FOREST RELATED POLICY AND CLIMATE CHANGE MITIGATION IN INDONESIA

(A CASE STUDY IN BROMO TENGGER SEMERU NATIONAL PARK)

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Abstract

Climate change is a global threat. The risks of climate change range from an increase in sea level to food scarcity. Indonesia is vulnerable to the risk of climate change, and is also responsible for about 1.5% of global greenhouse gas (GHG) emissions; it has even become one of 5 top emitter countries that contribute to global emissions from deforestation. Acknowledging climate change risk as well as the role that the country plays in global climate change, the Government of Indonesia (GOI) committed to reduce its emissions by 26% by 2020, and with international assistance, the target is increased to 41%.

Indonesian forests play an important role as a carbon sink. The United Nations Development Programme (UNDP) (2007) reported that 6 billion metric tons of carbon is stored in Indonesia's forests. However, high rates of deforestation caused the country to lose 2.8 ha of forest area annually from 1998 to 2000.Deforestation even occurs in protected conservation areas. In the 2008–2011 period, deforestation in conservation areas was estimated to be 4 402.46 ha per year (MoF, 2011). In order to rehabilitate degraded areas, the Ministry of Forestry introduced a rehabilitation policy, which also applies to conservation areas. This study aims to analyze policies on climate change mitigation in the forestry sector, especially with regards to the implementation of reforestation projects in Bromo Tengger Semeru National Park (BTSNP). In order to understand the background of the Afforestation/Reforestation Clean Development Mechanism (A/R CDM) in BTSNP and examine the possibility of reforestation in the area, historical analysis of deforestation in Indonesia is important.

The results of this study show that while deforestation in Indonesia is generally caused by institutional problems resulting from inappropriate forest related policies, in BTSNP, deforestation mainly occurred in Tengger Highland owing to development policies that resulted in inappropriate forest land use decisions in the past, especially during Dutch and Japanese occupation. In addition, institutional problems such as changing regulations, unclear borders between forest areas, and social, economic, and political conditions such as poverty and changing political regimes exacerbated the extent of deforestation in Tengger Highland.

Among three reforestation projects that have been implemented in Tengger Highland, the Ecosystem Revitalization Project (ERP) and the A/R CDM pilot project have been successful in reforesting some areas in Tengger Highland, BTSNP, while the National Movement on Forest

and Land Rehabilitation (Gerakan Rehabilitasi Hutan dan Lahan/GERHAN) failed to reforest the area. There are 5 critical variables which affect the success or failure of reforestation projects in BTSNP called the '5 C Protocol'. They are content, context, commitment, capacity, and clients & coalitions.

Key words: Climate change, deforestation, reforestation

Table of Contents

List of Abbreviations

A/R CDM	: Afforestation/Reforestation Clean Development Mechanism
ASEAN	: Association of South East Asia Nation
BBTNBTS	: Balai Besar Taman Nasional Bromo Tengger Semeru
BPTN	: Bidang Pengelolaan Taman Nasional
BTSNP	: Bromo Tengger Semeru National Park
COP	: Conference of the Parties
CDM	: Clean Development Mechanism
CER	: Certified Emission Reduction
CMP	: Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO_2	: Carbon dioxide
DAS	: Daerah Aliran Sungai
DGFPNC	: Directorate General of Forest Protection and Nature Conservation
DNA	: Designed National Authority
DNPI	: Dewan Nasional Perubahan Iklim
DOE	: Designed Operational Entity
DR	: Dana Reboisasi
EB	: Executive Board
ERP	: Ecosystem Revitalization Project
FAO	: Food and Agriculture Organization
FWI	: Forest Watch Indonesia
GERHAN	: Gerakan Rehabilitasi Hutan dan Lahan
GFW	: Global Forest watch
GHG	: Green House Gas
GOI	: Government of Indonesia
JICA	: Japan International Cooperation Agency
JIFPRO	: Japan International Forestry Promotion and Cooperation Centre
KMDM	: Kecil Menanam Dewasa Memanen
LULUCF	: Land Use Land Use Change and Forestry
IPCC	: Intergovernmental Panel on Climate Change
ICER	: long term Certified Emission Reduction

MoF	; Ministry of Forestry
MOP	: Meeting of the Parties
NAPACC	: National Action Plan for Addressing Climate Change
NC-CDM	: National Commission for Clean Development Mechanism
NS	: Natural Service
OMOT	: One Man One Tree
PDD	: Project Design Document
PIR	: Perkebunan Inti Rakyat
PSDH	; Provisi Sumber Daya Hutan
PT KTI	: PT. Kutai Timber Indonesia
RPTN	: Resort Pengelolaan Taman Nasional
SD	: Sustainable Development
SFC	: Sumitomo Forestry Corporation
SPTN	: Seksi Pengelolaan Taman Nasional
STT	: Sectoral Technical Team
tCER	: temporal Certified Emission Reduction
TF	: Timber forest
TT	: Technical team
UNFCCC	: United Nation framework on Climate Change
UP	: Utilization Permit
UR	: Utilization Right

List of Tables

List of Figures

CHAPTER I

INTRODUCTION

1.1. Research Background

Climate change[1] is a major global threat (Eliasch, 2009). The climate has changed our world in a way that can be measured by researchers. Observational evidence from all continents and most oceans show that many natural systems are being affected by regional climate change, particularly temperature increases (IPCC, 2007a). The warming of the climate system is unequivocal, as evidenced by observations of increases in the global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. Global surface temperatures over the 100-year period from 1906 to 2005 increased by 0.74°C on average. The temperature increase is widespread globally and greater at higher northern latitudes. Land regions have warmed faster than the oceans (IPCC, 2007b).

Increased emissions are problematic as the ability of the global atmosphere to store or absorb pollution is limited. In other words, the appropriation of the global atmosphere is now becoming an issue. With increased concentrations of greenhouse gases (GHGs), the global atmosphere may change, leading to potentially severe consequences for humans and other species. Indeed, various Intergovernmental Panel on Climate Change (IPCC) reports have documented the rising levels of global average temperatures and changing regional climate patterns. Left unmanaged, climate change will prevent the progress of

[1] The United Nations Framework Convention on Climate Change (UNFCCC; 1992) defines climate change as a change in climate that is attributed directly or indirectly to human activity altering the composition of the global atmosphere, and that is in addition to natural climate variability observed over comparable time periods. In contrast, climate change in IPCC usage refers to any change in climate over time, regardless of whether it is due to natural variability or human activity.

development and compromise the well-being of current and future generations (UNDP, 2010). Regional climate changes impact hydrology (water temperature and quality, increasing salinity) and biological systems (migration patterns, upward and pole-ward shifts of species, algae levels) (IPCC, 2007a). Moreover, the IPCC warned of people faced with, and countries threatened by, food shortages, water scarcity, devastating natural disasters, and deadly disease outbreaks. In summary, at present, the ability of the global atmosphere to serve as a sink is becoming threatened; additional "withdrawals" from this sink may lead to deterioration in its ability to provide "pollutant-absorbing" services (Dolšak, 2001).

Because of its geographical location, topography, and socioeconomic aspects, Indonesia is particularly vulnerable to the impacts of climate variability and climate change. Analysis of long-term historical climate data suggests that maximum and minimum temperatures have increased consistently (Ministry of Environment, 2007). Significant decreases and/or increases in rainfall have also been detected in many part of the Indonesian region, with different significant trends in different areas. Global warming is also likely to cause an increase of sea level. Historical data shows increasing trends in mean sea level (MSL) in a number of locations. However, the rate of increase varies between locations (Sofian, 2009 in MoE 2010). Moreover, climate-induced natural hazards such as flooding, landslides, water or vector borne diseases, wind storms, and droughts were documented to have occurred more frequently by the 1980s.

It is acknowledged that human activities have been substantially responsible for the increasing concentrations of atmospheric greenhouse gases, that these increases enhance the natural greenhouse effect, and that this will

result, on average, in additional warming of the Earth's surface and may adversely affect natural ecosystems and humankind. Thus, in 1992, several countries joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC). The ultimate objective of the UNFCCC is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

Action on climate change can take the form of mitigation or adaptation. Climate change mitigation is a term used to describe human interventions to reduce new greenhouse gas emissions (UNEP, 2003). Mitigation refers to all policies and measures aimed at reducing emissions of greenhouse gases, such as carbon dioxide, or at capturing them in forests, oceans, or underground reservoirs. Adaptation is the term used to describe activities aimed at preparing for or dealing with the consequences of climate change, be it at the level of individual households, communities, and firms, or of entire sectors and countries.

By 1995, countries realized that emission reduction provisions determined by the UNFCCC were inadequate. Negotiations were launched to strengthen the global response to climate change; two years later, the Kyoto Protocol was adopted. The central feature of the Kyoto Protocol is its requirement that countries limit or reduce their greenhouse gas emissions. To help countries meet their emission targets, and to encourage the private sector and developing countries to contribute to emission reduction efforts, negotiators of the Protocol included three market-based mechanisms: Emissions Trading, Clean Development Mechanism (CDM), and Joint Implementation (UNFCCC, 1997). Among the three mechanisms aimed at reducing greenhouse gas emissions,

CDM is the most popular one. The mechanism has already registered more than 1,000 projects and is anticipated to produce certified emission reduction (CER) credits amounting to more than 2.7 billion tons of CO_2 equivalents in the first commitment period of the Kyoto Protocol, 2008–2012 (UNFCCC, 2010).

The CDM allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex 1 party) to implement emission-reduction projects in developing countries. Such projects can earn CER credits, each equivalent to one metric ton of CO_2. These CER credits can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol. The mechanism stimulates sustainable development and emission reduction, while giving industrialized countries some flexibility in how they meet their emission reduction targets.

Being a non-Annex 1 country[2], Indonesia is not required to declare or state emission reduction targets based on the Kyoto Protocol. However, as one of the 25 top emitter countries, which is responsible for about 1.5% of the GHG emissions in the world (Baumert et al., 2005 p.12), as well as a country directly affected by global warming, it is important for Indonesia to be involved in the mitigation of climate change. Therefore, Indonesia has ratified the Convention on Climate Change as well as the Kyoto Protocol. The convention has been ratified by Act No. 6/1994, while ratification of the Kyoto Protocol was agreed by Indonesia's Legislative Body (DPR) on June 28, 2004 through Act No. 17/2004. Ratifying the Kyoto Protocol allows Indonesia to invest in developing CDM projects that will benefit sustainable development. By May 2011, at least 65 CDM

[2] According to the Kyoto Protocol, a "Party included in Annex 1" means a party included in Annex 1 of the Convention, as may be amended, or a party which has made a notification under Article 4, paragraph 2 (g), of the Convention. Most of the countries are developed countries.

projects in Indonesia had been registered in the CDM Executive Board, most of which are from the energy sector (UNFCCC, 2011).

Moreover, Indonesia has committed to reduce its emissions by 26% by 2020, as stated by the President of the Republic of Indonesia in his speech at the 15th Conference of the Parties (COP 15) at the Bella Center, Copenhagen, Denmark, on December 17, 2009:

> "In the spirit of thinking outside the box, in September this year Indonesia declared an emission reduction target of 26% from business as usual by 2020, and this can be increased to 41% with enhanced international assistance. As a non-Annex 1 country, we did NOT have to do this. But we read the stark scientific warnings of the IPCC. So we set our new reduction target, because we wanted to be part of a global solution."

Unlike many other countries, the main source of GHG emission in Indonesia is the LULUCF sector (Land Use, Land Use Change, and Forestry). The National Greenhouse Gases Inventory (NGHGI) estimated that in 2000, the total GHG emissions in Indonesia for the three main greenhouse gases (CO_2, CH_4, and N_2O) without including the LULUCF sector reached 594,738 $GgCO_2e$ (CO_2 equivalents). With the inclusion of LULUCF, total GHG emissions from Indonesia increase significantly to about 1,415,988 $GgCO_2e$. The main contributing sectors were land use change and forestry, followed by energy and peat fire related emissions (MoE, 2007).

Since the forestry sector has become one of the main sources of GHG emission in Indonesia, the role of climate change mitigation in the forestry sector is important to achieve the emission reduction target in the country. Some policies related to climate change mitigation in the forestry sector have been formulated, including mainstreaming climate change in the development plan. Furthermore, some activities have been performed to manage forest resources

as well as mitigate climate change through the implementation of an afforestation/reforestation Clean Development Mechanism (A/R CDM), and initiation of the Reducing Emission from Deforestation and Forest Degradation (REDD) project.

This study is conducted to analyze forest related policy on climate change mitigation in Indonesia, how forest related policy (policy on forestry or policy on other sectors that affect the forestry sector) contributes to global warming through deforestation, as well as the possibility of involving such policies in climate change mitigation.

1.2. **Problem Statement / Research Question**

In order to determine the present condition of deforestation and climate change mitigation in Indonesia, this research tries to answer two questions, as follows:

1. How does forest related policy in Indonesia affect global warming through deforestation?
2. How can climate change mitigation policy through reforestation projects be implemented in Bromo Tengger Semeru National Park?

1.3. **Research Purpose(s)**

This research deals primarily with deforestation and climate change mitigation policy, especially reforestation, in Bromo Tengger Semeru National Park (BTSNP). The research aims at finding, identifying, analyzing, and interpreting two major policies, namely:

1) The policy affecting the occurrence of deforestation in Indonesia generally and especially Bromo Tengger Semeru National Park.

2) The implementation of reforestation in BTSNP and its contribution to climate change mitigation in Indonesia.

1.4. **Research Benefit**

This research hopefully can provide useful results that could give information and recommendations for public administrators and policy makers in every layer of the government to effectively implement climate change policy in the forestry sector. Hopefully, these policies till help to reduce GHG emission by avoiding deforestation, and enhancing the implementation of reforestation as an effort for climate change mitigation and sustainable development. In addition, this research may provide useful contributions to the development of public policy concerning the role of forest in climate change mitigation activities, especially those related to deforestation and reforestation.

1.5. **Literature Review**

Forests have a prominent role in climate change. The ability of plants and soil in forests to absorb carbon dioxide in the atmosphere makes forests an important terrestrial carbon sink. Conversely, deforestation and forest degradation generates carbon dioxide and contributes to global warming. Forests also suffer from climate change effects such as drought and extreme weather change. The world's total forest area in 2010 is estimated to be just over 4 billion hectares, corresponding to 31% of the total land area. **Forests contain more carbon than the entire atmosphere**. The world's forests store more than 650 billion tons of carbon, 44% in biomass, 11% in dead wood and litter, and 45% in the soil (FAO, 2010).

However, forests have contributed significantly to the increase in concentration of carbon dioxide in the atmosphere. The Fourth Assessment

Report of the IPCC shows that around 17% of global GHG emissions come from deforestation—the third largest source of anthropogenic GHG emissions, after energy supply and industrial activity (Figure 1). Even though the rate of deforestation in the last decade has decreased compared to in the 1990s,[3] in the absence of any mitigation efforts, emissions from the forestry sector alone are estimated to increase the atmospheric carbon stock by around 30 ppm by 2100 (Eliasch, 2008).

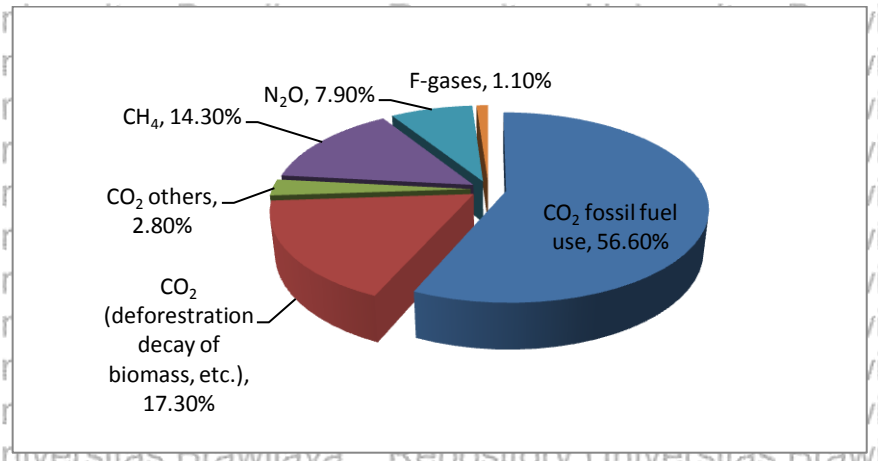


Figure 1. Composition of global emissions in 2004

Source: IPCC, 2007

The causes of deforestation have been debated from time to time. There has been the shifting "center of gravity" explanation on deforestation causes in some studies in the 90s (Sunderlin and Resosudarmo, 1996). The causes of deforestation are also viewed differently by various agencies.

Some studies from the 2000s show the evolution of deforestation causes over time. Global Forest Watch and Forest Watch Indonesia (GFW&GWI, 2002) classified deforestation causes into either underlying causes or immediate

[3] Around 13 million ha of forest were converted to other uses—largely agricultural—or lost through natural causes each year in the last decade. This is in comparison with a revised figure of 16 million ha per year in the 1990s (FAO, 2010).

causes, while Geist and Lambin (2002) categorized the general causes of deforestation into proximate causes and underlying causes. The underlying causes range from development policy to political context, while immediate causes include land use change decisions, weak law enforcement, excess timber processing capacity, conflict over forest resources and lands, local government revenue needs, and rural poverty.

It is estimated that 0.8 to 2.4 billion tons of carbon are released annually owing to land use change. The major portion of this is from tropical deforestation. This represents about 18.2% of current global carbon emissions (Baurnet et al., 2005), which is even greater than the percentage emitted by the global transportation sector with its intensive use of fossil fuels.

While the forest sector is a major source of CO_2 emissions, it also can provide very significant global emission reduction at a relatively low cost compared with abatement in other sectors (Stern, 2007; IPCC, 2007; Eliasch, 2008). Bottom-up regional studies show that forestry mitigation options have economic potential at costs up to 100 USD per tCO_2e to contribute 1.3–4.2 $GtCO_2e/yr$ (an average of 2.7 $GtCO_2e/yr$) by 2030. About 50% can be achieved at a cost under 20 USD per tCO_2e (around 1.6 $GtCO_2e/yr$), although there are large differences between regions. Global top-down models predict far higher mitigation potentials of 13.8 $GtCO_2e/yr$ by 2030 at carbon prices less than or equal to 100 USD per tCO_2e (IPCC, 2007). Eliasch's review estimates that the finance required to halve emissions from the forest sector by 2030 could be between 17–33 billion USD per year if forests are included in global carbon trading.

Forest mitigation options include reducing emissions from deforestation and forest degradation, enhancing the sequestration rate in existing and new forests, providing wood fuels as a substitute for fossil fuels, and providing wood products for more energy-intensive materials. However, forestry mitigation activities implemented under the Kyoto Protocol in the first commitment period (2008–2012) are limited to afforestation and reforestation under the Clean Development Mechanism, which has been using deforestation as a measurement of verifiable changes in carbon stocks since 1990.

The Marrakech Accords defined afforestation as the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding, and/or the human-induced promotion of natural seed sources. However, reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding, and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land.

Implementation of policy, including climate change mitigation policy, can be evaluated by measuring programs outcomes against policy goals. Thus, the general process of implementation can only begin when general goals and objectives have been specified, when action programs have been designed, and when funds have been allocated for the pursuit of the goals. These are the basic conditions for the execution of any explicit public policy (Grindle, 1980).

Implementation activities, according to Grindle (1980), are influenced by the content of policy as well as the context in which the policy is implemented (see Figure 2). The policy implementation will be affected by those who have interest in the policy as well as those who oppose the policy. Potential benefits attained

by stakeholders can also affect the policy implementation. Policy implementation is also affected by the degree of difference of behavior change the program envisioned for its intended beneficiaries. Introduction of new technology requires considerable behavior adaptation and participation, while other programs may require little in the way of change of behavior patterns. Moreover, programs that are designed to achieve long-term objectives may be more difficult to implement than those whose advantages are immediately apparent to the beneficiaries. The content of various policies also dictates the site of implementation. Some policies may depend upon a limited number of key decision units, while others are executed by a large number of individual decision makers dispersed throughout an extensive geographical area, but usually belonging to a single bureaucratic organization. As the site of implementation becomes more dispersed, both geographically and organizationally, the task of executing a particular program becomes more difficult, given the increase in decisional units involved.

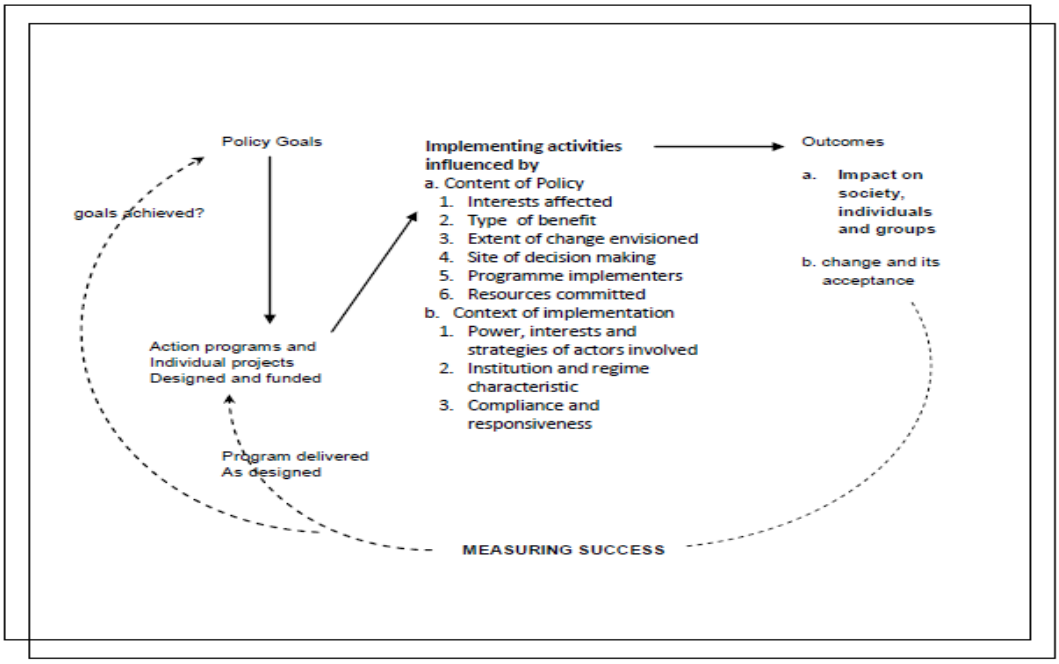


Figure 2. Schematic showing measurement of policy implementation

Decisions made during policy formulation may also indicate who is to be charged with executing various programs; such decisions can affect how the policy is pursued. There may be differences in the capacity of various bureaucratic agencies to manage programs successfully. Some will have more active experts and dedicated personnel than others, some will enjoy greater support of political elites and have a greater access to resources, and some will be more able to cope with the ranges of demands imposed upon them. In addition, the form in which policy goals themselves are stated may have a definite impact on implementation.

Policy or program content is often a critical factor because of the real or potential impact it may have on a given social, political, and economic setting. Therefore, it is necessary to consider the context or environment in which administrative action is pursued. Therefore, analysis of the implementation of specific programs may imply assessing the "power capabilities" of the actors, their interests and the strategies for achieving them, and the characteristics of the regime in which they interact.

Based on a literature review, Najam (1995) argued that implementation success or failure in a wide variety of policy issues is affected by the "5 C Protocol":

(1) The **C**ontent of the policy itself—what it sets out to do (i.e. goals), how it problematizes the issue (i.e. causal theory), and how it aims to solve the perceived problem (method).

(2) The nature of institutional **C**ontext—the corridor (often structured as operating procedures) through which policy must travel, and by whose boundaries it is limited in the process of implementation.

