THE ENTWINED TREE:

TRADITIONAL NATURAL RESOURCE MANAGEMENT OF SERAMPAS,

JAMBI, INDONESIA

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAI'I IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

BOTANY

AUGUST 2008

By

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We certify that we have read this dissertation and that, in our opinion, it is satisfactory in scope and quality as a dissertation for the degree of Doctor of Philosophy in Botany.

DISSERTATION COMMITTEE

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For my beloved Yanti, Ninis, Tata, Zaidan
my mother and my late father, now and forever

ACKNOWLEDGEMENTS

My interest in Serampas emerged about a year before leaving Indonesia to start my study at the Department of Botany, University of Hawaii. I was involved in a number of discussions with some colleagues who undertook research on local level institutions, especially in the sub district of Jangkat, Jambi Indonesia. Bang Jonet and Besse eagerly introduced me to the community of Jangkat and Serampas. The closed attachment of Jangkat people to their traditions encouraged me to explore more about their knowledge, especially dealing with nature.

In summer 2004, I did preliminary research in Jangkat to obtain a general perspective about the people as well as the landscape of Jangkat. Thanks to the Arts and Science Award at the University of Hawaii which provided the summer travel grant. The findings of my summer travel drove my research towards focusing specifically on Serampas; the "most traditional" and the most isolated community among the Jangkat villages.

"The Entwined Tree: Traditional Natural Resource Management of Serampas, Jambi, Indonesia". I picked this title for my dissertation with two main considerations. First, Serampas consider an entwined tree (*kayu dililit*) as taboo. People avoid cutting the timber for house construction. A number of climbers that grow entwined with the tree create a microenvironment suitable for other species, such as epiphytes and insects; thus increasing biodiversity around the tree. However, too many lianas and vines may kill the tree slowly, because it can no longer support all of the climbers.

Secondly, and more importantly, the entwined tree symbolizes the condition of Serampas today. They are being "entwined" by a number of social, economic and environmental pressures that gradually change the community. On the one hand they strive to maintain their traditional cultures and traditions. On the other hand, they cannot avoid implementing the introduced governance system imposed by the government. As an entwined tree, the fate of Serampas is not only defined by their own community but significantly driven by "climbers", a number of factors outside Serampas.

I am convinced that it was virtually impossible to complete this dissertation without the encouragement, guidance and assistance from academic advisors, friends, family and colleagues. First of all, I'd like to give my sincere thanks to my honorific research committee chair, Dr. Tamara B. Ticktin, who accepted me as her Ph.D. student without any hesitation and patiently mentored me since the beginning of my study in Hawaii. She offered me enormous advice, encouragement and always guided me in the right direction. I could not have finished my dissertation successfully without her help.

My sincere thanks to my other research committee members including Dr. Will McClatchey, Dr. Jefferson Fox, Dr. Travis Idol, Dr. Mark Merlin and Dr. Lisa Gollin for their untiring support and advice. Dr. Will McClatchey and Dr. Lisa Gollin sharpened my research methods, especially the ethnography. Dr. Jefferson Fox and Dr. Mark Merlin guided me in dealing with park and people issues and shifting cultivation. Dr. Travis Idol provided significant suggestions, mainly in terms of agroforest-related issues. I also wish to thank to Dr. Rainer Bussmann, although he could not serve until the completion of this dissertation, he significantly contributed to developing and improving my research ideas.

I am deeply indebted to the people of Serampas, including those who live in Tanjung Kasri, Renah Kemumu, Renah Alai, Lubuk Mentilin, Rantau Kermas and

Bangko, for their generous support and help over the course of my field work. They did not only share information, knowledge and culture, but also provided intimate relationships that make Serampas my second home. In particular, I thank Pak Darmono, Pak Ronald, Pak Dedy, Pak Kas, Pak Haji Awal, Pak Neneng, Pak Tio, Pak Lutral, Pak Abu Nawas, Nek Dedy and Pak Wiwi who shared their space and acted as my host families during my nomadic life and made my field work much easier.

I thank my research assistants, students and friends including Mukhlisin, Pak Elis, Rokhima, Pak Jemi, Mbak Wiwin, Giant, Dani, and Anas who proved to be talented and tireless field assistants. Agus Subagyo significantly helped me to deal with a lot of paperwork in the provincial level including ticketing and lodging. Ibu Afriastini and colleagues in the Herbarium Bogoriense tirelessly went back and forth to check my plant specimen identifications. I want to thank a number of other friends and colleagues who provided numerous assistance and support that allowed me to complete this dissertation.

I also want to extend my sincere gratitude to some organizations including the International Fellowship Program (IFP) - Ford Foundation, International Foundation of Science (IFS), UNESCO Obuchi Scholarship, American-Indonesian Cultural and Education Foundation (AICEF), University of Hawaii Arts and Science Award, East West Center, Indonesia International Education Foundation (IIEF) and ICRAF Southeast Asia all of whom generously provided funding and assistance over the course of my study in Hawaii and my field work in Indonesia. I also thank the University of Jambi for letting me to take a leave for a while to pursue my doctorate program at the University of Hawaii. The Kerinci Sebelat National Park not only allowed me to do research in the region, but also provided some accommodation and useful data.

I also want to thank some very nice friends in the Department of Botany as well as those in the Department of Anthropology, University of Hawaii, including Shimona Quazi, Bruce Hoffman, Orou Gaoue, Jeremy Spoon and Heather McMillan who provided some valuable and constructive comments and tremendously improved my dissertation as well as helped with English and statistical problems.

Last, but certainly not least, I would like to thank to my lovely wife and children Yanti Budiyanti, Nisrina Hanifah Tsabitah Aristawati and Ahmad Zaidan who fully supported me to study in Hawaii and sacrificed so much over the course of my long absence in the family. I love you all.

