

World Forests XVI

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A Goal-Oriented Approach to Forest Landscape Restoration

 Springer

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Contents

Part I Setting Goals

- 1 **A Tool for Comparing Alternative Forest Landscape Restoration Scenarios**..... 3
David Pullar and David Lamb
- 2 **Forest Landscape Restoration in the Netherlands: Policy Aspects and Knowledge Management** 21
Rob J.J. Hendriks, René G.A. Boot, Wim de Haas, and Herman J.F. Savenije
- 3 **Incorporating Social and Natural Science in the Restoration of an Indonesian Conservation Forest: A Case Study from Jambi** 41
Ulfah J. Siregar, Iskandar Z. Siregar, S. Wilarso Budi, Yulius Hero, Didik Suharjito, and Hardjanto

Part II Restoring Biodiversity

- 4 **Forest Landscape Restoration in China**..... 65
Weimin Xi, Huaxing Bi, and Binghui He
- 5 **Managing Forest Stand Structures to Enhance Conservation of the Amur Tiger (*Panthera tigris altaica*)**..... 93
Xuemei Han, Chadwick Dearing Oliver, Jianping Ge, Qingxi Guo, and Xiaojun Kou
- 6 **Restoration of Forests Associated with New Town Development in Hong Kong** 129
C.Y. Jim

Chapter 3

Incorporating Social and Natural Science in the Restoration of an Indonesian Conservation Forest: A Case Study from Jambi

Ulfah J. Siregar, Iskandar Z. Siregar, S. Wilarso Budi,
Yulius Hero, Didik Suharjito, and Hardjanto

3.1 Introduction

Indonesia, with its 130.6 million ha of designated forest,¹ has the third largest area of tropical forest in the world. According to the Indonesia Constitution, the forest area is administered by the Government through the Ministry of Forestry (MoF) as a national resource. The total forest area is divided into 55.6 million ha of conservation and protection forest and 57.2 million ha of limited production or production forest. A further 14.0 million ha have been identified as being available to be cleared and used for other purposes (MoF 2006). The natural production forest has been commercially utilized since 1960, becoming one of the main drivers of the Indonesian economy from 1980 to 1990 when a substantial global market share of the tropical timber trade was secured through exports of logs, sawn timber, plywood and other forest products.

o However, the exploitation of these natural forests has also become one of the main drivers of deforestation and forest degradation in Indonesia. During the period 1985–1997 the deforestation rate was 1.87 million ha/year. It then increased in 1997–2000 when 2.83 million ha/year of the designated national forests were cleared

¹ MOF 2011. Forest statistic of Indonesia. Forest area statistics vary among national reports, FAO and other sources. Often this reflects differences in definitions of forest. In the 2010 FAO Assessment, the forest area in Indonesia was 94 million ha. The larger area quoted here is based on recent (2011) Indonesian Ministry of Forests estimates.

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while another 0.67 million ha/year of forest outside the national forest estate was also cleared (MoF 2007). In the period 2000–2005 the deforestation rate was lower and averaged 1.08 million ha/year, with the highest rate of deforestation being found in Sumatra (MoF 2007). These patterns have led to the proportion of the GDP accounted for by timber production declining between 1997 and 2003.

Such extensive deforestation and forest degradation has raised regional and global concerns since this deforestation has been among the largest sources of carbon emissions in developing countries. But large areas of damaged forest lands also represent a potential resource of immense value (ITTO 2002). The Government has long been aware of the declining forest resources. It has made efforts to halt deforestation and forest degradation by combating illegal logging and introducing various restoration and rehabilitation programs.² These latter have included the establishment of forest plantations, promoting community forestry and designating new conservation areas. However there has been only limited success in restoring or rehabilitating degraded forests and lands. During the late 1990s only about one third of the targeted areas were successfully reforested (MoF 1998) while Iskandar et al. (2003) reported that in the year 2000 only 2.3 million ha of a 9.4 million ha target area were reforested. The involvement of local communities in the reforestation program has also been very low (Siregar et al. 2007).

This chapter illustrates the multiple causes of degradation of forests in Indonesia, some of the underlying conflicts involved in the management of forest resources and the difficulties encountered in many restoration and rehabilitation efforts attempting to operate on a landscape scale. The chapter is based on the Grand Forest Park restoration project in Jambi Province. This project was funded by ITTO based on a proposal submitted jointly by the Faculty of Forestry, Bogor Agricultural University and the Directorate General of Land Rehabilitation and Social Forestry, Ministry of Forestry, Indonesia.

3.2 Forest Land Use in Indonesia

Since the 1960s Indonesia has divided its land area into two categories. These are state forest land (Hutan Negara) and the rest. State forest land is administered by the Ministry of Forestry while the rest is administered for agriculture and settlement by other line agencies, including the Ministry of Agriculture (and Estate Crops). The National Land Administration Agency (Badan Pertanahan Nasional) has technical responsibility for the tenure of all land, land surveying and the issuing of entitlements but, in practice, it does not oversee activities on state-owned forest land. Local community and forest dwelling people within state forests have been

² Corruption has seriously hampered enforcement of forest policies and regulations in Indonesia, which ranked 100 out of 182 countries in the 2011 Corruption Perception Index of Transparency International (<http://cpi.transparency.org/cpi2011/results/#CountryResults>).

accommodated in a number of ways, but their legal rights over the land according to 1967 Basic Forest Law is secondary to the interest of the state. Later, the new Forestry Law No. 41/1999 and subsequent regulations issued by the MoF created new avenues for improved local access and rights over forest resources, such as Collaborative Management in Protected Areas (Forestry Minister Regulation No P19/2004), Social Forestry (Regulation No.91/2001), Community Forests, Community Forest Plantations, and Customary Forests (Regulation No. 6/2007).

An increasing Indonesian population, which was 219.9 million people in 2003 (BPS 2005) has put enormous pressure on forested land, because around 48.8 million Indonesians live in and around forest areas. Around 10.2 million of these people are classified as poor (CIFOR 2004 and MoF 2006). The current land tenure system, which limits local access and rights of such poor people, has created conflicts over land use throughout in Indonesia.