(3) The **C**ommitment of those entrusted with carrying out implementation at various levels to the goals, causal theory, and method of the policy.

(4) The administrative **C**apacity of implementers to carry out the changes desired of them.

(5) The support of **C**lients and Coalitions whose interests are enhanced or threatened by the policy, and the strategies they employ in strengthening or deflecting its implementation.

In addition to the 5 C Protocol proposed by Najam (see Figure 3), Brynard (2006) argued that communication could easily be regarded as a variable for implementation. In other words, this could be regarded as the sixth 'C' in the implementation protocol. It could be argued that communication is an integral part of each of the above-mentioned variables, but is also worthy to single out because of its importance.

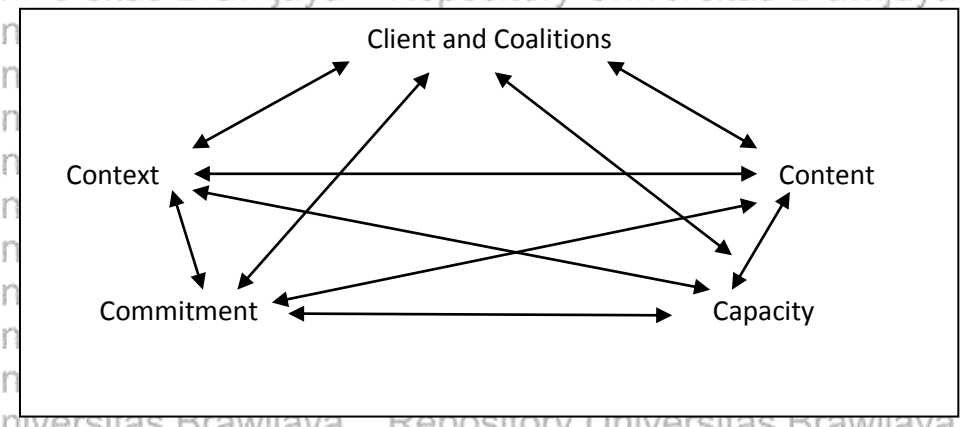


Figure 3. The 5 C Protocol proposed by Najam (1995)

1.6. **Research Method**

1.6.1. **Research Strategy and Design**

In order to answer the research questions and achieve the research purposes and benefits, I choose the qualitative research method as an

appropriate strategy to analyze climate change mitigation and forest related policy in Indonesia.

Qualitative research describes a set of non-statistical inquiry techniques and processes to gather data about social phenomena (McNabb, 2002). By using qualitative data we can preserve chronological flow, see precisely which events led to which consequences, and derive fruitful explanations. Qualitative data refer to a collection of words, symbols, pictures, or other non-numeric records, materials, or artifacts that are collected and have relevance to the study.

1.6.2. Research Location

The research is conducted in Bromo Tengger Semeru National Park (BTSNP), particularly in Tengger Highland, where most reforestation projects are located. Administratively, the research sites are located in Pasuruan Regency, East Java Province, Indonesia. The reason for choosing this location is that BTSNP has decided to implement an A/R CDM pilot project for a potential full scale A/R CDM in Indonesia.

1.6.3. Research Focus

Moleong (1998) argued that research focus plays an important role as a means to direct research, in order to ensure that relevant and useful data/evidences are collected. To analyze climate change mitigation and forest related policy in Indonesia, the focus of this research is:

1. Forest related policy and climate change in Indonesia
   (1) Deforestation in Indonesia and its impact on climate change; history and causes of deforestation in Indonesia, especially in the case study site (Bromo Tengger Semeru National Park)
   (2) Impact of deforestation in Indonesia to climate change
   (3) Forest related policy to address climate change in Indonesia

2. The implementation of reforestation projects in Bromo Tengger Semeru National Park

(1) The content of policy; the goals, methods, and implementation strategies which affected the success/failure of the policy implementation

(2) The institutional context

(3) The capacity of the implementers

(4) The commitment

(5) The support of clients and coalitions in the implementation of reforestation projects

1.6.4. Sources and Types of Evidence

The sources of data for this research are documents, archival records, interviews, direct observation, participant observation, and physical artifacts. Considering the accuracy of evidence and the validity of this research, I utilized multiple sources of primary and secondary evidence, as follows:

(1) Documents, which include letters, written reports of events, administrative documents, formal studies, as well as news clippings and other articles appearing in the mass media;

(2) Archival records, such as organizational charts and budgets over a period of time, an organization's service records, maps and charts of the geographical characteristics of the research site, and survey data previously collected about the research site;

(3) Interviews, in which I used open-ended interviews with relevant respondents who were chosen based on my experience and knowledge as a park officer to reveal their knowledge, opinions, and insights on the case being studied;

(4) Direct observation, by making a field visit to the case study site, since I know that the project has been done in the field, and that some relevant activities or environmental conditions are still available for observation; and,

(5) Participant observation, in which I utilized my two years of experience as a member of the BTSNP CDM Team for collecting study evidence.

1.6.5. Field Work

Field work was conducted between August 2010 and March 2011. The field research periods, locations, and methods for data collection are summarized in Table 1. For evidence collection, I firstly visited the Bromo Tengger Semeru National Park office in Malang City, East Java Province in August 2010. Here I interviewed the Head of the Technical Division, the Chief of Park Protection Section, the A/R CDM Team, and relevant technical officers who were chosen based on my experience as a park officer. I also collected relevant secondary data.

In August 2010, March 2011, and March 2012 I also visited the PT. Kutai Timber Indonesia (PT.KTI) A/R CDM Base Camp in Tosari Sub-District, Pasuruan Regency, to interview PT.KTI officers and members of the local community. During this period, I also collected relevant secondary data, conducted field observation, and took photographs as important sources of evidence for the study. In June 2012, the interviews with Japan International Forestry Promotion and Cooperation Center (JIFPRO) and Sumitomo officers in Tokyo as well as interviews through the internet with BTSNP officers were conducted.

Table 1. Time, location, and methods of field research

Time Period	Location	Method
August 2010	Malang City	Interview and secondary data collection

August 2010	Pasuruan Regency	Interview, secondary data collection, and field observation
March 2011	Malang City	Interview and secondary data collection
March 2011	Pasuruan Regency	Interview, secondary data collection, and field observation
March 2012	Malang City & Pasuruan Regency	Interview, secondary data collection, and field observation
June 2012	Tokyo, Japan	Interview and secondary data collection

1.6.6. Analysis of Evidence and Interpretation

The data analysis used in this research is interactive analysis, taken from Miles and Huberman (1994) (see Figure 4). Miles and Huberman (1994) describe the three activities in data analysis as an interactive model that includes data reduction, data display, and deriving a conclusion (drawing and verifying). The first step, data reduction, refers to the process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written-up field notes or transcription. This is followed by the presentation of data, which involves organizing the data that will be used to arrive at a conclusion. The final step is the conclusion (drawing and verifying), the closing process for the data analysis. This entails a description of the data, phenomena, and the researcher's conclusions.

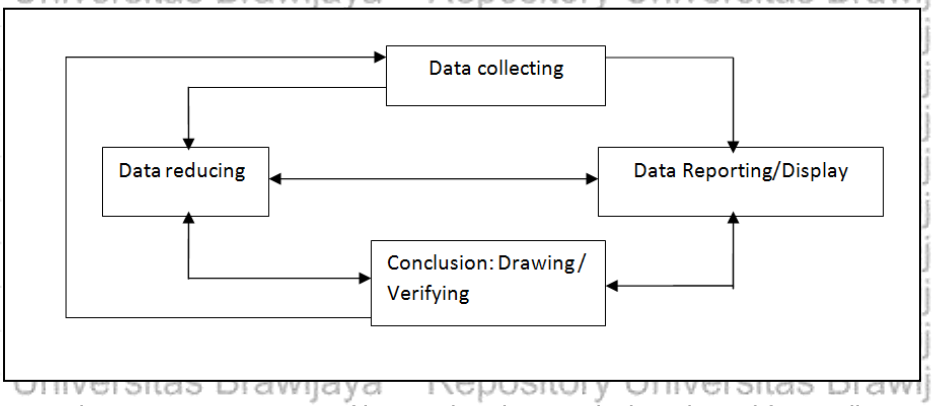


Figure 4. Components of interactive data analysis, adapted from Miles and Huberman (1994).

CHAPTER II

RESEARCH SITE DESCRIPTION

2.1. Bromo Tengger Semeru National Park

2.1.1. History and Status

The history of Bromo Tengger Semeru National Park (BTSNP) began in 1982, when the Ministry of Agriculture announced that 58 000 ha of Bromo Tengger Semeru was designated to become Bromo Tengger Semeru National Park at the World National Park Congress in Bali, concurrently with 12 other National Parks, through the Declaration Letter (*Surat Pernyataan*) Number 736/Mentan/X/1982 on October 14, 1982. Later, after the Ministry of Forestry was established as a separate entity from the Ministry of Agriculture in 1983, the status of BTSNP was affirmed by the Ministry of Forestry through the enactment of Ministry Decree Number No 278/ Kpts-VI/1997 on May 23, 1997; at this time the area was revised to 50 276.20 ha. Nevertheless, Bromo Tengger Semeru was officially assigned as a national park area through the Ministry of Forestry Decree Number 178/ Menhut-II/2005 on June 29, 2005.

2.1.2. Location, Area, and Physical Conditions

Geographically, BTSNP lies between 7°51′ and 8°11′S, and 112°47′ and 113°10′E with an elevation of 750–3676 m.a.s.l (see Figure 5). Most of the area is undulating and hilly, and is covered by grassland. This magnificent protected area extends from tropical forest to the crater of Tengger and the summit of Mount Semeru (3 676 m). It lies in the East Java Province within the administrative districts of Malang, Pasuruan, Probolinggo, and Lumajang.

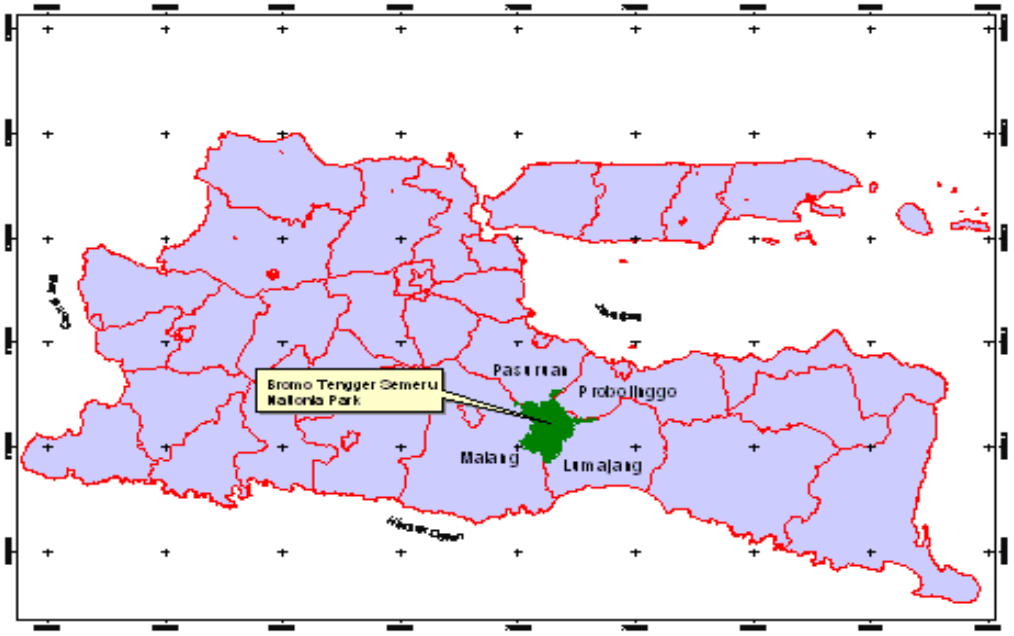


Figure 5. Location of Bromo Tengger Semeru National Park in East Java, Indonesia.

Based on the Decree of the Directorate General of Forest Protection and Nature Conservation (DGFPNC) No. 68/Kpts/DJ-VI/1998 from May 4, 1998, the area of BTSNP is divided into 5 zones, namely the core zone (22 006 ha), wilderness zone (23 485.20 ha), intensive utilization zone (425 ha), traditional utilization zone (2 360 ha), and rehabilitation zone (2 000 ha). According to Act No.5/1990 and Ministry of Forestry Regulation No.56/Menhut-II/2006 on zoning guidelines of national parks, zones in national parks are areas within the park that are distinguished by functional, ecological, social, economic, and cultural conditions.

The core zone is an area in the national park where any change by human activities is not allowed and should absolutely be protected. Because of its original natural, physical, and biological conditions, this zone serves as a representation of the region's biodiversity. The wilderness zone is an area that because of its location and function has the ability to support preservation of the

core zone and the utilization zone. The utilization zone is an area in the national park that can be utilized for ecotourism and other environmental services because of its location, condition, and potency. The traditional utilization zone (herein called the traditional zone) is an area in the national park where local communities who depend on the natural resources for their welfare are allowed to utilize the area traditionally. The rehabilitation zone is an area that has been degraded and, therefore, needs to be rehabilitated to restore its biodiversity and ecosystem. Figure 6 shows a zoning map of BTSNP.

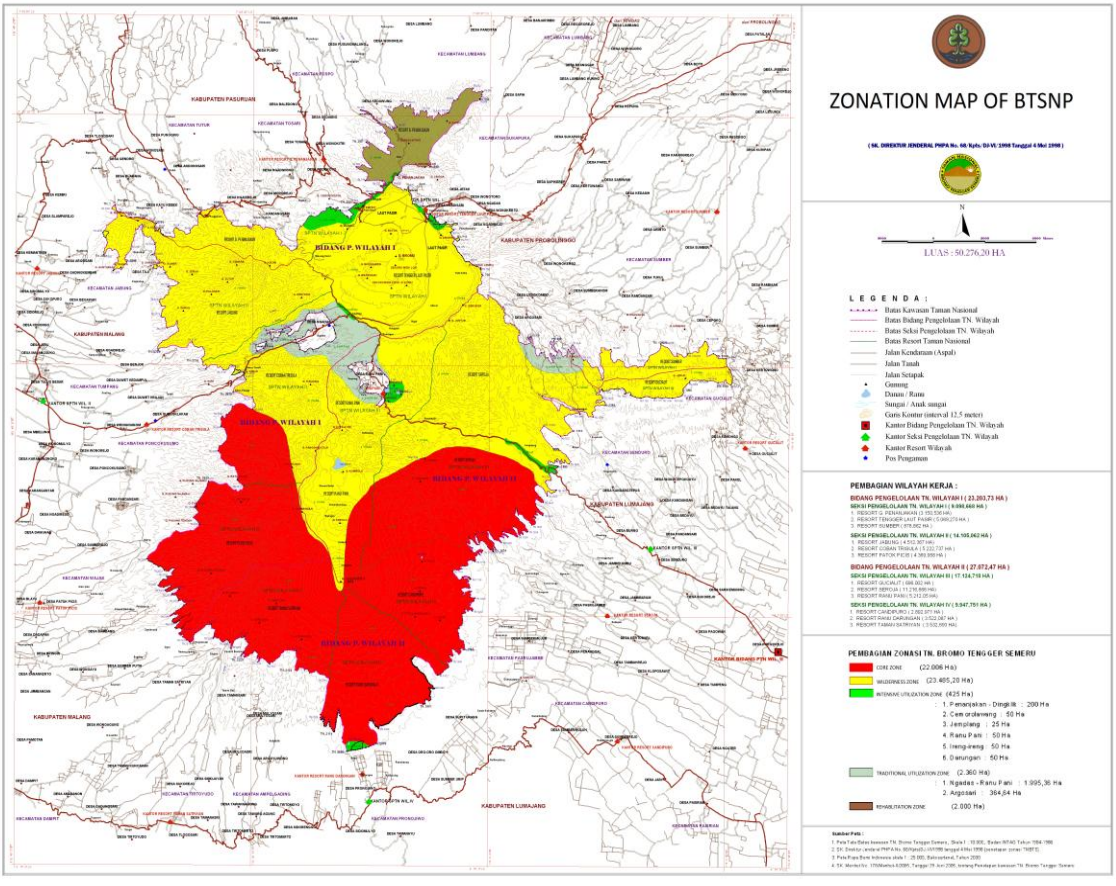


Figure 6. Zoning Map of BTSNP.

Climate of BTSNP varies, depending on elevation and topography, and is related to alignment of the mountains. The temperature of BTSNP ranges between 3 and 22°C. The lowest temperature occurs at the highest elevations during the dry season, ranging between 3 and 5°C. Some places often experience below freezing temperatures. The maximum daytime temperature ranges between 20 and 22°C.

Based on the classification of climate types by Schmidt and Ferguson (1951), the climate types of BTSNP consist of type A (per humid) in the Southeast Semeru area, type B (slightly seasonal) at the southern slope, peak, and eastern slope of Mount Semeru, and type C (seasonal) in the Mt. Argowulan area, Penanjakan, Keciri, Argosari Block, and from Ranu Kumbolo to Jambangan, while in Ngadas, Ranu Pane, and Watu Pecah to Poncokusumo have climate type D (seasonal), with an average rainfall of 166 mm/month. Figure 7 shows the mean monthly rainfall in BTSNP. Air humidity is high, with a maximum range of 90–97% and a minimum range of 42–45% at an atmospheric pressure of 1007–1015.7 mm Hg.

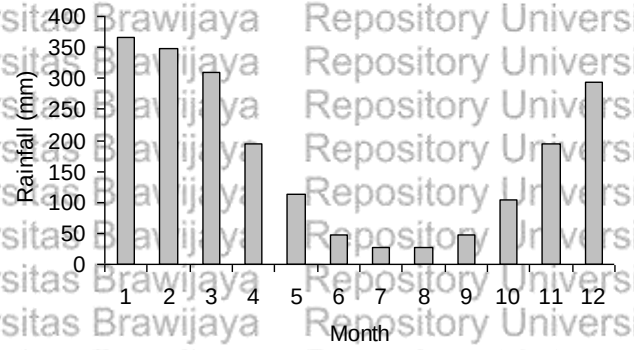


Figure 7. Mean regional rainfall in BTSNP.

The soil type is strongly affected by volcanic ash and tuff materials. The predominant soil types in the project site are regosol, andosol, and litosol (based on a map of Tanah Tinjau Propinsi Jawa Timur from 1966). Andosols are highly

porous, dark-colored soils developed from volcanic material such as volcanic ash, tuff, and pumice. They are found in Indonesia, but they typically occur in wooded highland areas of the continental lands bordering the Pacific Ocean. Their worldwide extent is estimated at less than 1 percent of the total terrestrial area on Earth. Soil colors are gray, brown, yellowish brown, and white, with soil texture commonly varying from sand to ashy clay with an independent structure or single fined, and an independent consistency of firm–tough.

According to a geological map of Java and Madura (scale 1:500 000) published by the Directorate of Indonesian Geology in 1963, the geological formation of BTSNP is volcanic intermediate to volcanic basic, which is formed by volcanic eruption. BTSNP is placed in the Quaternary volcanic zone. It is a volcanic chain running in the east-west direction along Java Island. Bromo Tengger Mountain can be distinguished from other volcanoes by its shape; it is a giant cone with its peak cut off, which can be seen clearly from the north when driving between Pasuruan and Probolinggo. Mount Bromo is an active volcano lying on a volcanic inner arc, caused by the collision of the Eurasian and Indo-Australian plates.

BTSNP, like most volcanic areas, has a radical water order, so during the dry season, surface water is barely available or even completely extinct. This is because all water that inundated the soil surface during the wet season disappears quickly by penetrating the lower layer of soil. The existing ground water is rainwater that penetrates through spreading mountain stones, moving into the stone layer, below which is a watertight clay-stone layer. During the rainy season, rivers within volcanic stone areas are full, but become dry upon the arrival of the dry season. Water channels from BTSNP to the downstream basin

are rivers and canals. There are more than 50 rivers and springs and four lakes within BTSNP. Most of them are utilized by communities around the park in their daily life for domestic as well as agricultural needs.

It is apparent that BTSNP has a very important role in water supply for the livelihoods of those living in the downstream basin throughout the year. The existence of springs in BTSNP can accommodate hygiene water requirements for communities in surrounding villages and can satisfy water requirements for production activities such as agriculture and electricity.

2.1.3. **Potency**

Bromo Tengger Semeru National Park has rich biological diversity, natural services, natural scenic beauty, and natural phenomena, which hold potential for many purposes such as science, education, supporting cultivation and breeding, as well as ecotourism.

The park is well known as an ecotourism destination for its beautiful 'crater in crater' scenery of Tengger Mountain, as well as the unique Tengger tribal culture. The highest mountain on Java Island, Mount Semeru, has also become a tourist attraction for many adventurers and nature lovers. Thousands of people come to the mountain to celebrate Indonesia's Independence Day each year in August (see Figure 8).


Figure 8. Ecotourism potency in BTSNP. Left: Beautiful scenery of Tengger Crater, Right: People celebrating Indonesia's Independence Day in Kumbolo Lake, Mount Semeru.

Based on the classification of vegetation types for Southeast Asian forests by Whitmore (1984), the vegetation zones of BTSNP consist of lower and upper montane forest. Cemara gunung (*Casuarina junghuhniana*) and Jamuju (*Dacrycarpus imbricatus*) are characteristic trees in the montane forests. Edelweis (*Anaphalis javanica*), orchids, and endemic grasses such as *Styphelia pungieus* are also found. BTSNP is habitat for at least 1026 species of vegetation (including 226 orchid species, 18 of which are endemic to East Java, and 7 endemic to BTSNP).

There are about 137 bird, 22 mammal, and 4 reptile species in BTSNP. There are some rare and endangered species such as luwak (*Pardofelis marmorata)*, ayam hutan merah (*Gallus gallus*), and several bird species such as peregrine/alap-alap (*Accipiter virgatus*), elang ular bido (*Spilornis cheela bido*), srigunting hitam (*Dicrurus macrocercus*), elang bondol (*Haliastur indus*), and belibis living around lake Ranu Pani, Ranu Regulo, and Ranu Kumbolo. Figure 9 shows some endangered species in BSTNP.

Figure 9. Endangered species in Bromo Semeru Tengger National Park: Ayam Hutan (left) and Leopard/*Panthera pardus* (right).

2.1.4. **Socio-economic Conditions**

There are about 78 villages from 18 sub-districts and 4 regencies neighboring BTSNP with a population of at least 188 138 people (BTSNP, 2010). The educational level of people around the site is quite low; many of them have graduated only from elementary school or did not complete elementary school. While working as farmers in their daily life, most of them utilize the trees and other forest products to fulfill their daily needs. Firewood, water resources, mushrooms, and medicinal plants are examples of forest products that are used by the community. Since the national park has developed eco-tourism in the area, some members of surrounding communities also participate in eco-tourism activities to enhance their welfare.

Some villages around Bromo and Semeru are inhabited by members of the Tengger tribe. The tribe still respects its customs, values, and culture. One of the popular ritual ceremonies that is held annually by the tribe and has become a tourist attraction is the Kasada ceremony, shown in Figure 10.

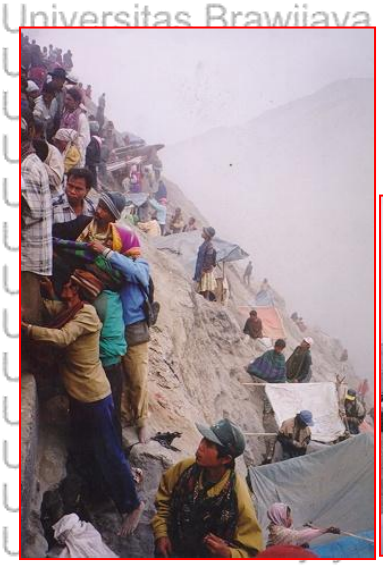


Figure 10. During the Kasada Ceremony, people pick up offerings that are thrown into Mount Bromo's crater by Tenggeresse for God (right); Kasada ceremony being held in Pura Poten in the "Sea of Sand" of the Tengger crater (left).

