**	**8**	**22**	**27**	**22**	**13**	**7**	**100**

Table 4.5 shows that only 1 (one) respondent aged under 30 years and only 7 respondents aged over 50 years. This indicated that data gathered were in the range of a normal curve with an average age of 40 years as shown in the following **Figure 4.1.**

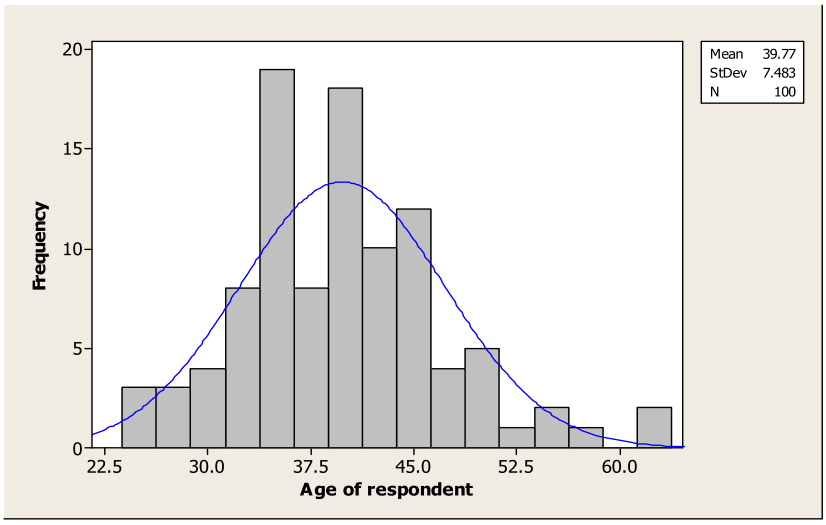

Figure 4.1. Graph of Distribution of Respondents Based on Age

Besides age, profession was influenced by education level. In general, respondents had formal education and almost no respondents that had not enjoyed schooling. There was only one respondent who did not enjoy formal education, age above 60 years and living as a farmer.

Table 4.6. Distribution of Respondents Based on Education Level

Classification based on distance of village to forest	Name of Village	No schooling	Elementary School	Intermediate School	High School	University/ Academy	Total
A. Directly adjacent to forest	Aik Berik	1	2	2	8	0	13
	Kembang Kuning	0	0	0	7	1	8
	Lantan	0	3	1	3	0	7
	Setiling	0	6	2	5	0	13
	Telon Ambon	0	2	1	4	0	7
	Tetebatu	0	0	0	10	1	11
Total of A		1	13	6	37	2	59
A. Not directly adjacent to forest	Jerowaru	0	0	0	3	0	3
	Mataram City	0	0	0	0	1	1
	Kota Raja	0	0	0	8	2	10
	Praya	0	0	0	2	4	6
	Tanak Beak	0	0	0	7	2	9
	Teratak	0	0	0	3	4	7
	TNGR	0	0	0	4	1	5
Total of B		0	0	0	27	14	41
Total		1	13	6	64	16	100

Table 4.6 shows that 64% of respondents attained high school education and 16% have completed higher education. Therefore, it is reasonable to assume that with such educational background, the understanding of respondents on the dynamics and problems that had been experienced would be very good, and they were able to clearly provide explanation when interviewed. Of the 100 respondents, there were only 19 people who had education below intermediate school level. **Figure 4.2** presents the pattern of relationships between jobs and education backgrounds.

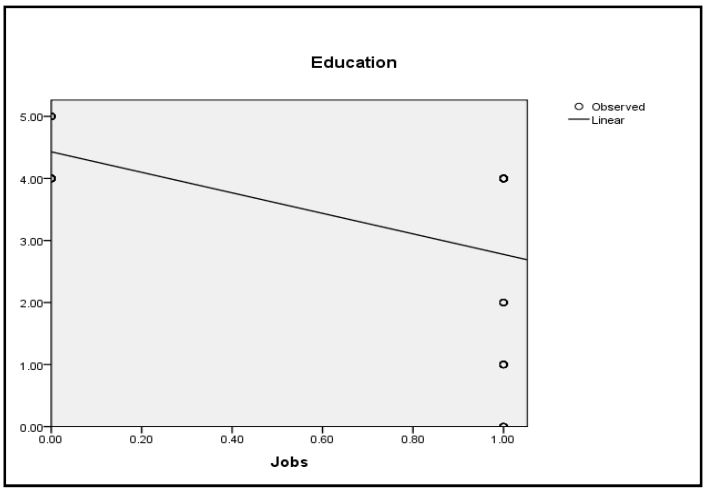

Figure 4.2. Relation between Jobs and Education Background

Figure 4.2 shows that the higher the education level, the higher was the number of respondents who tend to work in areas outside agriculture such as employees, breeders, traders, or artisans.

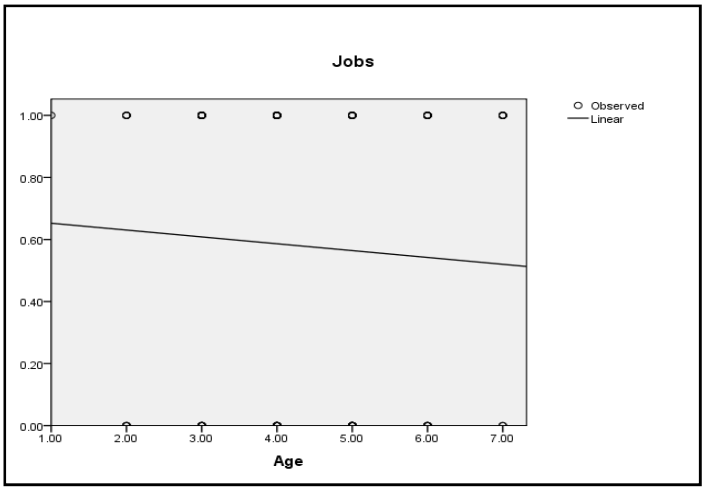

Figure 4.3. Relation between Jobs and Age Class

Figure 4.3 shows that there is no close relationship between jobs (employment) and age groups. Age of respondents could not be used as an indicator to show what type of works had been conducted to sustain the life of these respondents. There was a dominant age group who worked as farmers and also worked as non farmers like employees, traders, artisan and others.

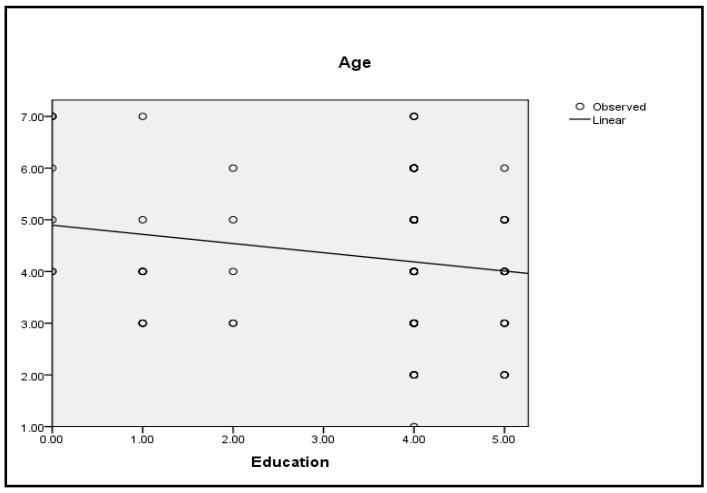

Figure 4.4. Relationships between Education Background and Age Class

Figure 4.4 shows that the younger age group tend to have better education background. There were some respondents, more than 50 years of age, who have no schooling or only hold primary school certificate.

4.4. Community Perceptions on Impacts of Forest Management

Community forest management performed by Farmers Group Participants of community forest in the Protection Forest of Mount Rinjani Forest Group was not only related to technical aspects of forestry and biophysics, but also an integral part of the local social environmental dynamics. The condition of the social environment in the vicinity of forest areas would affect the approach and mechanisms to achieve sustainable forest management. Conversely, the ways and performance of Farmers Group Participants of community forest in managing the forests located within their area of administration would affect various aspects of the community life living in the vicinity. From a social perspective, forest management impacts felt by the community could be divided into positive and negative impacts.

Based on the results of field observations and interviews with respondents, it was noted that people generally had positive perceptions towards forest management. A total of 102 of 111 respondents (92%) in 13 villages around the forests in Central Lombok and East Lombok Regencies who were interviewed, said that people experienced the

positive impacts of community forest management. Looking at the perceptions of respondents from each village, about 100% of respondents in eleven villages felt the positive impacts of forest management. **Table 4.7** shows the perceptions of rural forest community on the impacts of forest management.

Table 4.7. Perceptions of Rural Forest Community on Impacts of Forest Management

Location	Number of respondents	Positive Impacts		Negative Impacts	
		Positive (people)	Percentage (%)	Negative (people)	Percentage (%)
Central Lombok Reg					
District of Nort Batuaklian					
1. Teratak Village	7	2	29	5	71
2. Tanak Beak Village	9	9	100	0	0
3. Aik Berik Village	12	12	100	0	0
4. Karangsidemen Village	4	4	100	0	0
5. Lantan Village	7	7	100	0	0
6. Setiling Village	13	13	100	0	0
District of Kopan					
1. Kopang Village	2	2	100	0	0
2. Wajageseng Village	9	9	100	0	0
District of Praya					
1. Praya Village	6	2	33	4	67
Sub-Total of Central Lomb Regency	**69**	60	87	9	13
East Lombok Rege					
District of Siku					
1. Tete Batu Village	11	11	100	0	0
2. Kembang Kuning Village	8	8	100	0	0
3. Kotaraja Village	10	10	100	0	0
District of Selon					
1. Selong Village	4	4	100	0	0
Sub-Total of East Lombo Regency	**33**	33	0	0	0
Total Responde	**102**	93	91	9	9

Table 4.7 shows that with regard to perception of respondents in East Lombok Regency, 100% of respondents felt the positive impacts of the presence of community forest and forests. Percentage of people who had positive perceptions toward community forest and National Park in each village within the territory of East Lombok Regency tend to be uniform. As many as 13% of respondents in Central Lombok Regency, considered the presence of community forest had not necessarily change the behaviour of forest management. People believed that the participants of community forest sometimes sell their membership rights to certain parties outside the village to be further stated as their property. However, after the management of community forest was diverted to *Pesantren* Darussolihin (islamic boarding school), community forest ownership can be restored and public awareness of community forest improved. Whereas the people living far from the forest (villages not directly adjacent to forest) considered that community forest did not guarantee that the forest would be maintained properly.

Based on the results of FGD (focus group discussion) with communities in 2 regencies, it is known clearly that forest management had positive impacts for communities in and around forests. In this Social Impact Assessment, the positive impacts of forest management could be divided into four categories, namely:

1) Land use by the community

   Community was given discretion in utilizing the land and land under the stands. Communities could take dry grass and twigs for fodder and fuel wood.

2) Environmental impacts on community

   This facilitated in water resources restoration and prevention of floods, landslides and erosion. Communities felt that when there was encroachment, water sources dry up and there was frequent landslides, erosion and flooding in the rainy season. But when Community forest allowed (allowed what??) the environmental conditions began to recover and the impact of flood and landslide hazards can be reduced.

3) Economical impacts on community incomes

Community forest assisted the people without any land to grow crops to provide additional income. Communities could grow vegetables, *empon-empon*, bananas, potatoes and others which might be sold. Prior to the community forest, people just relied on selling illegal wood for living. In addition, working in farms outside the area were the next livelihood options for forest villagers.