3.3 The Grand Forest Park Sultan Thaha Syaifudin – Jambi Province

3.3.1 *The Forest*

The Grand Forest Park Sultan Thaha Syaifudin (GFP) in Jambi Province (once known as Senami Forest) was designated as a forest area during the Dutch occupation and had a clear boundary (Fig. 3.1). Later, by the Governor's Decision Letter No. 18 in 1983, the 15,830 ha forest was divided into two areas. One part was designated as a watershed protective forest and the other part was allocated to (limited) timber production. At that time any limited production forest in Indonesia was usually managed by private timber companies. Each company held a logging right or concession from the Ministry of Forestry for certain period of time, with an agreement that the company would manage the forest area sustainably. At the end of the contract, this right could be terminated or extended, depending on the company's performance record.

In the case of the Grand Forest Park Sultan Thaha Syaifuddin forest, worsening forest conditions led the government to terminate the concessions in 1993 and assign the whole area as a conservation forest area managed by the Regency/District Forest Service (Dinas Kehutanan). Dinas Kehutanan is a local, district-level institution under a Provincial Government, which is in charge of local forestry and forest management. In practice Dinas Kehutanan implements local/provincial policy upon its territory with guidance of other forest institutions belonging to central Ministry of Forestry, such as Natural Resource Conservation Agency (BKSDA), Watershed Management Agency (BPDAS) and Forest Area Gazettement Service (BPKH).

But changes in the political situation in Indonesia, followed by the economic crisis in 1997 have led to encroachment and, in some areas even occupation by local and immigrant people. Degradation continued to the point where the original ecosystem is almost unrecognizable. Efforts to restore the forests by the Dinas Kehutanan have been hampered by both a lack of technical capacity and funds.

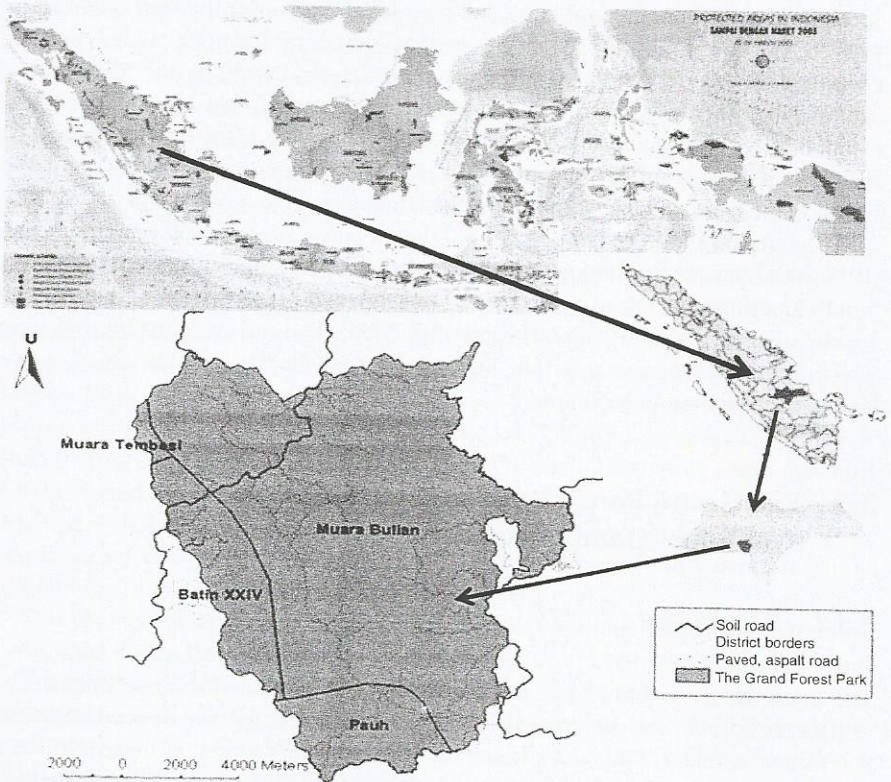


Fig. 3.1 Location of Grand Forest Park Sultan Thaha Syaifuddin, Jambi Province, Indonesia

3.3.2 Historical and Social Background

Before considering approaches to forest restoration that have been undertaken in the area it is useful to consider some of the historical and social background surrounding this forest. Jambi Province has an old history starting in the sixth century CE with the discovery of an ancient relic dated at 686 CE. An old Malay kingdom governed the Jambi area at that time and then this was succeeded by an Islamic kingdom during 1460–1907. When Indonesia gained its freedom in 1945 Jambi was designated as a Residence, and then in 1957, as a Province, which was directly under the Central Government of Indonesia. The GFP is surrounded by ten villages and in 2004 the total population of those villages was 23,156 people, consisting of 12,192 males (53%) and 10,964 females (47%). Most of this population is concentrated in three villages namely Bungku, Sridadi, and Jangga Baru. The population density is 57.7 people per km². Most Jambi people are Moslem but there is one community, namely Suku Anak Dalam, which is made up of indigenous forest dwellers and which has an ancient non-Islamic culture involving matrilineal lineage

and nomadic way of life. Although dominated by people following traditional practices this community has allowed some immigrants to join it.

At present the Jambi population consists of a heterogeneous mixture of native people and immigrants from various provinces in Indonesia, such as Javanese, West Sumatranese (Minang), Chinese and Bugis (South Sulawesi). Each of these communities brings with it a different culture and attitude. Most people living in and around the Grand Forest Park work in agriculture, either as farmers or in estate crops such as oil palm. The main economic drivers in Jambi are crops such as rubber and oil palm, as well as forest products like sawn timber and plywood. However, the termination of forest concessions has left many community members unemployed. Some of these people now regard the forest area as an *open-access* resource that they can still log to increase their income.