3.1.5. Administration and Policy Direction

Bromo Tengger Semeru National Park is managed by a national park office called Balai Besar Taman Nasional Bromo Tengger Semeru (BBTNBTS), an institution under the Directorate General of Forest Protection and Nature Conservation, Ministry of Forestry. The underpinning missions of national park management are the protection of life-support systems, preservation of biodiversity and ecosystems, and utilization of resources on a sustainable basis. In order to attain this mission, national parks are managed through zoning systems, which may consist of a core zone, utilization zone, and other zones depending on necessity.

There are some basic rules regarding national park management, including Act No. 5/ 1990 on conservation of biodiversity and its ecosystem, Act No 41/1999 on forestry, Government Regulation No. 45/2004 on forest protection, and Ministry of Forestry Regulation No. 68/1998 on nature reserves and nature conservation areas, in addition to other regulations.

According to the laws, a national park is a nature conservation area that has a native ecosystem, managed through the zoning system, and utilized for the purposes of research, science, education, support cultivation, tourism, and recreation. Zoning in the national park includes the core zone, wilderness zone, utilization zone, and other zones, based on the needs of the park. Based on Act No.5/1990, activities that can change the integrity of the core zone, such as reducing the area of the core zone and introducing new species of flora or fauna, are prohibited (Art. 33.1 and 33.2). Similarly, activities that are not well suited with the function of the zones are prohibited in those zones (Art. 33(3)). Whoever purposively violates Art 33 (1) shall be punished by a 10-year maximum prison sentence or a maximum fine of Rp. 200 000 000 (two hundred million rupiah), while an inadvertent violation shall be punished by a 1-year prison sentence or a fine of Rp. 100 000 000 (one hundred million rupiah). For purposive violation of Art 33 (3), the maximum punishment is 5 years in prison or a Rp. 100 000 000 fine, and 1 year in prison or a Rp. 50 000 000 fine for an inadvertent violation (Art 40).

According to the Ministry of Forestry Regulation Number P.03/Menhut-II/2007, issued on February 1, 2007, BBTNBTS is a National Park Office Type B lead by Echelon II official, with its headquarters located in Malang City, East Java Province. The park has 2 field management divisions called Bidang Pengelolaan Taman Nasional Wilayah (BPTN) I and II. Each BPTN has 2 field sections, namely Seksi Pengelolaan Taman Nasional Wilayah (SPTN); SPTN I & II are in BPTN I, and SPTN III & IV are in BPTN II. As a field administration unit of the Ministry of Forestry, the head of the park is directly responsible to the Director

General of Forest Protection and Nature Conservation, of the Ministry of Forestry in Jakarta. The organizational structure of BBSNP is shown in Figure 11.

In addition to the formal structure that was stated by the Ministry of Forestry Decree, in order to manage the park efficiently, the head of BBTNBTS also forms additional structure in the field under SPTN, the Resort Pengelolaan Taman Nasional (RPTN). There are 12 RPTN (2 RPTN for each SPTN) in BBTNBTS. The distribution and area of RPTN in BBTNBTS are shown in Table 2.

Table 2. The distribution and area of RPTN in BBTNBTS.

No.	Name of RPTN	Location	Area (ha)	Zoning
1	Resort Penanjakan	Ds. Wonokitri Kec. Kertosari, Kab. Pasuruan	4 642.64	Rehabilitation and Intensive utilization zone
2	Resort Sumber	Ds. Sumber Kec. Sumber, Kab. Probolinggo	570	Wilderness and Traditional utilization zone
3	Resort Tengger Laut Pasir	Ds.Ngadisari, Kec. Sukapura, Kabupaten Probolinggo	5 250	Wilderness and Intensive utilization zone
4	Resort Patokpicis	Ds.Patokpicis, Kec. Wajak, Kabupaten Malang	4 369.96	Core and Wilderness zone
5	Resort Coban Trisula	Ds.Wringinanom Kec. Poncokusumo, Kabupaten Malang	5 222.74	Wilderness, Traditional, and Intensive utilization zone
6	Resort Jabung	Ds.Jabung, Kec. Jabung, Kabupaten Malang	4 512.37	Wilderness zone
7	Resort Seroja	Ds.Pasrujembe Kec. Senduro, Kab. Lumajang	11 216.67	Core, Wilderness, and Traditional utilization zone
8	Resort Gucialit	Ds.Gucialit, Kec. Gucialit, Kab. Lumajang	696.02	Wilderness
9	Resort Rani Pani	Ds.Ranu Pani, Kec. Senduro Kab. Lumajang	5 212.05	Wilderness, Traditional, and Intensive utilization zone

10	Resort Ranu Darungan	Ds.Pronojiwo, Kec. Pronojiwo Kab. Lumajang	3 522.09	Core and Intensive utilization zone
11	Resort Candipuro	Ds.Candipuro, Kec. Candipuro, Kab. Lumajang	2 892.97	Core zone
12	Resort Taman Satriyan	Ds.Taman Satriyan, Kec. Taman Satriyan Kab. Lumajang	3 532.69	Core and Wilderness zone

Source: Statistic of BBTNBTS (2010)

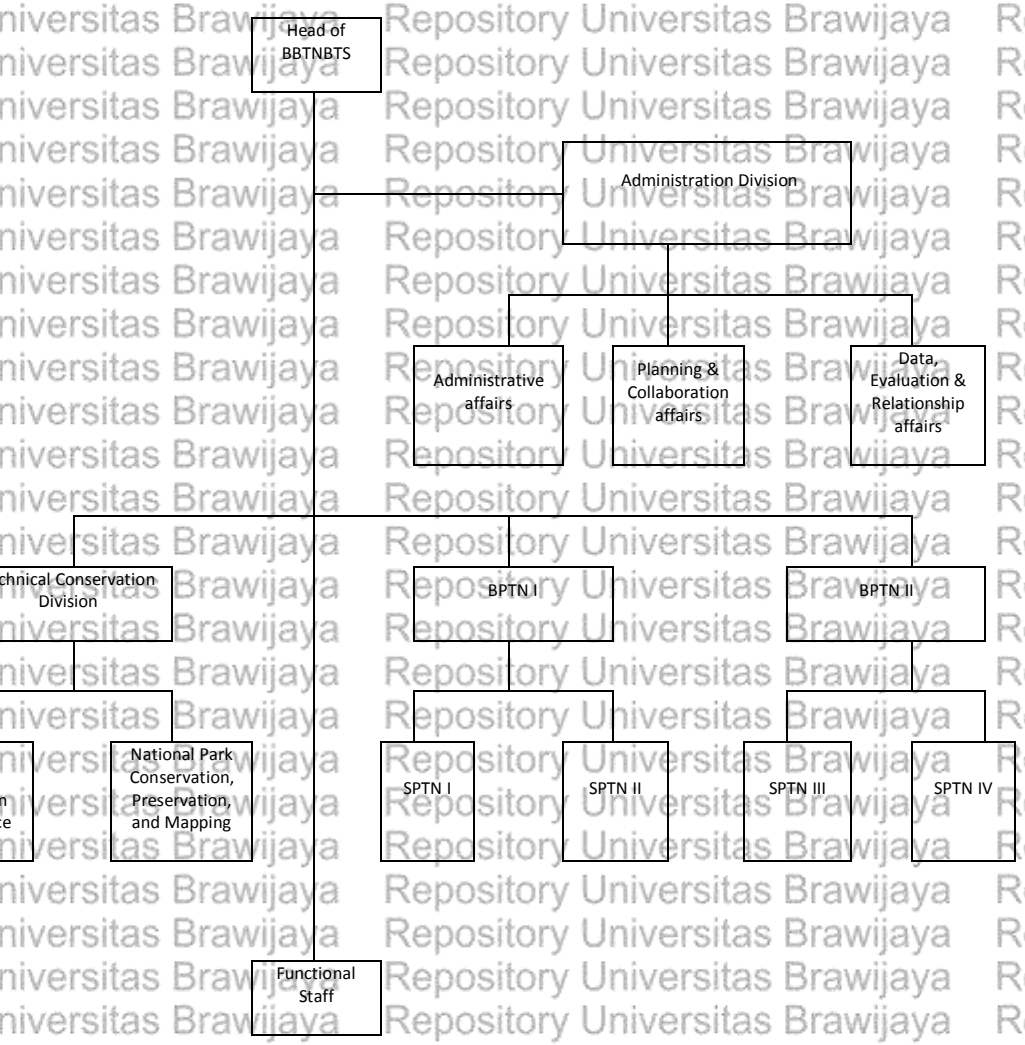


Figure 11. Structure of BBTNBTS.

2.1.6. **National Park Management Problems**

Bromo Tengger Semeru National Park, just like other conservation areas in Indonesia, faces some management problems threatening the integrity of the park as well as its function as a life support system. Forest degradation occurs in the park owing to illegal logging, forest fires, as well as encroachment. Natural and socio-economic conditions of communities around the park are some factors affecting forest and land degradation in the park.

Illegal logging in BTSNP is not as severe as it is outside Java. However, since the number of forests in Java is relatively small, it does threaten human beings and other living things as well as the ecosystem. Most illegal logging in BTSNP occurs because people around the park need firewood or charcoal for energy; only a small amount of wood is used for building materials. The amount of illegal logging activities in BTSNP between 2005 and 2009 is shown in Table 3.

Table 3. Illegal logging in BTSNP.

Year	wood		log		firewood		charcoal
	m^3	pcs	m^3	pcs	Staple Meter	m^3	Kg
2005	4.00	-	8.00	200.00	59.50	-	9
2006	6.06	-	8.00	156.00	115.00	-	1
2007	-	-	-	-	40.00	-	-
2008	12.20	33.00	-	33.00	50.59	1.39	-
2009	8.48	0.00	6.38	4.00	38.81	-	170
total	**30.74**	**33.00**	**16.02**	**393.00**	**303.19**	**1.39**	**180.00**

Source: BTSNP Statistical Book (2010).

Note: wood refers to processed timber, log refers to original timber, staplemeter is firewood unit equal to m_3

Besides illegal logging, forest fire is the main cause of forest degradation in the park. Although natural conditions such as drought and cold weather can trigger forest fires in BTSNP, the majority of fires are due to human negligence, such as the making of charcoal, fireplaces, and throwing out cigarette butts. The

use of fire for clearing land for agricultural uses around the park has also caused forest fires. The frequency and area burned during forest fires occurring in BTSNP from 2005–2009 are shown in Table 4.

Table 4. Forest fires in BTSNP.

Year	Area Burned (ha)	Location	Frequency (number of fires)
2005	334.77	Resort Tengger Laut Pasir, Resort Penanjakan, Resort Ngadas dan Resort G. Keciri	
2006	1 019.75	Resort Tengger Laut Pasir, Resort Ranu Pani, Resort Ngadas, Resort G. Keciri dan Resort Penanjakan	28
2007	705.50	Resort Tengger Laut Pasir, Resort Ranu Pani, Resort Ngadas, Resort Senduro, Resort Pasrujambe dan Resort Penanjakan	65
2008	250.90	Resort Tengger Laut Pasir, Resort Ranu Pani, Resort Sumber dan Resort Gn.Penanjakan.	22
2009	493.00	Resort Tengger Laut Pasir, Resort Ranupani, Resort Penanjakan dan Resort Coban Trisula.	15

Source: BTSNP Statistical Book (2010)

Encroachment refers to the clearing of forest area without permission from the authorities (explanation of article 50 (3b), Act No. 41/1999). In BTSNP, people have encroached into the park for agricultural purposes. The extent of encroachment in BTSNP is relatively low, estimated to be 118 ha from 2005–2009, however if this problem is not overcome it may spread to other areas in the park. Table 5 shows the amount of encroachment that has occurred in BTSNP from 2005–2009.

Table 5. Encroachment in BTSNP from 2005–2009

Year	Area (ha)	Location
2005	78.25	RPTN Penanjakan, Sumber, Gucialit, Ngadas
2006	1.35	RPTN Pananjakan, Darungan, Taman Satriyan, Ngadas
2007	-	-
2008	13.07	RPTN Patok Picis, Coban Trisula, Seroja, Jabung, Ranupani
2009	25.64	RPTN Seroja
Total	**118.31**	

Source: BTSNP Statistical Handbook 2010

2.2. Location of Reforestation Projects in BTSNP

Since most of the degraded area in BTSNP is located in SPTN I, especially RPTN Pananjakan, most of the reforestation projects are located in this area, Tengger Highland. Administratively, the area is located on the border of the Malang, Pasuruan, and Probolinggo Regencies. There are at least 5 villages around RPTN Pananjakan, which directly or indirectly interact with the national park area, including Mororejo and Andonosari villages (Pasuruan Regency), as well as Ngadas and Taji (Malang Regency). The villages (except Taji) are dominated by members of the Tengger tribe; one of the villages, Ngadas, is located inside the national park (enclave). Most of the people who live in the area are "wong Tengger" or Tengger People (Tenggerese).

By their own account, Tenggerese are neither a primitive tribe nor an ethnic group distinct from Javanese. According to their folk tradition, Tenggerese are descendants of non-Islamic Javanese who fled to the mountain after Majapahit (the latest Hindu-Buddhist kingdom in Java) fell into Islamic forces from neighboring principalities at the beginning of sixteenth century (Hefner, 1985). Although Tenggerese have ritual traditions now restricted to this region, the

cultural conditions of Tenggerese are similar to those in many areas in Java. Tengggerese are not an isolated ethnic group unaffected by development in Java. Despite some differences of speech, etiquette, and most importantly religion, social interaction between the Tenggerese and their neighbors display no "boundary maintenance mechanism" (Hefner, 1985). Figure 12 shows a Tenggerese village located near RPTN Pananjakan.

Figure 12. Mororejo, a Tenggerese village located near RPTN Pananjakan.

Like other Javanese, Tenggerese refer to the territory and population of a rural community as *desa*. Prior to the end of 19th century most Tenggerese desa consisted of a single nucleated settlement sharing certain resources and social obligations, agricultural lands, a group of *pamong* (village officials), a village priest, a spirit share, a cemetery, a spring or stream, a system of cooperative labor (kerja bhakti) for village maintenance, and an assortment of religious festivals financed by the community (Hefner, 1985). Nowadays, like other areas in Indonesia, the structure of Tenggerese villages follows the rule regulated by the central government. Most current administrative villages have incorporated two or three of the earlier nucleated villages. For example, Ngadas Village

consists of two earlier nucleated villages, Jarak Ijo and Ngadas. The administration organization of Tenggerese villages has become segmented and vertical, linking each village to a higher level of political administration, but providing no formal bonds between Tengger communities.

However, for many activities, the traditional nucleated villages that are now known as "dusun" remain the primary locus of social organization. Kin ties, task groups, and ritual exchange relations are most commonly organized within this border. The distinctive nature of Tengger village organization is the lack of formal groups, titles, status distinction, honorary names, and other social markers that might formally define the status of one person or groups against another. Tenggerese recognize the equality of people, or *pada pada*.

There is no corporate organization other than family and the village itself. No castes, status groups, or social clubs or societies. However, nowadays, the government has tried to intervene in this condition and introduce some formal organization to Tenggerese. In some Tenggerese villages where ecotourism activities occur, some organizations have been established, such as "paguyuban kuda" (horse rental service association), "paguyuban jeep" (jeep rental service association), and a tour guide association.

One of the features that distinguish Tenggerese from other Javanese is regional rituals. Rituals provide a motive and organization for social interaction among people from diverse Tengger communities. It is of central importance in the maintenance of a sense of shared identity among people from these communities (Hefner, 1985). In Tengger communities, the practice of rituals affect and are affected by the social and economic organization of the village.

There are some rituals that still performed by Tenggerese, no matter what their religion or where they live. Among many rituals, Kasodo is the most popular, involving almost all Tenggerese. In the Kasodo Ceremony, Tenggerese express their gratitude to God by throwing offerings to the Mount Bromo caldera.

Most Tenggerese earn their living from farming. For the farms, which are located in hilly land, drought and cold weather result in a limited number of crops that can be cultivated. Tenggerese farming produces some horticulture commodities such as lettuce, potatoes, and carrots. These commodities are produced almost in all Tenggerese villages. Hence, there exists trade with non-Tenggerese merchants outside of Tengger.

Although some transportation infrastructure has been built in almost all of Tengger Highland, there remains accessibility problems in Tengger. Many roads are in poor condition, and there is no public transportation from cities outside Tengger to Tenggerese villages. Consequently, the value of commodities produced in Tengger is relatively low, while goods and services from outside Tengger are bought by Tenggerese at expensive prices, owing to the high transportation cost.

These conditions have resulted in the dependency of the Tenggerese to their surrounding environment to support their daily life. They collect firewood, make charcoal, hunt birds and other animals, collect mushrooms, and collect grass from surrounding forests for livestock feeding. In the past, Tenggerese collected forest resources only for domestic needs, but nowadays they also sell forest products to others. Consequently, many forest areas around Tenggerese communities have been degraded.

Collecting mushrooms from the jungle and producing charcoal are the main sources of income of some communities who live in the surrounding areas, particularly communities who have no land (landless). They usually make charcoal when there are no agricultural activities that can be done. When making charcoal, communities cut trees and then burn them in a hole. At Wonosengkoro and Cemara Gading villages, small trees planted for rehabilitation were also cut by communities. The process of making charcoal may take from 3–15 days. From one hole, 50–100 kg of charcoal can be produced with price of about IDR 2000 per kg (market price of 1 kg charcoal is about Rp. 5000). Thus one hole can generate a total income of not more than IDR 200 000. A single hole is normally made by three people. Thus in a day, the average income from making charcoal is less than IDR15 000 per person; working on the land for a full day, a farmer could earn about IDR 20 000–25 000. However, making charcoal is still attractive for some communities; there is a need for additional income since farm labor is not necessarily available at all times, and the demand for charcoal is still there. In Tengger Highland, one household on average requires about 1–2 kg of charcoal per day for heating. Figure 13 shows firewood and charcoal that has been collected by communities in BTSNP.

Figure 13. Pictures of firewood (left) and charcoal (right) collected by communities surrounding the reforestation project site

Reforestation projects in BTSNP, especially RPTN Pananjakan, are located in areas that are mostly savannah and hilly land. The National Movement of Forest and Land Rehabilitation or *Gerakan Nasional Rehabilitasi Hutan dan Lahan* (GERHAN) is mainly located in Argowulan, Kandangan Block, the Ecosystem Revitalization Project (ERP) is located in Argowulan, and the A/R CDM Pilot Project is located in Mungal, Wonokoyo, and Kandangan Blocks. Figure 14 shows the location of these reforestation projects.

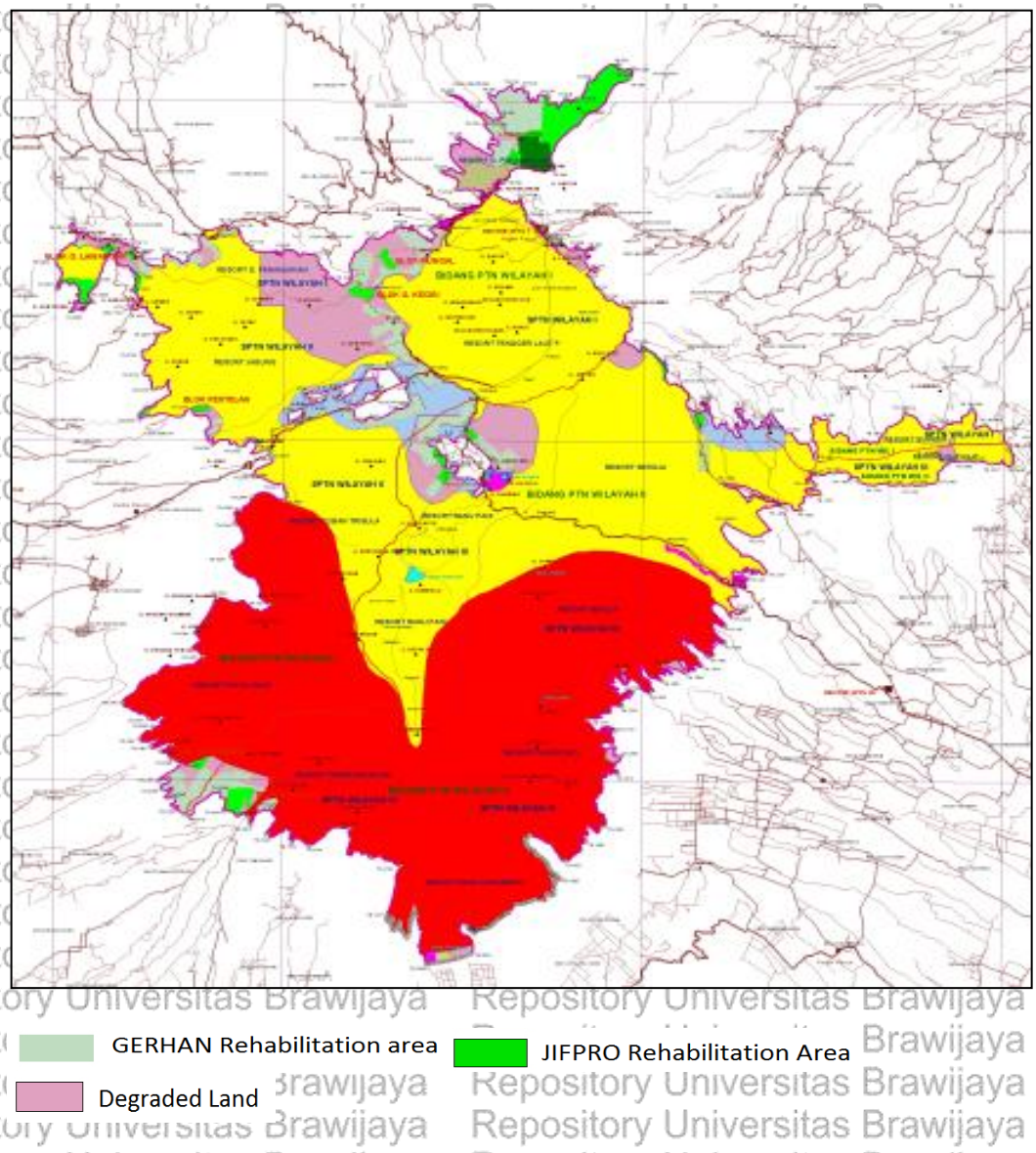


Figure 14. Map of reforestation areas in BTSNP

CHAPTER III

FOREST RELATED POLICY AND THE LOSS OF THE TERRESTRIAL CARBON SINK IN INDONESIA

3.1. Deforestation in Indonesia: History and Causes

Indonesia is home to some of the most magnificent tropical forests in the world (GFW/FWI, 2002). Unfortunately, the country has lost most of this forest. Estimation of the extent of deforestation in Indonesia varies widely from one study to another.[4] However, most studies on deforestation place Indonesia as one of the countries with highest rate of deforestation in the world. A Food and Agriculture Organization of the United Nations (FAO) study found that annual deforestation in Indonesia from 1990–2000 reached 1.9 million ha, ranked second only after Brazil. The rate decreased to 0.495 million ha between 2000 and 2010, which ranks Indonesia in third place after Brazil and Australia. Statistical data from Indonesia's Ministry of Forestry (MoF) show that deforestation in Indonesia increased from 1.6–1.8 million ha/year in 1985–1997 to 2.83 million ha/year in 1998–2000 (MoF, 2004), then decreased in 2000–2005 to 1.089 million ha/year (MoF, 2006) and further decreased to 0.832 million ha/year in 2006–2009 (MoF, 2010). The amount of deforestation in Indonesia estimated by the FAO and the MoF from 1985–2009 is shown in Figure 15.