4) Increase community welfare

   Community forest could provide improved incomes. People who previously relied as being farm workers and illegal loggers, with the presence of community forest, they started taking advantage of intercropping crops. The yields were used for schooling and provision of supporting means of livelihood. In addition, the forest was also used as a source of natural medicine that can help people who are sick and for other purposes.

4.5. Causes of deforestation and forest degradation

Based on the interviews, causes of deforestation and forest degradation in Mount Rinjani were solely economic reasons. Approximately 30% of the people of Central Lombok Regency or more than 6000 people worked as farmers and farm workers. Farmers rely heavily on the availability of land for agricultural business. About 49% of area in Central Lombok Regency was forested and only 27% were rice fields and plantations. This meant that 6,000 farmers and farm workers only manage 27% of the total land area for their livelihoods (**Table 4.8).**

Table 4.8. Land Utilization in Central Lombok Regency

Type of Land Use		Districts			Percentage of Use
		Batukliang Utara	Kopang	Sikur	
I.	Wet Rice Field	2,031	2,877	2,433	
1.	Technical irrigation	1,257	1,776	0	10.55
2.	Semi-technical Irrigation	325.12	747	2,410	12.11
3.	Simple PU Irrigation	199.5	0	0	0.69
4.	Simple Non PU Irrigation	0	40	375	1.44
5.	Rainfed	173.05	314	28	1.79
II.	Dry Field	16,275	3,289	19,300	
1.	Land for Buildings	283	514	411	4.20
2.	Dry land/Garden/Dry field	2,460	1,437	731.7	16.10
3.	Fish ponds	0	32	0	0.11
4.	State forest	13,369	634	4	48.73
5.	Plantation	0	246	0	0.86
6.	Others	163	426	387.3	3.40
Total Area		18,306	6,166	21,733	100

Source: BPS (2009)

Limited areas resulted in forest encroachment by the community into garden and fields and illegal logging to supply construction timber, furniture and firewood. There were several reasons why people carried out deforestation and forest degradation as presented in the **Table 4.9.**

Table 4.9. Arguments for Deforestation and Forest Degradation

Location	Number of Respondents	Arguments					
		Economical Reasons	Rate	Land Requirements	Rate	Conflicts of Utilization	Rate
Central Lombok Reg							
Districof Batuakliang Uta							
1. Teratak Village	7	7	+++	7	+++	0	-
2. Tanak Beak Village	9	9	+++	9	+++	9	+++
3. Aik Berik Village	12	12	+++	12	+++	12	+++
4. Karangsidemen Village	4	4	+++	4	+++	4	+++
5. Lantan Village	7	4	+++	4	+++		
6. Setiling Village	13	13	+++	13	+++	13	+++
Districof Kopan							
1. Kopang Village	2	2	+++	0	-	0	-
2. Wajageseng Village	9	9	+++	9	+++	9	+++
Districof Praya							
1. Praya Village	6	6	+++	4	+	0	-
Sub-Total of Central Lombo	**69**	66		62		47	
East Lombo							
Districof Sikur							
1. Tete Batu Village	11	11	+++	11	+++	0	-
2. Kembang Kuning Village	8	8	+++	8	+++	0	-
3. Kotaraja Village	10	10	+++	10	+++	0	-
Districof Selong							
1. Selong Village	4	4	+++	4	+++	0	-
Total of East Lombo	**33**	33		33		0	
Total Responde	**102**	99		95		47	

Note:

+++ : Completely Agree
++ : Agree
+ : Possibly
- : Not mentioned

From **Table 4.9**, it could be seen that most respondents said that the main reason for conducting forest encroachment were family's economic problems and the need for land. Another reason was because of resentment in the utilization of forest products (forest use conflicts), which was only granted to private parties (CV. “R”s), while local

people were not given the opportunity to also manage. This was especially felt on the respondents residing in Central Lombok Regency.

4.6. Actors in Deforestation and Forest Degradation

Based on the results of interviews with villagers and stakeholders at Forestry and Plantation Service of the regencies of Central Lombok and East Lombok as well as Protection section of Unit III of Mount Rinjani National Park (TNGR) it was noted that most of deforestation and forest degradation were carried out by communities around the forest. In addition, there were certain elements who participated in encouraging deforestation practices.

Table 4.10 shows that based on the perceptions of respondents in thirteen villages, they recognized that they were also the actors of deforestation and forest degradation. However, such actions were triggered by the entrance of private sectors (companies) supported by individual officers. Lack of harmony in relationships between Forest Service and the community had occurred at the time of reforestation activities in 1985. This was because, after the main crops have grown, the people were told to clear the forest area without providing alternative activities to the community to sustain their living. In addition, a private party such as CV. “R” was given the right to take fallen timbers due to high winds in the protection forest area in 1998-2000 without the involvement of the local community which triggered the community to perform illegal activities. Such behaviours were also encouraged by the high demand for construction timber, firewood and furniture. Montong Dao area is a transit area of timber flow from villages directly adjacent to the forest. The high demand for timber could be monitored by the number of people who were still active in the market selling sawn timber in Teratak and Setiling. Wood flow would then lead to Praya and the City of Mataram. Currently, wood is very hard to obtain so the size of the transported timber is smaller. The average diameters of the timber taken were less than 30 cm.

Table 4.10. Respondent's Perception towards Actors of Deforestation and Forest Degradation

Location	Number of Respondents	Actor			
		Community	Traders	Enterprises	Official
Central Lombok Reg					
District of Batuakliang U					
1. Teratak Village	7	+++	+++	-	+++
2. Tanak Beak Village	9	+++	++	+++	+++
3. Aik Berik Village	12	+++	+	+++	+++
4. Karangsidemen Village	4	+++	-	+++	+++
5. Lantan Village	7	+++	-	+++	+++
6. Setiling Village	13	+++	++	+++	+++
District of Kopa					
1. Kopang Village	2	+++	+++	+++	-
2. Wajageseng Village	9	+++		+++	+++
District of Pra					
1. Praya Village	6	+++	+++	++	+
Sul-Total Central Lom Regency	**69**				
East Lombok Rege					
District of Sik					
1. Tete Batu Village	11	+++	+++	-	-
2. Kembang Kuning Village	8	+++	+++	-	-
3. Kota Raja Village	10	+++	+++	-	-
Districof Selon					
1. Selong Village	4	+++	+++	-	-
Sul-Total of East Lom Regency	**33**				
Total Responde	**10**				

Noted:
+++ : Completely Agree
++ : Agree
+ : Probably
- : Not mentioned

4.7. Activities within Forest Areas and Their Impacts on Forests

Some activities were conducted in forest areas that impact on the forest conditions of the Island of Lombok, among others were:

1) Development of infrastructures, such as airport, settlement, estates, and other public infrastructures.
2) Community activities in the forest area, which be classified into two time sequences:

Before Community Forestry Programme

- Cutting down timber for own purposes and also sold in Praya and Mataram.
- Intercropping with dryland paddy ("gogo"), banana, "durian", jack fruit ("nangka") in protection forests and national park were commonly practiced (in the year of 1975-1997)
- Extracting grasses, "pakis" and jack fruit ("nangka").
- Many "Teratak" people received order for "illegal timber" to supply fuelwood for households and tobacco industries as well as raw materials for furniture.

After Community Forestry Programme

- The main income of the forest community was, rather than timber, originated from intercropping with chilli, corn, tuber, sweet potato ("ubi") and banana.
- Maintaining trees and cultivating coffee, cacao, banana, jack fruit ("nangka"), and "rambutan".
- Reforestation with some activities, i.e. intercropping, planting green belt, land rehabilitation, collaborative Community Forestry, and self-managed planting movements ("*gerakan menanam swadaya*").
- Currently, villagers of Wajagesang could harvest their own plantation of non-timber forest product (planted since 2004), such as bamboo, banana, "talas", ginger, and "aren" in the protection forest.
- Generally, the community understood the regulations concerning protection forest and conservation forest. Forest rangers, extension staffs and

community performed some collaborative activities with regard to forest conservation and protection.

3) Activities having potential "trade off" with forest resources:
    - Enlargement of intercropping as a result of declining crops yields due to tree canopy shading in the Community Forestry area.
    - Extraction of fuelwoods, especially high scale extraction to fulfil fire materials for cooking tobacco.

4.8. Conflicts of Interests Among Different Sectors and Actors

Conflicts of interest between sectors often occurred with regard to the utilization and land use including forests. Some sectors of the economy that often clashed include:

- Forestry sector
- Agricultural sector
- Mining sector
- Public works sector (infrastructure)

In addition to conflicts of interest between the government sectors, conflicts of interest also occurred between actors, in the utilization of space and use of forest areas. Some actors who perform activities in and around forests include:

- Local people
- Forest rangers
- Estate staffs
- Police
- Businessmen

Not all actors who conducted activities in and around the forest caused forest damage. On the contrary, there may be activities conducted away from the forest but became one of the driving factors causing forest destruction. Some actors who were directly or indirectly caused conversion of forest areas and / or destruction of forests, among others were:

- Policy makers, who proposed to convert forest areas into other purposes, such as airport, estates, or other public infrastructures.
- People living within and surrounding forest areas, some of whom played important roles in forestland conversion, due to practices of illegal logging and conversion to agricultural crops.
- Tobacco industries, who extract fuelwoods for drying & cooking tobacco.
- Forestry & Estate Service, who directly and indirectly caused deforestation and degradation. The reforestation programme that was carried out in 1960 failed because people were not involved in such a programme. In 1980, people participated in reforestation programme by planting mahogany with contractual agreement. At the time, people were allowed to plant intercropping crops such as banana and tobacco. However, after the termination of the contract, Forestry Service demolished the crops and prohibited people to enter the forest. In 1990's, Forestry Service also gave privilege to a private company to harvest "sengon" (*Paraseriates falcataria*) without the involvement of local people. This has resulted in the disappointment of the locals and eventually some logged timber illegally or encroached the forest area.
- Collusive officer-businessmen. Weak law enforcement was another cause of deforestation and forest degradation. It is also common that illegal logging and illegal trading were backed up by "a figure" from the military personal, policemen, or forestry officers.
- Businessmen, who ordered illegal timber from local people or funded them to encroach forest area to cultivate crops.