These illegal loggers can be classified into three groups (Suharjito 2006). They include villagers living in the GFP area (Jebak village), villagers living near the GFP area (Singkawang, Sridadi, Mekar Jaya, Pompa Air, Bungku, Jangga Baru, Empelu and Tenam villages) and investors (in illegal logging) coming from more distant areas (Muara Bulian, Jambi, Kerinci, Jakarta and Wonosobo). They can also be classified as either farmers (peasants), public servants (including police, legislative member), entrepreneurs, and village leaders. The illegal loggers mostly come from Sub-Districts such as Muara Bulian, Muara Tembesi, Bajubang, and the outside Batanghari District. Some Government officers, including police, have sometimes also been involved in illegal logging activities.

Law Number 22/1999 on government decentralization has devolved authority and responsibility for natural resources management from central to local government, and shifted the coordinating authority from provincial to regional/district governments. However, the lack of capacity at regional government has made implementation and communication flow between the central and regional government slow. This difficulty was later accommodated in Law No. 32/2004, which does not separate the authorities of regional, provincial and central governments, but requires a common effort from those different government levels in administering national governance based on three main principles, namely Government Efficiency, Externalities, and Accountability (MoF 2006). Most people do not have clear understanding about the different levels of government authority and responsibility. As a result, conflicting policies often develop between different levels of government concerning certain forest areas.

However, this has not been the case at Grand Forest Park. Law No 5/1990 and Government Regulation No. 68/1998 both state that Grand Forest Park is a conservation area meant for research, acquiring knowledge, providing opportunities for education and supporting culture or cultural practices, eco-tourism or public recreation. Grand Forest Park is also special because it is the only type of forest conservation area in which authority has been given by the Central Government to the Local Government. Other types of forest conservation area such as national parks, nature reserves, nature eco-parks, wild life reserves and hunting areas are managed by Central Government through the Ministry of Forestry. The policy on Grand Forest Park has provided full freedom to the local government agencies to manage the park.

Together with the decentralization law, the government issued Act No. 17/2003 concerning State Finances and Act No. 33/2004 on Fiscal Balance between the central and regional governments. The regulations allow regional governments to explore various means of generating additional funds (i.e. local revenue) through levies on sectored revenues such as forestry, mining and transportation. This has become the incentive for the regions to maximize their fiscal allocation by exploiting their forest resources to the greatest extent possible. One consequence of this is that it has put the sustainability of regional forest resources at risk. This situation is worsened by the continued expansion of estate crop plantations such as oil palm and rubber which has caused illegal forest conversion in some areas.

3.3.3 Biophysical Background

The GFP area lies between $1^{\circ} 45' 55''$ and $2^{\circ} 14' 30''$ south latitudes and between $103^{\circ} 12' 30''$ and $104^{\circ} 47' 30''$ east longitudes. The land is flat to undulating with an altitude range of 10–100 m above sea level. The average rainfall is 2,265–2,976 mm with 176 rainy days per year. The dry season usually starts in April and lasts until October, and the following wet season begins October until the next April. Recently, however the commencement and length of the dry and rainy seasons have been rather more variable (Siregar et al. 2006a). Humidity ranges from 62 to 84% and temperature normally ranges between 20 and 30°C.

Dominant soils in the area are red yellow podzolics (70%) followed by alluvials (18%), granosols (3.24%) and other soil types (8.58%). The bulk density varies between 0.91 and 1.42 g/cm³, normal porosity ranges from 49 to 66%, and permeability to water is usually 2.11–13.18 cm/h. From the percentage of silt (13 to 43%) and clay (19 to 42%), the soil can be classified as sandy loam to light loam (Wilde et al. 1979). Although soil exchange capacity (6.16–13.56 meq/100 g) is moderate, the degree of base saturation (7.60–28.99%) is relatively low (Siregar et al. 2006b).

The original forests were rich in commercially valuable species. Previously the GFP area was famous for its iron wood or bulian (*Eusyderoxylon zwagerii*). In the past iron wood grew in almost every part of Jambi's forests, except Kerinci District (Irawan and Gruber 2003) and was associated with more than a hundred other commercially useful tree species. These included meranti (*Shorea* spp.) mersawa (*Anisoptera costata*), medang (*Litsea* spp.) while balam (*Palaquium* sp.) were also important commercially. Non-timber forest products were also important including jernang/red colored resin (from *Daemonorops draconcellus*), resin (dammar), jelutung tree-sap, honey and fruits. Many native plants used by local people, such as Mahang (*Macaranga* sp.), wild durian (*Durio* sp.), Tembesu (*Fragraea fragrans*), Merpayang (*Caphylum macropudum*), Kempas (*Koompassia malaccensis*), Balam (*Payena* spp), Jelutung (*Dyera costulata* sp), rattan Manau (*Calamus mannan*) and

also found in these forests. However, recent vegetation surveys have revealed that very few of these tree species are still common.

There are now three types of forest cover in the area, namely, secondary forest, degraded forest land, and rubber tree plantations. Secondary forests are dominated by less economically important species and have an average basal area of only 15.6 m²/ha (Pamoengkas et al. 2006) while degraded forest land consists of bushy grassland and bare land. Some of these degraded lands have been planted with rubber trees or oil palm by local communities. The communities then consider these plantations as being their own property although some also belong to investors from outer villages. Despite these changes in the nature of the forest cover a number of important animal species have been recorded as being still present in these residual forest areas including Harimau Sumatera (*Panthera tigris sumatrae*), Tapir (*Tapirus indicus*), Kijang (*Muntiacus muntjak*), Beruang Madu (*Helarctos malayanus*), Kancil (*Tragulus sp.*), Siamang (*Hylobates syndactylus*), Landak Sumatera (*Hystrix brachiura*), Trenggiling (*Manis javanica*), Kera ekor panjang (*Macaca fascicularis*), Badak (*Buceros rhinoceros*), and Kuau (*Arguasianus argus*). However, important wildlife such as tiger and deer are now thought to have disappeared from the area.

It is important to note here that most of this conservation forest area was formerly a concession forest and there is no clear demarcation and separation of the whole area into zones, such as a main conservation area, utilizable zone and buffer zone, which are usually present in most other conservation forests. Instead, the whole Grand Forest Park area is more representative of many present-day tropical forest landscapes in Jambi Province and contains a mix of secondary forest and degraded forest lands interspersed with extensive areas of other, non-forest land-uses, with many people living in this area depending on the agricultural and forest resources to maintain their livelihood.