[4] One of the causes of this difference is unclear or diverging use of the term "deforestation" (Dick, 1991; Soemarwoto, 1992; Suharjo, 1994; Angelsen, 1995). Much of the debate on deforestation has been plagued by varying and often imprecise use of terms ranging from complete loss of forest cover to loss of primary forest alone, as many scholars have noted, whichever definition is used makes a difference to the results of the deforestation rate. Generally, changes in natural forest cover are particularly important for biodiversity, while changes in total forest cover are more important for regulation of hydrological flows (Pagiola, 2000). Indonesia's Ministry of Forestry defines deforestation as "land cover changes from forested land to non-forested land, including for estate crops, settlement, industrial area, etc."

Forests store much of the terrestrial carbon stock in their biomass, dead wood, litter, and soils. Considering all carbon in biomass, dead wood, litter, and soils, the estimated total carbon stock in forests in 2010 is 652 billion tons, corresponding to 161.8 tons per hectare (FAO, 2010). However, deforestation has resulted in a decrease of the carbon stock of forest areas. According to the FAO (2010), the total carbon stock in the biomass of the world's forests decreased by about 10 Gt from 1990–2010, or -0.5 Gt per year on average, mainly because of a reduction in the world's forest area. In Indonesia, the loss of carbon stock in forests from 2005–2010 is estimated to be -1.7 tons/ha/year.

Deforestation in Indonesia has been a long-term process, involving many stakeholders and caused by many factors. Although concern regarding the change of forest cover gained international attention in the 1970s, the process of deforestation in Indonesia had started from the colonial era, when the Dutch Colonial Government converted forests into estate cropland. However, it was after the commercialization of forests in the 1970s that debate over deforestation in Indonesia flourished.

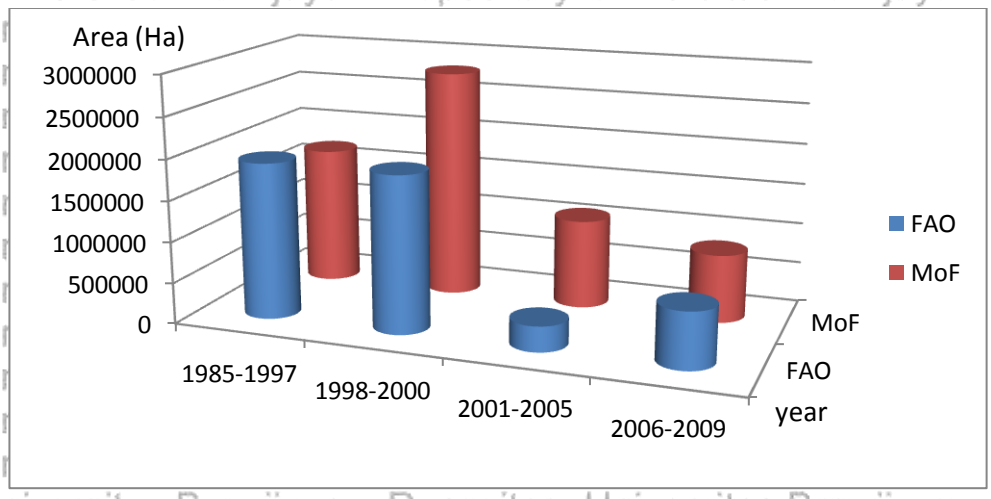


Figure 15. Deforestation in Indonesia from 1985 to 2009.

Discussing deforestation in Indonesia requires consideration of the history of government policy on forest management and utilization. It is noted that since the era of the Dutch Colonial Government, the forest became one of the most important resources of government revenue. Timber (the main product of the forests) as well as forest land have sustained the economy of the country since the colonial era.

Dutch Colonial Era

The history of forest exploitation in Indonesia starts in the 18th century, when the Dutch colonial government exploited old teak *(Tectona grandis)* forest in Java and Madura to supply raw materials for the wooden ship industry. Companies were owned by Chinese and Dutch entrepreneurs, and spread along the North Java coast, from Tegal, Jepara, Juwana, Apex, Tuban, Gresik, to Pasuruan (Peluso, 1990, 1992; Simon, 1993, 1999).

Until the end of the 18th century, the conditions of the Java teak forests were seriously degraded, and started to threaten the sustainability of teak wood supply for the wooden ship industry. In order to secure teak wood supply, when the Dutch colonial government raised Herman Willem Daendels as the Governor-General of the Indies Netherlands on January 14, 1808, the tasks assigned to Daendels included the rehabilitation of the forest through reforestation activities in degraded forest areas, and limitation of the teak logging in Java and Madura.

However, Daendels's attempts to carry out reforestation and limit the logging of teak in Java and Madura did not achieve optimal results, mainly because of a limited number of forest officers as well as lack of science and technology in the Forestry Bureau. Additionally, a forced cultivation system called

"tanam paksa" *(Cultuurstelsel)* introduced by Van den Bosch between 1830 and 1870 resulted in a drastic change of forests in Java, since many forest areas were opened and converted into coffee plantations to improve export commodities. Meanwhile, the need for teak wood to supply the wooden ship industry, building warehouses for the drying of tobacco, sugar mills, and building barracks for housing the workers and employees of plantations increased during the period of *cultuursteelsel (*Schuitemaker, 1950, as quoted by Simon, 1993).

In the outer islands,[5] the Dutch colonial government managed and arranged forest area regarding the appointment of permanent forests, forest protection, and collection fees for timber and non-timber forest products. Some regulations were announced including: (1) *Agrarische Reglement* imposed in West Sumatra, Manado, Riau and neighboring islands, Bangka and Belitung, Palembang, and Jambi and Bengkulu; (2) Forest Protection Ordinance enacted in Belitung, Palembang, Singkep, Lampung, and Riau; and (3) Farming Regulation and Logging Reglemen imposed on Kalimantan.

There is no clear information about the deforestation rate in the Dutch colonial era. However, it was estimated that in 1900, Indonesia was still a densely forested country. According to modeled estimates by the World Bank, forest cover in the three major islands of Sumatra, Kalimantan, and Sulawesi at that time was 103 million ha (Holmes, 2000). This represents a reduction of only about 13 percent from their original forest cover, as estimated by MacKinnon (1997). It has been argued that the major cause of forest clearance that occurred up to 1950 was agriculture, notably rice cultivation and state crop plantation. Dutch colonial records from 1939 estimated that large scale plantations included

[5] 'Outer islands' refers to islands in Indonesia other than Java, Bali, and Madura Islands

approximately 2.5 million ha "in exploitation," of which only 1.2 million ha were actually planted. Prior to 1990, state-owned estate companies held the largest area of palm oil plantations in Indonesia. Most of the state-owned estates were originally established by the Dutch colonial government between 1870 and 1930. This was made possible by the 1870 Agrarian Law, which declared all land not under permanent cultivation to be "waste land." Dutch developers were then offered as much land as needed on a 75-year renewable lease at nominal rent (Gordon, 1982: cited in Casson, 2000).

Japanese Occupation

On March 8, 1942, the Dutch were defeated unconditionally by Japan's Dai Nippon Army Soldiers. The Dutch Colonial Government's scorched-earth war tactics employed before succumbing to the Dai Nippon caused damage to production facilities and infrastructure, including the destruction of forest areas. During the Japanese occupation (1942–1945), the Bureau of Forestry Netherlands *(van het Dient Boschwezen)* was replaced by *Ringyo Tyuoo Zimusyo* (Forestry Central Office). All Forestry officers were asked to continue their duties, and Dutch Regulations regarding Forest Management remained in force to manage forests in Java and Madura. Meanwhile, the business management of forests outside Java and Madura were handled by the central government, although some were also addressed by the autonomous government.

During the Japanese occupation, teak forest management in Java experienced a low period resulting from limited forestry employees, as well as *chaos* caused by the Independence War. The Japanese Colonial Government

exploited forests on a large scale, especially the teak forests of Java and Madura, to build a wooden boat industry under the authority of *Sangyobu* (Department of Industry) and the Department of Shipping. Many forest areas were also converted to plantations, protection caves, and warehouses for logistics and ammunition storage of Japanese war machines. In short, forests became one of the main resources to finance the war, and therefore forestry affairs were classified to be *Gunzyuseisanbu* affairs (the Department of War Needs).

Post Independence Era

After Indonesia proclaimed independence on August 17, 1945, with reference to Article 33 paragraph (3) Undang-Undang Dasar (UUD) 1945 – the constitution of the Republic of Indonesia – the government began to lay out the legal arrangements for forest management in accordance with the condition of Indonesia as an independent and sovereign country.

After the recognition of the sovereignty of the Republic of Indonesia by the Dutch government on December 27, 1949, then based on the Government Regulation no. 26/1952, the Bureau of Forestry was authorized to control and manage state lands designated as forest area. Meanwhile, the laws applicable to forest management were still the regulations produced by the Dutch colonial government. In 1950, what was then called the Indonesian Forest Service produced a vegetation map of the country; it concluded that nearly 84 percent of Indonesia's land area was covered in primary and secondary forest and plantations of estate crops such as tea, coffee, and rubber (Hannibal, 1950 cited in FWI/GFW, 2002).

In the early independence era the plantation system partly collapsed as Dutch plantation owners no longer had the backing of the colonial government, and labor migration was no longer undertaken with government help (Gordon, 1983: 181). Meanwhile, President Sukarno promoted an isolationist policy during the period of Guided Democracy, which was antagonistic towards the entry of foreign capital or foreign loans (Robinson, 1986: 73). However, the pattern of property ownership remained unaltered, and individual plantations continued to be established until all Dutch-owned plantations were nationalized and placed under the control of the New State Plantation Company (*Perusahaan Perkebunan Negara Baru*) in 1957 (Gordon, 1982; Sarin, 1996). As a result, forest conversion into plantations still occurred at the time.

In 1960 the government issued regulation No.19/1960 regarding State Company. In order to realize the status of the Bureau of Forestry as a State Enterprise, the government announced Regulations No.17 to No. 30 of 1961 on the Establishment of the State Forestry Companies (PERHUTANI). The forest area managed by PERHUTANI included East Java, West Java, Central Java, South Sumatera, Riau, North Sumatra, Aceh, West Kalimantan, East Kalimantan, South Kalimantan, Central Kalimantan, South Sulawesi / Southeast, and Maluku. After the Dwikora Cabinet[6] formed by President Sukarno in 1964, the government set up the Department of Forestry as an institution that was given authority to manage forests across Indonesia. Meanwhile, in order to promote economic development and spread the population, the government also started to convert

[6] The Dwikora Cabinet (*Kabinet Dwikora*) was the 21st Indonesian cabinet, resulting from reshuffling of the previous cabinet by President Soekarno on August 27, 1964 to produce a cabinet better able to implement the government policy he had announced in his Independence Day speech entitled "The Year of Living Dangerously." The cabinet was appointed on September 2nd and served for a year and five months before being reshuffled on February 21, 1966.

some forest areas for into land for other purposes, including the establishment of estate crops, transmigration, and mining.

Unfortunately, fourteen months after the establishment of the Department of Forestry, political chaos resulted in the establishment of a new government named the New Order (Orde Baru/ORBA) led by General Soeharto. The Ampera Cabinet formed by Soeharto dissolved, and the Department of Forestry was placed under the Directorate General of Forestry in the structure of the Department of Agriculture. In 1967, for the first time, the government established forestry law to replace Dutch Colonial law, namely Law. No 5/ 1967, on Basic Forestry Law. Afterward, the government launched Government Regulation No. 21/1970 and Government Regulation No 18/1975 on Forest Exploitation Rights and Forest Harvesting Rights (HPH and HPHH). Soon after these regulations were issued, exploitation of forest resources on a large scale occurred particularly in Sumatra, Kalimantan (Borneo), Sulawesi, Maluku, and Irian Jaya (Papua), through the provision of HPHH concessions to foreign and domestic owned capital. The issuance of some regulations on tax and fees for forest products also stimulated the extent of forest exploitation in Indonesia. Relevant regulations included the Ministry of Agriculture Decree No. 451/Kpts/Um-7/1979 on timber royalty, the Ministry of Finance Decree No. D 10A/KMK/06/1978 in February 1978 and No. 157/KMK/06/1978 in April 1978 on timber export tax, the Ministry of Finance decree No. 368/KMK/U11/1979, the Ministry of Agriculture Decree No. 475/Kpts/EKKU/1979 on grading and scaling fees, and the Joint Decree of the Ministry of Agriculture, Ministry of Industry, and Ministry of Trade on the export of logging products.

In 1968, 18 logging concessions were issued with total forest area of 2 million ha; the number of concessions rose to 101 in 1972 with 31 million ha of forest area, and dramatically increased in 1988 to 538 concessions on 55 million ha. In the 1990s, there were 657 concessions with a total forest area of 69 million ha (Nurjaya, 1993 in Hidayat, 2004). In 2000, 652 concessions still existed, covering an area of 69 million ha; 293 of them were apparently still operating under valid licenses (nearly 34 million ha), 288 had expired licenses but had not returned the land to government control (nearly 30 million ha), and 71 (about 5.5 million ha) had been formally returned to government control (MoF, 2000).

Although logging concessions were intended to maintain forest lands with sustainable production, the concession system had, in fact, been a major cause of deforestation and forest degradation in Indonesia, especially on the outer Islands. This is because most logging companies did not comply with "the rules of the game." They harvested much more timber than the allowed volume, and expanded their logging area outside their own concessions. A report by the Ministry of Forestry in July 2000 indicated that in a survey of nearly 47 million ha of forest land under active or expired concessions, about 30 percent was degraded, reduced to scrub, or converted to agriculture, and only 40 percent was still classified as primary forest in good condition.

Meanwhile, the palm oil industry also experienced growth in the 1960s. The Government of Indonesia (GOI) with World Bank assistance boosted the palm oil industry by making direct investments via state-run companies called *Perseroan Terbatas Perkebunan* (PTPs) (Larson, 1996 cited in Casson, 2000). During this period, the area planted with palm oil on government estates grew from 84 640 hectares in 1969 to 176 408 hectares in 1979. After 1979,

smallholder estates expanded, while the large-scale private plantation sector grew most rapidly after 1986, again with government encouragement. Companies were given a range of incentives, including access to credit at concessionary rates for estate development, planting, and processing. Most of these plantations were found in Sumatra, primarily North Sumatra. However, the government had begun to expand state-owned plantations into Kalimantan and Irian Jaya by the late 1980s.

The development of estate crop plantations over the past 30 years has become one of the causes of deforestation. From 1982 to 1998 at least 2 779 882 ha of forest had been converted into palm oil plantations and 6 091 946 ha into rubber plantations (Casson, 2000). Moreover, Regulation No. 614/Kpts-II/ 1999 on Directives on the Development of Mixed Forest Plantings allows companies to establish timber plantations or estate crops in "nonproductive production forests"[7] gives additional pressure for changes in forest cover.

Transmigration is another major cause of deforestation in the outer islands. Reducing population density in Java (the densest concentration of Indonesia's population) has been performed since the early 20th century. During the period of 1950–1979, there were an average of 6570 transmigrant families who moved from Java to the outer islands each year. The number rose significantly in the period of 1980–1984 to 73 200 families each year. At least 1.7 million hectares of forest was opened up for agricultural land and transmigrant settlement between 1969 and 1993 (GOI, 1993). There are three patterns of transmigration sites.

[7] Nonproductive production forests are defined as production forest which are not productive anymore.

From the 1960s to 1980, transmigration focused on developing subsistence agriculture. The Food Crop Pattern allotted each transmigrant household 2 ha of farmland, of which half was cleared and ready for use and half was still forested and awaiting clearance. During the 1990s, until the formal end of the Transmigration Program in 1999, the emphasis shifted away from subsistence agriculture and toward providing wage labor on industrial timber estates and palm oil plantations. The People's Nucleus Plantation Pattern (PIR; Perkebunan Inti Rakyat) involved associations between private palm oil companies (the nucleus or *Inti*) and transmigrant families (the *Plasma*). Each household received 3 ha of land, of which 2 ha were to be developed for palm oil. The Industrial Timber Estate Pattern involved transmigrant families receiving land in exchange for their labor on privately owned timber plantations. In addition, families received land on which to establish their own crops. Almost 39 percent of timber estate areas that have actually been planted lie in transmigration sites (Potter and Lee, 1998), and nearly 1 million ha of palm oil plantations with a formal link to transmigration sites had been established by the end of 1995. By March 1999, 13 614 460.32 ha of forest had been converted to plantations and for transmigration (Casson, 2000). The actual impacts of transmigration projects on forests have probably been greater than these numbers imply, given the often poor site choices and the land clearing practices employed. Transmigrant families who were (and are still) unable to support themselves from their allotted site typically strayed into neighboring unallocated forest. In addition, their presence often increased the land pressure felt by indigenous inhabitants, leading to further forest clearance.

In the late 1990s, after massive forest fires triggered by El Niño resulted in smoke (haze) spreading to some ASEAN (Association of Southeast Asian

Nations) countries and led to a high rate of deforestation, the role of forest fires as one of main causes of deforestation in Indonesia received much attention. However, scientific evidence based on radiocarbon dating of charcoal deposits in East Kalimantan indicates that lowland forest areas have repeatedly burned since at least 17 500 years ago, during periods of extended drought that appeared to have characterized Quaternary glacial periods (Goldammer, 1990). Although fire has been a feature of Indonesia's forests for thousands of years, timber harvesting, plantations, and shifting cultivation have transformed vast areas of Indonesia's forest from a fire-resistant to a fire prone ecosystem. Logging practices have generally been poor, leaving a vast accumulation of logging waste in the forest. Pioneer and secondary species grow rapidly in logged areas, forming a dense and fire-prone ground vegetation layer in place of the sparse ground cover characteristic of primary rainforests. Moreover, the cheap land clearing system that uses fire to prepare land for agriculture or plantations have triggered forest and land fires at larger scales. This fundamental change, combined with the periodic occurrence of the El Niño climatic phenomenon, set the stage for the massive outbreaks of fire that have occurred over the past 20 years. The first great fire, resulting from the convergence of Suharto-era forest management and an El Niño event, engulfed 210 000 km^2 of the East Kalimantan province during 1982–1983. East Kalimantan was the first focus of Indonesia's timber boom and had been almost wholly divided into logging concessions during the 1970s. A severe El Niño-induced drought struck the area between June 1982 and May 1983, and fires started almost simultaneously across wide areas of the province at the end of 1982. Figure 16 shows the change in forest cover in Indonesia that occurred from 1950–2010.

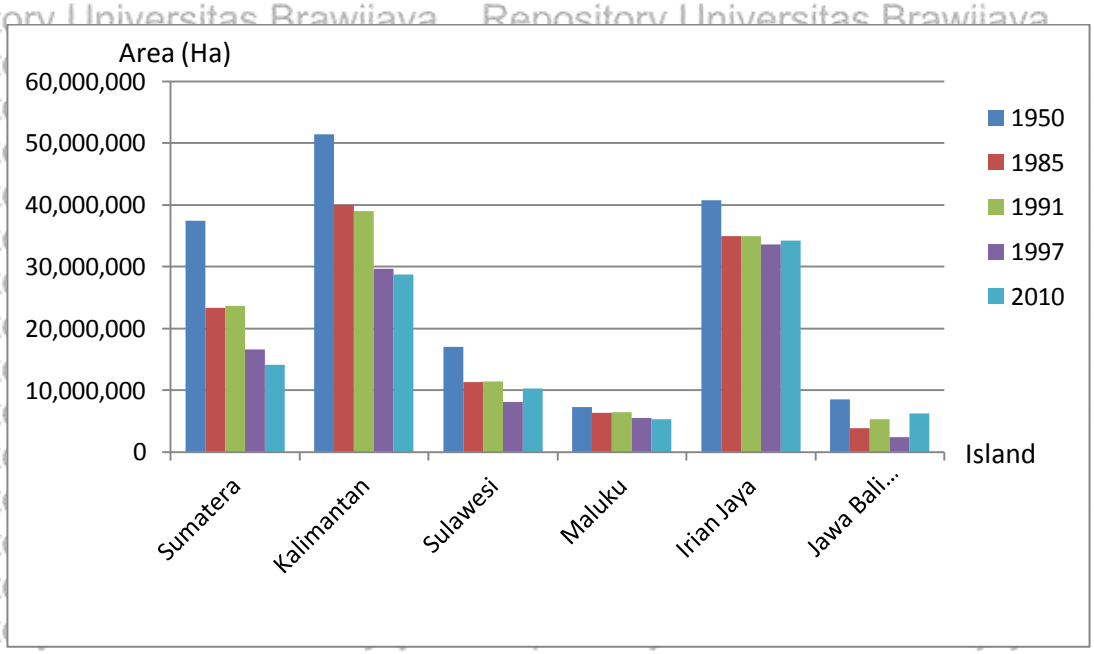


Figure 16. Forest cover change on Indonesia's main island from 1950 to 2010.

Sources: Forest cover form 85-97 Ministry of Forestry available online at http://www.dephut.go.id/Halaman/Peta%20Tematik/PL&Veg/VEG98/LOSTFORE.PDF (Note: 1997 data for Maluku, Java, Bali, and Nusa are not available, and were estimated from GFW/FWI 2000). Data for forest cover in 2010 are from the Statistical Book of the Ministry of Forestry, 2010).

Soeharto fell in 1998, after 32 years in command, and was followed by a so-called "era reformasi" (reformation era). In this new governmental era, the Forestry law Act No 44/1999 was established to replace Act No 5/1967. At the same time, Otonomi Daerah/Otda (Regional Autonomy), a new governing system that gives high emphasis on decentralization[8], was announced. Act No 22/1999 on Local Government and No. 25/1999 on Fiscal Balance between the central and local government gave the legal basis for the transfer of authority from the central government to the local government, including in the forestry sector.

[8] Act No. 22/1999 uses the term 'decentralization' to refer to "the delegation of governance authority" by the central government to 'Autonomous Regions' (*Daerah Otonom*). These are defined to include provinces (*propinsi*), districts (*kabupaten*), and municipalities (*kota*), which are deemed to be related to one another in a nonhierarchical fashion. The law vests these autonomous regions with authority "to govern and administer the interests of the local people according to their own initiatives, based on the people's aspirations, and in accordance with the prevailing laws and regulations".

Act No. 22/1999 assigns district and municipal governments authority to exercise principal governance functions in a wide range of fields, including public works, health, education and culture, agriculture, communication, industry and trade, capital investment, environment, land, and cooperative and manpower affairs. The regional autonomy law transfers authority to autonomous regions in "all fields of governance, except authority in the fields of international policies, defense and security, the judiciary, monetary and fiscal matters, [and] religion" (Art. 7). It also specifies that the central government should retain authority in a number of "other fields", defined to include "policies on national planning and national development processes at the macro-level; fiscal balancing; systems of state administration and state economic institutions; human resource development; and utilization of natural resources; as well as strategic technology, conservation, and national standardization" (Art. 7).