4.9. Distribution of Deforested Area & Most Degraded Forests in Lombok Island

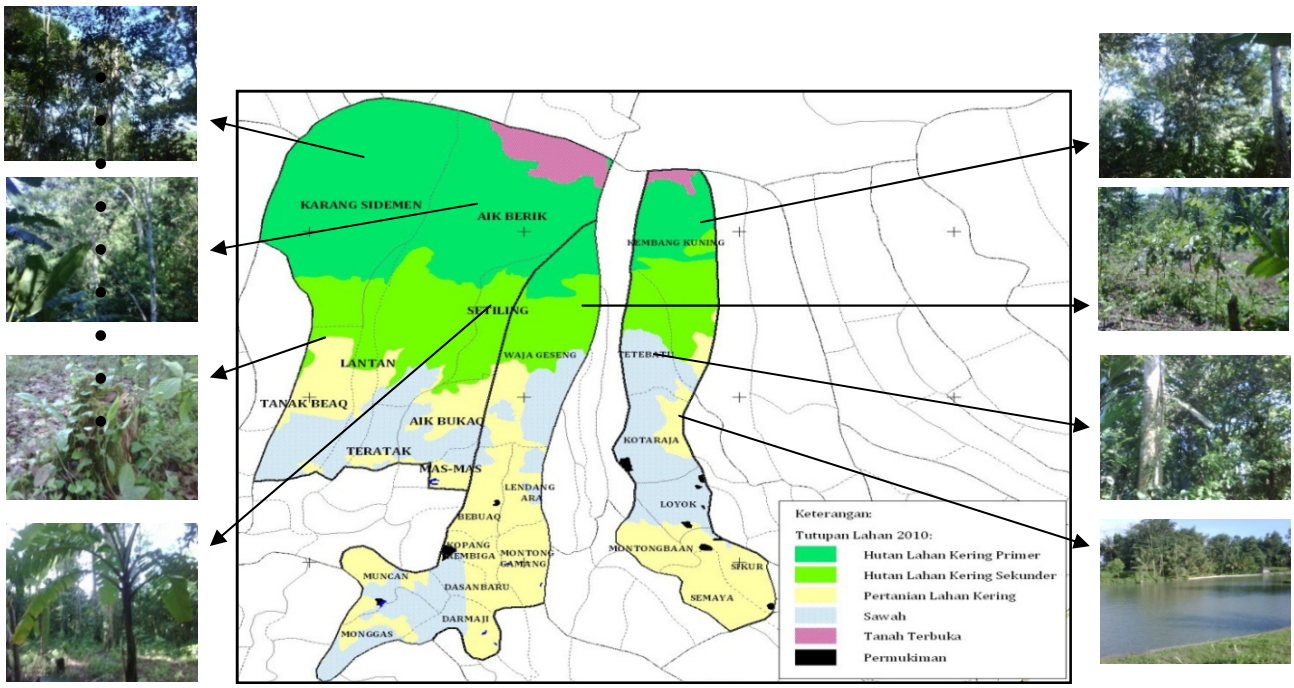

Figure 4.5. Map of Deforested Area & Most Degraded Forests in some location at the regencies of Central Lombok and East Lombok

Table 4.11. Type of Land Cover

Village	Types of land cover (Satellite image 2010, Ha)			
	Cropland	Forested Area	Other landuse type	Sum
Batukliang Utara District	**1,636.01**	**14,295.56**	**926.60**	**16,858.17**
- Aik Berik village	16.03	6,257.73	926.60	7,700.35
- Karang Sidemen village	0	6,492.18	0	6,492.18
- Lantan village	80.03	475.30	0	1,055.33
- Setiling village	3.57	1,070.34	0	1,083.91
- Teratak village	526.39	0	0	526.39
Kopang District	**1,497.42**	**2,175.09**	**0**	**3,672.52**
- Wajageseng village	1,497.42	2,175.09	0	3,672.52
Sikur District	**2,308.59**	**3,069.31**	**155.99**	**5,563.17**
- Kembang Kuning village	269.29	2,545.50	155.99	2,970.78
- Kotaraja village	1,287.50	0	29.28	1,316.78
- Tetebatu village	751.79	523.82	0	1,275.61
Total	**5,442.03**	**19,539.96**	**1,111.87**	**26,093.85**

This section describes the location where deforestation and forest degradation occurred, and describes the villages around the degraded forest:

1. Some areas in Aik Berik Village, i.e. in the Community Forestry area (plantation year 1975-1990's), Tambingkeke and Elar Bongko Protection Forest.
2. Some areas in Setiling Village, i.e. in Salah Nupang, Barmayung, Gunung Tebolak and Jurang Gares
3. Some areas in Lantan Village, i.e. National Park area, Cempake, Pendok Sentul, and Pakis
4. Some areas in Karang Sidemen Village, i.e. Orong Lengku Dewuh, Wanarisset Jorang Bunut, Sembilir, Eyat Mayung-1, Eyat Mayung-2, Otak-otak, and Lebah Kopang.
5. Some areas in the Teluk Ambon Hamlet, i.e. Nyeredet, Orok Peji, Orok Linsar, Barejn Mayung, Petolak, and Orok Batukan.

4.10. Description of Villages Related to Deforestation and Forest Degradation

According to the key person and household interview, observation and landsat data in some areas have been identified as locations that historically or presently strongly related to deforestation and/or forest degradation in Lombok.

1) Aik Berik Village

Aik Berik Village is located in the district of Batukliang Utara in the regency of Central Lombok. The distance of the village to the district capital is 4 km, while its distance to Mataram City reached 38 km and some 23 km to the regency's capital. Comparison of men to women reached 104%. The number of villagers in Aik Berik in 2008 was 5800 people, with an area of 41.87 km^2. The damaged forests, among others include areas around Tambingkeke and Elar Bongko Protection Forest.

The topographical condition of Aik Berik Village was generally undulating and lied at an altitude of 420 m.a.s.l. The soil condition was relatively fertile and there were many sources of water and a waterfall named Benang Stokel Waterfall. The communities were mostly subsistence farmers, producing agricultural commodities that include

bananas, rice and animal husbandry. Aik Berik Village is bordered by a Protection Forest with a distance of approximately 1 km, while the distance of the village to the National Park reaches 15 km. Interactions of the community with forest existed especially with regard to the collection of fuel and food supplies, etc. Previously, (between 1980 and 2002), the communities encroached the forest to convert it to dryfield and settlement. Although currently encroachment is decreasing, activity endangering other forest resources that is more rampant is pheasant hunting. Forest surrounding the Village of Aik Berik suffered severe damages due to illegal logging and forest encroachment to dryfield. Moreover, people also gathered fuelwood in large volumes to be sold into the market in Teratak. At present this activity no longer takes place.

The worst deforestation case occurred in the Protection Forest of Tambingkeke and Elar Bongko caused by the entrance of private company (CV. "A") to collect timber without the involvement of the community. Due to this activity, conflicts occurred among local police, forestry officials and local people concerning the management of wood waste and there was no socialization on the utilization of waste wood by Forestry Service which was taken by someone else.

Causes of deforestation in the village were dominated by the entrance of Aik Berik people to gather wood and sold to the market at Teratak. Raw material needs for fuelwood, furniture and construction timber came from the public or from the local entrepreneurs in Selong, Praya and Mataram. This practice continues to today.

Moreover, people entered the forest to carry out intercropping. Encroachment occurred continuously due to the imbalanced number of population and agricultural land area. The agricultural land area reached 658 hectares and the number of households reached 389 or an agricultural density of 0.59. In 2008, number of landowners reached approximately 365 people, 269 people as cultivators and 387 people as labours. All these time, the community activities have been using the forest as the main land for livelihood by harvesting yields of intercropping crops such as bananas, *empon-empon* etc. Moreover, people also collected fuelwood and grasses from the Community Forestry area.

Currently, the productivity of the intercropping crops such as bananas and others are threatened. The higher coverage of the core woody plants, increased the competition of plant growth and therefore, lowering the yields. People income have declined, which in turn, threatening the subsistence of their livelihood.

Other potential conflicts identified in Berik Aik Village were the installation of water pipes to be distributed to other areas as well as the presence of mineral water companies that did not involve the local community and did not provide economic improvement for the community. Society assumed that when they safeguard the forest, the environmental forest services such as water would be maintained. Under good forest condition, work and living spaces for the community would be narrower resulting in the decline of the income. On the other hand, the number of people using forest services such as water continued to grow with an absence of compensation to upstream areas. The upstream communities started stifling and threatening to damage the forest ecosystem in the absence of upstream-downstream completion of this incentive.

Falling crop yields greatly affected people's lives. This had the potential to influence people's behaviour to re-cut the trees to allow re-growth of the crops. It was considered reasonable though, because when the trees were trimmed, the trimmed parts could be used as fuelwood that were used for own purposes or sold outside the village. As we all know, the specific policy by the Governor of West Nusa Tenggara to substitute tobacco fuel from kerosene to coal, has lowered tobacco farmers' income. Fuelwood was considered as a good substitute for kerosene and did not result in big losses. Therefore, fuelwood was considered as the prime wood for drying tobacco. As a result, trees were trimmed and cut to meet such demands.

2) Setiling Village

Setiling Village is located in the district of Batukliang Utara in the regency of Central Lombok. Proximity to the district capital is 6 km and to the regency's capital is 27 km. The population comparison between men to women reached 91%. The number of people in Aik Berik Village in 2008 was approximately 6209 people, with an area of

37.62 km^2. Damaged forests were located in the vicinity of Salah Nupang, Barmayung, Gunung Tebolak and Jurang Gares.

The village topography was generally undulating and located at an altitude of 770m a.s.l. The soil condition in Setiling village is relatively fertile and there are many sources of water. The main occupations of the village people were mostly farmers and craftsmen. Produced agricultural commodities include chilies, taro, yams, bananas that were sold through debt bondage to middlemen or sold directly at the market within Setiling Village. Setiling Village is bordered by Protection Forest with a distance of less than 2 km and the distance of the village to the National Park reached 25 km. Interactions with forest communities existed especially with regard to fuelwood collection, food supplies, etc. The total forest area comprised 51% of the total area of Setiling Village.

Previously, in the year of 1960, reforestation programme was carried out by cutting down unproductive logs in the forest and replaced them with *sengon*. Communities were involved as workers and were given permission to perform intercropping. This policy lasted for 3 years. After that, the people were prohibited from entering the forest. Yields of the intercropping crops were cut by public officers so that there was no real reason for the local communities to re-enter the forest. This, however, did not result in conflicts due to the positive thinking of the people for not going against government policy.

In 1980, *sengon* plants that have been planted by the people were cut down by CV. “R” with the permission from the local government. Communities were not involved while temporary labours were acquired from outside Setiling Village. However, this once again, did not lead to conflict. After that, the government initiated to improve forest condition by trying to perform *lelesan* for unproductive trees and performed plantation with *cemplongan* system but failed. The failure happened because such acts were not accompanied by maintenance efforts.

For that, the people were regarded as potential workers and they were asked to cooperate. Setiling community who were invited to join were those living adjacent to the

forest where they were assisted by local officers (not too many). After 3 times planting, the results were not satisfactory. This might be due to the public disappointment at the previous public policies or guidance that were not capable to explore the attention and skills to change people's behaviour.

The next policy offered was to invite the community to re-do intercropping in forest areas while planting mahogany as a core species. Mahogany seedlings were provided by the community by means of collection in several nurseries such as in Telon Ambon and Janggor (Tumasir) located at a distance of more than 10 km. There were no facilities provided to the people that they must go on foot. This was done as long as they were granted license to perform intercropping. The community planted upland rice, corn and chilli as cultivation crops. This contract expired in 1983. Forest conditions were improving, making Setiling Village as a village that was successful in reforestation programme. Once again, after this, people were prohibited from re-entering the forest to conduct any activities including collecting yields of the intercropping crops. This was not a problem due to the strong roles of some village figures such as teachers and village heads so as to reduce the negative movement of the society. People started to feel hope to have the land returned for farming when the policy for Community Forestry was enacted. However, the improved condition of Setiling forests as well as larger land allocation within forest in other villagesforced Setiling communities to enter land dispute with the neighbouring villages like Aik Berik. But this did not last long because the leaders in both villages were able to coordinate and Aik Berik Village allowed the opportunity to perform collaborative efforts with Setiling Village.

Forests in Setiling Village were damaged as a result of logging waste between the years of 1985-2000 by the Forestry Service of Central Lombok. This policy resulted in a conflict with the local police due to the inappropriate procedural permission. Logging license was provided by direct appointment to one of the companies without going through a proper tender process.