Restoration of this conservation area is very difficult because of severe conflicts among stakeholders over land-use and the uncertain patterns of land tenure. On the one hand, the local government (represented by the Dinas Kehutanan), which is the legal landholder, wants to restore the forest as a conservation area. On the other hand, the local community (who were responsible for deforesting the area) wants to continue to occupy it and use it for agriculture. Several past efforts by law enforcement agencies to drive out the illegal occupants and plant trees in the area have failed since the illegal occupants kept coming back, removed the planted trees and replaced them with rubber trees or oil palms. These failures suggested that a top-down rehabilitation and restoration program of the area would not work and that a different approach involving local community participation is necessary. Almost all stakeholders – government agencies as well as local people – share some responsibility for forest degradation. However, local people will be expected to become the main actors in restoring and managing the forests. Therefore, building the capacity of local communities seems to be the most appropriate approach to be used, and the development of supporting policies at the national, regional and local levels should become priorities.

3.4 The Restoration Approach

Restoration necessarily involves dealing with socio-economic aspects as well as biophysical issues. Nawir et al. (2007) pointed out that various factors need to be addressed in a rehabilitation effort if it is to be sustained. These include having an appropriate project design to ensure the generation of multiplier effects and using appropriate forestry extension programs to ensure the adoption of a rehabilitation approach by community. There must also be an enabling policy framework to resolve socio-economic problems.

3.4.1 *Socio-economic Aspects*

The restoration, management and rehabilitation of degraded and secondary forests can only succeed if land tenure, land user access and customary property rights are secure and forest governance is effective (ITTO 2002). Local community rights and access over forestlands can be improved through adopting a collaboration approach and many have found this is the most effective way to solve natural resources conflict (Buckles and Rusnak 1999; Wondolleck and Yaffee 2000). Stakeholders are able to share their resources (information, money, labor, etc.) through collaboration and solve problems that cannot be solved by the individual participants.

Restoring or rehabilitating a forest ecosystem requires the changing of people's perceptions, attitudes and behaviors (ITTO 2002). But there are three common impediments to changing people's behavior. The first of these concerns the institutions and regulations surrounding restoration. These involve local governments, their role in providing permits for various land use activities and their sometimes inconsistent policies and regulations. These problems often generate conflict over land tenure. To cope with these challenges it is necessary to raise the awareness of local governments and other stakeholders such as the local community and private sectors about what forest restoration can involve and the benefits it can provide. This can be done by distributing information through media or through village meetings. The more communities know about the benefits likely to arise from restoration, the more likely it will be that conflicts can be avoided. The support of local community and other stakeholders can only be obtained when their role and expected contribution in the restoration project is explained. However, explanation by itself is not enough and communities also need to be empowered. This means consistent policies and regulation need to be developed through negotiation and coordinated planning among related sectors at various levels. Good relationships should be established among responsible institutions and there should be a similar perspective concerning the task at hand in each body.

The second impediment needing to be overcome is the necessity for landholders to receive an economic benefit from any restoration project. Without this it is likely to be impossible to get support for change. The main economic problems faced by

farmers in many communities are the difficulties of getting access to credit or financial support, the high opportunity costs of restoration, the long gestation period and the perception of a limited market for many of the products arising from restoration. To support improvements in people's livelihoods and community welfare, restoration project developers can help mobilize various funding sources and schemes for small scale project activities, such as community forests or small multipurpose trees plantation. In this way, people's livelihoods can be integrated into restoration projects making it more likely they will participate. Provision of information about markets for non-wood products and for forest-based services such as carbon storage may provide further opportunities to improve the local economy.

The third and final impediment to restoration concerns technical problems such as the often limited availability of planting materials, technical guidelines and expert assistance. Similarly there can be limitations imposed by labor availability, land productivity and land suitability. These will only be resolved by strengthening the capacity of relevant institutions to provide the necessary technical assistance.

3.4.2 Biophysical Aspects of Forest Restoration and Rehabilitation

The nature of simple monoculture tree plantations are widely understood but a distinction needs to be made between rehabilitation and ecological restoration. The term forest rehabilitation has been used to describe a variety of practices when more than one species is used to restore degraded agricultural land and can include different forms of agroforestry, multi-species tree plantations or improvement of the productivity of natural regrowth forests by relatively minor intervention measures such as liberation thinning and enrichment planting (Sarre 1995). Rehabilitation is basically a man-facilitated recovery process that improves forest biomass and functioning though not necessarily recreating the original forest composition (Lim 1992). The term ecological restoration, on the other hand, will be used to indicate an attempt to restore a forest to something like its original composition. The distinction between these alternatives can be seen in Fig. 3.2. According to Lee (2004) the attributes of an ecosystem and can usefully be simplified into two main components, namely structure and function. The component described as Ecosystem Structure is concerned with the species composition, forest cover, canopy height, etc. The component described as Ecosystem Function is concerned with the biomass present, the degree of nutrient cycling, water use etc. Ecological restoration involves re-establishing more of the original structure and composition than Rehabilitation although the degree to which Ecosystem Functioning is restored may be similar.

Restoration at a landscape scale raises additional issues. The IUCN and WWF define forest landscape restoration as a process that aims to regain ecological integrity and enhance human well-being in deforested or degraded forest landscape (Maginnis and Jackson 2002). It focuses on restoring functionality of the forest and the provision of goods, services and ecological processes. Given the need for economic benefits