Article 11 states that "the authority of Districts and Municipalities will encompass all governing authority other than the authority exempted in Article 7" – or in other words, all areas of authority beyond those explicitly reserved for the central government. Article 11 goes on to specify several particular areas where authority is directly transferred to autonomous regions at the district and municipality level:

> *Fields of governance that must be performed by district and municipality shall include public works, health, education and culture, agriculture, communication, industry and trade, capital investment, environment, land, co-operative and manpower affairs (Art. 11).*

Law 25/1999 on Fiscal Balancing provides a framework for the redistribution of revenues among Indonesia's national and regional governments. In particular,

the law gives district and provincial governments considerably greater authority and responsibility to manage their own budgets, and to raise their own revenues to help offset the added costs associated with decentralization. Notably, it also authorizes a redistribution of royalties from timber production and most other types of natural resource extraction among the country's national, provincial, and district governments. In the forestry sector, the fiscal balancing law stipulates that provincial and district governments would now receive a combined 80% of the Forest Resource Rent Provision (*Provisi Sumber Daya Hutan,* PSDH) (an increase from a combined 45% prior to regional autonomy), and that district governments would receive 40% of the highly lucrative Reforestation Fund (*Dana Reboisasi,* DR) (which the central government had retained entirely prior to regional autonomy). Indonesia's regional autonomy and decentralization initiatives generated an extremely enthusiastic response among stakeholders at the provincial and district levels. Although the two laws were scheduled to take effect on January 1, 2001, many provincial and district governments began issuing their own regulations and asserting their administrative authority in key areas almost immediately after the regional autonomy law was issued.

In most forested regions of Indonesia, district officials initially used their expanded authority to issue large numbers of small-scale timber extraction and forest conversion permits, and to impose new types of fees and royalties on log harvesting (Barr et al. 2001; McCarthy 2001a, 2001b). District governments also took steps to carry out their own land-use spatial plans, and to formulate district development strategies, which in many cases, were based heavily on the exploitation and conversion of forests (Potter and Badcock 2002; Casson 2001a, 2001b). At the same time, forest-dependent communities took advantage of the

political space created by Indonesia's regional autonomy law to (re)assert claims over land and forest resources from which they had been displaced or excluded during the New Order period. Collectively, these actions reflected a widespread feeling that after 32 years of centralized control in the forestry sector, the time had now come for district and local actors to get their rightful share of the benefits associated with forest resources.

3.2. Deforestation in BTSNP

Forest degradation occurs not only in production forest, but also in conservation areas, including national parks. From 2008–2011, deforestation in conservation areas was 4 402.46 ha/year (MoF, 2011). In Bromo Tengger Semeru National Park, deforestation occurs mainly in the northern part of the park where Tengger Mountain is located (also known as Tengger Highland). Deforestation in the area began in the 19th century when the Dutch Colonial Government set out to transform Java's economy, and changed Tengger Highland forest to a coffee plantation. In the 1830s, the Dutch also encouraged migration and moved settlers to Tengger Highland to support the development of plantations. As a result, during 1830–1850 all territories between 600–1200 meters above sea level were stripped of jungle and transformed into one vast coffee stand; only upper slope areas were left because of their coldness. In the end of 19th century, roads and commerce came to the area, bringing land-hungry migrants to the highland (Hefner, 1990), increasing pressure on the forest. A photo of a forest during the Dutch Colonial Era is shown in Figure 17.

Environmental problems resulting from forest logging forced the colonial government to establish regulation on forest management. The introduction of the *Bosch ordonantie voor java en Madoera* in 1865 then followed by the

Domeinverklaring in 1970 limited local access to forest land (Purnomo, 2011). In 1874 the government also introduced regulations that required new permission to open forest land issued by the sub-district officer, not by the village leader. The regulation also intended to control soil erosion by obligating farmers in upland areas to make terraces (Palte, 1984 in Hefner, 1990). Moreover, the Forestry Department was formed in 1879 to manage forests that were cut massively. Unfortunately, deforestation as well as erosion in the highland continued nonetheless.

Figure 17. Forest in Pananjakan in the Dutch Colonial era.
(Note: this picture is from a collection of a museum in Netherland)

The great depression, Japanese occupation, and the Independence War in the 1940s increased pressure on the forest. Initially, Japanese arrival brought hope for people in Tengger Highland by allowing people to take over European plantations. The Japanese also asked farmers to cut trees in the plantations owned by Europeans, and made them into charcoal. However, crop type limitation[9] caused food scarcity as well as natural degradation. People switched their trading commodity to charcoal, with poor farmers producing charcoal from illegally cut trees from state forests (Palte, 1984) to generate income; income

[9] Japanese limit the type of crops that can be cultivated by farmers.

from agriculture had drastically decreased. Moreover, in order to supply fuel for the coal and railway industry, the Japanese cut trees in state land as well as private land, and allowed the upper slope of the Tosari District to become degraded (Hefner, 1985). The Japanese regime devastated the economic situation in upland Bromo by controlling all economic activities (Purnomo, 2011). It also destroyed environmental conditions in the area by cutting down the forests.

The problem of the degradation of forests in Tengger Highland remained following Independence in 1945. In the early independence era the new government and citizens struggled with Dutch aggression and let the forest go unmanaged. Following the end of Dutch colonial rule in 1948, the pine forest had been managed by the Forest Agency (Jawatan Kehutanan). Under the supervision of the Forest Agency, the communities around the pine forest were free to utilize the trees, and produced firewood and charcoal for their living. There were no strict regulations in order to avoid excessive logging by local people (an old farmer in Tosari interviewed during the survey for making PDD). Even some Forest Agency officers gave the opportunity for local people to utilize the forest, as stated by Mr. Budi Santoso, senior officer of BBTNBTS, who was in charge of the area for many years:

> "In the middle of the 60's, when Indonesia's Communist Party (Partai Komunis Indonesia/PKI) had a strong influence in Indonesia, Forest Agency officers who had affiliation with the party made a promise to give forest land to Tenggerese. Although PKI lost its influence in 1966, people who had been promised land still encroached and cut the trees from the area for charcoal making." (Interview on June 8, 2012)

Consequently, the forest cover has gradually decreased, and some parts have been changed into grassland or bare land.

In 1981, the Ministry of Agriculture changed the status of some parts of Tengger Highland and Semeru from nature reserve to *taman wisata alam* (nature park), and also formed a new nature park[10]. Laut Pasir Tengger, Ranu Kumbolo, and Ranupani-Regulo nature reserves changed to nature parks, while a new nature park was established on May 21, 1981, through the Ministry of Agriculture Decree No. 508/Kpts/Um/6/1981, named the Ranu Darungan Nature Park.

The status of the area was changed again in 1982, when the Ministry of Agruculture declared 58 000 ha of Tengger Highland and Semeru mountain as Bromo Tengger Semeru National Park (BTSNP), declared concurrently with 12 other national parks through the Declaration Letter (surat pernyataan) No. 36/mentan/X/1982 on October 14, 1982 during the World National Park congress in Bali. Later, after the Ministry of Forestry was established as a separated entity from the Ministry of Agriculture in 1983, the status of BTSNP was affirmed (ditunjuk) by the Ministry of Forestry through the enactment of the Ministry of Forestry Decree no. 278/Kpts-VI/1997 on May 23, 1997, but its area was revised to 50 270.20 hectares. Nevertheless, it was in 2005 that BTSNP oficcially was assigned (ditetapkan) as national park area through the Ministry of Forestry Decree no. 178/menhut-II/2005 on June 29, 2005.

Even though the area has been stated as a national park conservation area since the 1980s, so-called "small scale deforestation"[11] still occurs in the area today. While deforestation in the past, especially during the colonial era, resulted mainly

[10] A nature reserve is a strictly protected area set aside to protect biodiversity and also geological/geomorphological features, where human visitation, use, and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring. Conversely, a nature park is an area which is mainly set aside for ecotourism.

[11] Purnamasari (2010) defined small scale deforestation as forest conversion by small-scale farmers at the district-level.

from land conversion from forest to plantation/agricultural land, recently (under national park management) deforestation occurs because of illegal logging, encroachment, and forest fires. From 1993 to 2010, at least 1200 hectares of national park area was degraded by fire, and another 863 039 ha was encroached (see Figure 18).

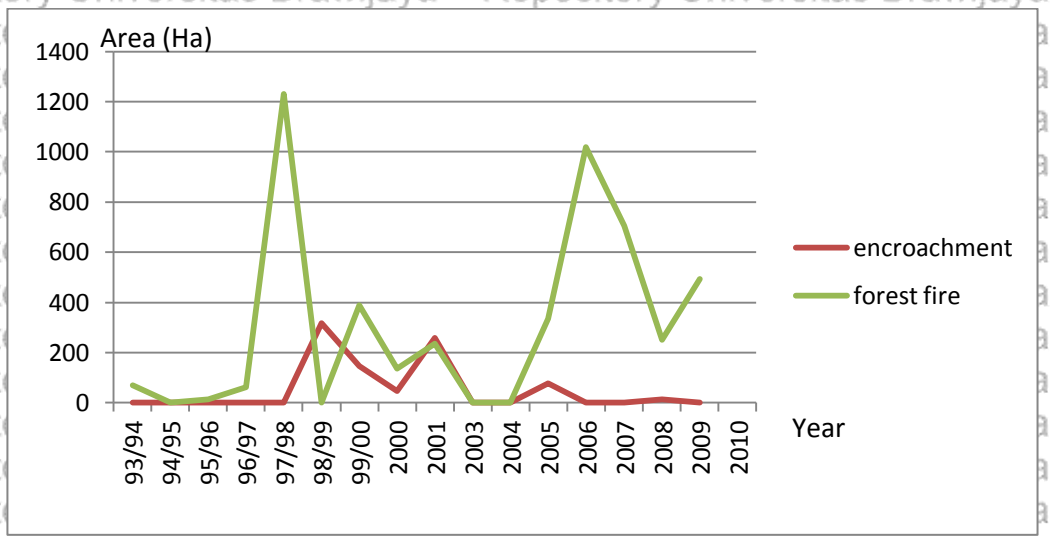


Figure 18. Deforestation caused by forest fires and encroachment in BTSNP from 1993–2010.

Illegal logging, although it does not occur to an extent that results in the loss of forest cover over a wide area, also gives pressure to the area, with an estimated 1291.5 m^3 of trees cut between 1992 and 2010 (see Figure 19). To a large extent, forest fires in BTSNP result from inappropriate land clearing methods in nearby areas, charcoal making, and grass rejuvenation applied by the local community, in addition to a few cases of fires caused by visitors/tourists. Most of BTSNP is adjacent to PERHUTANI's forest, although some portions are adjucent to private land (especially in the enclave villages). In the PERHUTANI area, especially in the production forest, local communities are allowed to plant crops under the trees or in the land where the trees have been cut and will be replanted. Owing to budget limitations, many farmers use fire to clear the land

before the planting season. Dry weather and strong wind can easily spread the fire into the adjacent national park.

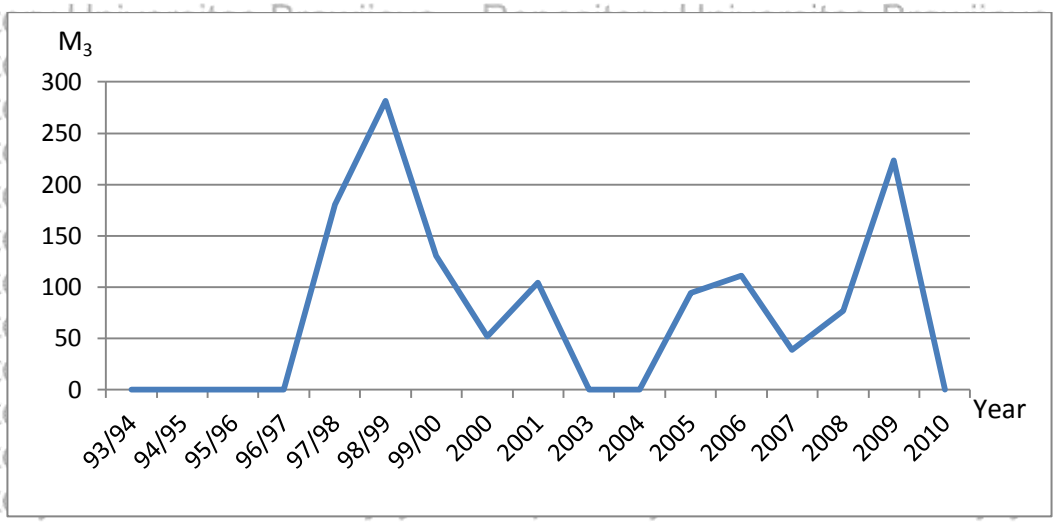


Figure 29. Deforestation caused by illegal logging in BTSNP from 1993–2010.

Charcoal making is a cause of both fire and illegal logging in the national park. Cold weather in Tengger Highland leads to a high demand for charcoal to be used for heating and sometimes for cooking. To make charcoal, people usually cut a tree, devide it into several pieces, and then burn the pieces of wood in a hole for multiple days. Imperfect burial occurs often, resulting in fires on the surface. Figure 20 shows a forest fire which has been caused by this practice.

Figure 20. A forest fire in the park between RPTN Pananjakan and Ngadas caused by charcoal making.

In order to adress illegal logging, forest fires, and encroachment problems, BBTNBTS uses not only repressive methods by enforcing the law, but also uses preventive methods as well as local traditional approaches. Although regulations regarding national park management such as Act No.5/1990, Act No 41/1999, and other regualtions state punishment for the violation of the rules, in some cases the national park officers use traditional approaches by applying "*hukum/kesepakatan adat"* (an informal regulation which has existed in the community for years) instead of formal rules.

The Tengger tribe has *"hukum/kesepakatan adat,"* which regulates the daily life of Tenggerese people, in addition to formal state rules. Some are related to the environmental aspect of Tenggese life. Regarding property rights, for example, in order to protect local property the Tenggerese are forbiden to sell their land to outsiders. They also protect sacred sites such as ancestral graves and places of worship by preserving the area and not cutting trees in the area. Violation of "hukum adat" will result in social sanctions as well as fines which must be paid to the community. Required donation of bags of cement for the building of public facilities is a common fine for lawbreakers. National park officers sometimes also use this kind of punishment for people who commit illegal activities in the park in coordination with local political leaders. Using informal rules when dealing with local people hopefully will harmonize the relationship between government officers and local communities.

Although communities have local wisdom in some aspects of life, especially related to the environment, population growth and influence from outer areas have lead to cultural erosion. In a sacred area, such as an ancentral grave,

even though the trees around the grave are not cut, much of the surrounding forest has been degraded. In addition, using informal rules to deal with the local community does not always bring about good results in national park conservation. Some people who have been reprimanded for cutting of trees or making charcoal in the national park have been punished according to “hukum adat,” but continued to perform illegal acticities in the national park. Meanwhile, to solve the encroachment problem, park officers in coordination with local government have tried to use a social approach to avoid conflict with the local community. In some areas, people who encroach the border and cultivate in national park lands have been gathered by the national park office and the local government (village and sub-district), and signed an agreement stating that they will leave the park by a certain time. If they do not leave the park within the agreed time limit, the park officers will then enforce the law based on the formal rules.

CHAPTER IV

REFORESTATION IN THE NATIONAL PARK: STORING CARBON IN INDONESIA'S PROTECTED AREA

4.1. Climate Change Mitigation Policy in Indonesia's Forestry Sector

The issue of climate change began to get attention from the Government of Indonesia (GOI) in 1994, when the United Nation Framework Convention on Climate Change (UNFCCC) was ratified, followed by the ratification of the Kyoto Protocol in 2004. The Kyoto Protocol is an international agreement linked to the UNFCCC. The detailed rules for the implementation of the Protocol were adopted at the 7th Conference of the Parties (COP 7) in Marrakesh in 2001, known as the "Marrakesh Accords." The major feature of the Kyoto Protocol is that it sets legally binding targets for Annex 1 countries[12] to limit and reduce emissions. The overall Annex 1 emissions should be at least 5% below their 1990 levels in the first commitment period, 2008 to 2012.

Under the treaty, Annex 1 parties are expected to meet their commitments mainly through domestic efforts; they must meet their targets primarily through national measures. However, the Kyoto Protocol offers them additional means of meeting their targets via so-called "flexibility mechanisms," which include: Joint Implementation (JI, Article 6), Clean development mechanism (CDM, Article 12), and Emissions Trading – known as "the carbon market" (ET, Article 17). Through the JI, emission reduction units resulting from joint projects can be transferred from one Annex 1 Party to another. CDM provides a similar opportunity for

[12] According to the Kyoto protocol, "Party included in Annex I" means a Party included in Annex I to the Convention, as may be amended, or a Party which has made a notification under Article 4, paragraph 2 (g), of the Convention. It consists of 37 highly industrialized countries and countries undergoing the process of transition to a market economy.

transfer of credits to Annex 1 countries from projects implemented in developing countries. ET allows for the trading of credits between Annex 1 countries. The purpose of these flexibility mechanisms is to increase the cost-efficiency of mitigation activities, as well as to promote technology transfer and sustainable development in general. Recognizing that developed countries are principally responsible for the current high levels of GHGs in the atmosphere as a result of more than 200 years of industrial activities, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

Among the three mechanisms, the Clean Development Mechanism (CDM) is a flexible mechanism that allows developing countries to be involved in climate change mitigation. While under the Kyoto Protocol there is no obligation to limit or reduce their emissions, developing countries can voluntarily contribute to emission reduction through CDM. Under Article 12, the purpose of CDM "shall be to assist Parties not included in Annex 1 in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex 1 in achieving compliance with their quantified emission limitation and reduction commitments."

Indonesia, in comparison to other Asian countries, was quite late in adopting the Kyoto Protocol. However, the country has huge potential of GHG emission reduction both in the energy sector and in LULUCF. Therefore, soon after ratifying the Kyoto Protocol, Indonesia's Designated National Authority (DNA) called Komisi Nasional Mekanisme Pembangunan Bersih (Komnas MPB) or the National Committee on Clean Development Mechanism (NC-CDM) was established on July 21, 2005 through the Ministry of Environment Decree No.

206/2005. The Ministry of Forestry even made progressive action by issuing the Ministry of Forestry Regulation No. 14/2004 on procedures of the Afforestation/Reforestation Clean Development Mechanism.

Hosting the 13th COP in 2007, attention on climate change dramatically increased in Indonesia. Many efforts have been performed, including mainstreaming climate change into the country's development policy. During COP 13 in Bali, the GOI launched its National Action Plan for Addressing Climate Change (NAPACC) as a guideline for various agencies for carrying out coordinated and integrated efforts for mitigation and adaptation of climate change. In 2008, the government also established the Dewan Nasional Perubahan Iklim (DNPI) or National Council on Climate Change through Government regulation No.46/2008. The council, led by the president, consists of ministers who are responsible for climate change issues, such as the Ministers of Environment, Forestry, Agriculture, Industry, Energy, and Mineral Resources, etc. In conducting its daily activities, the council is chaired by Prof. Rahmat Witoelar (the previous Minister of Environment who chaired COP 13 in Bali). Moreover, in 2011 the government issued the National Action Plan (NAP) on GHG Emission Reduction.

In order to mainstream climate change in development policy, the GOI integrated NAPACC, NAP on GHG Emission Reduction, and the Climate Change Mitigation Roadmap into long- and medium-term development plans. According to the NAP on GHG Emission Reduction, there are 5 main activities to reduce GHG emission including: (1) agriculture; (2) forestry and peatland; (3) energy and transportation; (4) industry; and (5) waste management and other supporting

activities. Figure 21 shows a conceptualized diagram of mainstreaming climate change into the GOI's development policy.

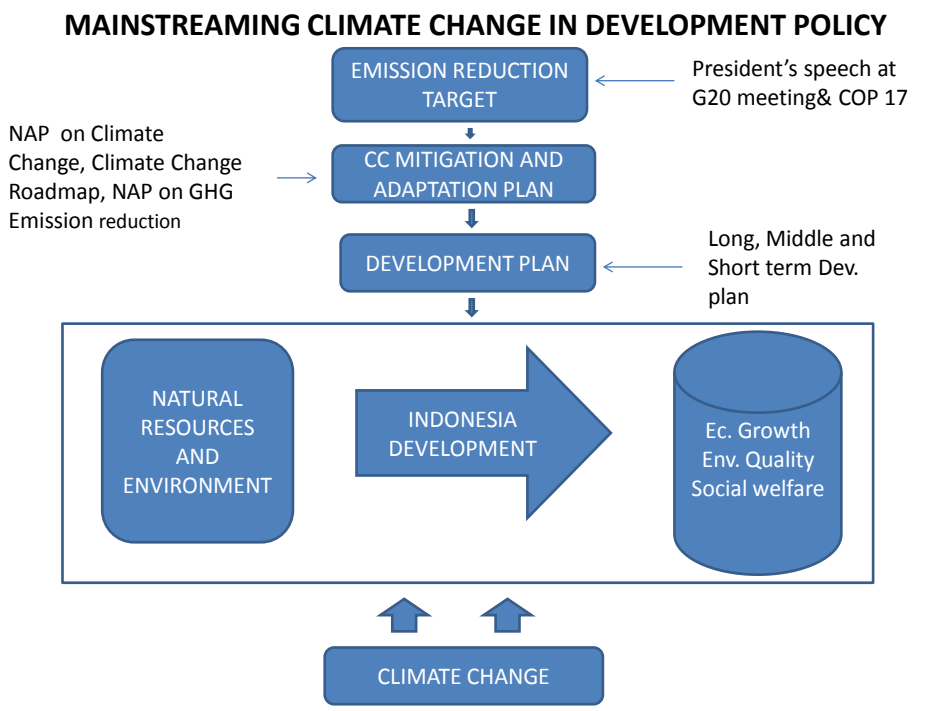


Figure 21. Mainstreaming climate change in Indonesia's development policy.
Source: Adapted from Second National Communication, 2010

Since the main sources of GHG emissions in Indonesia come from the forestry and peat land sector, the role of this sector is very significant in the climate change mitigation efforts of the country. The government-set emission reduction target for this sector is 0.672 $GtCO_2e$ for a 26% emission reduction scenario, and 1.039 $GtCO_2e$ for a 41% emission reduction scenario. In order to achieve the emission reduction target in the forestry and peat land sector, the NAP on GHG Emission Reduction set some policies that should be implemented by the GOI; the policies should also improve environmental quality, prevent disasters, increase the employment rate, and increase income of the people and the state. The strategies that will be used to reduce emissions in the forestry sector include: a) reducing deforestation and forest degradation; b) increasing

planting to enhance the absorption of GHGs; c) protecting forests from illegal logging and forest fires as well as implementing sustainable forest management; and d) optimizing land use and water resources.

Among these strategies, increasing planting to enhance the absorption of GHGs through forest and rehabilitation in prioritized watersheds is expected to reduce the GHG emissions of the country by 91.75 million CO_2e. Reforestation is not a new policy that has been formulated just to address climate change; it has been done in the country for many years. Since the early 1950s, the Indonesian government has implemented various forest and land rehabilitation programs. The first was the rehabilitation Kitri Coral movement in October 1951, a national campaign that appealed to people to plant trees in their yard (Mursidin et al., 1997). In 1976/1977, a forest and land rehabilitation project was started and financed through "Dana Inpres" (President Instruction Fund), and covered most of the land that had been damaged in Java. This project provided tree seedlings to the public to be planted, such as Albizia (*Paraserianthes falcataria*). Subsequently, the rehabilitation program for combating land degradation became one of the main priorities of the Forestry Department.