ABSTRACT

This dissertation aims to examine some of the cultural and ecological relationships between local people and protected areas through a case study of the people of Serampas and Kerinci Seblat National Park (KSNP) in Sumatra, Indonesia. Specifically, this research addresses seven main questions: (1) What are the traditional management practices associated with forest and agroforest resources?; (2) How have these traditional resource management practices changed over time? (3) What effects do traditional resource management practices have on forest/agroforest plant structure, composition, & diversity?; (4) What ethnobotanical knowledge (EK) do Serampas have and how has this changed_over time? (5) How are useful plants distributed across land-use type?; (6) How do Serampas value their natural resources, especially forest and agroforest resources?; and (7) What are the current interactions between Serampas Communities and the KSNP?

The people of Serampas are still strongly attached to their traditional customary system (*adat*) that governs most aspects of people's lives, including the management of natural resources. Upland rice farming through shifting cultivation has been the back-bone of Serampas livelihoods over generations. Serampas traditions restrict the exploitation of some natural resources by means of taboos and traditional protected forests.

A number of changes, especially more intense exposure to the market, have influenced the Serampas traditional systems and challenge the sustainability of the local natural resources. The practice of incorporating cinnamon (*Cinnamomum burmanii* [Nees & T. Nees] Bl.) into the traditional practice of shifting cultivation has changed the

dynamics of shifting cultivation, led to increases in the land area under low diversity cinnamon agroforesty and to decreases in higher diversity secondary forests.

Serampas commonly use 318 plant species belonging to 89 families. The most useful species for the Serampas are edible plants and medicinal plants. Old-growth forests have the highest richness of useful taxa, followed by customary forests, secondary forests and lastly cinnamon agroforests. However, secondary forests have the highest proportion of useful species. The forest types with the highest richness of useful plants are not necessary the ones that people perceive as the most important culturally and economically.

In terms of conservation, the policy of Indonesian government has gradually moved towards participatory management but this has not been fully implemented in the case of Serampas and KSNP. The revival and adaptation of some Serampas traditional management techniques documented here could benefit both conservation and local development initiatives.

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LIST OF ABBREVIATIONS

AGF:	agroforest (cinnamon)
CAMPFIRE:	Communal Area Management Programme for Indigenous Resources
DGONCFP:	Directorate General of Nature Conservation and Forest Protection, Minstry of Forestry
HA:	Hutan adat (customary forest)
ICDP:	Integrated Conservation Development Program
IUCN:	International Union for Conservation on nature and Natural resources
KSNP:	Kerinci Sebelat National Park
NP:	National Park
NTFP:	Non-timber Forest Product
PP:	Peraturan Pemerintah (government regulation)
RAP:	rapohen (secondary forest)
RG:	rimbo gano (old-growth forest)
TEK:	Traditional Ecological Knowledge
TRM:	Traditional Resource Management
UU:	Undang Undang (law established by People's Representative Council)
UNEP:	United Nation for Environment Programme
VCA:	Village Conservation Agreement (Kespekatan Konservasi Desa)

CHAPTER 1

INTRODUCTION

"Alah ikat kareno buatan, alah psko kareno mufakat"

"The breaking of bundle because of an act, the breaking of heirloom due to an agreement". This proverb infers that such a strong traditional system as well as an heirloom may degrade because of few people who wish.

1.1. Background

This dissertation is based on two main emerging discourses: the incorporation/separation of (indigenous) people from protected areas and the revitalization/decline of traditional ecological knowledge (TEK). The escalating rate of degradation of nature throughout the world as well as the desire to protect nature for scenic and scientific purposes has driven people to instigate different kinds of actions in order to preserve nature. Naturalists were in the front line of the nature conservation initiation in many parts of the world (e.g., Sayer 1995, Jepson and Whittaker 2002). The establishment of the world's first national park area in North America in 1872 symbolizes the beginning of the conventional model of nature conservation (Brandon *et al.* 1998, Ghimire and Pimbert 2000).

The US national park model was dispersed and copied by many nations including those in tropical countries of the world (Stevens, 1997). However, in the tropics, those areas rich in biological resources mostly overlap with indigenous lands (e.g., Toledo 2001, Zimmerman *et al.* 2001). The idea of conventional conservation that excludes people from protected areas has therefore raised challenges, resistance and resentment from local people. Unavoidably, conflicts between people and protected areas have emerged in different parts of the earth (e.g., Orr 2000, Lynagh and Urich 2002, Nygren 2004, Okello and Kiringe 2004 and Aplin 2004).

The perception of many governments of indigenous people has changed over time, following the dynamics of the indigenous people's movements as well as of scholars' and activists' growing concern over indigenous rights. In recent years, the orientation of much academic research has also shifted to encompass more of a human - nature ecosystem perspective and employ multi-disciplinary approaches, instead of exclusively focusing on "natural" ecosystems that exclude humans (e.g., Sheil *et al.* .2004, Bawa *et al*, 2004). In realizing the counter-productiveness of separating local people from protected areas, many conservationists and developmentalists strive to develop conservation approaches that address not only the objectives of nature preservation, but also take into account the considerations and the needs of local people. Therefore the paradigm of nature conservation has gradually shifted towards perceiving local people as an element of a protected area system. In many places, national governments, conservation organizations and other institutions have been starting to work together with local people to develop conservation programs that are appropriate for the local socio-economic-cultural and environmental setting.