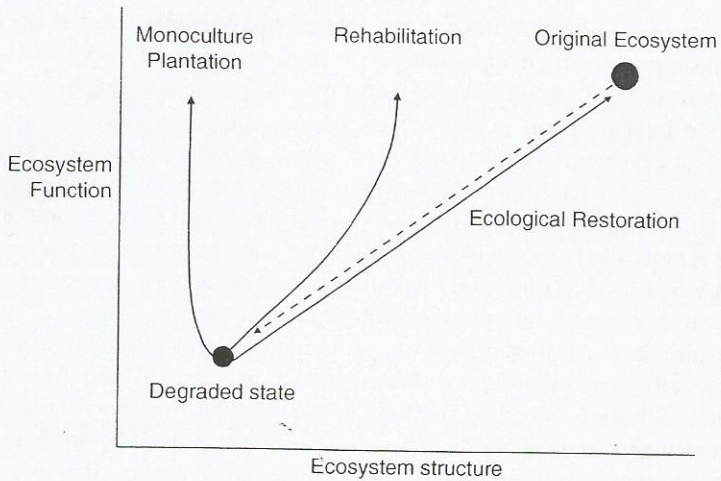


Fig. 3.2 Ecosystem degradation can be expressed in terms of structure (e.g. species richness, forest cover, height, etc.) and function (e.g. biomass, nutrient cycling etc.); degradation occurs when an ecosystem loses structure and a capacity to function. Restoration, rehabilitation or monoculture plantations may all recover much of the original forest functioning but differ in the extent to which they recover forest structure

to be generated it may be necessary to involve mono-specific estate crops as well as different types of agroforestry and other forms of afforestation to overcome degradation at a landscape level. Rehabilitation and ecological restoration may both have a role to play in different parts of the landscape.

Given that rehabilitation allows for more flexibility in the composition of the new forest it is an especially attractive option in many rural landscapes. Perhaps the most important decision to make when initiating a rehabilitation program is to decide which species to plant. The species selected not only influences silvicultural practices but also the type of utilization possible in the future. Considerable ecological and silvicultural knowledge exist to guide this choice although stakeholder's objectives and needs may change over time. Incorrect species choices and changes in stakeholder priorities mean that an adaptive approach to management is required. This adaptive approach should be incorporated into the collaborative management plan.

According to Evans (1992), the choice of which species to use depends on three basic questions (i) What is the purpose of the intended plantations? (ii) Which species are potentially available for planting? (iii) What will grow on the site available? Much depends on the type of site in which planting is being done but, in most cases indigenous species are recommended because these species are often adapted to the environment and already filling an ecological niche. In addition, indigenous species, even in monocultures, are generally considered more ecologically valuable than exotics for conservation of native fauna and flora (Evans 1992).

3.5 Rehabilitation and Ecological Restoration in Grand Forest Park

Because of the diverse interests from the stakeholders the Government, through Dinas Kehutanan and the District Natural Resource Conservation Agency (BKSDA), decided that there should be three types of forests in Grand Forest Park namely (i) conservation forests, (ii) production forests and (iii) buffer zone forests. The location of the conservation and production forests was determined by their present condition with the former being based on areas where some residual secondary forests persist while the production forests were located in areas where most of the original forests had been severely degraded. Forests in the conservation areas are to be strictly protected to conserve native species. Forests in the production areas are also used to conserve native species but, in this case, some degree of utilization is permitted. In the buffer zone forest of Grand Forest Park there is more freedom to utilize and modify the species composition.

Even though stakeholders recognize the authority of the Dinas Kehutanan over the forested area in practice they have tended to undermine it. They have done this by regarding the forested area as an open access resource which could be encroached upon, cleared and used for agricultural crops, rubber or oil palm plantation or even for settlement. This meant that in undertaking restoration there was a need to firstly, improve the degree of mutual understanding about forest restoration and then, secondly, to build a commitment to forest restoration amongst villagers and government agencies, and, finally to increase the capacity of villagers and local government agencies to actually undertake various forms of restoration.

3.5.1 Fostering Mutual Understanding Among Stakeholders

A number of steps were undertaken to build a commitment to restoration and foster mutual understanding between stakeholders. These were undertaken with the assistance of facilitators, consisting of local university staff, agriculture and forestry extension officers, NGOs and community leaders. The first step was to obtain a better understanding of just who the various stakeholders were. The following types of information were collected:

1. Primary information: the name of the individuals or groups, their affiliations, the principal members/leaders and contact information;
2. General characteristic of each group: the formal or informal mission and interests, related activities in other places; formal or informal authority over the activity; size and scope of influence (e.g. membership, employment, land area);
3. Interests: the future outcome likely to be desired by each stakeholder, in both the short term and long term;
4. Probable levels of involvement: the ways in which the stakeholder might wish to participate in restoration;

5. Stakeholders' needs: what sorts of things each stakeholder might require in order to participate, ranging from basic information about the project through to an invitation to take a leadership role.

This information was collected by interviewing individuals, undertaking focus group discussions and through workshops. The categories of stakeholder involved in this process were as follows:

1. Villagers living around the forest, particularly from Senami Baru, Sridadi, and Bungku villages. These people have a strong dependence on existing forests because they use them to collect various forest resources. Many are also interested in the forests as potential sources of agricultural land;
2. Forest encroachers coming from more distant villages whose interest is in the land under the trees rather than the forest itself, particularly for rubber cultivation;
3. Local NGO activists, academicians and researchers who are interested in forest protection and conservation. These groups are primarily concerned about the intrinsic value of the forests and in maintaining ecosystem functioning.
4. Government officials and public servants who are responsible for forestry development. These include district forestry services, provincial forestry services and related sectors such as agriculture services, industrial services, heads of regional/district planning agencies, heads of police resorts, heads of sub-districts (Camat) and the Provincial Watershed Management Agency (BPDAS) staff members who have the legal authority to protect, preserve, and enhance conservation forest resources;
5. Forest entrepreneurs (the forest industry) who utilize forest products and pay tax as well as others having a commercial interests in the forest such as illegal loggers and charcoal makers;
6. District parliament (District Legislative) members who represent citizens and who are legally responsible for public resources;
7. Donors who are assumed to represent the 'global interest'. These are mostly groups having environmental concerns but increasingly they are also represented by donors concerned with welfare impacts.

This analysis confirmed there were quite different perceptions among stakeholders about the nature of forest resources. These depended on the nature and intensity of the interaction each group had with the forest. Stakeholders' perceptions were affected by past experiences as well as their knowledge, interests and values. This meant it was important to achieve some degree of mutual understanding among stakeholders of the socio-economic problems as well as of the ecological functions performed by different types of forests.