In 2002, the Ministry of Forestry issued a policy under the auspice of social forestry to promote a community-based rehabilitation program. The technical plan for this program was designed based on a five-year Forest and Land Rehabilitation Program (*program Rehabilitasi Hutan dan Lahan/RHL*). It used the river basin or *Daerah Aliran Sungai* (DAS) as a management unit. There were 60 DAS that were considered in the highest priority category to be rehabilitated. However, because of financial constraints, the program focused on rehabilitating 17 DAS over 5 years, with a total budget 1.6 billion USD (Baplan, 2003). This

policy was supported by the allocation of Reforestation Funds or "Dana Reboisasi" (DR), which has been applied since 2001 under the coordination of local government districts/municipalities. At the end of 2003, the National Movement for Forest and Land Rehabilitation or *Gerakan Rehabilitasi Hutan dan Lahan* (GNRHL/GERHAN) was proclaimed by the President of the Republic of Indonesia, Megawati Sukarnoputri, which aimed to rehabilitate three million hectares of degraded land over 5 years. Under the new government led by President Susilo Bambang Yudhoyono, forest and land rehabilitation is still one of the five priorities set by the Ministry of Forestry. In order to accelerate achievement of the GERHAN project targets, the Ministry of Forestry also launched some reforestation programs such as the *Kecil Menanam Dewasa Memanen* (KMDM), a program that persuades elementary school students to plant trees. On November 28, 2007, the President of the Republic of Indonesia launched simultaneous planting of 79 million trees, and through his Decree No. 24/2008, stated November 28 to be National Tree Planting Day or **Hari Menanam Pohon Indonesia** and December to be National Month of Planting or **Bulan Menanam Nasional**. In 2009, to complement the national election's "one man one vote" principle, the President announced a reforestation program, One Man One Tree (OMOT). Since Indonesia has a population around 230 million, the program target is the planting of 230 trees in 2009.

4.2. **The Implementation of Reforestation Programs in BTSNP**

The earth's terrestrial ecosystems store around 2 050 Gt of carbon in their biomass and soil (to 1 m depth). Protected areas worldwide cover 12.2% of the land surface, and 15.2% of the global terrestrial carbon stock (312 Gt) lies within the protected area network (Campbell, 2009). Using the IPCC definitional

scenario[13], WMO, UNEP, and IPCC (2000) estimated that the global average annual carbon stock changed owing to afforestation and reforestation from 2008–2012 was 197 to 584 Mt C per year. This would be offset by annual changes in carbon stocks from deforestation of about –1 788 Mt C per year, producing a net change of –1 591 to –1 204 Mt C per year.

As conservation areas account for 20% of Indonesia's forest area, they have a significant role in storing carbon. Remaining forests in conservation areas store carbon, and rehabilitation of degraded land will also increase the carbon stock. Storing carbon through afforestation and reforestation projects in conservation areas, including national parks, provides more advantages than projects implemented in other areas. As they are designed for the protection of life support systems, preservation of biodiversity, and utilization of natural resources in sustainable ways, timber harvesting is not allowed. Consequently, carbon that is stored in the national park will remain for a long period. Moreover, property rights[14] allow the projects to limit conflict over the land.

When Bromo Tengger Semeru was launched as a National Park in 1982, some areas on the park had already been degraded. According to the DGFPNC decree in 1998, there were 2000 hectares in the park designated as a rehabilitation zone that needed to be reforested. Rehabilitation of the degraded land in the park started in 2001 using government budget from the Reforestation Fund (Dana Reboisasi). From 2001 to 2007, 765 hectares were replanted using this scheme, most of them located in the Pasuruan regency. In 2003, when

[13] There are many possible definitions of a 'forest', as well as meanings and approaches of 'afforestation', 'reforestation', and 'deforestation' (ARD). The choice of definitions determines how much and which land in a country is included under the provisions of Article 3.3 of the Kyoto Protocol.

[14] In Indonesia, a national park is located in state land and managed under government authority.

GERHAN was launched, again using the Reforestation Fund, BTSNP became one of the designated areas to be rehabilitated, along with forests and other degraded lands in the Brantas Watershed. From 2003 until 2009, a total area of 1 937 ha was replanted under GERHAN. However, reforestation efforts performed by the government failed to reforest some areas of the park. Although there is no official report on the extent of success or failure of the reforestation in the park, the fact that there are only a few trees left in the GERHAN site in Tengger Highland suggests that most of the reforestation programs failed to reforest the area.

In 2006, BTSNP began a new strategy in the reforestation effort in association with a foreign agency. In cooperation with the *Japan International Forestry Promotion and Cooperation Centre (*JIFPRO) and Toyota Boshoku, BTSNP conducted a reforestation program called Ecosystem Revitalization in the Pananjakan area from 2006 to 2011. Meanwhile, efforts to pioneer the implementation of an A/R CDM pilot project in BTSNP started with the cooperation of Sumitomo Forestry Co. Ltd.

4.2.1. **National Movement on Forest and Land Rehabilitation (GERHAN)**

The implementation of GERHAN started in 2003, based nationally on the Ministry of Forestry Decree No.349/Kpts-II/2003 on the Implementation of National Movement on Forest and Land Rehabilitation and No. 369/Kpts-II/2003 on Guidance for the Implementation of National Movement on Forest and Land Rehabilitation. The areas replanted under GERHAN are shown in Table 6. The purpose of the project is to accelerate forest and land rehabilitation in priority watersheds to overcome flood, landslide, and drought problems in an integrated way, through participation of multiple stakeholders and resource mobilization. In

conservation areas, the scope of GERHAN activities includes administration of the projects, technical planning, physical activities (planning and maintenance), coaching, and monitoring.

Table 6. Distribution area of GERHAN in BTSNP.

Year	Rehabilitation area				Total (ha)	Type of vegetation
	PASURUAN (ha)	PROB. (ha)	LUMAJANG (ha)	MALANG (ha)		
2003	200	-	-	507	507	Cemara G. dan Akasia D
2004	435	-	-	265	700	Cemara G. dan Akasia D
2005	75	-	-	155	230	Cemara G. dan Akasia D
2006	-	-	100	-	100	Cemara G. dan Akasia D.
2007	100	-	-	100	200	Cemara G. dan Akasia D.
2008	100	-	-	100	200	Cemara G. dan Akasia D.
2009	100	-	-	100	200	Cemara G. dan Akasia D.
2010	-	-	-	100	100	Cemara dan Suren.
Total	**710**	-	100	**1227**	**1937**	

Source: BTSNP Statistical Book 2010 and BTSNP Rehabilitation Map

In the first three years of GERHAN implementation in BTSNP, rehabilitation was conducted mostly in Malang and Pasuruan Regencies. In 2006, 100 ha in Lumajang were also rehabilitated under GERHAN mechanism, and then from 2007 to 2010, the location of GERHAN focused in Malang and Pasuruan again.

In some areas, GERHAN successfully reforested the national park, while in other areas it failed. Areas that have been successfully reforested through GERHAN include Ranupani village, Lumajang Regency and Tamansari, Malang Regency (BBTNBTS, 2010). In Pasuruan Regency (Tengger Highland), GERHAN failed to reforest the degraded land in the area.

4.2.2. Ecosystem Revitalization Projects (ERP)

Ecosystem Revitalization Projects (ERPs) in BTSNP were conducted under the Memorandum of Understanding (MoU) between the Directorate General of Forest Protection and Nature Conservation (PHKA) and Toyota Boshoku–JIFPRO, signed on July 31, 2006. The project location is 159 ha in Block Argowulan (Resort Pananjakan: SPTN I – BPTN I), which administratively lies in the Pasuruan Regency. The area was planted by cemara gunung (*Casuarina junghuhniana*), akasia (*Acacia decurens*), and other species (mentigi) over 5 years (2006/2007 – 2010/2011).

The purposes of the project include: a) maintaining catchment area; b) preventing soil erosion; c) revitalizing ecosystem through rehabilitation; and d) providing job opportunities and enhancing local livelihood. The project scopes are: a) planning; b) planting (seed preparation, land preparation, planting); c) maintaining of plantation; d) building infrastructure (road inspection, providing equipment etc.); e) protecting the area; f) fire management; and g) community empowerment (facilitated by NGO).

During the 5 years of its implementation, the project planted 265 000 trees in 159 ha and replanted dead trees with 51 000 trees. The results of a plant assessment performed by Muhammadiyah Malang University or Universitas

Muhammadiyah Malang (UMM) shows that the survival rate of the trees is quite high. The number of planted seedlings and survival rate are shown in Table 7.

Table 7. The number of planted seedlings and survival rate of ERP plantation

Year	Number of Trees	Survival Rate (%)	
		Cemara	Akasia
2006/2007	50 000	81.71	89.79
2007/2008	55 000	88.80	87.89
2008/2009	55 000	67.74	78.17
2009/2010	55 000	100	94.64
2010/2011	50 000	51.42	71.57

Source: JIFPRO

The plant assessment also showed that akasia grows faster than cemara, which is good for accelerating land cover. On the other hand, cemara, even though it grows slower than akasia, has high durability against wind, dew, and sulfur. In addition to planting activities, the ERP also conducted community empowerment activities in the Keduwung village, close to the plantation area. The activities were facilitated by two NGOs. Initially, the community empowerment program was facilitated by LEM 21, an NGO founded by alumni of the Faculty of Biology of Brawijaya University. Since LEM 21 activities were mostly located in the Pacitan Regency, the NGO could not intensively facilitate the program in Keduwung village, therefore in the third year it was replaced by Lembaga Paramitra (LSM Paramitra), a local NGO. Community empowerment activities performed by LEM 21 and Lembaga Paramitra in Keduwung village are described in Table 8.

Table 8. Community empowerment activities in Keduwung village

Year	Implementer	Activities	Results
2006/ 2007	LEM 21	- Mapping of the village - Nursery training - Firewood planting	- Map of village's potency and Keduwung village portrait - Nursery - Demplotka firewood plantation in private land
2007/ 2008	LEM 21	- Developing forest protection mechanism by community - Fire management training - Nursery training - Goat farming - Environmental education	- Local community group for forest protection - Increase in community knowledge on fire management - Nursery business - Livestock relief - Establishment of conservation cadre
2008/ 2009	LSM LEM 21	- Assistance on maintenance activities	- Cooperation agreement on maintenance activities
2009/ 2010	LSM Paramitra	- Re-mapping of village problems and potency - Stakeholder meeting	- Community workplan - Understanding among stakeholders on Keduwung village development.
2010/ 2011	LSM Paramitra	- Making firewood-saving stove (50 stoves) - Ecotourism training	- Sample of the stoves

Source: BBTNBTS's Head of Technical Division's Presentation in Closing Seminar of ERP

In order to support planting activities, the ERP also built & provided infrastructure such as huts, inspection roads, fire management equipment, and nursery equipment. It also conducted supporting activities such as forest protection and fire management. Other activities included: a) visits from the funding institution and facilitator (2–3 times a year); b) environmental education for students (twice); c) planting ceremonies (twice); d) workshops (twice); and e) a closing seminar (March 2012). Moreover, JIFPRO and Toyota Boshoku committed to expand maintenance activities for one more year, until 2013.

4.2.2. **A/R CDM Pilot Project**

Efforts to develop CDM activities in BTSNP were initiated in December 2006, when the head of the BTSNP Office planned to initiate two programs

related to CDM, namely inventory of the land cover eligible for reforestation under CDM, and preparation of reforestation CDM project proposal. In 2007, two programs related to CDM initiation were implemented.

The result of the inventory showed that some areas in BTSNP were eligible for CDM activities. This was then followed up with several field surveys by parties interested in developing the CDM project in BTSNP, including Sumitomo Forestry Co. Ltd (SFC), through its subsidiary PT. Kutai Timber Indonesia (PT.KTI). The consultant CER Indonesia (CERINO) was chosen to prepare the Project Design Document (PDD). After field surveys and meetings between the parties, on October 14, 2008, a Memorandum of Understanding (MoU) between the Directorate General of Forest Protection and Nature Conservation (DG-FPNC), the Ministry of Forestry of the Republic Indonesia, and Sumitomo Forestry Co. Ltd. (SFC) concerning Afforestation/Reforestation – Clean Development Mechanism Pilot Project was signed in Jakarta.

According to the MoU, the purpose of the A/R CDM project in BTSNP is to reforest 1 000 ha of BTSNP, East Java, Indonesia. The objectives of this project are to sequester CO_2 through reforestation in some areas of BTSNP in order to reduce the emission of Green House Gases (GHGs) in the atmosphere, and to enhance biodiversity conservation. Local people/communities hope that the degraded land in BTSNP will be rehabilitated by this project, as they know that the project activities can reduce the risk of flooding to the downstream area, increase water supply during the dry season, enhance the water quality, conserve, and prevent the soil erosion. The project can also benefit local people/communities by providing jobs for workers. The scope of the project includes administration, field work, and other activities mutually agreed upon.

a) Administration of the project

Administration of the project consists of project plans and reports, as well as fulfillment of administration requirements for the registration as a CDM project. After the MoU had been signed, the project work plan was proposed by BBTNBTS and SFC on October 31, 2008. According to the work plan, the A/R CDM in BTSNP would start in November 2008 with an expected operational lifetime of 60 years. The length of the renewable crediting period is 20 years, or 240 months. The activities of the project include planning, field preparation, planting, and maintenance.

The plan was sent to DG-FPNC, but unfortunately, there was no immediate response from DG-FPNC for approval. DG-FPNC also did not give any special instruction or guidance for BBTNBTS as the implementation unit who represents DG-FPNC in the field. While the annual work plan was prepared by SFC and BBTNBTS individually, SFC prepared an annual work plan for planting and maintenance in the field, and BBTNBTS prepared a plan for protecting the A/R CDM area from fire and other activities that threaten the area.

The A/R CDM plan activities stated in the Project Design Document (PDD) were based on field conditions, by calculating the mass of stands, soil analysis, etc. The PDD was prepared by CER Indonesia (CERINDO), a research institute hired by SFC. The process to make the PDD started in November 2007, before the MoU was signed. The PDD draft prepared by CERINDO was then was sent to BBTNBTS to get feedback, and the draft was then sent to DG-FPNC by BBTNBTS. Unfortunately, the draft has not yet been officially discussed by DG-FPNC and SFC as the signers of the MoU. The delay of discussion on the PDD was caused by unclear divisions of authority in carrying the A/R CDM pilot

project, especially in DG-FPNC, as well as unsynchronized regulation. As stated by the secretary of the BBTNBTS's A/R CDM Team, Ms. Farianna:

> "We are in BBTNBTS waiting for the invitation from the Ministry of Forestry (MoF) in Jakarta to discuss the PDD, however there is no certain section in the MoF which is responsible for the implementation of the project, each section or division in DG-FPNC for example claimed that A/R CDM in BTSNP is not its responsibility. Therefore, we have reported the problem in our annual report and, hopefully, will get the response from the Director General of DG-FPNC. As a technical unit of the Ministry of Forestry, BBTNBTS can only wait for the instruction from the Ministry, but we will take initiative to accelerate the process." (Interview, June 11, 2012)

Moreover, the head of the team, Ms. Emy Endah S. also stated that:

> "Since BBTNBTS is a Technical Management Unit under DG-FPNC Ministry of Forestry, and the MoU regarding A/R CDM in BTSNP also was signed by DG-FPNC, the PDD should be proposed by DG-FPNC. However, we will facilitate the meeting to discuss the PDD before it is submitted to NC-CDM in the future." (Interview, June 11, 2012)

SFC also complained about the two problems as being the main issues that hindered the effort to register the project as an A/R CDM project, as stated in a presentation by SFC in a panel discussion in Tokyo in 2010. Therefore, SFC asked the GOI, especially the Ministry of Forestry, to review the rule and choose a division/section in DG-FPNP who will be responsible for the implementation of the A/R CDM.

b) Field work (planting and maintenance activities)

Planting in the project area has been performed by direct planting using seedlings. Tree species that have been planted in the area are *Acacia decurens, Casuarina junghuniana,* and other local species. Since the project area is relatively dry and threatened by fire, plant maintenance has been done through cleaning the litter and bush around the plants as well as fire prevention. Fire will be prevented by patrol and making fire bulkheads. BTSNP is a conservation

area, therefore, the cropping pattern used for planting is a mix of line systems (*Sistem jalur*) and "cemplongan."[15]

Before the CDM planting activities, KTI conducted trial planting in one hectare of the project area in December 2008, financially supported by SFC. The trial planting was conducted to ensure the survival rate of certain species, and to improve the planting technique. The planting seedlings were collected in the National Park. Species, number of planted trees, and survival rate in July 2009 are shown in Table 9.

Based on the results of trial planting, some species that had high survival rate such as *Casuarina junghuniana* and *Acacia decurens* were chosen to be the main species that would be planted in the A/R CDM, while some species with a low survival rate, such as *Trema orientalis,* would be planted in a small number. In order to increase the biodiversity in the area, PT.KTI is still trying to find other local species for planting in the CDM area.

Table 9. Survival rates of the A/R CDM trial planting

Species	Number of planted trees	Number of alive trees in July 2009	Survival rate (%)
Casuarina junghuhniana	210	202	96.2
Toona sureni	210	125	59.5
Trema oirentalis	210	19	9.0
Podocaspus imbricatus	105	87	82.9

[15] In conservation areas, land clearing (which removes all shrubs and other vegetation on the land) is not allowed, as it changes the biodiversity in the area. Line system is a planting system with a cleaning pattern along the line, where planting holes are made at a certain distance along the line, while 'cemplongan' is a technical system of planting without cleaning the whole field; the cleaning is only carried out around the hole where the plant will be planted. This technique is applied usually on sloping land in order to avoid soil erosion.

Acacia decurens	210	199	94.8
Dodonaea viscose	210	130	61.9
Total	1 144	762	66.6

Source: PDD, May 25, 2010

The first term of planting activities in the field started officially in December 2009 in the Keciri and Mungal blocks. The first planting was done in the opening ceremony by the head of BBTNBTS and the Director of Plantation of PT.KTI, followed by some of the village heads from the surrounding area. 194 249 seedlings were planted in the first phase in 171.09 ha of the Keciri and Mungal blocks. The second planting term was conducted in the Wonokoyo and Kandangan blocks. In the second year, there was a decreased number of seedlings planted; only 73 010 seedlings were planted in 68.69 ha of the Kandangan and Wonokoyo blocks. The third term was conducted in Block Kandangan by planting 75 500 seedlings in 70.25 ha. Unfortunately, drought and an eruption of Mt. Bromo at the end of November 2010 resulted in a decrease in the survival rate of planted seedlings. Owing to the Mt. Bromo eruption, the survival rate of the planted trees in the first and second term also dropped (see Figure 22). The survival rate of the first term plantation dropped down from 80% in June to 70% in September, and further decreased to 30% at the end of December. In order to replace the dead trees 91 400 seedlings were replanted. The replanted trees consisted of *Casuarina junghuniana* (87%), *Acacia decurens* (6%), *Dodonea viscose* (6%), *and Engelhardia spicata* (0.44%). Table 10 shows the planting progress of the A/R CDM project.

Figure 22. Mt. Bromo eruption (left) and an A/R CDM plant in Keciri following the eruption (right)

Table 10. Planting Progress of the A/R CDM Pilot Project

Activity Year	Location	Area (ha)	Number of Seedlings	Survival rate (%)
First term planting, 2009/2010	Keciri and Mungal	171.09	194 249 [*Hibiscus similis* (25%), *Engelhardia spicata* (2.7%), *Toona sureni* (14%), *Schima wallichii* (12.3%), *Casuarina junghuniana* (37%), and *Trema orientalis* (9%)]	80
Second term planting, 2010/2011	Kandangan and Wonokoyo	68.69	73.010 [*Casuarina junghuniana* (41%), *Acacia decurens* (38%), *Dodonea viscose* (10%), *Engelhardia spicata* (1%), and others (10%)]	90
Third term planting 2011/2012	Kandangan	70.25	*Casuarina junghuniana* (81%), *Acacia decurens* (13%), *Dodonea viscose* (5%), and others (1%)	100

Source: The A/R CDM annual progress report

c) Other activities

There is no further explanation of what other activities as mutually agreed upon are in the MoU or other documents. According to Ms. Emy Endah Suwarni, MSc., head of CDM Secretariat of BBTNBTS, so far it was interpreted as communication among project proponents in the implementation of the project.

That is, every plan that will be implemented and every problem that may possibly occur will be discussed by PT.KTI, Sumitomo, and BBTNBTS (interview, June 8, 2011).

However, based on the MoU, work plan, and the field observation, some activities can be considered as "other activities mutually agreed" such as dissemination of information and stakeholder process. The stakeholder process is a process that is intended to improve the stakeholders' understanding of and commitment to the design and implementation of A/R CDM project activity. The stakeholder process would be conducted in three stages; two stages to be done in BTSNP, while the third stage of the stakeholder process to be organized and conducted by the Designated National Authority (DNA), housed in the Ministry of Environment (MOE), if additional consultation is deemed necessary before approval is given.

The first stage is aimed to raise stakeholder awareness about the A/R CDM (What is a CDM project? What are the advantages of a CDM project? How is a CDM project conducted? Where and when is a CDM project conducted? Who can undertake a CDM project?). The first stakeholder process was conducted in 2007 in the BBTNBTS office through a one day workshop with the communities interested in being involved in the A/R CDM project, local NGOs, and local governments.

The second stage was conducted through an official ceremony at the project site, and involved the Minister of Forestry and other staff in the Ministry of Forestry, students, and also Bupati from the Probolinggo district, Malang district, and Pasuruan Regency. Focus Group Discussions (FGDs) at the community and district level targeted stakeholders' understanding, needs, priorities, interests,

and commitments related to implementing A/R CDM project activity. A broader forum of district stakeholders including media coverage and larger events were incorporated in the ceremony.

Dissemination of information to communities and other institutions was also done before and during the implementation of the project. Firstly, in October 2008 BTSNP and DG-FPNC informed some institutions from the local government such as the Forestry Board (Dinas Kehutanan), Local Planning Bureau (badan perencanaan Daerah/Bappeda), heads of villages around the park, and informal community leaders of the plan to reforest BTSNP land using the A/R CDM scheme in a meeting at the BTSNP office. Dissemination of information to communities around the project site was performed twice in Mororejo village, Pasuruan Regency and Gading Kembar village, Malang Regency in 2009.

4.3. **The role of the 5 C protocol in the success/failure of the implementation of the reforestation project in BTSNP**

Various factors influence policy implementation, including the content of the policy, the nature of the policy process, the actors involved in the process, and the context in which the policy is designed and must be implemented (Walt and Gilson, 1994). Najam (1995), based on a literature review, identified 5 critical variables called the “5 C Protocol” (content, context, commitment, capacity, and client & coalition) that shape the direction that implementation might take. In this sub-chapter, the role of the 5 C Protocol in the implementation of reforestation projects in BTSNP will be discussed.

4.3.1. **Content of Policy**

The starting point for a policy implementation assessment is, naturally, the policy itself. The policy’s content, formulation process, and extent of its

dissemination influence whether the necessary groundwork is in place to support effective implementation. Policy content should clearly frame the underlying problem area, the policy's goals and objectives, and the population to be benefited, along with the broad actions and strategies to address the problem (Nakamura and Smallwood, 1980; Walt and Gilson, 1994). Other crucial elements include time horizons, rationale, and language used. Unclear or confusing policy objectives or actions may be one reason why some policies are not implemented (Calista, 1994.) For a policy to support effective implementation, it should address the underlying problem through appropriate policy action, be based on strong stakeholder involvement, and be followed by dissemination to key audiences.

The content of policy affects the path of its implementation. A policy typically contains a set of intentions or goals, a mix of instruments or means for accomplishing the intentions, designates governmental or non-governmental entities charged with carrying out the intentions, and an allocation of resources for the task (May, 2003). According to Grindle (1980), implementing activities are influenced by the contents of policy such as interest affected, type of benefit, extent of change envisioned, site of decision-making, program implementers, and resources committed. The content of policy is important not only in the means it employs to achieve its ends, but also in its determination of the ends themselves, and in how it chooses the specific means to reach those ends (Najam, 1995). The content of the policy, choice of the implementation strategy, and instruments to be used all affect the implementation.