Today, the activity threatening the existence of the forests is the presence of a new sawmill that was opened in early 2010. The sawmill company is buying timber from the community gardens and encouraging people to replace the purchased timbers with

sengon. Sengon was definitely not for the purpose of furniture, while societal expectations was when the timber is sold for furniture purposes, its price would be higher compared to wood carpentry. If this happens, then the sengon planted by the community would have low value and this would encouraged them to enter the forest to cut down mahogany which is now more than 35 cm in diameter.

3) Lantan Village

Lantan Village has a population density of 110 people / km^2, with a total area of 41.68 km^2. Lantan, which means long in Sasak language, is located adjacent along existing villages of Aik Berik, Karang Sidemen and Tanak Beak. The number of residents in the Lantan Village reached 4567 people in 2008. Total labours in rural Lantan comprised of 963 men and 1305 women, of the total population of 2141 men and 2426 women. The ratio between population and productive labour age differed by sex is 0.45 as the total male productive age and 0.55 as the total number of women productive age. Lantan Village is located 3 km from the regency capital and 21 km from the capital of Central Lombok Regency. Road access that was dominated by dirt roads and very few paved roads, made it difficult to reach this village during rainy season. The distance of Lantan Village to Protection Forest is less than 1 km and distance to the national park is less than 10 km. The degraded forests were located around Gunung Rinjani National Park, Cempake, Pendok Sentul, and Pakis.

Out of the total area of 41.68 km2, 3343 ha or 80% of the whole area belong to the state forest. The total agricultural land area in Lantan Village is approximately 763 out of a total number of 742 land owners or having an agrarian density of 0.97. As many as 478 people were owners of agricultural land, 544 people were cultivators and 329 people work as labourers. The number of available labour is greater than the area of the rice fields which reached 155 hectares or the ration between area of rice field to available labours having a ratio value of 0.11.

Deforestation in Lantan occurred around the GRNP, covering areas such as Cempake, Pendok Sentul and Pakis. The form of deforestation that occurred was by converting forests into plantations and selling the timber to middlemen. Intercropping yields such

as coffee, cocoa, bananas, durian, jackfruit and rambutan were sold by debt bondage to buy basic necessities such as rice, etc.

Forest encroachment has been made public since 1970. Communities cut timber to be sold in Mataram or in Teratak. However, when Community Forestry permit were issued, illegal logging activities declined. People were not able to enter the forest with ease. The existence of armed forces who continued to hold up people entering the forest resulted in a declining interaction between community and forest. However, because of economic pressure and lack of community education at the time, these have made people desperate and re-enter the forest. Hence, as a solution to this problem, the local people were asked to become a smallholder farmer for the Community Forestry programme. The result was that the community were able to improve intercropping cultivation and hence illegal logging decreased.

When the Community Forestry permission was given commencing in 2003, the people were experiencing better livelihood, particularly the need for water and land for intercropping cultivation. This has led to increased cultural life of the community which now has a motorbike for their daily activities. Motorcycles were obtained on credit, and will be paid after the harvest.

Nevertheless, along with the tree canopy as the plant's core, people's income began to decline. The community were increasingly concerns that the Community Forestry area will be taken over by the state. This triggered the community to start cutting down wood in the area of Community Forestry Programme and sold them in Teratak for the purposes of furniture, carpentry and fuelwood. In addition to intercropping, there were few community-managed cages to raise cattle. The need to find fodder resulted in the entrance of people to the forest. Tree canopy was thought to be limiting community needs. The wide tree canopy limits the growing space that it decreased the available space for the grasses to grow. These factors encouraged the people to re-enter the forest and cut down timbers. Starting with collecting twigs and branches, the people then began cutting down trees with a diameter of less than 30 cm for either sale or own used.

People having no agricultural land for paddy and dry fields, would enter the forest to plant tubers to fulfil daily necessities. This practice still continues today. Society is very dependent on forests. Efforts have been made to move the community's agricultural land from the forest by building a complex barn that aims to make animal husbandry as the main livelihood. This was not really changing people's behaviour. However, the community still maintained them with the thought that government- owned articles are not to be lost. This showed a positive public perception where in this case, it would be easy to invite the community to carry out a development programme. People still entered the forest especially to the Community Forestry area, as the only area to sustain their daily life necessities.

4) Karang Sidemen Village

Karang Sidemen Village is located in the district of Batukliang Utara in Central Lombok Regency. The distance of Karang Sidemen Village to the district capital is 6 km and 27 km to the regency's capital. Comparison of the population of men and women reached 91%. The population of Karang Sidemen Village in 2008 reached 6209 people, with an area of 37.62 km^2. Damaged forest areas occurred in the vicinity of Orong Lengku Dewuh, Wanarisset Jorang Bunut, Sembilir, Eyat Mayung-1, Eyat Mayung-2, Brain-brain, and Bees Kopang.

The topographical condition of Karang Sidemen Village was generally undulating and located at an altitude of 770m a.s.l. The soil condition in Karang Sedimen Village was relatively fertile and there were many sources of water. Livelihoods were mostly came from agriculture. Some of the produced agricultural commodities include coffee, jackfruit, and avocados, which were sold to the market. Karang Sidemen Village is bordered by the Protection Forest located at a distance of approximately 2 km, while the distance of the village to the National Park reached 25 km. Interactions between the forest and community existed especially with regard to gathering fuelwood and collapsed timber for building materials and fuelwood. In the year of 1998/1999 there was a figure in the Forestry and Estate Service of Central Lombok Regency who permitted the people to collect wood waste. However, timbers taken by this entrepreneur were healthy trees with high economic value and people were only given

about Rp 500,000-Rp. 600,000/m^3. The local people worked as labours cutting down mahogany trees. This resulted in damaged forest areas between the years of 1998-2000.

Waste timber extraction activities in the area of Orong Lengku Dewuh within the Research and Development Forest of Wanariset Jorang Bunut, Sembilir, reached 52 ha in 1997/1998. These areas are now transformed into Community Forestry area with a total area of 403 hectares. Involving the community in the utilization of waste wood, where the payment did not comply with community efforts has resulted in people cutting down the existing mahogany. As a result, no more mahogany forests existed between the years 1997-2001. In 1997, a waste collection was permitted in Orok Lengkudewuh, followed by Simbilir in 1999 and in Jorang Bunut 2001. Jealousy was also triggered because the community felt that they were safeguarding the forest, yet entrepreneurs came from outside the area.

Deforestation and forest degradation around the Village of Karang Sidemen is still ongoing. In 2007, the case was collection of wood waste. Squatters came from West Lombok in 2009, and there was a case where 2 people from Presa Sasaot Hamlet, Sasaot Village, West Lombok Regency were arrested in Labah Kopah area by forest officials.

Efforts to repair the damage were initiated by planting mahogany forests along with MPTS (multi purpose tree species) such as robusta coffee, cocoa, avocado, jackfruit, durian, rambutan and mangosteen in the Community Forestry area.

5) Telon Ambon Hamlet

Telon Ambon Hamlet is located in Wajageseng Village in Kopang district, Central Lombok Regency. The distance of the Hamlet to the village is approximately 10 km, to district is 15 km, and to the regency's capital is about 27 km. Damaged forest areas occurred in the vicinity of Nyeredet, Orok Peji, Orok Linsar, Barejn Mayung, Petolak, and Orok Batukan.

The topographical area of Telon Ambon Hamlet was generally hilly and the Hamlet is situated at an altitude of 500m a.s.l. The soil condition in Telon Ambon was relatively fertile with micro-climatic conditions which tend to be more humid. Main livelihood sources were mostly from palm sugar and livestock, while the mainstays of agricultural commodities were palm sugar, intercropping of upland rice, bananas, durian and jackfruit.

Telon Ambon Hamlet is directly adjacent to the Protection Forest and National Park of Gunung Rinjani. Interaction between the communities and protection forest occurred through practice of intercropping to plant upland rice, banana, durian and jackfruit. Interaction with the national park existed through the collection of grass for fodder and harvesting bamboo that had been planted earlier by the community themselves in 2004. The distance of the Hamlet from the village centre or the district, only allowed the people to sell their yields to the middlemen and received bids at any price although very low.

Community interaction with the forest has been long-standing. Reforestation took place in 1975 and thinning was conducted in 1987. The thinning activities that avoid the involvement of the local people resulted in forest thinning. According to Arsyad (Forest ranger of GRNP Section II) during such time, the forest were cleared without leaving any waste. Until now, people still cut down timbers and replace them with rice.

Apart from community interactions, there were several sawmill permits that were issued illegally by the Trade and Industry Service. The lack of raw materials permits was not an obstacle to the issuance of the sawmill permits. The sawmill would buy timber from the community with more emphasis on timber gardens, while the purchasing system was by bulk or per stem.

6) Praya Barat Daya District

There are some areas of secondary forests located about 10 km from the capital of Praya Barat Daya District. The distance of the forests to the regency capital of Praya is about 15 km. Deforestation and forest degradation occurred in the secondary forests

during the period of 1995 to 2000 and again in 000-2005. During 1995 to 2000, where political reform was taken in Indonesia, a chaotic situation found every where including forests. Within five years (1995-2000) about 600 ha of forest in Praya Barat Daya districts was deforested. The deforestation still occurred during the year 2000 to 2005 by more than 200 ha. Totally about 900 ha of secondary forest in Praya Barat Daya district was deforested within 10 years, from 1995-2005. To rehabilitate those forests, local government proposed to develop People Forest Plantation *(Hutan Tanaman Rakyat = HTR).* The local government proposed 900 ha of forests to be allocated for HTR and got approval from Forestry Minister for 895 ha. Currently, the Bupati (regency head) has released permission for HTR in the two villages, namely Pandan Indah and Mangkung. Besides those villages, there are two more villages in Praya Barat Daya district proposed for HTR, i.e. Kabul and Batu Jangkih.

4.11. Time Frame and Chronology of Deforestation and Forest Degradation in Lombok Island.

Deforestation and forest degradation in Lombok Island occurred within the period of 1960's, 1980's, 1990-2002 and after 2002 due to the following reasons:

- Year of 1960's: failure of reforestation programme, people were not involved in the programme.
- Year of 1980's: policy of cutting timber "lelesan" given to local people without sufficient replanting.
- Years between 1990-2002, Forestry Service appointed a private company to monopolize timber utilization which avoid local people involvement. Local people were disappointed and then they logged timber illegally. During political reform movement in 1998-2002, illegal logging was practiced in almost all Indonesian regions, including Lombok Island.
- Year of 2002 to present. Generally the situation was better after implementation of Community Forestry Programme. However, within this period, extraction of fuelwood for tobacco industries formed the most threats for forest degradation.