3.5.2 Building Stakeholders' Commitment to Rehabilitation and Ecological Restoration

From series of interviews, group discussions and workshops, it became clear that most stakeholders recognized the importance of restoring the key forest functions. Most of them have witnessed the negative impacts of forest destruction in the

recent years, such as reduced availability of forest products, frequent forest fires and the reduced availability of water. This had not necessarily prevented some of them from destroying the forest. The main reason behind this contradictory attitude was always the desire to generate higher incomes. Moreover, there has been no trust among stakeholders with everyone being suspicious of each other. All assumed the others were also trying to obtain as great a benefit as possible from the remaining forest.

During this process it also became clear that Dinas Kehutanan, as the legal authority over the forest, was unable to guard the forest by itself because of a lack of capable persons and funds. This meant that the best solution would be for Dinas Kehutanan to adopt some form of collaborative forest management with the local community. The local community was willing to do so provided it also had some form of tenure that gave it legal access to at least some forest resources.

In order to achieve this, a series of dialogues was begun with stakeholders followed by a major workshop involving the facilitators referred to above. The initial dialogues involved the District Forestry Service, the District Development Planning Agency and the District Parliament (District Legislative). Another dialogue involved the District Forestry Service and the Vice-Head of District (Wakil Bupati). The participants in the workshops included representatives from hamlets/villages as well as local governments, local NGOs and local universities. The result of these activities was a greater level of mutual understanding concerning the problems needing to be addressed. Agreement was also reached between stakeholders of their roles, obligations and rights concerning forest restoration within Grand Forest Park. In addition an agreement was reached between farmers and local government over temporary tenure arrangements for afforestation in some areas.

3.5.3 Building Stakeholders' Capacities to Undertake Forest Ecological Restoration

The third task was to improve the capacity of the communities and government agencies to undertake forest restoration. A training needs assessment was conducted to identify existing knowledge and skills and the need for capacity building. Subsequently, a series of training sessions, started with training of trainers, was undertaken by facilitators together with agriculture and forestry extension officers. This training covered both socio-economic as well as silvicultural aspects. It included the development of forest farmer groups and establishing improved methods of cooperation between forest farmers and District Forestry Services. Based on exercises carried out during this training, stakeholders were able to produce an operational plan for the restoration work. Extension workers also distributed seedlings, fertilizer, and other materials needed for forest restoration and assisted farmers in designing and establishing their plantations. Extension workers sought to take gender, social categories and social classes into account when designing their training program to ensure that women, landless farmers, taciturn people, and powerless people could participate in the restoration project

3.5.4 Designing and Implementing Rehabilitation and Restoration Plantings

Following these various discussions, agreement was reached on the types of plantings to be carried out in the Grand Forest Park. As noted earlier, the distribution of conservation and production forests was determined by the degree of degradation that had occurred in the past and restoration treatments were allocated accordingly. One restoration plot of 200 ha was placed in a fragment of secondary forest, which was regarded as the main conservation area. Two rehabilitation plots of 100 ha each were established in a more severely degraded secondary forest, which was regarded as more suitable for production forest. Finally, two agroforestry plots of 50 ha each were established in bushy grassland area, which was regarded as representative of a future buffer zone. The location of these plots can be viewed in Fig. 3.3. All these plots were intentionally placed in different villages, in order to involve as many communities within the Grand Forest Park as possible. The spatial distribution of these plantings did not seek to improve the connectivity between residual forest areas within the project area but, rather, sought to explore the outcomes of different types of restoration as a first step towards developing a Master Plan for the area.

In the conservation zone involving ecological restoration plantings, 90% of the species to be planted were to be forest tree species, preferably native to the area, and 10% were to be multipurpose tree species (MPTS). The MPTS included only fruit trees commonly found in natural forest and explicitly excluded rubber trees. In the production forest zone which involved rehabilitation plantings, 60% of the species planted were to be forest tree species and 40% MPTS. In this case the MPTS could include 30% rubber tree and 10% fruit trees. In the buffer zone, which is already occupied by local communities, agroforestry systems were to be established as a transition phase, before the zone finally becomes a utilizable zone. Some of the main species chosen for each zone are shown in Table 3.1.

Planting areas for the restoration project were mapped by representatives from each of the nearby villages and Dinas Kehutanan officers, as guided by facilitators. In each case the boundaries of the plantation site were marked by village representatives and these boundaries were verified by a local Government forestry Dinas Kehutanan officer. Arrangements were made to provide workshops and temporary offices, temporary nurseries and temporary camps/barracks for those involved in the actual planting program.

Potted seedlings were used in plantation establishment. A number of potential suppliers were identified including farmer groups, local communities and local commercial suppliers. Several criteria were used to ensure only high quality seedlings were used. These were that: (i) seedlings grown from local seed source were preferred, (ii) seedlings were healthy, free of pest and disease and (iii) polybags were used and the media in which the seedlings were grown was suitable.

Transportation facilities, such as temporary and permanent bridges from temporary nursery to planting sites needed to be secured since it is preferable that only a limited number of seedlings, sufficient for that and the following day's planting are