The policy to conduct the reforestation project through GERHAN was first stated in the Ministry of Forestry Decree No. 349/Kpts-II/2003 and No. 369/Kpts-

II/2003. The decrees stated the goals, scope of activities of the projects, and guided how the project should be conducted. Implementation of this program followed technical guidance from the Ministry of Forestry, especially through the Directorate General of Land Rehabilitation and Social Forestry (DG LRSF) as an agency who is responsible for the technical aspect of GERHAN. In the administration sphere, the implementation of GERHAN followed the national budgeting system, which is regulated by the Ministry of Finance. In 2007, the President of the Republic of Indonesia issued the Presidential Regulation on the National Movement on Forest and Land Rehabilitation No. 89/2007. Through this regulation, some aspects of the implementation of GERHAN changed. One of these new mechanisms was the bidding system for planting activities. The Ministry of Forestry, through its field technical unit, conducted biddings to choose companies to conduct the reforestation project, using the standard that has been set. In addition, some activities to support reforestation, such as protecting the area and fire management, were also done by the winning bidder. In order to address budgetary problems, multi-year budgeting was used for GERHAN.

Moreover, the Ministry of Forestry issued technical guidelines for the implementation of GERHAN through the Ministry of Forestry Regulation No. P. 22/Menhut-V/2007. The regulation gave technical as well as administrative guidelines of how GERHAN should be implemented, from the preparation to the evaluation stage.

Although regulations about GERHAN gave clear guidelines especially on technical aspect, this top-down approach tended to complicate the implementation of the policy, and ultimately led to the failure of reforestation in some areas, especially in Tengger Highland. While field work (planting and

maintenance) was conducted by BTSNP, planning and providing seedlings for planting were managed by Balai Pengelolaan Daerah Aliran Sungai (BP DAS), an agency under DG LRSF. Moreover, the long process of budgeting resulted in a delay of planting activities. The budget for rehabilitation was not available in the rainy season, which is the best time for planting. Since planting activities depend on the season, the delay of the activities affected the survival rate of the planted trees. Moreover, limited maintenance[16] resulted in a low survival rate of the planted trees.

Allowing the private sector to do field work (planting and maintenance) in BTSNP under GERHAN was expected to bring better results compared to the previous system, in which the government took full action for the rehabilitation. However, the uncertainty of payment, high standard of survival rate, and low standard of cost[17] resulted in the private company not performing at its best for reforestation of the park. As a result, the project failed to reforest some areas in the national park, especially in Tengger Highland.

The policy to conduct the Ecosystem Revitalization Project (ERP) in BTSNP is stated in the MoU between the Directorate General of Forest Protection and Nature Conservation (DG FPNC) and Toyota Boshoku – JIFPRO, signed July 31, 2006. Unlike GERHAN, which focuses on rehabilitation activities to overcome natural disaster problems (flood, landslides, and drought), the ERP

[16] During initial planting years (year-0), only 10% of trees could be replanted to replace the dead trees. In the first year (year-1), maintenance activities (weeding, replanting, etc.) could only be done if the survival rate was at least 70% (based on the assessment by independent assessor); the second year maintenance did not accommodate replanting activities.

[17] The company is paid for the work that has been done after the assessment proved 80% survival rate. This standard is the same for all reforestation projects under GERHAN, regardless of location. With the same cost and survival rate as other locations, although the conditions of the area are different (remote area, limited technical methods allowed) the company should spend much more cost to achieve the standard.

was not only concerned with ecological aspects (maintaining catchment area, preventing soil erosion, revitalizing ecosystem) but also socio-economic aspects (providing job opportunities, enhancing local livelihood). Therefore, the ERP accommodated other activities to support the rehabilitation, such as fire management and community empowerment.

The policy for the A/R CDM pilot project is stated in the Memorandum of Understanding between DG-FPNC and SFC, signed October 14, 2008. While the MoU contains general information about the policy, the details of how the project will be conducted technically and what kind of benefits are expected can be found in the PDD. According to the MoU, the objective of the A/R CDM pilot project in Bromo Tengger Semeru National Park is to absorb atmospheric carbon dioxide. The project is jointly implemented by DG-FPNC and SFC. The scope of cooperation under the MoU include; administration of the project, field work (planting and maintenance), and other activities as mutually agreed upon. The purpose of the proposed A/R CDM project activity is to reforest 1 000 ha of Bromo Tengger Semeru National Park, East Java, Indonesia. The proposed A/R CDM project activity will reforest the grassland and bare land with adaptable species such as *Casuarina Junghuhniana*, as well as local species such as *Hibiscuss*, *Toona Sureni,* and *Danglu*. The objectives of this project are to sequester CO_2 through reforestation in some areas of BTSNP in order to reduce emissions of Green House Gases (GHGs) in the atmosphere, and enhance biodiversity conservation.

Unlike other reforestation projects in BTSNP, the A/R CDM pilot project applies land preparation before planting activities. At each tree planting position, the soil is tilled to a depth and width of 30 × 30 cm to enhance seedling growth

and survival. In this planting practice, seedlings are simply inserted into holes or slits made manually. This seems the most appropriate way to maintain the existing ground cover. The proposed area is covered by grassland, but the planting does not apply a clearing method; manual patch clearing in line is used. This method consists of vegetation clearing and soil cultivation confined to narrow patches or relatively small patches on sloping lands with erodible soils in arid and semi-arid regions, with cleared patches situated on the contour lines. The width/distance of the cleared patches is 2 m and 6 m. They should be cultivated to a good tilt before planting. The hand tools most commonly used for this technique are the mattock, heavy hoe, and grubber. The mattock consists of a hoe or digging blade on one side and a pick or cutting blade on the other. This method can reduce competition among vegetation and increase the survival and growth rates. Cultivating soil on patches along the contour lines of slopes is performed in order to improve moisture conditions, build contour trenches for absorbing and storing water for newly planted seedlings and young trees, to prevent flash floods or dry mantle floods, and to control run-off and erosion on the steep slopes where plant cover has deteriorated.

During the dry season, forest fire is the main risk in the project area. Therefore, success of the project depends largely on the management of fire effectively. To overcome and minimize the risk of fire, BBTNBTS cooperated with PT.KTI, who designed an intensive fire management system. Under this management system, increased awareness, improved fire monitoring, and adequate equipment will be applied to BTSNP. The intensive fire management system should be established by involving active participation of local people/communities. Therefore, BBTNBTS in cooperation with Japan

International Cooperation Agency (JICA), SFC, and PT.KTI conducted a training program of wild fire prevention. Approximately 50 local people participated in this training, which was held on July 11 and 12, 2011.

Policy implementation involves applying one or more of the basic techniques of government to policy problems known as policy tools, policy instruments, or governing instruments (Howlett and Ramesh, p 157–158). The choice of policy instruments is shaped by the characteristic of the instruments, the nature of the problem at hand, governmental past experience in dealing with the same or similar problems, the subjective preferences of decisions makers, and the likely reaction to the choice by affected groups.

In order to implement reforestation projects in BTSNP, the GOI tended to use mandatory instruments in the implementation of GERHAN, while for the ERP and A/R CDM, the GOI tended to use both voluntary and mandatory instruments. Voluntary agreement between DG-FPNC and Toyota Boshoku-JIFPRO as well as between DG-FPNC and SFC are forms of voluntary instrument policy. Planting and maintenance as main activities of the project are conducted fully by the private sector, in this case by SFC through PT.KTI. The SFC contracted PT.KTI to conduct planting activities with full financial support from SFC, while the private sector functioned only as a funder and facilitator for the ERP.

On the other hand, mandatory instruments were also used in the implementation of the ERP and A/R CDM in BTSNP through laws and regulations. Although SFC and PT.KTI were free to choose which methods to use and what species would be planted, they had to follow the regulations for national park management. Therefore, they had to coordinate with DG-FPNC and

BBTNBTS to ensure that the method they used and the species they planted do not break the rules.

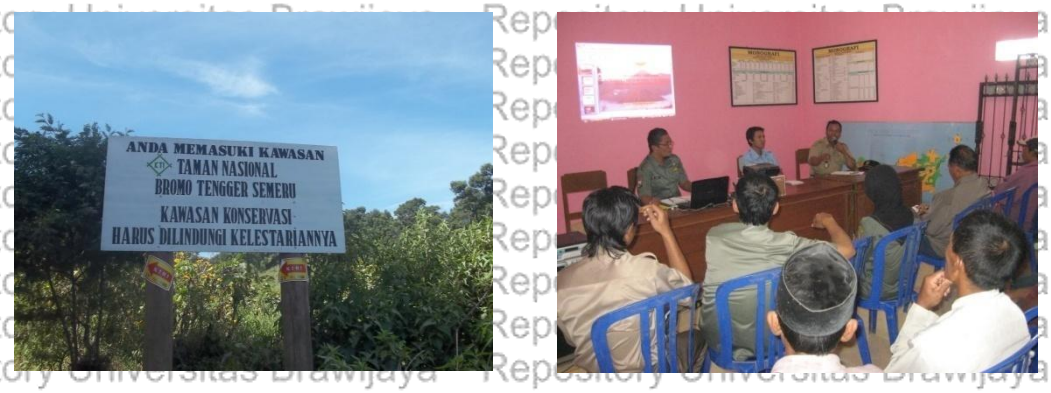


Figure 23: Dissemination of information: an information board in the A/R CDM area (left), and A/R CDM socialization in Gading Kembar village, Malang, by BBTNBTS and PT.KTI (right)

The parties who are involved in the ERP and A/R CDM projects, including the Ministry of Forestry, DG-FPNC, BBTNBTS, Toyota Boshoku, JIFPRO, SFC, PT.KTI and CERINDO, also use a mix of instruments, namely dissemination of information. The Ministry of Forestry, JIFPRO, Toyota-Boshoku, SFC, and CERINDO use websites, leaflets, and booklets to disseminate information about the ERP and A/R CDM. BBTNBTS and PT.KTI conducted meetings with local communities to ensure that the community around the A/R CDM area knew more about the project and its benefit for them, so that they could participate in the effort to make the project sustainable. PT.KTI also placed an information board in the area (see Figure 23).

4.3.2. **Context of Policy**

Policy implementation cannot be removed from the context in which is take place. The social, political, and economic contexts influence what policies are developed and whether and how those policies are put into practice (Thomas & Grindle, 1991). Contextual and environmental factors can provide both

opportunities and constraints for effective policy implementation (Calista, 1994). These forces exist at multiple levels (e.g., international, national, local) and change over time. For example, policies are often formulated within a multi-year timeframe. Thus, achieving policy goals means that implementation must proceed through inevitable changes in political regimes, governmental structures, economic conditions, and social environments. As the political economy changes, the context of the climate change mitigation context also changes, in turn affecting which actors are involved, which policy decisions are made, and what processes take place at various levels, including the operational and service delivery levels. Local economic circumstances, historical trends, and the socio-political dynamics all can combine to alter outcome and to narrow the options available for policy implementation (Honadle, 1999).

In order to understand the implementation of the policy, there are at least three aspects concerning institutional context that need to be considered: a) the key institutional actors influencing or being influenced by the policy; b) the interest and power relationship between and within relevant institutions; and c) the institutional characteristics as influenced by the overarching structure of social, economic, political, and legal setting in which they operate (Najam, 1995).

In BTSNP, reforestation programs have been conducted at different times in some places using a variety of schemes/mechanisms, including GERHAN, ERP, and the A/R CDM pilot project. Each scheme has its own characteristic and has been implemented in a different institutional context. Some of the programs have successfully reforested the national park, while others failed. At least 1 930 ha of BTSNP in 4 regencies have been rehabilitated through GERHAN from 2005 to 2009. Among them, only small areas have been successfully reforested

including rehabilitation in Ranupani village, Lumajang Regency and Tamansari, Malang Regency (BBTNBTS, 2010), while the rehabilitation program through the GERHAN scheme in the Keciri and Mungal blocks failed to reforest the degraded land in the area. On the other hand, the reforestation in the similar area under the ERP and the A/R CDM pilot project successfully reforested the area. In addition to natural factors, institutional characteristics that are influenced by socio-economic and political conditions around the area at the time the policy was implemented are believed to be key factors.

Rehabilitation or reforestation in Tengger Highland has been conducted at least four times, firstly under a routine project funded by the Rehabilitation Budget (Dana Reboisasi/DR) in 2003, using the GERHAN mechanism in 2007, using the ERP scheme, and finally under the A/R CDM scheme. Although the same program was implemented in the same location, different key institutional actors, interests, and the power relationship among the institutions and institutional characteristics (socio-economic, political, and legal setting) caused different results.

In the implementation of a policy, there are several elements that contribute to achieving a program's goal. According to Howlett and Ramesh (1995:52), policy actors are one of the elements that have a relationship with the implementation of policy. Policy actors may be divided into the following five categories: elected officials, appointed officials, interest groups, research organizations, and mass media.

Although, conceptually and at the national scale, all of the categories of the actors were involved in the implementation of GERHAN, the government had a

dominant role from planning to monitoring and evaluation of the projects. GERHAN, with its top-down approach and national standardization, did not give opportunities for project implementers to innovate and adjust the implementation of reforestation based on local conditions. Moreover, there was not enough space for the participation of the local community in the reforestation projects under GERHAN, neither to get information about the project, nor to become directly involved in the project (except as short-term laborers). On the other hand, the ERP and the A/R CDM pilot project accommodated all actors and gave opportunity for the local communities to participate by working on the projects, community empowerment, or at least to get appropriate information about the projects.

In the implementation of reforestation projects using ERP and A/R CDM pilot project mechanisms, in addition to the government (elected and appointed officials), interest groups such as private sectors and NGOs also have a significant role. In the ERP, Toyota Boshoku funded the project, while JIFPRO had a role as facilitator, and BBTNBTS implemented the reforestation activities in the field. JIFPRO is a Japanese organization that was established to contribute government-level assistance (ODA) and facilitate private-level (NGO) cooperative efforts to promote international afforestation. Its aim is to extend various measures that comprehensively support international tree planting activities implemented through ODA and by NGOs by providing human resources, technology, and information. Activities of JIFPRO include developing human resources for the promotion of Global Forest Management and Conservation, campaigning to develop social awareness, supporting private sector efforts in international forestry cooperation, afforestation and reforestation activities in the

Tropics, collecting and disseminating information, studies and research on techniques of management, and conservation of tropical forest.

Moreover, NGOs and communities around the area (especially from Keduwung village) participated through the community empowerment program. Local people not only participated as laborers, but also provided seedlings for the projects. In the implementation of the A/R CDM in BTSNP, the interest groups represented by the private sector included Sumitomo Forestry Co. Ltd (SFC) and PT.KTI.

SFC is a company headquartered in Tokyo, Japan. The company has a wide range of business activities such as forest management; sales of timber, wooden products, chips, ordinary plywood, secondary-processed plywood, fiber board, metal building materials, housing equipment, and ceramic building materials; building of custom order housing, sales of built-for-sale housing and land for housing, and sales of interior products; and construction, sales, and renting of apartments/condominiums. Its business spans from South East Asia, Oceania, Far East, North America, and Europe. PT. Kutai Timber Indonesia is the wood manufacturing company established by a joint venture between Sumitomo Forestry Co., Ltd. Japan and PT. Kaltimex Jaya in 1970, whose primary business is marketing and manufacturing of plywood and wood product base in Indonesia. Since December 2001, 99% of PT.KTI's stocks were taken by Sumitomo Forestry. The company's Head Office is located in Jakarta, while its factory is located in Probolinggo, East Java. It also has branch offices in Surabaya, East Java, and Samarinda, East Kalimantan.

While SFC funds the projects, PT.KTI conducts field work, including planting, maintenance, and protecting the area. Although members of the local

community had roles as laborers, PT.KTI were involved for long-term, and got information about the projects since the preparation stage. Moreover, the plan for PT.KTI to develop community forestry in the private land offered another benefit for the improvement of economic and natural conditions for the communities.

The other policy actor component is research organization. According to Howard and Ramesh (1995), this policy actor is a significant set of societal actors in the policy process, composed of the researchers working at universities and think tanks. In the implementation of reforestation projects, the contribution of the research organization is quite significant. In the ERP, the research organization that is involved is UMM, who assessed the success of reforestation, especially the survival rate of the planted trees. In the A/R CDM pilot projects, CERINDO, an independent research organization whose members are experts of environmental issues, plays an important role in the formulation of PDD, which is a main administrative requirement for a project to be approved and considered as a CDM project by the National Authority and the Executive Board of UNFCCC. The Forestry Research and Development Board, another research organization under the Ministry of Forestry, also contributed in the preliminary research to get information about the possibility of developing an A/R CDM in BTSNP.

The last policy actor is the mass media. There is no denying that the mass media is a crucial link between the state and society. It can influence the preferences of the government and the society on public problems and solutions. However, in the implementation of these reforestation projects (GERHAN, ERP, A/R CDM pilot project) in BTSNP, the role of the mass media is weak.

It can be seen that there are many actors that are involved in the implementation of the ERP and the A/R CDM pilot project in BTSNP, while in the implementation of GERHAN only the government had a dominant role. Moreover, it can be seen that the role of interest groups, in this case business organizations (Toyota Boshoku, SFC, PT.KTI), is very strong. Although the private sector has a significant role in the implementation of the ERP and the A/R CDM pilot project in BTSNP, it cannot be denied that other actors also have important roles. The role of community in the reforestation projects is also very important. Allowing community participation in the implementation of the ERP and the A/R CDM pilot project brings about good results in the reforestation projects. In addition, the government, through elected as well as appointed officials, has a significant role. The Ministry of Forestry Decree No. 14, 2008 that regulates procedures of the A/R CDM did not allow the A/R CDM to be conducted in the conservation area, but the limited availability of land which met Kyoto Protocol[18] standards forced the government to develop the project in the national park. Additionally, the Ministry of Forestry launched the project and gave the recommendation letter for the implementation of the projects.

Besides the role of each actor, the relationship among actors in the implementation of reforestation projects in BTSNP was a key factor for the success of the projects. Communication and coordination intended to build a

[18] The text of the Kyoto Protocol did not set specific rules as to how LULUCF emissions and removals would be incorporated into the accounting system. The current framework for implementation, was finally accepted at COP 7 in Marrakech in 2001. The Marrakech Accords decided the eligibility of land use, land-use change, and forestry project activities under the CDM is limited to afforestation and reforestation for the first commitment period, and define 'afforestation' as the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land, and 'reforestation' as the direct human-induced conversion of non-forested land to forested on land that was forested but that has been converted to non-forested land.

partnership is one of the important requirements in the implementation of public policy. Van Meter and Van Horn (1975) revealed that one of the variables in the model of policy implementation is communication between the related organizations, which is connected with other variables in generating high performance of policies. Moreover, Hogwood and Gunn (1984) stated that there must be communication and coordination among the various agencies involved in a policy program.

As found in the implementation of the ERP and the A/R CDM pilot project in BTSNP, each agency implements the program in coordination and communication with others. DG-FPNC facilitated Toyota Boshoku and SFC to conduct reforestation in BTSNP by providing state forest land, and assisted with the administration of the project. BBTNBTS routinely coordinated and communicated with JIFPRO, SFC, and PT.KTI before, during, and after reforestation activities in the field. In the community empowerment programs under the ERP, BBTNBTS, LEM 21/Paramitra, and JIFPRO also communicated and coordinated in the implementation of the program. In the administration of the A/R CDM pilot project, CERINDO communicated with BBTNBTS in the formulation of the PDD, so that the PDD did not violate the regulations of national park management. Before deciding which species would be planted, and when and where the planting activities would be done, SFC and PT.KTI always coordinated and communicated with BTSNP. The annual plan and report were also prepared through communication of the parties.

Institutional characteristics as influenced by the overarching structure of social, economic, political, and the legal setting in which they operate also affected the implementation of reforestation projects in BTSNP. The

implementation of reforestation projects in BTSNP gave economic benefits for the local community. However, the ERP and the A/R CDM pilot project offer more benefits than GERHAN, as the projects were conducted in one area for a longer period. Even the ERP not only gave opportunity for the communities to work as laborers in the project, but also generated income sources by giving them training to make nurseries and then to sell the seedlings from the nursery to the project. The community empowerment program in this project also allowed the communities to identify local potency to be developed to enhance their livelihood, make development plans, and communicate the plans with the government.

The implementation of the A/R CDM pilot project in BTSNP also has absorbed many laborers from villages around the site. Monthly, PT.KTI hired at least 6 persons as its employees in the base camp and as foremen who patrol and monitor the plantation in the field. In the nursery, there are 3 persons hired by PT.KTI. For operational costs in the base camp, PT.KTI spent at least Rp. 20 million per month and Rp. 9 million in the nursery. For planting activities, PT.KTI used laborers from villages around the location such as Mororejo and Kandangan. Local people were hired to prepare the land, make holes for planting, distribute sticks, and fertilizer and plant seedlings. In a planting season, tens to hundreds of people were employed with wages of Rp. 25 000 per day. They work daily, 8 hours per day. On average, one laborer could plant 30 seedlings a day. Foremen and monthly employees' wages were Rp. 630 000 per month.

In addition to job opportunities, the A/R CDM pilot project activities also have given opportunity for local people to supply materials needed by the project such as fertilizer and sticks. The people around the site supported the project, as

stated by some laborers and the head of Mororejo village. According to them, the reforestation project brought about not only the improvement of natural conditions on the site, but also economic improvement of local people.

Political conditions also affected the decision to conduct the A/R CDM in BTSNP. Hosting COP 13 in 2007 led to increased attention on the climate change issue in Indonesia. Such attention also flourished in the Ministry of Forestry. Although according to Ministry of Forestry Regulation No. 14 which regulates A/R CDM in Indonesia, A/R CDM can be conducted in production forest and protected forest, not including conservation areas, the Minister of Forestry insisted on developing the project in BTSNP, which is a conservation area. Indeed, in November 2008, the Minister launched the project to the public and symbolically planted trees for the A/R CDM project with the Director of Sumitomo Forestry, although the regulation had not been changed. However, after 3 years of waiting, in April 2012 the Minister of Forestry issued Ministry of Forestry Regulation/Permenhut No 20/2012 on carbon activities, allowing the implementation of the A/R CDM in the conservation area. The issuance of the regulation escalated the possibility of the A/R CDM pilot project in BTSNP to be officially registered as a CDM project. The project also has already been listed on the UNFCCC website as consideration project since April 13, 2012.

4.3.3. **Commitment of Actors to Policy Implementation**

Commitment is important not only at the "street level" but at all levels through which policy passes (Najam, 1995). The Ministry of Forestry has high commitment to reforest the degraded area in BTSNP. Some reforestation projects have been conducted in the national park to ensure the ecosystem will

function optimally, as close to possible as before the area was degraded. In Tengger Highland, the most degraded area in BTSNP, at least 4 reforestation projects have been conducted in the thousand hectare area with the most allocated budget. In the first two reforestation projects, the government bore all the costs, but in the latest two projects, some foreign private companies have funded the projects, while the government was responsible for small portion of the cost, particularly for administration and forest protection.

The policy of the Ministry of Forestry to develop reforestation projects in BTSNP through partnership with the private sector [Toyota Boshoku-JIFPRO and Sumitomo Forestry Co. Ltd (SFC)] has bought about good results in the field work implementation. Although there have been some obstacles and problems in the field, during the five years of the ERP and in the first three years of the A/R CDM pilot project implementation, the projects have had success in comparison to GERHAN, which was held in the same location in the past.

The success of the ERP and A/R CDM projects was affected by the involvement of the private sector, especially foreign companies with their sufficient budgets, as well as high motivation to make the project successful, whatever the challenges. While the ERP project has finished (with an additional 1 year of maintenance), the A/R CDM pilot project is still in the implementation stage. Therefore, lessons from the ERP implementation can be taken for the success of the A/R CDM, especially with regards to field work.