Table 4.12. Time Frame of Deforestation & Chronology of Degraded Forests

Locatio	Time Fran	Chronolo
Aik Berik Villa	1975-1989	Waste wood utilization conflict between Forestry Service with the local police due to the direct utilization of waste wood by wood Entrepreneur (APEN). As a result people encroached the forest and collect timber, though not waste timber
	1997-2002	Forest encroachment by the public for intercropping
	2002-2003	Inability of Darussolihin Boarding School in managing Community Forestry, resulting in the total area of Community Forestry from 1980 hectares to 2010 hectares
Setiling Villa	1960	Reforestation with sengon was done by first cutting down the trees with low economic value
	1980	CV. "R" with permission from Forestry Service cut down sengon trees that derived from rehabilitation
	1983-1985	Community were invited to participate in reforestation and provided the opportunities for intercropping. After 1985, people were prohibited to enter the area
	2000	Forestry Service appointed companies to utilize waste wood, without the involvement of the local people. As a result, the people were involved in illegal logging
Lantan Villa	1970-2000	Local people were involved in illegal logging. During this period, the characteristics of the deforestation were very similar to events in the Setiling and Aik Berik Villages.
	2002-2005	Community were involved in establishing Community Forestry. And now, people just take advantage of open space to plant crops

Table 4.12. Time frame of deforestation & chronology of degraded forests (continued)

Karang Sideman Vil	1997-1998	Utilization of wood waste by enterprises in Orong Lengkudewuh area covering 52 hectares
	1999	Waste wood utilization carried out in Sembilir areas
	1999-2001	Utilization of wood wastes were conducted in Bunut area
	1998-2000	Utilization of wood waste by companies, which not only take waste wood chop wood but also healthy ones. This triggered the community to participate in cutting down trees
	2007-2009	Illegal logging by the locals from Karang Sidemen Village and Sasaot Village within West Lombok Regency
Telon Ambon Hai	1975-1997	Reforestation under the stands, intercropping, green belt, GERHAN, forest joint venture, governmental organizations
	2004	Bamboo planting in national park's buffer zone
	1999	Appointment of CV. "R" for utilization of waste wood, involving the community as timber carriers without an appropriate fee.
Praya Barat DaDistric	1995-2000	A massive illegal logging and forest encroachment practiced due to absent of order following "reformasi" (unplanned political reform). About 600 ha of secondary forest has been deforested during this period.
	2000-2005	Deforestation was continued by more than 200 ha by the year 2000-2005.

Table 4.12. Time frame of deforestation & chronology of degraded forests (continued)

	2005-present	No deforestation during this period. Local government proposed area of 900 ha to be allocated as HTR (People Forest Plantation) in order to rehabilitate degraded forests and improving people welfare. Forestry Minister approved 895 ha for HTR and currently Bupati has allocated HTR in 2 villages, i.e. Pandan Indah and Mangkung. It is planned that HTR will be also practiced in more villages.

Deforestation and forest degradation are complex issues and interrelated with other issues. Deforestation and forest degradation in Lombok Island were mostly caused by economic reasons, i.e. 1) needs for timber and other forest products, 2) encroaching forest land for agricultural crops, 3) expansion space for intercropping, 4) extracting fuelwood for cooking tobacco and 5) infrastructure development.

1) Needs for timber and other forest products

Logging were conducted in some areas of Lombok Island, parts of which are illegal, to fulfil raw materials for timber industries, mostly sawmills and furniture industries, which were located in some villages and they usually bought timber from local people. People living in and surrounding the Community Forestry areas have direct interactions with forest for extracting fuelwood, fruits, medicinal plants, and other forest products.

2) Encroaching forest land for agricultural crops and grazing

In addition to logging, encroachment was a problem that quite often occurred and caused a decrease in the quantity and quality of the forest in Lombok. Most cases of encroachment were done to convert forest into agricultural areas and for crop cultivation. Besides planting crops, people living around Gunung Rinjani National Park entered the forest to collect grass and in some areas, converting forest for grazing areas.

3) Expansion Space for Intercropping

Encroachment also occurred in some places of agroforestry allotments. After participated in Community Forestry Programme, the local people could enjoy better income from intercropping crops. However, after two years, trees were growing bigger and then problem of canopy shading occurred because crops have no enough space and light to grow. This has resulted in the declining income from intercropping and without proper arrangement, it would become potential threats to the forests because people need more space for growing crops.

4) Extraction of Fuelwood for Tobacco Industries

The local government was trying to reduce this threat by offering solution to replace fuelwood with coal as fuel for cooking tobacco. It was not easy to implement this solution due to some resistances from some tobacco farmers on the basis that the quality of the tobaccos cooked with coal would not be as good as those cooked with fuelwood, thus reducing the selling price. Also from environmental perspective, replacing fuelwood with coal would not solve the problem because coal is produced from non-renewable resources and allegedly poured whole far greater emissions than wood.

5) Forestland Conversion for Infrastructure and Economic Development

Unlike the problems associated with the use of forest products (wood and non wood) as well as encroachment, which generally lead to forest degradation, deforestation on the Island of Lombok was caused by conversion of forest areas for the benefit of other sectors. In addition to conversion to agricultural land and plantations, conversions of forest areas were also done because of regional area expansions. For example, in 2008, a new regency was established, i.e North Lombok Regency, which was actually an expansion of the West Lombok Regency and Mataram City. Obviously, with such expansions, lands were required for the development of economic activities and infrastructure, which were usually carried out with the request for forest land conversion.

Similarly, the exchange of forest area conducted for the construction of Lombok International Airport at the regency of West Lombok, which required the use of 595 ha forest area. In reality, exchanges of forest areas until now still not fully realized and in fact, lead to uncertainty and land tenure conflicts in some places.

5. POLICIES & LEGAL INSTRUMENTS FOR REDD AT NATIONAL & LOCAL LEVELS

5.1. Importance of REDD Scheme Implementation

In the future, Lombok Island forest management schemes must be adapted to the new paradigm of forest management to reduce, prevent and adapt the global climate change. The paradigm of BAU (business as usual) that has been adopted; namely, to sell the timber as the only forest product has now been rolled toward the utilization of environmental services (PES, payment of environmental services) and carbon trading with REDD (reduced emission from deforestation and forest Degradation). REDD is one scheme that is expected to reduce the rate of emissions of greenhouse gases, especially CO^2 from the loss of carbon stocks in forests by reducing the rate of forestland conversion and harvest forest stands. REDD is one mechanism that promises compensation for environmental services of carbon good for the country, local governments and local communities.

Obviously, the benefits will be experienced when REDD policy could be implemented in planned and systematic ways. REDD must be able to involve key stakeholders both located at central and regional levels and be able to design an appropriate pattern to include ecological, economic and social aspects so that the output of REDD can be achieved. In order for REDD objectives to be achieved, the exploration of information and perception of good forest management by government agencies at regional and local community are required.

5.2. National Legal Instruments on REDD

Attention of the government to participate in suppressing the rate of greenhouse gases increase through reducing deforestation and forest degradation is reflected through the issuance of Minister of Forestry Regulation No. P. 68/Menhut-II/2008 concerning

Demonstrative Activities of Carbon Emissions Reduction from Deforestation and Forest Degradation and Minister of Forestry Regulation No. P. 30/Menhut-II/2009 on Procedures for Reducing Emissions from REDD (Nugroho, 2010).

Licensing procedures for formulating DA REDD regulated in the Minister of Forestry Regulation No. P.68/Menhut-II/2008 are as follows (**Figure 5.1**).

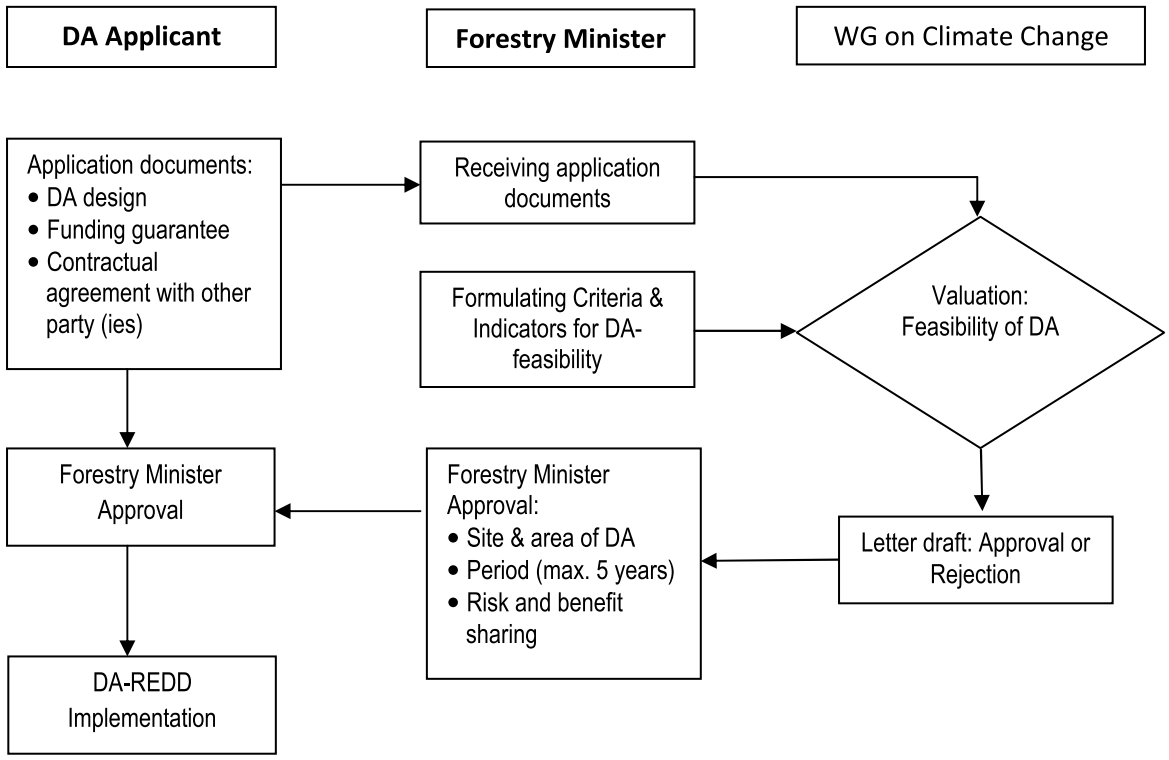

Figure 5.1. Procedures for DA REDD Licensing

Meanwhile, the licensing procedures for the implementation of REDD are regulated in Minister of Forestry Regulation No. 30/Menhut-II/2009 as described in **Figure 5.2**.