Long before the emergence of scientific-based nature conservation, many indigenous groups developed land use practices that were compatible with conserving nature. These practices take/took many forms including taboos, sacred groves, sacred forests, protected ponds and other resource-use restrictions (e.g., Colding and Folke 1997, Colding and Folke 2000, Long and Zhou 2001, Kamanda *et al.* 2003,). The practices are part of a local resource management system that is developed through experimentation and the development and transmission of traditional ecological knowledge over a long time. The practices are frequently institutionalized into traditional institutions that govern resource use and incorporated into local worldviews that influence the everyday lives of people (Berkes, 1999). The longer the historical record of people's interaction with nature (local resource), the more associated knowledge they may be able to accumulate (e.g., Gadgil *et al.* 1993 and Meffe *et al.* 2006) and hand down to the following generations. A number of indigenous groups illustrate supporting evidence of utilizing natural resources over generations without significantly disrupting the resources (e.g., Dove 1985a, Denevan 1992).

However, current resource management practices frequently neglect and belittle indigenous systems (e.g., Plotkin and Forsyth, 2006). New development approaches and modern knowledge system have gradually marginalized the existence of the traditional resource systems that have persisted over generations. Unavoidably, the loss of local knowledge and practices is increasingly reported across different cultures (e.g., Chernela 1987, Alcorn 1989, Grenier 1998, Berkes 1999, Shanley & Rosa 2004, Posey 2004 and Brosi *et al.* 2007). In addition, traditional resource systems are very site-specific (e.g., Brush 1996, Grenier 1998, Warren and Pinkston 1998, Barsh 1999). This characteristic can hamper the incorporation of local perspectives into an effective management of nature conservation initiatives (e.g., Lynam *et al.*, 2007).

Parallel to the growing interests in involving indigenous people in managing protected areas, there have been emergent concerns among scholars to better understand traditional resource management systems practiced by millions of people, especially in developing countries. While traditional resource management systems and their ecological outcomes may be highly variable over both time and space, research has illustrated that a number of traditional resource management practices that used to be portrayed as backward and irrational are not only economically viable but also ecologically sound (e.g., Gouyon *et al.* 1993, Michon *et al.* 2000).

Some traditional communities in Indonesia have practiced traditional resource management systems that balance the need to use a resource and the need to conserve the resource. Some ethnic groups including the Iban in West Borneo (Wadley *et al.*, 2004) and the Karendi in Sumba (Fowler, 2003) practice and recognize sacred forest as a common tool in their traditional forest management. In Java, people practice home gardens that maintain biodiversity while reaping garden products (Christanty *et al.* 1996, Parikesit *et al.* 2004). Local people of Sumatra have developed complex agroforest systems including *damar* agroforests in South Sumatra (Michon *et al.*, 2000) and jungle rubber agroforests in Central Sumatra (e.g., Gouyon *et al.*, 1993).

Serampas is a group of indigenous people who inhabit the area on the border within the area of Kerinci Seblat National park (KSNP) in Midwestern Sumatra, Indonesia. The group has occupied the region for many generations before the park was established in 1999 (e.g., Bonatz *et al.*, 2006). To some degree, they still practice and maintain their traditional life-style, including the way they manage natural resources. The Serampas represent a community that is struggling with addressing the two main issues mentioned at the start of this chapter. On the one hand, they were neglected by the KSNP conservation programs that targeted their lands. On the other hand, their traditional systems have been systemically marginalized by local and central governments, while at the same time they have been adapting part of their practices to rapid changes in modernization, such as roads, entry into the cash economy and new products. Being a marginalized community and in an isolated region also means less development in terms of economy as compared to other communities. The Serampas struggle with securing their land as well as with improving their welfare; at the same time they also seek recognition of their distinct socio-cultural identity.

1.2. Research objectives

This research aims to examine some of the cultural and ecological relationships between local people and protected areas through a case study of the people of Serampas and Kerinci Seblat National Park. The major objective is to produce a holistic analysis of Serampas' TEK and practices related to natural resource management in and around the national park. This research will answer seven main questions: (1) What are the traditional management practices associated with forest and agroforest resources?; (2) How have these traditional resource management practices changed over time? (3) What effects do traditional resource management practices have on forest/agroforest plant structure, composition, & diversity?; (4) What ethnobotanical knowledge do Serampas have and how has this changed over time? (5) How are useful plants distributed across land-use type?; (6) How do Serampas value their natural resources, especially forest and agroforest resources?; and (7) What are the current interactions between Serampas Communities and the KSNP?

1.3. Study Period and Site

The research was undertaken within the community of *Serampas,* a sub clan who inhabit the northeastern area of Jangkat Sub District, Merangin, Jambi, Sumatra Indonesia. Serampas is a group of five villages composing of one of very few communities in Sumatra that still inhabit the interior of tropical rain forest. The community was chosen based on various considerations including that they still live a traditional subsistence lifestyle, have inhabited an area adjacent to or within a protected area over generations, closely interact with the forests, largely lack modern infrastructure and have not experienced large scale modern development. In terms of distance, Serampas is only about 70 KM to the closest district city. However, Serampas is not very accessible due to the lack of road infrastructures as a consequence of its location, which is in the area of a National Park (see Fig. 1). Such community was expected to hold and practice traditional ecological knowledge associated with the forest.