Climate change mitigation is a national and even international agenda that does not belong to only one party, thus related parties should have prepared the budget to support the implementation of this program. According to simple cost analysis by CERINDO, the total cost of the implementation of A/R CDM activity

for 20 years is about 3 010 089 USD; sources of the funding include DG-FPNC, the BTSNP office, and SFC. It has been stated in the MoU that SFC is the party who responsible to provide financial support for some A/R CDM activities including site surveys, PDD formulation, seedling preparation, validation, verification, planting activities, monitoring, and certification of the project. Funds from SFC are handed over directly to the implementing agent in the field such as PT.KTI, who responsible to conduct planting activities in the field, and CERINDO, who formulated the PDD. SFC also finances other activities that are needed to support the success of implementation, such as dissemination of information and fire management.

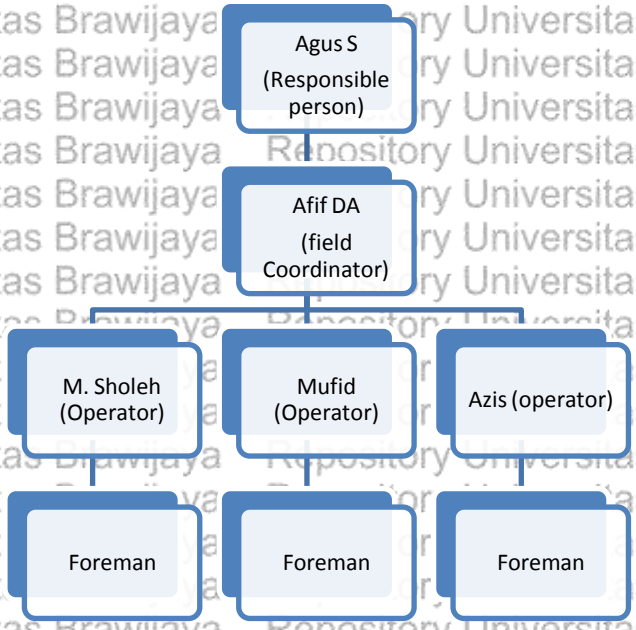
In order to support the implementation of the A/R CDM in BTSNP, the head of BBTNBTS formed a special team, the BTSNP CDM Secretariat. The team consists of some elements in BBTNSP representing the field management unit, technical staff, and functional staff related to CDM issues. During 3 years of implementation, the structure of the team has changed 3 times, depending on the need of action in the field and the changes of BBTNBTS's officials. According to the Head of BBTNBTS's Decree Number SK/07/21/TU-2/CDM/2011, the task of the team is coordinating and facilitating the implementation of CDM with other parties, and establishing pre-conditions needed for the continuity of the A/R CDM project in the future. The structure of the latest team is listed in Table 11:

Table 11. BBTNBTS CDM Secretariat Team

Role	Position (Name)	Task
Founder	Head of BBTNBTS (Ir. Soetrisno S)	-
Head of the team	Head of Technical Division (Ir. Emy Endah Suwarni)	-
Secretary	Head of Planning and corporation sub division (Farianna Prabandari, S.Hut, MSi.)	-
Members	Head of Field Management Division Area 1 (Ir. Setyo Utomo, SH, M.Si)	Field Coordinator
	Head of Utilization and Service Section (Siti Junaeti, S.Hut)	Responsible for community empowerment
	Head of Conservation, preservation and Mapping (Ir. Moch. Mulyono)	Responsible for forest fire management
	Head of SPTN I (Fatkhurrahman, SE)	Assist field coordinator, community empowerment, and FFM affairs in SPTN I
	Head of SPTN II (Tatag H Rudhata, SH)	Assist field coordinator, community empowerment, and FFM affairs in SPTN II
	Subur H. Handoyo (RPTN Tengger Laut Pasir)	Assist KTI and monitoring protection of the area in Resort TLP
	Basuki Agus P (RPTN Gn. Pananjakan)	Assist KTI and monitoring protection of the area in Resort Gn. Pananjakan
	Functional PEH (Ir. Boiga, MSc., Ir. Agus Dwi Andono, Nursidiq)	Monitoring evaluation of plant growth
	Forest Ranger Functional Polhut (Budi Santoso, Priyadi Urip Sentosa)	Protection of the CDM area

As a company who was chosen to conduct planting and maintenance activities in the field, PT.KTI also formed a special structure to manage A/R CDM activity in the field. Some positions, such as operators and foremen in the field, are recruited from villages around the A/R CDM location. Figure 24 shows the team structure of PT.KTI.

Figure 24. Structure of A/R CDM Team of PT.KTI



4.3.4. Capacity of Actors to Policy Implementation

Successful implementation is also a function of the implementing organization's capacity to do what it is expected to do. The ability to implement policies may be hindered by such factors as overworked and poorly trained staff, insufficient information, and financial resources or impossible time constraints (Van Meter and Van Horn, 1975).

In implementing reforestation projects in BTSNP, the capacity of government officers, especially BBTNBTS officers, is limited. As national park officers, the main tasks of BBTNBTS officers are protecting the national park,

preserving the park's biodiversity and ecosystem, and utilizing national park resources on a sustainable basis. Therefore, most of the park officers have no background on reforestation activities, although there are some officers with a background in forestry science.

Moreover, the conditions of the reforestation site, which is dry & located in hilly land, made it difficult to reforest. Unfortunately, limited capacity and experience on reforestation projects, especially in such conditions, hindered efforts to reforest the degraded land in the park. The same problem also occurred when a private company (who won bidding for the GERHAN project in BTSNP) conducted planting activities in the national park. Even though the company had much experience in reforestation projects under GERHAN in other areas, since the conditions of BTSNP (especially in Tengger Highland) are drastically different from other areas, the company failed to reforest the area.

Acknowledging that the ability of the government to conduct the reforestation project in many degraded areas in Indonesia including BTSNP is limited, the Ministry of Forestry accepted the assistance of the private sector, including foreign agencies, to participate in the reforestation projects in the park. JIFPRO and SFC are two foreign agencies that were allowed to conduct reforestation in the park, as they have capacity to do such projects; Figure 25 shows the spatial extent of some JIFPRO achievements.

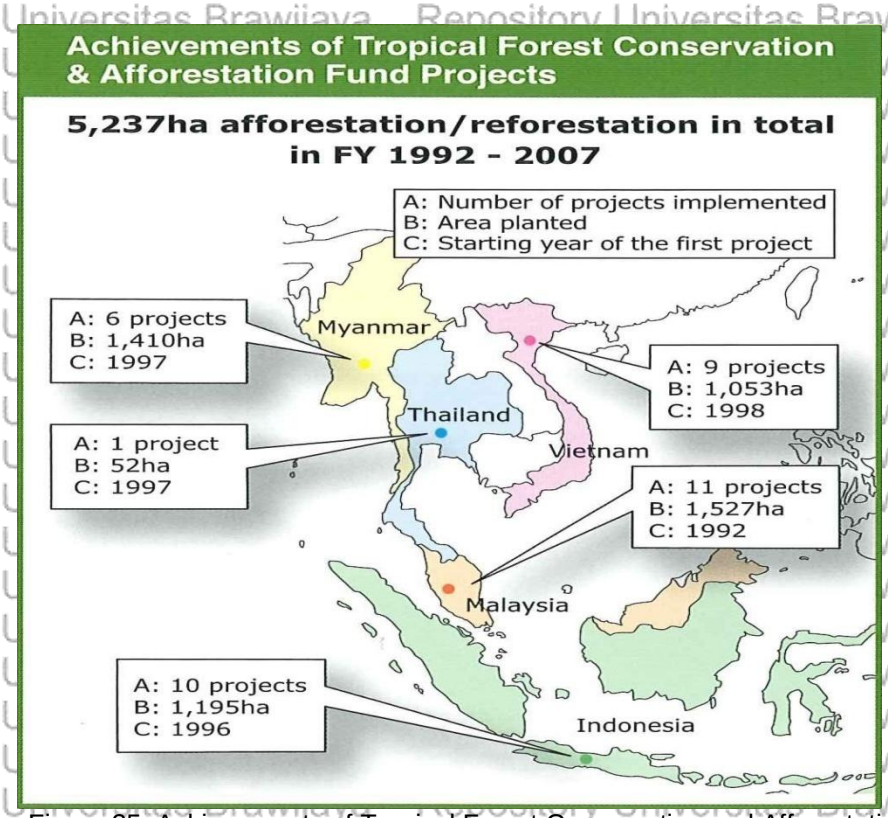


Figure 25. Achievements of Tropical Forest Conservation and Afforestation Fund Projects conducted by JIFPRO

Source: http://www.jifpro.or.jp/Activities/Re_afforestation/Re_afforestation_E.html

JIFPRO extends its own afforestation and reforestation scheme in the tropics with their "Tropical Forest Conservation and Afforestation Fund." The Fund was founded by JIFPRO in 1991 with the objectives being to restore the global environment, to improve the livelihood of local communities, and to promote friendship between various nations. The Fund is largely made up of contributions from two sources: donations received from citizens, companies and organizations in Japan, and grants from various funds set up by different bodies in Japan, specifically for the conservation of the global environment. With this Fund, so far a total of thirty-seven projects, large and small, have been implemented in five countries in Southeast Asia, in cooperation with central and/or local administrative agencies of those countries. As of the end of March

2008, a total of about 5 200 hectares of wasteland have been turned into green land through these projects, including twenty-nine completed projects.

Sumitomo Forestry Co., Ltd. (SFC), another private company permitted to conduct reforestation projects in BTSNP, also is well known for being involved in such projects. In Indonesia, Sumitomo has been in the forestry business on Sumatra, Borneo, and Java islands to develop resources in southern areas since 1942. Some joint ventures have been established to support its activities in Indonesia including PT. Kutai Timber Indonesia, PT. Rimba Partikel Indonesia, PT. Ast Indonesia, and PT. Sinar Rimba Pasifik. SFC also has a fine record in forest regeneration projects in Indonesia. It initiated the tropical forest regeneration project in Sebulu East Kalimantan, from 1991–2004 and successfully planted 738 000 trees in 503 ha, in land that had been degraded as a result of slash and burn land clearing.

The company realizes that environmental problems such as global warming and fossil fuel depletion are increasingly becoming global issues. From the perspective of a corporation, contributing to society and the global environment through business activities is both a vital social responsibility and key to corporate growth. Therefore, from April 2009, Sumitomo Forestry began a program of using plantations to absorb the CO_2 emitted over the lifetime of principal structural members, from the harvesting of timber to the construction of housing. The principal structural members used in housing generate approximately six tons of CO_2 per unit, from the cutting down of timber to actual construction. It is possible to offset this by planting trees on land area equivalent to two times the floor space of the house and cultivating these trees for ten years. In order to offset the CO_2 emitted by all the custom-built and spec homes sold

during the five-year period beginning with the 2009 fiscal year, the company planned to plant approximately 2 000 000 trees on 1 500 hectares of land over five years, then manage and cultivate the trees for another ten years.

Figure 26. Besshi Cooper Mine before reforestation (1881) and after reforestation (2003).
Source: SFC collection accessed online from SFC Website

Sumitomo decided to become involved in the A/R CDM project in BTSNP as part of the company corporate social responsibility (CSR) activities. The company intended to develop such projects in the spirit of promoting the welfare of the country and humankind in general. Although SFC realized that the physical conditions in the proposed area made it difficult for reforestation, by performing trial planting the company made sure that with effort, the reforestation could proceed in the area. The company's experience in reforesting degraded land in Japan also influenced the decision. Tracing back to the origin of the establishment of the Forestry Department in Sumitomo, forest degradation in Mount Besshi resulting from a copper mining operation forced the company to establish a major reforestation plan. Nowadays, the mine has been reforested to a lush green state (see Figure 26).

In the implementation of the A/R CDM, the GOI also tried to enhance the capacity of BBTNBTS officers, especially regarding the CDM. Therefore, before

the implementation of the A/R CDM pilot project, some personnel were trained for the CDM. In 2007, the first training session was held by the Directorate of Natural Services Utilization and Ecotourism in Cipanas Bogor, to which 6 persons from BBTNBTS were sent, including the former head of BBTNBTS. In 2009, BBTNBTS, in cooperation with JIFPRO, also conducted a training seminar for the A/R CDM, attended by some BBTNBTS officers and representatives from institutions related to the implementation of the A/R CDM in BTSNP.

As the company who is responsible for the field work activities in the implementation of the A/R CDM pilot project in BTSNP, PT.KTI also has a lot of experience in conducting afforestation and reforestation projects in Indonesia. It has been sponsoring planting activities since 2000 through cooperatives with farmers, farmer associations, private and government plantation companies, and forest observers. Between 2000 and 2004, PT.KTI, as a sub-contractor of Taman Nasional Way Kambas, Lampung, also rehabilitated the park's area that was burned. During those years, it cultivated 417 022 various kinds of *Dipterocarpaceae* trees on 360.11 ha.

4.3.5. **Clients and Coalitions**

Although the government and other implementing agencies have significant roles in delivering policy, it cannot be denied that the ultimate effectiveness of any implementation depends on the target to whom policy is being delivered. That is, the clients and coalitions of interest groups, opinion leaders, and other outside actors who actively support or oppose a particular implementation process (Najam, 1995).

In the implementation of reforestation policy in BTSNP, support from the local community, interest groups, and opinion leaders also have significant

influence. When GERHAN was implementing, limited information and benefit that could be reaped by the local community resulted in low support. In the Keciri area, some planted trees had been cut for making charcoal. This condition, along with other factors, led to the failure of reforestation through GERHAN in Tengger Highland.

On the other hand, planted trees from reforestation under the ERP and the A/R CDM pilot project have thus far not been disturbed. Local communities around the ERP site support revitalization activities because they acknowledge the ecological and economic benefits of the activities. They are also pleased because they were involved as employees in planting, maintenance, and protection of the plantation, and allowed to use the inspection road built in Argowulan. The community empowerment program has also allowed the community to enhance their livelihood. Local community and political leaders also give their support for the implementation of reforestation projects under the A/R CDM pilot project. During meetings with local communities and other stakeholders, in the launching ceremony, and during the first year planting ceremony, local community and political leaders as well as the local government stated that they support the implementation of the A/R CDM in BTSNP.

From the descriptions of content, context, commitment, capacity, and clients and coalitions in the implementation of reforestation projects in BTSNP, it is clear that the 5 C Protocol has an important role for the success or failure of policy implementation. Those 5 variables also interact with each other in affecting the implementation. The role of the 5 C protocol in the implementation of GERHAN, the ERP, and the A/R CDM pilot project in BTSNP, especially in Tengger Highland, can be seen in Table 12.

Table 12. Influence of the five C protocol in the implementation of reforestation projects in Tengger Highland, BTSNP.

Protocol	GERHAN	ERP	A/R CDM pilot project
Content	▸ Goals: reforest the area to overcome flood, landslide & drought problems ▸ Instruments: mandatory instruments ▸ Method: no land clearing	▸ Goals: reforest the area, revitalizing the ecosystem, enhance local livelihood ▸ Instruments: voluntary instruments (involvement of the private sector/Jifpro & Toyota Boshoku), mandatory instruments (law and regulation) ▸ Methods: no land clearing, intensive maintenance (replanting, fire management, routine patrol)	▸ Goals: reforest the area, absorb CO_2 ▸ Instruments: voluntary instruments (involvement of the private sector, SFC through PT. KTI), mandatory instruments (law and regulation), mixed instruments (dissemination of information) ▸ Methods: land clearing in line, organic fertilizer, intensive maintenance (replanting, fire management, routine patrol)
Context	▸ The project was set nationally without considering local condition ▸ Government has dominant role in the formulation and implementation policy	▸ The involved actors vary (government, research institutions, private sector, NGOs, local community) ▸ Economic benefit from the project	▸ Increased attention on climate change issues after hosting COP 13 in Bali ▸ National election in 2009 (political campaign, One Man One Tree) ▸ The involved actors vary (government, research institutions, private sector, local community) ▸ Economic benefit from the project
Commitment	▸ Limited budget from the GOI (especially for replanting, maintenance, patrol), as there	▸ Sufficient budget from private sector/Toyota Boshoku (for planting, replanting,	▸ Ministry of Forestry commitment (launched the project, issuance of recommendation

	were too many areas that need rehabilitation ▸ Bureaucratic budgeting system	maintenance, patrol)	letter although the regulation has not allowed) ▸ Allocation of forest fire equipment by DG-FPNC ▸ Budget allocation and training A/R CDM team by BBTNBTS ▸ Sufficient budget and resource allocation (planting, replanting, maintenance, patrol)
Capacity	▸ Limited human resources, though there were many activities that should have been managed (BTSNP officers' main tasks do not include reforestation activities, especially in Tengger Highland, where ecotourism is high)	▸ Physical facilities; nursery, bridge, inspection road ▸ NGO's staff capacity to facilitate community empowerment programs ▸ JIFPRO's experiences in reforestation projects	▸ Physical facilities; nursery, base camp, bridge, inspection road ▸ Skill level of agency staff (A/R CDM staff training) ▸ Sumitomo FC and PT.KTI's experience in reforestation projects
Client & Coalition	▸ Although local community around the site supported rehabilitation projects, there was limited information and direct economic benefits ▸ Some people cut replanted trees to fulfill their needs	▸ Local community supports revitalization activities; acknowledgement of ecological and economic benefits of the activities	▸ The economic and ecological impact of the project make the people around the site support the project, as stated by some laborers, the head of some villages, traditional local leaders as well as local government

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Deforestation in Indonesia has been a long-term process, involving many stakeholders and caused by many factors. It has occurred since the colonial era, and continues nowadays. Deforestation in Indonesia is mainly the result of forest-related policies that treat the forest as purely an economic resource. Development policy that emphasized economic growth and relied on the exploitation of natural resources led to forest degradation. Some policies that resulted in deforestation include the issuance of logging concessions, development of plantations, and transmigration. Because of those policies, many forested areas were converted to plantations (tea, coffee, rubber, and palm oil), transmigration settlements, and agricultural areas. In addition, inappropriate forest management and land use have triggered forest fires, which escalated deforestation in the country.

In Bromo Tengger Semeru National Park, deforestation happens mainly in the northern part of the park where Tengger Mountain is located (also known as Tengger Highland). The causes of deforestation in the area have varied over time:

1. During the Dutch Colonial Government era, forest conversion to coffee plantations was the main cause of deforestation in Tengger Highland.
2. During the Japanese occupation and the Independence War in the 1940s, deforestation was mainly caused by tree cutting for fuel (charcoal, firewood, and *jarak* plantations).

3. In the mid-60s, encroachment was main cause of deforestation in Tengger Highland.
4. After the area was declared a national park, encroachment, illegal logging, and forest fires have resulted in small-scale deforestation in Tengger Highland.

Deforestation has led to the loss of terrestrial carbon stock in Indonesia. Although deforestation occurs in conservation areas, the rate is much lower than other forest areas. Storing carbon through reforestation projects in conservation areas such as national parks provides many advantages. Designed as areas for the protection of life support systems, preservation of biodiversity, and utilization of natural resources in sustainable ways, in national parks timber harvesting is not allowed. Consequently, carbon stored in a national park will remain for a long period. Moreover, the clarity of property rights allows the projects to limit the conflict over land.

In order to rehabilitate degraded land in national parks as well as to mitigate climate change, some reforestation projects have been attempted. In BTSNP, one of the conservation areas in Indonesia, especially in Tengger Highland, at least 4 reforestation projects have been conducted through various schemes, including Gerakan Rehabilitasi Hutan dan Lahan (GERHAN), Revitalization Ecosystem Projects (ERP) and the Afforestation/Reforestation Clean Development mechanism (A/R CDM). Some projects successfully reforested the degraded land, while some failed. Though the GERHAN reforestation project failed to reforest the area, the ERP and A/R CDM brought about good results.

There are 5 critical variables that affect the success or failure of the implementation of forestation projects, named the "5 C Protocol." They are the content of the policy itself, the context in which the policies were implemented, the commitment and capacity of the actors involved, as well as the support from clients and coalitions. Each variable interacts with the other in affecting the success or failure of policy implementation. Among the variables, institutional context as well as clients and coalitions reflected in the socio-economic conditions and support of the local community have significant roles in the implementation of reforestation projects in BTSNP. Without support from the local community, the projects would not be successfully implemented. Similarly, without concern over the socio-economic conditions of local communities and involving the communities in the implementation of reforestation projects, successful implementation would not be achieved.

5.2. **Recommendations**

5.2.1. **Theoretical Recommendations**

The research results revealed the importance of content, actors, and socio-economic and political context to the success of policy implementation. Based on the research results, I take the position of Nakamura and Smallwood, (1980) and Walt and Gilson (1994), who argued that in order to ensure a policy is successfully implemented, it should clearly frame the underlying problem area, the policy's goals and objectives, and the population to be benefited, along with broad actions and strategies to address the problem. I also agree with Howlett and Ramesh (1995), who argued that in the public policy process, actors play a critical role, as well as Thomas and Grindle (1991), who argued that the social, political, and economic contexts influence what policies are developed and

whether and how those policies are put into practice. Moreover, I also agree with Najam (1995) and Brynard (2006) who suggested that the set of five critical variables (the 5C Protocol), namely content, context, commitment, capacity, client and coalitions, as well as the sixth C (communication), shape the direction of implementation.

5.2.2. Practical Recommendations

In order to prevent further deforestation in BTSNP as well as keep the planted trees undamaged, I offer the following policy recommendations:

1. Since the underlying causes of deforestation in BTSNP are the need of energy sources and other natural resources as well as rural poverty, BBTNBTS should consider those problems in national park management. Some policies which can be implemented include: a) allocating an adequate traditional utilization zone in the national park where local communities can utilize natural resources to fulfill their needs in a sustainable way; b) providing alternative energy resources for the local community (in cooperation with the local government, NGOs, and other stakeholders); c) giving Payment Environmental Services (PES) for the local community in exchange for protection of the national park area. In the reforestation site, certified emission reduction (CER) credits resulted from the reforestation can be sold and shared with the local community.
2. Considering the high cost needed to reforest the area and the high threat of forest fires and volcanic material, the reforestation site at this time should focus on the degraded land that has a low risk of exposure to ash from Mount Bromo. However, there needs to be research and field trials performed on

what species and techniques are most appropriate for planting in the volcanic area.

3. Regarding climate change mitigation, there are two possible schemes which can be implemented in BTSNP, as shown in the table below:

No.	Climate Change Mitigation Scheme	Advantages & Disadvantages	Follow-up Steps
1	A/R CDM	- The procedures to get approval from the DNA and registration as a CDM project is a long and complicated process - The A/R CDM pilot project in BTSNP has MOF recommendation & there is high support from MOF to achieve the next step - High risk of non-permanence, if the project only focuses on reforestation without considering socio-economic conditions of the local community	- Propose PDD to the DNA - Expand the scope of activity to accommodate community empowerment - Expand the area not only in the national park but also to private land to give opportunity for the local community to get trade carbon from community forestry
2	REDD+[19]	- Combining reduction in greenhouse gas (GHG) emissions with poverty reduction and the protection of biodiversity - Market funding has not been available for REDD+, however there are "non market" funds including private funding, and development aid through bilateral and multilateral channels	- Formulating the plan for REDD+ implementation - Coordinating among stakeholders

[19] Interpretations of REDD+ vary. A broad definition, based on the COP 13 decision in Bali in 2007, holds that REDD+ comprises local, national, and global actions whose primary aim is to reduce emissions from deforestation and forest degradation, and to enhance forest carbon stocks in developing countries (Angelsen, 2009).

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