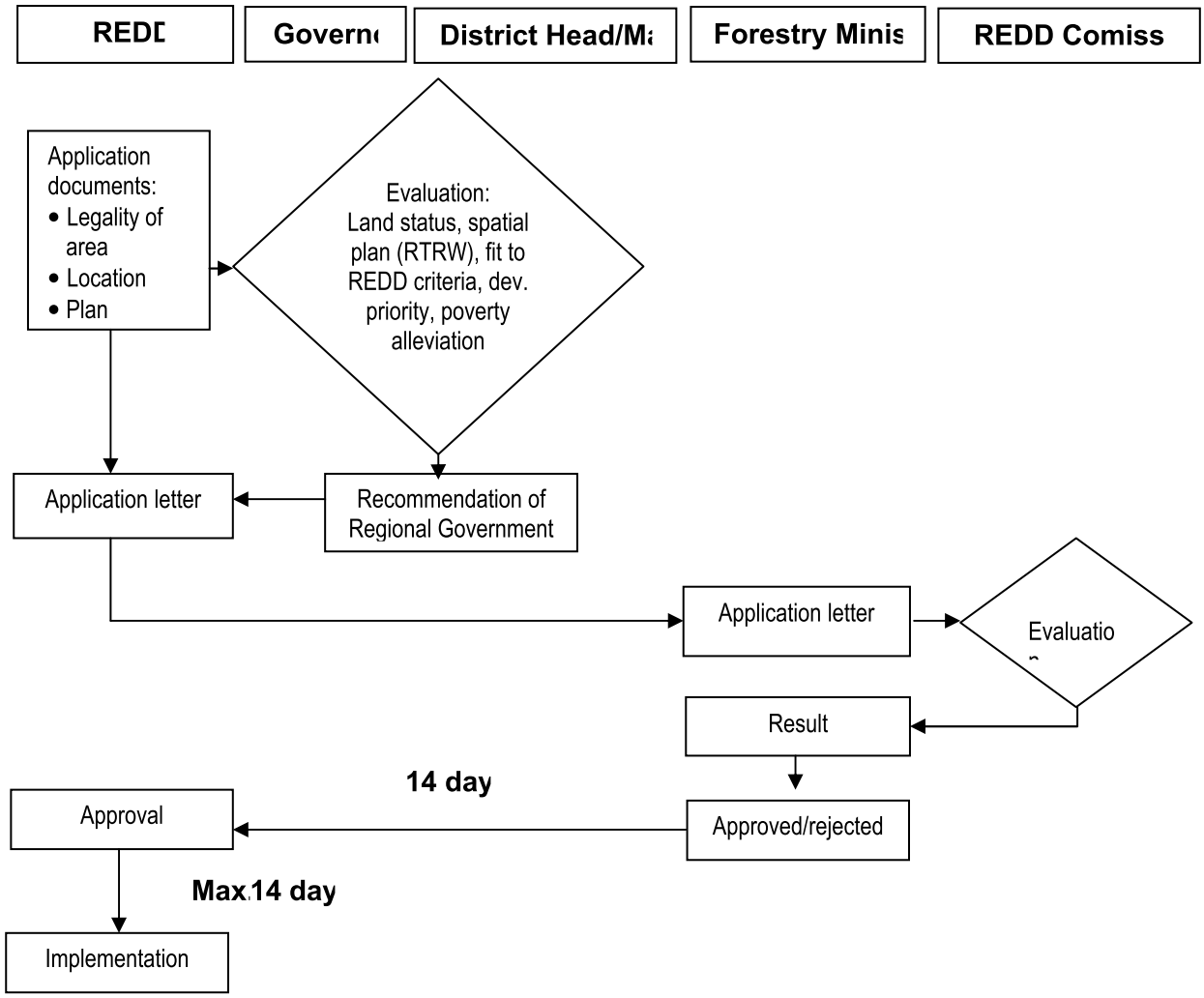

Figure 5.2. Procedures for REDD Licensing

5.3. National Policy on Profit Sharing from REDD Scheme

In accordance to the Minister of Forestry Regulation Number P.36/Menhut-II/2009 concerning Licensing Procedures for Utilization of Absorption and/or Storage of Carbon in Production Forests and Protection Forest, equal benefits of REDD Programme to all parties (governments, communities, and developers) are very much concerned. When the programme is implemented in community forest or privately owned land, 70% allocation of the project's value would be given to the community, while government would only absorb by 10% and developer by 20%. Meanwhile, if REDD programme is to be implemented in Protection Forest, then the government would acquire 50%,

community 20% and the developer 30%. The provisions regarding this profit-sharing need to be considered by the developer in order to determine the REDD scheme that will be implemented, the location of REDD, carbon price and the most important is feasibility of the activities that will be carried out (**Table 5.1**).

Table 5.1. Profit Distribution of REDD based on P.36/Menhut-II/2009

No	License	Profit Distribution		
		Government	Community	Developer
1.	Forest Concession (HPH)	20%	20%	60%
2.	Forest Plantation (HTI)	20%	20%	60%
3.	Ecosystem Restoration (HPH Restorasi)	20%	20%	60%
4.	Community Forestry Plantation (HTR)	20%	50%	30%
5.	Community Forest (Hutan Rakyat)	10%	70%	20%
6.	Community Forestry (HKm)	20%	50%	30%
7.	Costumary Forest (Hutan Adat)	10%	70%	20%
8.	Village Forest (Hutan Desa)	20%	50%	30%
9.	Forest Management Unit (KPH)	30%	20%	50%
10.	Special Purpose Forest (KHDTK)	50%	20%	30%
11	**Protection For(HL**	**50%**	**20%**	**30%**

5.4. Local Government and Customary Regulations ("Awig-Awig")

One of the most important local government regulations concerning timber utilization is SKAU (letter of timber origin). The SKAU is issued by village head through the following procedure:

1) People enquire to village head for SKAU by attaching names of proposed cut trees, standing stock, and rough map of the site.
2) Checking site and standing stock (timber potential).
3) Releasing SKAU with tariff of Rp 15,000-Rp 25,000/tree

Besides local government regulation, there is also customary regulation that still exist in several places. On third December 2009, for instance, the Community Forestry

Farmers Group (GAPOKTANHKm) "Rimba Lestari" located in the Village of Aik Berik, District of Batukliang Utara, Regency of Central Lombok conducted a meeting, aiming to re-agree on awig awig, which has been discussed in 2000 also to add and to revise. This meeting was attended by a representation of the Non-Governmental Organization (NGO) Lalu Erwandi, Kardaeni, Ahmad Cassation (YKSSI), Drs. Antare Dewa Putu, the SP (Forestry & Estate Service of Central Lombok), Mr. Humaidi (Village Head Aik Berik), Mr. Marwi (Gumpar) Chairman of the Group and the Village Board of GAPOKTANHKm Aik Berik. All participants have agreed to approve internal regulation, called “awig awig”, within the scope of membership of Community Forestry of the Village of Aik Berik, district of Batukliang Utara, Regency of Central Lombok.

5.4.1. Core Values of the “Awig-Awig”

There are nine core values of “Awig-Awig”, namely:

1) Honest / open
2) Togetherness / kinship
3) Responsibilities / in all things in work
4) Sincerity / willing to make sacrifices
5) Intelligence / need to keep learning
6) Justice / no distinction among members
7) Concern among fellow
8) Willingness and ability / commitment
9) Mutual trust and / are not prejudiced.

5.4.2. Obligations of Members under the “Awig-Awig”

One of the most important substances of “awig-awig” is to regulate the obligation of members. The member of GAPOKTAN-HKm in the Village of Aik Berik shall follow the obligations below:

1) Each farmer that is a member of the GAPOKTAN-HKm must maintain / treat with care both their land and crops in the Community Forestry area.

2) Each farmer that is a member of the GAPOKTAN-HKm must abide and implement community forest management plan that has been prepared and agreed upon
3) Each farmer that is a member of the GAPOKTAN-HKm should plant woody plants and MPTS (multi purpose tree species) in accordance with the rules and regulations.
4) Each member must clear land on a regular basis at least 3 (three) months and a maximum of 6 (six) months.
5) Each community forestry manager should maintain and protect / maintain the forests from theft / illegal timber and vandalism by anyone and from anywhere
6) For people coming from outside the Community Forestry of Aik Berik Village who already managed the Community Forestry land shall submit its management to the Village of Aik Berik, which will be arranged later through the system and mechanism of Village Government.
7) Every manager of Community Forestry must comply with all applicable regulations, including the internal rules or awig-awig that have been formulated together.
8) Each manager should be actively involved in all group activities and invitations to come on time or until the time limit of tolerance to 30 minutes.
9) Each group / group members must hold regular meetings once in two months
10) The GAPOKTAN-HKm members who will leave their lands to other regions or abroad more than six months should give notification to GAPOKTAN-HKm Village Head and Administrator and create a power of attorney for management.
11) IUPHKm holder is obliged to form a safety team of community forest land (Pam. GAPOKTAN-HKm).

5.4.3. Rights of Members under the "Awig-Awig"

"Awig-awig" is not only regulating obligations but at the same time also regulating the rights of GAPOKTAN-HKm members, i.e.

1) Any manager who has fulfilled their obligations are entitled to obtain permission for official or legitimate Community Forestry management
2) Each member of GAPOKTAN-HKm is entitled to utilize the area in accordance with the permit obtained.
3) Every manager of Community Forestry is entitled to benefits or yields of Community Forestry non-wood (fruits, *empon-empon* etc.).
4) Every administrator has the right to get fair treatment and protection (no discriminatory).
5) Each manager is entitled to an opinion in the deliberations or in groups
6) Each organizer is entitled to become members of the group / community forest management organization
7) Each manager is entitled to coaching or assistance from the government (agencies) and those who provide guidance.

5.4.4. Prohibition within the "Awig-Awig"

There are some prohibitions regulated by the "Awig-awig", that are:

1) Every manager of Community Forestry is not allowed to expand the arable land into forests and or seize land / location from others.
2) Every manager of the Community Forestry should not move / compensate / sell / create their land area as collateral.
3) Board members or anyone else are not able to give permission for managing Community Forestry on the whole area of community forest management whose permits are held by cooperatives "Rimba Lestari" Berik Aik Village unless to the person / people who legally live in Aik Berik.
4) All members and managers of GAPOKTAN-HKm or anyone else are not allowed to perform logging in the protection forest areas.
5) The members / managers are prohibited from committing immoral conducts, alcohol or drugs, gambling and the like on Community Forestry land.
6) For those members / managers of Community Forestry carrying cattle to the Community Forestry land are prohibited to herd their cattle wildly.

5.4.5. Sanctions Referring to the "Awig-Awig"

"Awig-awig" is a comprehensive regulation at the lowest level of society, e.g. village scope. This customary regulation does not only deal with obligations, rights, and prohibition, but also regulate sanctions as follows:

1) For members who abandon their lands (not maintained for 3 months) will be given SP1-SP3 each of which SP is a 1(one) month; if ignored then the management rights would be revoked by the group and board.
2) Members handing over land / compensating the loss to others will be imposed fines amounting to the price, and the land will be removed from the hands of buyers and reported to the authorities.
3) For anyone who steals / destructs plant or performs logging in protection forest, their land will be revoked by the group and will be terminated as a member of the group and reported to the authorities.
4) Members / officials who do not follow the mutual aid without acceptable reasons will be fined Rp 20.000 / mutual help. If until 3 timesthe fines have not been paid, then the land will be revoked.
5) For administrators who did not carry out their duties properly / breaking the rules, they will be given SP1-SP3. If ignored, their roles as board members will be terminated.
6) Every manager / member who did not attend the meeting without an acceptable excuse will be fined Rp 15,000-./non presence.
7) For member / manager of Community Forestry who perform immoral acts, alcohol or drugs, gambling and the like on Community Forestry land , their land shall be revoked by the holder of IUPHKm without any warning letters.
8) For members / managers who herd their cattle wildly on Community Forestry land, they will be given SP1-SP3 if ignored then their arable land would be taken by land managers covering ¼ of the cultivated area owned.

5.4.6. Management Fines

To avoid arising conflicts due to fund and/or financial management and other disagreements, there is a guidance given by the “Awig-Awig”, i.e.

1) Funds obtained from violation fines shall be managed by a joint Community Forestry Farmers Group (GAPOKTAN-HKm) "Rimba Lestari" as operational funds of GAPOKTAN-HKm.
2) Things that have not been written in this awig awig will be rearranged through consultation.

6. CONCLUSION & POLICY RECOMMENDATION

6.1. Conclusion

Deforestation and forest degradation in Lombok Island have started a way back, among others were due the failure of reforestation programme in the 1960's. Further forest degradation occurred in 1980's because of improper implemented policy, of which permission to cut timber *"lelesan"* was given to local people without sufficient replantation. In 1990's, furthermore, illegal logging was escalating, triggered by disappointment of the locals, as monopoly of logging license given to a private company without their involvement. The most important factor, which influences deforestation, is political reform movement in 1998. Similar to other Indonesian regions, the uncontrolled movement also caused massive practices of illegal logging in Lombok Island. A huge number of logs were extracted from Lombok's forests from 1998 to 2002. There are some agents of deforestation and forest degradation identified in Lombok island, i.e. policy makers, local people, timber industries, logging contractors, illegal loggers, agricultural crops investors, tobacco industries, and collusive officer-businessmen.