This research covers all five Serampas villages including Renah Alai, Rantau Kermas, Lubuk Mentilin, Tanjung Kasri and Renah Kemumu. However, I focused my research on the villages of Tanjung Kasri and Renah Kemumu. I purposely set the two villages as the main research sites based on the following considerations. First, both Tanjung Kasri and Renah Kemumu are the most remote and isolated villages of Serampas. The other Serampas' villages are relatively well accessed now by four wheel vehicles and have been extensively exposed to cash farming business. Second, in terms of farming systems, the two villages have very different characteristics; Tanjung Kasri is dominated by shifting agriculture whereas Renah Kemumu mainly relies on wetland rice farming. Although the two villages are next to each other, they have different markets

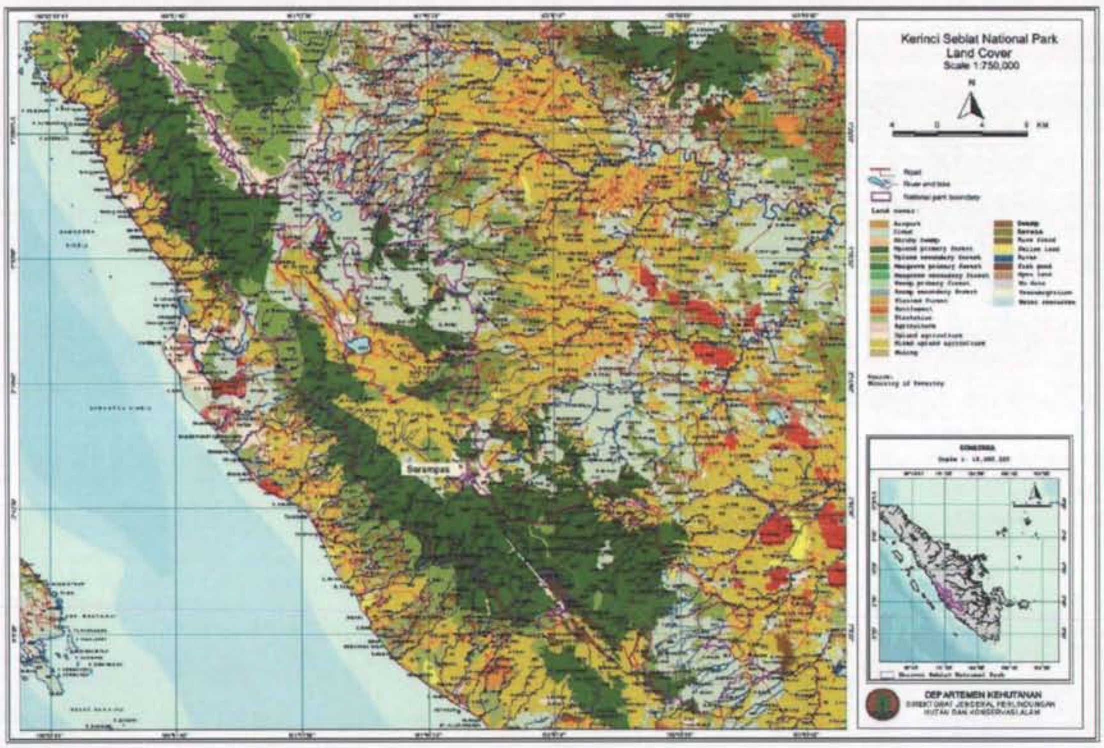

Fig. 1. Serampas and the Kerinci Seblat National Park

for their products mainly due to geographical barriers. The main market for Tanjung Kasri is Danau Pauh that is connected to Bangko, the district capital. Meanwhile the major market for Renah Kemumu is Lempur that is connected to Sungai Penuh, the capital of the neighbor district.

Outside Serampas, additional information was collected from a number of people and institutions in Sungai Tenang (neighbor to Serampas), Lempur, Bangko, Sungai Penuh, Jambi, Bogor and Jakarta. The overall fieldwork was carried out in the period of July 2005 to March 2006. Prior to the fieldwork, I undertook a pilot study at my proposed research site in summer 2004 to gain a general overview of the local landscape and its communities.

1.4. Methods

This research employs and combines both ethnographic and ecological methods in order to reveal traditional ecological knowledge and traditional resource management practices associated with forest and agroforest. Overall, this research used four main methods including participant observation, respondent interviews, focus group discussions and ecological-botanical assessments. The ethnnographic methods were carried out using a combination of Serampas Language and Bahasa Indonesia. Detailed methodologies are presented in each chapter. Before doing the research I obtained permission to conduct the research from the Kerinci Seblat national Park as well as from the Committee on Human Subject at the University of Hawaii (Appendix A).

People's participation in this research was on a voluntarily basis. They were asked for their willingness before joining this project with informed consent (Appendix B and C). Furthermore, every respondent recorded in each step of this research was identified under an interview-identified number and therefore is anonymous. Names of the respondents do not appear in this disseration or in the other publications. Vouchers of all plants reported in this dissertation were collected and are stored at the Biology Laboratory, the University of Jambi, Indonesia.

1.5. Dissertation Organization

This dissertation is divided into twelve chapters and a comprehensive appendix. Chapter 2 reviews the growing literature on discourses about indigenous people, TEK and protected areas. The chapter further discuses about the characteristics of TEK as compared to western-based knowledge systems and some conservation perspectives on TEK. It also covers some aspects of Traditional Resource Management (TRM), especially related to forestry and agroforestry. The last section of the chapter traces the early history of the world protected areas and some conservation models that incorporate people into protected areas.

Chapter 3 introduces the people and the landscape of Serampas. This chapter discusses the history of Serampas occupancy on their current sites. To some degree, geographical isolation has contributed to preserving some of the rituals and cultural traditions that still persist in modern day Serampas. Some aspects of everyday life within the community of Serampas as well as how this research was carried out with the community are presented at the end of the chapter.

The people of Serampas are still strongly attached to their adat (customary system). Chapter 4 describes adat historically as well as the traditions that still persist in the community, including their changes over times. *Kenduri Psko*, a prominent tradition that is still well maintained by the Serampas is described at the end of the chapter.