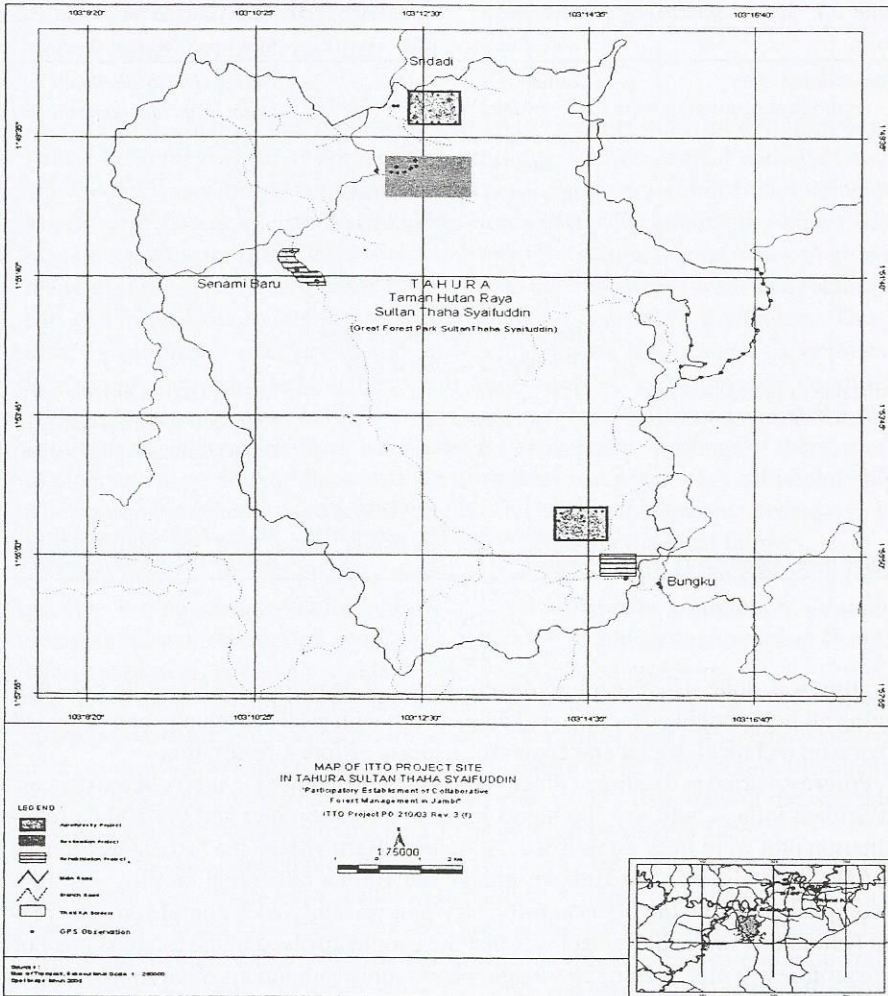


Fig. 3.3 Location of 200 ha restoration plot (uniform grey shading), 100 ha rehabilitation plot (horizontal lines) and 50 ha agroforestry plots (blocks with dark boundaries) in three different villages”

taken into the field at any time. Seedlings were carried in the planting sites using containers that could be easily lifted and dragged.

Planting sites were prepared by: (i) clearing shrubs and bush within the line planting, (ii) securing working roads, (iii) digging the planting hole and (iv) installing support stakes. All works were carried out manually, involving selected farmers representing each community and supervised by forest officers. Sites where natural constraints had been identified by local people such as rocky areas with shallow soils were excluded. Plantations were closely monitored and replacement or supplementary

Table 3.1 Species selected by stakeholders for planting each zone of the Grand Forest Park

Zone	Forest tree species	Multi purpose tree species
Conservation zone (ecological restoration work)	Bulian (<i>Eusideroxylon zwagerii</i>)	Durian (<i>Durio zibethius</i>) Duku (<i>Lancium domesticum</i>)
	Meranti (<i>Shorea spp</i> and <i>Hopea spp</i>)	
	Jelutung (<i>Dyera costulata</i>)	
	Damar mata kucing (<i>Shorea javanica</i>)	
	Rattan jernang dan manau (<i>Calamus spp</i>)	
	Red Balam (<i>Palaquium spp</i>)	
	Tembesu (<i>Fragrarea spp</i>)	
Utilizable or production zone (rehabilitation work)	Mahoni (<i>Swietenia macrophylla</i>)	Rubber (<i>Hevea braziliensis</i>) Nangka (<i>Artocarpus integra</i>) Duku (<i>Lancium domesticum</i>)
	Sungkai (<i>Peronema canescence</i>)	
	Pulai (<i>Alstonia scularis</i>)	
	Gmelina (<i>Gmelina arborea</i>)	Mangga (<i>Mangifera indica</i>)
Buffer zone (agroforestry work)	None	Rubber (<i>Hevea braziliensis</i>)

planting was done when seedling deaths occurred. It is important to note here that during all field activities, facilitators kept in touch with each community and provided advice on technical, social and economic aspects of forest restoration.

Progress varied in the three villages because of differences in their circumstances. At Sridadi village both the 200 ha ecological restoration plot and the 100 ha rehabilitation plot were fully established. At Senami Baru village the 50 ha agroforestry plot was 95% finished. At Bungku village the 100 ha rehabilitation plot was 95% accomplished, while the 50 ha agroforestry plot was only 24% completed. The reason behind this low achievement was that the people involved in the establishment of the agroforestry plot at Bungku village were mainly indigenous *Suku Anak Dalam*, who are still in the process of transition from slash and burn (shifting) cultivation into permanent agriculture and their participation in all activities was rather low compared to other community members who are mainly local farmers.

Survival rates in all of the restoration plots were variable though most species exceeded 40% and were generally higher at Bungku village's rehabilitation plots. Survival rates were also variable for species used in the agroforestry plantings. Again they were higher in Bungku village's plots although this may have been because the site was newly cleared and the soil fertility was still high. A much lower survival rate was found at the Senami Baru village agroforestry plot perhaps due to poor maintenance of young transplanted seedlings.

3.5.5 Integrating Silvicultural Constraints and Socio-economic Factors

As expected, changes and modifications had to be made once the program began. At the beginning of the restoration project the lack of ecological and silvicultural knowledge was a major constraint on the way the project could be implemented. There were few demonstration plots or experience with community-based forest management meaning that there was hardly any information or experience in growing many of these forest tree species. Limited time and resources meant that facilitators and extension workers could not always maintain contact with villagers. This, in turn, meant project managers had to trust in the natural abilities and capabilities of local communities to adapt their cultivation method to match site conditions. Although the participatory process used to select species selection generated a short-list of promising species, there were not always sufficient seedlings of these species to plant and the quality of those that were available was not always sufficiently high. The solution adopted was to replace the species, where this became necessary, with others on the list, upon consultation and agreement with the local farmers.

Land preparation and planting depended on contractual agreements with farmer groups. Prolonged negotiation and contractual agreement completion sometimes delayed the start of planting activity. Lack of local technical experience in the management of degraded and secondary forests also caused problems.