Illegal logging practices started to decrease in 2002 due to strong operations to combat illegal logging. Furthermore, the decreasing illegal logging was caused by lower availability of commercial timber in the forests, as a consequence of previous massive illegal logging. Increased awareness of people in Lombok Island in conserving forest resources is also an important factor, which explains the decreasing number of deforestation and forest degradation in the last decade. Floods, landslides, and some other environmental disasters have led the awareness of people to keep environmental functions of forests. Increasing ecotourism activities surrounding Gunung Rinjani National Park, which is also improving prosperity of local people, has changed the way of thinking of the local people towards sustainable natural resources management.

Deforestation and forest degradation in Lombok Island has resulted from a complex process and is influenced by a number of causes. Changing forest policies as well as regional regulations has implied changes of roles of agents, and caused deforestation and forest degradation. There are some agents of deforestation and forest degradation in Lombok Island, i.e.

Policy makers
Local people
Timber industries
Logging contractors
Illegal loggers
Agricultural crops' investors
Tobacco industries
Collusive officer-businessmen

Policy makers

It is not an easy task to make sustainable development policy in a small island with relatively dense population such as Lombok. To support economic development, many infrastructure projects are required. Several years ago, the provincial government of West Nusa Tenggara decided to develop an international airport in Lombok Island. To realize the development of the international airport, the provincial government requested for forest area conversion. Some forests had been converted but the land compensation is only partly available or it is very difficult to be verified due to land tenure claims of local people. Another problem, which drives deforestation, is enactment of new regencies, districts or villages. This phenomenon influenced direct forest conversion, because a new administrative unit would require new sites for infrastructure facilities such as government offices, roads, and settlements.

Local people

Local people require land for cultivating agricultural crops. In some areas, government allowed local people to cultivate crops within forest area under an intercropping system. Intercropping system was well implemented, until the problem of canopy shading appeared. When trees are grown up, the alley crops have less space to grow and receive less sunlight. Due to this problem, some people disturbed trees in order to get more space for their crops. Beside land competition of alley crops, some local people also logged timber illegally to be used personally, or to be sold in the market as raw material for construction timber, furniture, and fuelwood. Timber needs for fuelwood in Lombok Island is relatively high, especially for cooking tobacco.

Timber industries

Timber industries, i.e. sawmills and furniture industries are the underlying agents for forest degradation. Usually local people logged timber from forests illegally to be sold to timber collectors, who supply raw material for sawmills and furniture industries. Therefore, it is also important to enforce illegal timber trading not only to the illegal loggers, but also to timber industries by making a better arrangement on the demand side.

Logging contractors

In 1990's local government appointed a private company as the logging contractor to harvest small-scale timber, so called "waste wood" in some areas. It was practiced for several years and generally poorly supervised. It generated further problems because of lack of involvement from local people, and then created disappointment from the local people on the system which triggered illegal logging in some forest areas.

Illegal loggers

Illegal logger is usually local people; however, most of them are funded also by capital owners. The illegal logs are purposely used to provide raw material for sawmills and

other timber industries, e.g. furniture and infrastructure construction. A small part of the illegal logs is also used for personal purposes such as house construction and fuelwood. Political reform movement in 1998 has caused massive practices of illegal logging. A huge number of timbers were extracted from forests from1998 to 2002. After 2002, illegal logging practices decreased because at the time there were many strong operations to combat illegal logging. Besides law enforcement, the decreasing number of illegal logging was caused by lack of commercial timber in the forests and increasing awareness of people to conserve forests due to several reasons, e.g. environmental function of forests and income generating from ecotourism activities surrounding Gunung Rinjani National Park.

Agricultural crops' investors

Investor of agricultural crop is another important agent influencing deforestation and forest degradation in Lombok Island. Some investors provided funding for local people to encroach forest area to be cultivated with agricultural crops. Most people are also very dependent to the investor to sell their agricultural products. Investors tried to get more land for planting agricultural crops to maximize profits. Farmers supported investors because a larger crop area means larger household income.

Tobacco industries

Tobacco industries are the other underlying agents for forest degradation. In Lombok Island, many people cultivate tobacco as their main commodity. To get added value, the tobacco leaf should be cooked in order to get dried tobacco. Cooking tobacco with fuelwood is believed to be the ideal way to produce best quality tobacco. Large volume of fuelwood have been extracted to serve tobacco industries without significant replantation.

Collusive officer-businessmen

Law enforcement could not be done effectively due to some collusion practices between officers and businessmen. Some respondents stated that illegal logging, illegal timber trading and forestland encroachment occurred because those practices were "backed-up" by the officers, whom could be a military personal, policeman, forestry official, or local government officer. Perhaps those practices were not easy to be proven but it shall be a concern in order to combat practices of illegal logging, timber trading and forest encroachment in a more effective way.

6.2. Policy Recommendation

To ensure REDD project in Lombok can run well, the followings need to be considered:

- While REDD licensing procedures in general have been regulated in the Regulation of the Minister of Forestry Number P. 68/Menhut-II/2008 Concerning Demonstrative Activities of Carbon Emissions Reduction from Deforestation and Forest Degradation and Regulation of the Minister of Forestry No. P. 30/Menhut-II/2009 on Procedures for Reducing Emissions from REDD, **in reality, even up to now. obtaining a business license as well as implementation of REDD DA cannot be done easily. This is caused by unclear institutional and working unit under the Ministry of Forestry who provided the duty and authority to handle the affairs of REDD, including the AR CDM, in each forest function.** Especially for the implementation of REDD in protection forests, the request put forward by KIPCCF is the first in Indonesia, so we need an intensive communication with the Ministry of Forestry to work immediately in setting the responsible unit for licensing matters related to REDD in the Protection Forest areas.

- Implementation of REDD requires active community participation. Therefore, the socialization of REDD pre-implementation activities should be done to provide insights and options for the communities in and around the forests whether to participate in REDD project or not. It is important for people to know and understand the consequences of the implementation of REDD programs so that their

participation performed was not because of compulsion but because of rational choice after weighing the advantages and disadvantages.

- Implementation of REDD should consider current conditions and desires that are developing in society. At this time people have felt the economic benefits of the Community Forestry programme and want to continue the program. Therefore, the positive sides of Community Forestry programmes such as community involvement in maintaining forests, utilization of non-timber forest products, as well as cultivation of crops on land under the stands through intercropping pattern must be maintained. Meanwhile, the negative side of such program such as a tendency to expand intercropping area should be minimized. Intercropping expansion undertaken by the community resulted from reduced crop yields due to the dense canopy with the increase of age that decreased the amount of sunlight that is reaching the ground surface. Therefore, selection of species and shade tolerant plants with high economic value (such as "Ateng coffee" is grown by intercropping pattern in Takengon area in NAD and Perhutani in West Java) must be conducted and disseminated to the public.

- The very high need for fuelwood for the tobacco industry is threatening forest sustainability, and solutions must be formulated. Efforts to replace fuelwood with coal as suggested by the local government was clearly not a good solution because in addition to low acceptance by the farmers, coal is a non-renewable natural resources and produces high emissions that are not environmentally friendly. The best solution is through plantation or rehabilitation of degraded land around the buffer zone of Gunung Rinjani National Park and around the borders of protection forests with fast growing plants and efficient source of energy as a source of fuelwood in the future.

REFERENCES

Badiozamani, G., 2007. Addressing Deforestation and Forest Degradation Through International Policy in Forestry and Climate Change. Edited by P.H. Freer-Smith, M.S.J.Broadmeadow and J.M. Lynch. CABI Oxfordshire. United Kongdom.

[BPS] Badan Pusat Statistik NTB. 2010. Provinsi Nusa Tenggara Barat (NTB) Dalam Angka 2010. Badan Pusat Statistik. Mataram.

Bryman, A., 2001. Social Research Methods. Oxford University Press.

[CIFOR] Center for International Forestry Research, 2010. Simply REDD: CIFOR'S Guide to Forests, Climate Change and REDD. Bogor. Indonesia.

[IFCA] Indonesia Forestry Climate Alliance, 2007. REDDI (Reducing Emissions from Deforestation and Forest Degradation in Indonesia): REDD Methodology and Strategies Summary for Policy Makers. The Ministry of Forestry Republic of Indonesia.

Kirk, M and D. Mai, 1997. Methods for Empirical Research. Lecturer Notes. CeTSAF Goettingen and Institute of Cooperation in Developing Countries. Phillips-University, Margburg.

Ministry of Forestry, 2008. Perhitungan Deforestasi Indonesia. Pusat Inventarisasi dan Perpetaan Hutan. Badan Planologi Kehutanan. Departemen Kehutanan, Jakarta.

Ministry of Forestry, 2009. Statistik Kehutanan Tahun 2008. Kementerian Kehutanan, Jakarta.

Nawir A.A, Murniati and L. Rumboko (Eds). 2007. Forest rehabilitation in Indonesia: Where to after more than three decades? Review of Forest Rehabilitation. Lesson from the Past. CIFOR, Bogor, Indonesia.

Nugroho, B., 2010. Kelembagaan AR/CDM dan REDD: Tantangan dan Agenda. Disampaikan pada: Capacity Building on Carbon Forestry Mechanism. Bogor, 2-4 Februari 2010.

Schlamadinger, B and T. Johns. 2007. Afforestation, Reforestation and Reduced Deforestation to Sequester Carbon and Reduced Emissions in Forestry and Climate Change. Edited by P.H. Freer-Smith, M.S.J.Broadmeadow and J.M. Lynch. CABI Oxfordshire. United Kongdom.

Sunderlin, W.D, Resosudarmo, I.A.P, Rianto E., and A. Angelsen. 2000. The Effect of Indonesia Economic Crisis on Small Farmers and Natural Forest Cover in the Outer Islands. CIFOR Occasional Paper NO. 28(E). CIFOR, Bogor, Indonesia

Apendix 1. Resume of Central Lombok Focus Group Discussion

ISSUES	SPEAKERS	DISCUSSION
What are the benefits of forests that you felt?	Marwi (Aik Berik Village)	• Generally helps the community to breathe, without forest, Aik Berik people would be devastated. • Significant benefits especially as water sources, there are 11 great springs that channell community needs. • Supporting Aik Bukak and Lantan. • Community Forestry programme benefits the economy from every angle • The problem of returning back to forest due to unclear meaning of sustainability. • Benefits the community, since Community Forestry Programme provides the benefits of intercropping (coffee, cocoa, banana and jackfruit, etc), where coffee, cocoa and banana are more dominant. Durian and jackfruit. Durian is more dominant. 1400.5 ha. • Improve education. Improve health. • Still utilizing forest products for medicinal purposes such as betel.
	Hi. Nurhidas (Setiling)	• Prior to the policy of finding food with fuelwood although terrorized by the authorities • After the policy of intercropping with banana, coffee (self made), avocado, cocoa and taro, galanga, ginger, there was welfare improvement. • In 2000, the government policy of Community Forestry Programme proved to be beneficial for society, Setiling Village which up to 2000 had no water, now since 2004 it has had its own clean water. • Previously during drought, the distance of water source was 2 km, now water is available within the village • Almost all households are able to send their children to school from Community Forestry Programme • Expecting a continuation of Community Forestry programme that provides many economic benefits such as cocoa, coffee and bananas. • Results are sold to middlemen with a system of debt bondage • The community strongly supports the forest. Benefits include planting betel and pepper • fuelwood was no longer required, home consumptions are using small twigs.