Chapters 5 and 6 identify of the plants that are commonly used by Serampas. It discusses how some uses have changed over time and how use patterns compare to other indigenous communities in Indonesia and elsewhere. Chapter 5 focuses on plants for food, medicine and rituals; whereas Chapter 6 includes plants for construction materials, fibers and tool materials and plants for other uses. Some traditions and rituals using plant are also briefly described in the chapters.

Chapter 7 analyzes the land use, land tenure systems and the practice of shifting cultivation in Serampas. It discusses the significance of shifting cultivation in the local livelihood as well as rituals and values associated with the traditional farming system.

Chapter 8 describes the development of cinnamon agroforestry in Serampas. It analyzes some variations and dynamism of the agroforest overtime. The last section of the chapter analyzes the ecological characteristics of cinnamon agroforest, the most widely practiced agroforest in the region, and its implications for biodiversity conservation.

Chapter 9 evaluates the socio-economic, cultural aspects and management of Serampas forests. The chapter begins with a discussion of changes in forest cover of Serampas over time and then follows with an analysis of the traditional forest management practiced by the community. The last section of the chapter analyzes ecological characteristics for most forest types that occur in Serampas and discusses their implications for and relationships to, biodiversity conservation.

Chapter 10 analyses local peoples perceptions about the relative importance values of some major landuse types recognized by Serampas. This chapter also identifies patterns in useful plants that occur in different land uses. The last section of the chapter evaluates the most important plants from each landuse type.

Chapter 11 integrates the previous sections of this dissertation and brings them into the broader perspective of nature conservation. This chapter traces the history of protected area in Indonesia. Specifically it analyses KSNP in terms of its interactions with local people as well as some challenges faced by the park. The chapter ends with some examples and suggestions for integrating TEK as well as local culture and traditions into conservation initiatives.

Chapter 12 summarize overall findings of this study, presents some current gaps for future research and identifies the implications of this research for Serampas and for other communities on the KSNP boundary and elsewhere.

CHAPTER 2

INDIGENOUS PEOPLE, TRADITIONAL ECOLOGICAL KNOWLEDGE (TEK) AND PROTECTED AREAS

" *...tidak lekang kareno paneh, tidak lapuk kareno hujan...* ".
"*.... will not crack due to the sun and will not degrade due to the rain ...* ". A phrase taken from local adage symbolizes the resilience of local customary system which is strongly attached to the people and not easily changed.

2.1. Indigenous People and TEK

2.1.1. Indigenous People

The identities of indigenous people are emerging and there is no single definition that is widely accepted. Berkes (2001) and Stevens (1997) identify indigenous people as descendant groups who firstly occupy an area, who are minority in politics, historically and culturally unique and perceive themselves as indigenous. The Working Group on Indigenous Populations under the United Nation describes:

> *"Indigenous communities, people and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing in those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as people, in accordance with their own cultural patterns, social institutions and legal systems" (UN ECOSOC 1986).*

In addition to the above description, the World Bank (1990) defines indigenous people as social groups that differ from the dominant society in term of their social and cultural identity and the people also being deprived by development programs. Furthermore, the bank characterizes indigenous people as having strong ties to their ancestor's territories and natural resources, determining themselves as a distinct group, using separate languages from their national language, operating customary social and political organization and tending to have subsistence in economy.

The International Labour Organization in its General Conference held in Geneva on June 27th 1989 ratified a convention 169 concerning indigenous and tribal people in developing countries. The convention recognized indigenous people as:

> *"(a) tribal people in independent countries whose social, cultural and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations; (b) people in independent countries who are regarded as indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural and political institutions".*

The most essential prerequisite to allow survival of indigenous people is recognition of their land right. Indigenous people also are seeking to gain equal opportunities to law, education and jobs, social security and healthcare, recognition of their distinct groups, native languages and customs (Posey, 2004). The term "indigenous" does not merely differentiate indigenous people from other groups; it is closely attached to land rights and territory, culture, traditions, languages, customarily law, control over natural resources and self determination (Colchester, 2000).

Indigenous people are widely distributed throughout this planet. Posey (1999) estimated that population of the group is around 300 million. Most of them live in mosaic landscapes in the highest biological diversity areas (Posey and Overal 1990; Kothari and Das 1999). Moreover, the indigenous people also make up between 70 and 80 percent of the world's cultural diversity (IUCN 1997).

2.1.2. Traditional Ecological Knowledge (TEK)

Indigenous people who are continuously attached to local resources over generations frequently hold "a broad knowledge base" about complex local ecological systems (Gadgil *et al,* 1993). The distinctive, traditional and local knowledge that evolved within specific circumstance in certain geographic area is recognized as indigenous knowledge (Grenier, 1998). The knowledge is learned and handed down over generation through parents, relatives and neighbors as part of childhood experience. The value of the knowledge is embedded in the local language and art such as song and stories (Alcorn, 1999). Warren and Pinkston (1998) define indigenous knowledge as a local-level knowledge system held by a particular community or ethnic group. Although the knowledge is expressed locally, Posey (1999) argues that the traditional knowledge deals with the universal issues.

Posey (2004) uses the term Traditional Ecological Knowledge (TEK) to express traditional lifestyles that encode traditional knowledge, innovation and perspectives of local communities. Other terms are also being used to articulate traditional ecological knowledge such as rural people's knowledge, indigenous knowledge, indigenous technical knowledge, indigenous knowledge system, indigenous resource management system, indigenous agricultural knowledge, local knowledge, local community system, traditional knowledge and traditional environmental knowledge (Sillitoe 1998, Posey 1999).

Berkes (1999) develops a more comprehensive definition about traditional ecological knowledge. It is "a cumulative body of knowledge, practice and belief evolving by adaptive process and handed down through generation by cultural transmission, about the relationship of living being (including humans) with one another and with their environment". Furthermore Berkes adds that the term of indigenous knowledge is used interchangeably with traditional ecological knowledge.