Under these circumstances, an Adaptive Management approach was adopted. Adaptive Management is a process by which people adjust their management strategies as a result of experience to better cope with change while maintaining the integrity of their management objectives (Wollenberg et al. 1999). Examples of the way adaptive management was used in the present project can be seen in Table 3.2.

Table 3.2 illustrates many changes may have to be made to the existing plans during the restoration process due to unpredicted events including changes in the species used caused by seedling shortages, delays in site preparation and disagreements over some of the contractual arrangements. Many more changes and adjustments are to be expected in the future when the time comes to distribute benefits arising from the project. These are likely to include non-timber forest product (fruits and other products from MPTS trees) from the ecological restoration area and substantial amounts of rubber in the rehabilitation and agroforestry areas.

The most crucial negotiations in the future are likely to concern the development and confirmation of land tenure arrangements which will allow the community to get benefits from the planted trees in return for maintaining the trees and guarding the forest area. As noted earlier, a temporary tenurial arrangement was adopted at the commencement of the project in order to get things started but more permanent arrangements will be needed in the longer term. This linkage between securing tenurial rights and accepting responsibilities for natural resource management has been also discussed by Moeliono and Yuliani (2009).

Table 3.2 Some examples of adaptive forest management in the restoration project at Grand Forest Park Sultan Thaha Syaifuddin, Jambi

Cycle of adaptive management						
Processes	Assessment	Design	Implementation	Monitoring	Evaluation	Adjustment
Species selection	PRA ^a Biophysical survey	MPTS ^b Timber species Spacing Line planting Operational Plan	Selected species Species proportion	Seedling number Species survival	Sufficient numbers of desired species is unavailable	Changes in species composition
Land preparation	Land allocation Training		Contractual agreement	Progress in prepared land	Delay in land preparation	Changes in plantation schedule
Planting stock procurement	PRA Training	Seedling sources Type of planting stock Operational plan Agreement	Seedling production	Seedling quality	Number is insufficient	Outsourcing to new nurseries
Planting and maintenance	PRA Training Maintenance allocation		Contractual agreement	Survival rate Plant growth	Lack of resources for maintenance	Changes in contractual agreement
Harvesting and distribution of benefits	PRA Laws and regulations Land tenure system	Operational plan Contractual agreement	Contractual agreement	Amount and distribution of benefit	Uneven distribution	Changes in contractual agreement

^a Participatory rural appraisal^b Multipurpose tree species

3.5.6 *The Program Outcome*

When the project ended in 2006, it was expected that there would be a second phase during which the planted trees would be maintained and enrichment planting of secondary forests would be carried out by the community. This did not occur however, and the project was terminated. It was also expected that some form of joint management involving the local government, represented by Dinas Kehutanan, and local communities would be developed when the project formally ended. Again, this did not occur. The main reason for these events has been the political changes in Jambi province since 2006. The most important of these has been the replacement of most of the former officers at Dinas Kehutanan by new staff who do not have proper knowledge of the project, its previous achievements and the proposed long-term collaborative arrangements. A second reason for the lack of continuity has been the changes in the funding arrangements between the national and local Governments. Although the local Government has a huge fund for reforestation (called DR or "Dana Reboisasi"), the fund is only being utilized for new projects unrelated to previous restoration projects. Unfortunately this form of disconnection is a common problem in Indonesia, and is the main reason why many local and central Government rehabilitation projects are unsuccessful. The allocation for DR fund spending is rigidly specified as being only for planting so that any other activity, for example maintenance of previous programs, is not allowed. Recent observations at the Grand Forest Park area have shown that although there are several new planting projects in different locations, none of them are spatially related to the initial project. This means there is no linkage with what went before so the results of the new projects are much less than they could have been.

Political changes also happened at the village level, where the established plots were located. Among three villages selected (i.e. Sridadi village for ecological restoration and rehabilitation, Bungku village for rehabilitation and agroforestry, and Senami Baru village for agroforestry), Bungku appeared to have changed the most. Some farmers have continued to tend the planted trees in the plots assigned to each of them and, after 5 years these are now ready to be harvested and generate some economic benefits. On the other hand, some of the less motivated and more skeptical farmers have abandoned their plantings. This has prompted suspicion among some in Government that, as has happened before, they were only interested in occupying the allocated land and may later misuse the temporary agreement by selling this land.

3.6 Conclusions

Restoration of a conservation forest area such as The Grand Forest Park Sultan Thaha Syaifudin requires a multi-disciplinary approach and the social components of any restoration program must precede any silvicultural efforts or site preparation work. Severely degraded areas like these that are occupied by many stakeholders

also need careful planning and the assistance of facilitators to raise awareness amongst stakeholders, and reach some degree of mutual understanding about the problem and its possible solution. Much preparatory work is also needed to build the capacity of local farmers to restore, maintain and eventually manage the new forest areas using their own funds.

The approach to overcoming forest degradation adopted at Grand Forest Park Sultan Thaha Syaifudin was to develop several different types of forests which could generate benefits for as many stakeholders as possible while also re-establishing ecological functioning. Areas chosen for these different restoration approaches were based on the amount of degradation the original forests had suffered. But the extent of restoration actually undertaken and the spatial distribution of this restoration across the landscape was strongly influenced by the patterns of land tenure. Negotiations between the government and local farmers about land tenure proved to be difficult and time consuming. A second major difficulty limiting the extent to which restoration was actually undertaken was the need to convince the Government to give up some of its authority to the community. This was because previous attempts to delegate authority to certain communities in the area in order to establish a forest plantation had been misused by the community. Both of these problems were overcome because external facilitators from universities, and NGOs were able to act as honest brokers.

But the program ultimately failed to meet its original objectives. The main lesson learned was that forest restoration involving community participation requires long term and continuous efforts in capacity building and education. In turn, this requires careful planning and strong facilitators or resource persons. Local farmers were receptive and responsive to the restoration initiative as long as they believed it would benefit them. Once external support diminished many farmers became doubtful that they would continue to benefit from these forest restoration initiatives. Others have continued with tree growing in the hope that additional support will forthcoming in future.

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