Apendix 1. Resume of Central Lombok Focus Group Discussion (continued)

	Zulkarnain (Head of Wajageseng Hamlet–Kopang).	In close proximity to Community Forestry and Gunung Rinjani National Park in East Lombok. • Benefits from the forest are the bamboo plant. In addition to address erosion and landslides, it can also be used as

		additional income. Prior to planting bamboo, in the rainy season, much rain water-borne mud flowing to our village. Around the year 2004 bamboo started to grow in riparian area and sloping areas; now large amount of water which could erode soil and mud no longer exists. • Bamboo seedlings from the Forestry Service was of local species • Previously, women stayed at home, but now they can enhance household economy by selling bamboo sticks to middlemen. Bamboo in the district of Kopang comes from Wajageseng and is used to produce webbing. • In the past, there were many springs, but once with Community Forestry Programme, the number of springs reduced. Since bamboo were planted, all the springs are back into function. During the rainy season, bamboo shoots store water. • ParticipatParticipating in GRNP: there was an agreement with GRNP to utilize areas surrounding GRNP by planting grass under forest stands for source of cattle feed. There was livestock assistance by exploiting grass in GRNP area. • Empty spaces will be planted with grass and core forestry species. • Collective cage system. It needs 375 ha of fodder for 5 villages. Now the trees have grown and the planting space is increasingly narrowed but does not affect the growth of elephant grass
Negativ impact of forest	Mardi (Aik Berik)	• Community Forestry Programme in the northern region acts as life-support. People are worried that when Community Forestry is maintained, the spaces for intercropping grow narrowed, and certainly reduce community's income. Hence, illegal logging will occur to open the canopy so that crops can grow better. • Forestry and Estate Service of Central Lombok Regency have not touched the local problems. • Society has created products as fruit production centers in West Nusa Tenggara,but there is no concern of local government and lack of synergy among agencies. • Why are there bananas in the region, because the ability and skills of people just to plant bananas. • If the forest is maintained, what about the community. Forest will be sustainable if society is prosperous. • Lack of socialization is a barrier. • 1800.9 of Community Forestry is ready for REDD and the results are purely for society. • When planting trees in the forest area, the grown trees are prohibited to be cut, thus, this has increased depression among the people • Four springs have been taken by whom? And for what? • Plants that are suitable such as mangosteen and nutmeg (good trees)

Fores Destruction activities	Sirojudin (Lantan)	• It caused by an illegal loggers • There are two Community Forestry activities and Land Cultivation Rights (HGU). Need more attention on Cultivation Rights • Government Regulation No 11 of 2010 follow-up management can be done for abandoned lands • Land-related conflicts occurred with regard to whom has the authority to acquire or produce license. Examples of Cultivation Rights conflict between local government and private party. Plasma in Community Forestry Programme means that private party must buy the harvests from Community Forestry area. • Land Cultivation Rights was over so the local government now has the authorities to regulate or giving out licence to follow up on the continuation of Land Cultivation Rights. Company helps the community to buy the local harvests to prevent them from encroaching the forest • Policy. In 1975 local woods were used. The Forestry Service policies including selective logging, *lelesan* and clearcut logging, resulted in the cutting down of all trees. • In 2005 when Community Forestry arrived, until now there was no facilitation or extension from the Forestry and Estate Service of Central Lombok Regency • Lack of synergies among the institutions • Private coffee land is replaced with sengon due to the promotion by the Head of Forestry and Estate Service of Central Lombok Regency which resulted in cleared community gardens and tend to increase emissions. But predictions of economic value are still small. In addition, Clear Cutting with Natural Regeneration (THPA) system tends to damage the water so there is a need to prepare zoning for forest harvesting
	Abdul Hamid (Setiling)	• The cause of forest destruction is plants. Local plants can not provide good income for the local economy. Because plant growth are blocked by the tree canopy. Many coffee plants in our area but productivity are very low and bananas were not fruitful. • Outside the forest area and how the utilization system. • Durian, jackfruit, sengon, trembesi. Mahogany, coffee, etc. • If a spring is found then the trees are not allowed to be all cut down. But the land belongs to the people of which means it is entitled to use • If coffee is converted into sengon, then the coffee will be harvested using selective logging system
Expectati	Sirojudin (Lantan)	• In the protection forest, demonstration plots should be established by planting *empon empon* to grow under the stands such as ginger, as well as marketing assistance
	Participant	• Under the REDD mechanism, safeguarding the forest already received compensation

		• Consideration should be made on the type of wood with the greatest carbon content thus has high resale value • Trembesi is able to absorb high C but also high water absorption that causes stunted growth of the surrounding stands • Issue that can be sold for agroforestry forests is a good structural improvement schemes that are capable of storing high and low carbon. For example, banana is substituted with durian what about the compensation? Because what counts is the difference between before and after the project. If prior to the project banana was replaced with durian, then the absorption / carbon savings will change and will receive additional compensation. • Bananas is a stimulant of growth forest stands, and when the tree have grown, the growth of bananas will be blocked and it will die alone
Expectatio	Participant	• Community Forestry Conflicts in 2001 • Field Assistance • Assistant for footprint calculation of Carbon • Assistant to calculate the cost benefit to society • Mediation in formulating a draft agreement between the developer and the community and local government • Construction of demonstration plots for *empon-empon* and also forest stands (model-empon forest / agroforestry) • Technical regulation • Institutional Assistance for Community Forestry (strengthening of capacity)

Appendix 2. Resume of Focus Group Discussion in Tetebatu Village, Sikur District, East Lombok Regency

ISSUE	SPEAKES	DISCUSSIC
The benefits forests	Participant	• Many water sources around tetebatu GRNP dried up in the past, but not now • Source of fodder • Tourism approximately 500-600 people (hiking, waterfalls), distance to forest boundary 1 hour • Fuelwood • Ferns for vegetables • Fruits (avocado, durian, jackfruit, cotton tree) planted by the cooperation between government and community
Additiona information	M. Fadli (Head of Area Section of GRNP East Lombok)	• In 2004-2005 approximately 200 (450) ha were burned, proposed area restoration and rehabilitation. Cooperation with community groups: about 10 ha were planted by the community and ended in March 2010, after which the community was allowed to plant 2 hectares. • Restoration was conducted in 2007, and about 10% were planted with fruits that are utilized by local communities • The total area of GRNP is about 30 thousand ha • The community is cooperative towards GRNP's forest • The need for fuelwood is high, and it becomes a problem
	Participant	• Conversion of kerosene to coal in 2010, PT. Sadana Arif Nusa conducted *green school* collaborating with more than 5 elementary schools where they provided seeds, and the seedlings which were then planted in the school environment and dispersed into the community and about 1 -2 months can be planted • Number of seedlings is 2500 seedlings/school
Negative impact forest	Participant	• If the agreement terminated and not continued, threat to the forest would be high
Forest Destructi activities	Participant	• Making charcoal • Illegal logging. Severed areas are in the western part of Pringgajurang - Montong Ivory. The motive was to sell the log to another place with the arrival of the buyer or the credit system and replaced with wood. • Difficulty to obtain kerosene resulted in increase of fuelwood thus pressing the forest • Community processed tobacco with fuelwood which was the failure of local government policy of converting kerosene to coal, and since coal is difficult to obtain, this has stimulated people to use wood. • Port harbour has been established in Labuhan Haji to facilitate the acquisition of coal • Also some assistance on the procurement of a suitable

		furnace with coal as fuel and the people skills to manage tobacco still require improvement • There are 21 companies to accommodate the virginia tobacco • For Tobacco farmers: if the loss is said to benefit 4-5 million, with a harvest cycle of 6 months with the acquisition of five tens of millionsper ha profit 8 million, the public expects over 10 million • Per kilo = Rp. 4000 and 40 million per quintal • Limited natural factors have caused crop damage thus replanting of dead plants was done and increased production costs. With high rainfall, leaching of fertilizer caused deaths in plants and need of fertilizer increased • People who planted tobacco in Sikur district reached 80%, by converting rice field • The use of coal increased pollution • Lack of awareness of people to plant
Expectatic	Participant	• Immediately extend contract • Expand cooperation contract • Provide appropriate economic programs (livestock, vegetables, etc)

Appendix 3. Resume of REDD Workshop in the NTB Forestry Service in Mataram

SPEAKER	DISCUSSION
Catur (SANTILI Foundation)	• REDD is still unclear, but it is now changed to REDD+ • Rights and social justice are often dismissed from REDD • Proposed REDD only to shift previous issue. The conflicts of water, forest, tourism and mining within GRNP are very high and REDD is not a new issue • Participatory mapping has been conducted in 2 villages in Northern part of Central Lombok • Regional regulation on area governance based on local institution • It is expected that REDD is not a promise and sectoral solution but island based • People who already plants are disappointed because there are no price, thus market requires facilitation • Biophysics: government policy on green economy is not able to accommodate the community aspirations • There is a need to relate micro, miso and macro problems that exist in the island • Fire wood, producing 1 day tobacco requires 12 trucks
Head of Forestry Service & Estate, Central Lombok Regency	• Meeting and field visits have been conducted 3 times • The plan was to plan 5000 ha in the buffer zone area of Gunung Rinjani National Park, there is a need for such area planning since the beginning, as anticipation can be made. The remaining area is 3200 ha • Realization of local owners' participations and those surrounding the forest area in REDD program • Action plan is required to be known for the sustainability of the activities
MARWI (Central Lombok)	• The communities often discussed this • Clear zoning is required, including protected zone, conservation and tourism zones • Strengthening institutional capacity
HUSNI (Faculty of Agriculture, University of Mataram)	• How much is the *emission baseline*? • Focus onREDD, there is a concern of *overlap* with the existing activities such as FFI (*Fauna Flora Indonesia*) and *watershed protection*?
DALILAH (Central Lombok)	• REDD as a stimulant for community empowerment to forest, finance, institution and biophysical • REDD as local intense for *global thinking*
MARKUM (Forestry Dept., University of Mataram)	• Cakug watershed Area • The average C-value in primary forest is 360 tonnes/ha including soil, litter, necromass and trees • The C-value in secondary forest is (mahoni-sasaut) 394 tonnes/ha age 50 years • The average C-value of Community Forestry is 160 tonnes/ha • Agroforestry 142 tonnes/ha • Private land surrounding the forest is 160 tonnes/ha • Community Forestry is an expansion of Protection Forest in which land use change permission from protection forest has decreased the carbon stock in Protection Forest • Zoning and *buffering* are required so that Community Forestry areas do not

	go deeper into the primary forest to prevent forest conversion; • Community Forestry:, there is a dilemma in inserting plant as indicator of REDD – plants with high C value has good class in certain age will be cut to utilize the wood value, thus differentiation is necessary • Is REDD to be used only within forest area or can it be also used outside?

Appendix 4. Documentation of Activities

Figure App. 4.1. Intercropping with Banana in Aik Berik Village

Figure App. 4.2. Community Forest in Aik Berik Village

Figure App. 4.3. Banana Plants' Condition in Lantan Village

Figure App. 4.4. Interview Session in Lantan Village

Figure App. 4.5.
Community Forest in Karang Sidemen Village

Figure App. 4.6.
Villagers' Cultivation Plants in Karang Sidemen Village

Figure App. 4.7 Wood Harvesting Waste in Telun Ambon Village

Figure App. 4.8. Harvesting Timber from Gardens in Telun Ambon Village

Figure App. 4.9. Seedbed in Tetebatu Village

Figure App. 4.9. Seedbed in Tetebatu Village

Figure App. 4.9. Interview Session in Kembang Kuning Village

Figure App. 4.12. "Dodol" made from Pineapple in Kembang Kuning Village

Figure App. 4.13. Interview Session in Setiling Village

Figure App. 4.14. Interview Session in Setiling Village