In many cases, indigenous people have practiced and held traditional ecological knowledge over time without explicitly naming the knowledge. For example, local people in the highland of New Guinea follow some effective agricultural practices done by their ancestors, but they have neither any theoretical background nor word explanation behind the practices (Sillitoe, 1998). In Mexico, some pieces of traditional agricultural knowledge are set in "scripts"; farmers just follow what the scripts say. For instance, local farmers allow the growing of local leguminosae without knowing the reason of the practice (Alcorn, 1989).

TEK is also considered as common knowledge and easy to find (Berlin *et al.*, 1974). Even people from outside indigenous communities can have easy access to the knowledge. Frequently, outsiders adopt and develop local knowledge without providing any benefit for the indigenous community.

TEK is not an exclusive and static knowledge base system; it is subject to be influenced by national and regional circumstances (Berkes and Folke, 1998). The knowledge is modified and changed flexibly in order to fit new different environment (Posey, 1999). The term 'traditional' of TEK does not refer to its antiquity, but implies the way in which the knowledge being obtained and applied. Much of the knowledge is actually quite new, however it still has a social meaning and legal character (Four Directions Council 1996 as cited by Posey 1999; Barsh 1999). Moreover, the term 'traditional' also implies that the indigenous people kept practicing and conserving the knowledge over generations. At the same time, they also observed, compared and checked the reliability of their findings with their ancestor's findings to continually revise the knowledge (Barsh, 1999).

Posey (1999) identifies some basic principles of TEK including; cooperation; the strong family attach and cross-generational communication, including links with ancestors; concern for the fate of the future generations' prosperity; local scale self-sufficiency and resilience; right to land, territories and resources; and restraint in resources exploitation and respect for nature. Besides self sufficiency and restrained resources use as mentioned by Posey; Kothari and Das (1999) argue that indigenous knowledge also inhabits a specific socio-cultural environment; integrates resources use with local landscape and conservation efforts; utilizes high level of biodiversity; and is also dynamic, innovative and egalitarian.

Indigenous people combine different characteristics of their TEK to address their needs. For example, Arakmbut, indigenous people of Peru, link their knowledge of animal behavior with a healing ritual in order to cure a patient (Gray, 1999). The Cree, indigenous people in the sub artic of Canada regard human-animal relationship as important as social relationship with human being. Reciprocity, respect and kindness are equally applied for both relationships (Berkes, 1998). Furthermore, TEK not only deals with human-nature relationships, but also people's interaction with 'invisible spirit world' (Posey, 1999). Belief systems together with socio-politic economic systems and knowledge systems serve as the main system of TEK (Kothari and Das, 1999).

Berkes (1999) summarizes and illustrates the fundamental components of TEK as 'several nested levels' (Fig. 2.1). The basic level is the knowledge of local animals and landscapes such as the knowledge of local animal behavior. The comprehensive understanding of the landscape and animal behavior will come out with management system of landscape/animals in larger scales. The developed management system requires the establishment of institutions that then finally link to the establishment of worldview (cosmology), the largest nest on top. These levels are all interrelated and sometimes the boundaries are blurred.

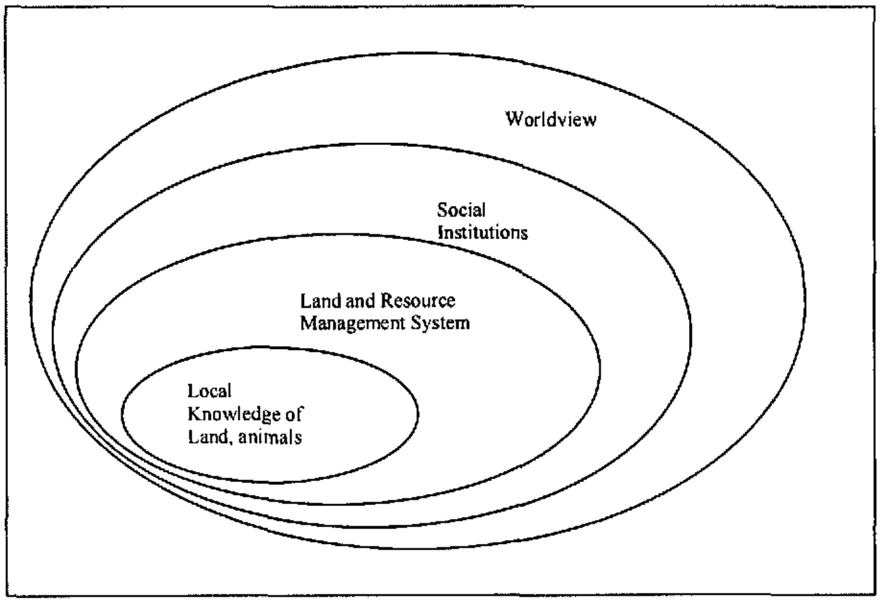

Fig. 2.1. Level of Analysis in Traditional Ecological Knowledge
(Adopted from Berkes, 1999)

2.1.3. Do Indigenous People Conserve Nature?

Some conservationists have portrayed indigenous people as living in harmony with nature. However, the role of indigenous people in conserving natural resources is still in a debate (e.g., Redford, 1991). In term of tropical forests, humans have modified forests since prehistoric periods. For instance, indigenous people Yucatan, Huastec and Kayapo have distributed edible plant seeds throughout their forests. "There are no virgin forests today nor were there in 1492" (Denevan, 1992). Most existing landmarks that used to be considered as "natural" or "pristine" by ecologists and botanists actually were effectively influenced by human existence within the historical period (Posey 1997, Ghimire and Pimbert 2000). Redford (1991) concurs that various scientific artifacts prove that local people have changed most tropical forests even before the European arrival. He maintains that precontact Indians were not 'ecosystem men", rather they had enormously altered the environment.

Indigenous people held more knowledge and better capabilities than non-indigenous people to live in the same habitat. In addition, a number of cases had confirmed the environmental soundness of some indigenous practices (Redford, 1991). For example, in the interior of Amazon forests, local people had modified species abundances without reducing the biodiversity (Denevan, 1992). In the field of agriculture, Dove (1985a) shows that many indigenous farming systems in Southeast Asia prove to have low impact on ecosystems by managing the lands and labors allocation effectively.

In fact, indigenous resource management systems may only be sustainable under specific conditions of low population density, abundant lands and limited market economic orientation. Sometime and only sometimes the systems might be modified to be used for the benefit of larger communities (Redford, 1991). However, we must not depict indigenous people just as "useful libraries of traditional information" (Alcorn, 1991). Indigenous people are equal and important partners in developing alternative strategies to conserve our nature (Alcorn 1991, Redford and Stearman 1993).

2.1.4. TEK versus Western-Based Knowledge Systems

The conceptual differences between indigenous knowledge and Western knowledge systems are debated. Agrawal (1999) argues that there is no extreme difference between the two knowledge bases. The only thing that might distinguish TEK from Western knowledge is its relation to power. However, some researchers believe that there are some basic aspects that significantly distinguish TEK from Western science. For example, Peterson (1999), Berkes and Folke (1998), Pierotti and Wildcat (1999) and Whitt (1999) argue that some indigenous ways of life balance humans and nature. Human and nature are intertwined and cannot be separated. Pierotti and Wildcat illustrate that nature is a kind of "compartment" within the house of indigenous people. Whitt (1999) emphasize that TEK is attached to nature, therefore, nature devastation will also degrade knowledge, belief and value systems held by the nature. Humans and nature are intertwined and cannot be separated.

To some extent, the above view is contradictory to Western system that often separates people from nature. Western knowledge of nature is distinct and divisible from nature (Whitt, 1999). Moreover, traditionally the western conception of nature has often put humans as "stewardship of the earth" that manage and exploit natural resources on the globe (Slikkerver, 1999). Consequently, Western sets human being in such a position above the nature (Pierotti and Wildcat, 1999).

Brush (1996) and Gadgil *et al.* (1998) observe that much knowledge of TEK is stored in unwritten form and preserved in oral traditions as opposed to western science which is stored in formally written text, rules and legal codes. TEK is also unique in each different culture and highly localized (Brush 1996, Barsh 1999). Furthermore, Gadgil *et al.* (1998) asses that some TEK lacks of rational explanations. Much of indigenous people's understanding of resource exploitation restraint relies on obeying their gods or avoiding social sanctions. Barsh (1999) points out that the social and legal dimension of TEK are unique characteristics of the knowledge system that distinguish it from Western knowledge.

Agrawal (1999) identifies a phenomenon of "scientization", a process of generating scientific knowledge based on indigenous knowledge through mechanisms of particularization, validation and generalization. The process transforms and conserves pieces of knowledge of TEK that hold significance for development and throws away what is left. Some pieces of TEK might be irrelevant to development, for example the ritual, words and movements of a shaman in a traditional healing. Agrawal emphasizes that "once the knowledge of indigenous people are separated from them and saved, there is little reason to pay much attention to indigenous people themselves".

In many cases, there are many indications that illustrate the disappearance of knowledge held by indigenous people (e.g., Chernela 1987, Alcorn 1989, Grenier 1998, Berkes 1999 and Posey 2004). Since the knowledge is mostly handed down orally, this makes TEK more susceptible to change and more easily replaced by other values (Grenier, 1998). In fact, this knowledge which had been tested over millennia is rarely documented (Lewis and Lewis, 2003).

There are some factors that undermine the survival of TEK. The dominant Western science and technology play significant roles in weakening the TEK (Slikkerveer 1999; Kothari and Das 1999). For example traditional healing system which had been practiced for centuries was instantly replaced with modern western healthcare system. Other factors such as over exploitation and resources conquest either conducted by state or private sector, also weaken the TEK (Kothari and Das, 1999).

2.1.5. Traditional Resource Management (TRM)

2.1.5.1. Socioeconomic and Cultural Perspectives of TRM

People who live and interact with local resources over generations tend to contribute to shaping the local resources. Fisher (1991) identifies the local forest management model as opposed to conventional systems initiated by outsiders. Local people express the management system in their own native language and occasionally develop some terms that can not be equally translated into English. Alcorn (1999) adds that TRMs are frequently invisible and unidentified even within local languages. However, landscape assessment and participant observation might reveal the existence of the TRM systems.

Traditional forest (resource) management practices have existed and practiced by communities over centuries, however, ecologists, foresters and development planners have just recently acknowledged the idea of integrating communities into forest management system (Wiersum, 1997). TRM is born through trial and error process that is incorporated with local religious belief (Gadgil *et al.* 1998 and Alcorn 1999). A community that has experience of coping from resource crisis commonly holds valuable management knowledge (Berkes and Folke 1998). Moreover, Alcorn observes that the feedback from trial and learning process might lead to taboos on such resource exploitation.

There are a number of growing terms expressing TRM system. Alcorn (1999) uses the term Indigenous Resources Management System (IRMS) to refer to local strategies, organization and knowledge of farming, herding, fishing, hunting and gathering. Other authors use various terms to articulate the indigenous forest (resource) management system such as customary forests, traditional forests and sacred forests (e.g., Poffenberger 1990, Aumeeruddy 1994, Kamanda *et al.* 2003). Berkes and Folke (1998) use the term of "Neo Traditional Resource Management System" or "Newly Emergent Resource Management System" to address management systems that do not have long historical links, however the system is still based on observation, experience and resource-based local knowledge. In this case, Bergossi (1998) adds that resource management systems practiced by the neo traditional community might have higher ecological resilience because they are more flexible to adjust with technological and cultural changes.

There are some evolving theories that try to describe TRM systems. Serageldin (1993) categorize TRM characters in to three main groups: economic, socio-cultural and ecological perspectives. He argues that TRM practices proportionally accommodate those three factors to adjust with local circumference and needs. In terms of economic perspective, TRM practices might not try to maximize economic benefit in exploiting local resources; however, it still contributes significant values to local people's income. A TRM practice sacrifices short-term advantage in order to gain long term benefit (e.g., Lancaster and Lancaster 1997, Horowitz 1998, Marjokorpi and Ruokolainen 2003). In some cases, local people ignore the high potential economic benefits of a resource of the expense of preserving their habit, ritual and culture (Horowitz, 1998). To gain economic benefit without devastating nature and culture, TRM can utilize various different products from a single TRM system and/or improves the efficiency in exploiting a resource. For example, in Nepal, local people collect and use a number of products from their traditional forests including leaf litter, dry firewood, rhododendron flower, grass and shrub (Fisher, 1991). In Jordan, different ethnic groups utilize a same region but employ different management system on the different seasons (Lancaster and Lancaster, 1997). In other words, the different ethnic groups create the different 'anthropological-ecological niches'.

Local social and cultural values play an essential role in preserving and implementing a TRM system. Alcorn (1999) argues that the highly developed TRM systems cannot be alienated from the contribution of local social and cultural values. A number of ethnic groups historically integrated belief systems and customary laws into their TRM. Although this is not always the case, most of customary authorities were passed down from a leader to his son or his close relative.

Taboo is one of the most widely consistent moral values dealing with TRM practiced by many different cultures. In many cases, taboos were employed as a social mechanism to impose local people behavior to be more ecologically sounds (Colding and Folke, 1997). Over time, the repetitive implementation of taboos constructs informal institutions that effectively control local resource exploitation (Colding and Folke, 2000). Taboo can be an effective instrument to conserve forest and its biodiversity as well (Long and Zhou 2001; Kamanda *et al.* 2003). Colding and Folke (1997) affirm that taboos protect threatened and ecologically important species effectively. In terms of specific-species protection, taboo integrates into belief system of culturally isolated human populations (cerates local avoidance) and/or the share the belief system throughout different cultural regions (cerates regional avoidance) (Colding and Folke, 1997).

Although TRM systems are traditional, they do not necessarily imply old fashion or antique (Fisher, 1991). These systems are flexible, dynamic, mobile, adjustable to the local natural-socioeconomic changes (Michon *et al.*, 2000). For example, people of *Kerinci* in the western Indonesia rely on local forest to fulfill their basic needs (Aumeeruddy and Sansonnens, 1994). Due to the high population growth; they do not have enough forests to be exploited. As a result, they developed *pelak,* a complex agroforest system that is an advancement of the existing upland agroforest system.

Instead of securing individual land rights, TRM systems promote the recognition of common property system over natural resources. The common property system is a property rights arrangement in which a group of resource users share rights and duties toward a resource. Access to a resource is not open to all, but to a specific group of users who hold the right in common (McKean, 2000). For example, in India, grazing land is communally owned by village councils (Mishira *et al.*, 2003). In West Borneo, an abandoned agroforest field will be automatically re-owned by local customary institutions (Marjokorpi and Ruokolainen, 2003). In Central Sumatra, traditional agroforests are established on private land, however they are rarely sold because local people perceive as their ancestors' land (Aumeeruddy and Sansonnens, 1994). While in Southern Sumatra, *Damar* agroforest (*Shorea javanica*) is established on local customary lands (Michon and De Foresta, 1999). Land property rights in TRM are commonly obtained through labor investment; not through lobbying or purchasing of concession rights (Michon *et al.*, 2000).

Socio-cultural aspects are crucial to conserving TRM. However, these aspects are fragile and very vulnerable to deteriorating (Alcorn, 1999). A number of cases show that TRM system could not compete with the more dominant system, especially state and private resource regimes that tend to undermine TRM system (Johnson and Forsythh, 2002). For example, in India, the sustainable use of local resources weakens as the resource being privatized and/or controlled by state (Gadgil *et al.*, 1998).

2.1.5.2. Conservation Aspects of TRM Systems

Kamanda *et al.* (2003) argue that TRM systems were not purposively designed to achieve ecological conservation; instead, this was a side effect of the social consequences of implementing a TRM system. For example, sacred forests exist as people obey local religious values, however the practice undoubtedly contributes to conserve the forests (Wiersum, 1997). Similarly, farmers unintentionally develop secondary growth habitat in slash and burnt agricultural system; it is a side effect of the farming system (Alcorn, 1999).

Barsh (1999) analyzes four aspects that make indigenous people essential to conserving biodiversity: (1) Indigenous people employ high species diversity and practice restraint in exploiting local resources. As a result, this TRM practice has less impact on biological diversity; (2) Indigenous people always attempt to improve biodiversity in their fields in order to increase their consumption variety and to minimize production risks; (3) In order to anticipate uncertainties of harvestable plant and animal, indigenous people underestimate the maximum amount of the harvestable species; and (4) Indigenous people have strong tie and take care of their land in order to maintain and hand down their TRM to their subsequent generations. Although TRM systems might have important roles in conserving the nature, they do not necessarily mean that all TRM systems are conservationist (e.g., Redford and Stearman, 1993). There are a number of cases showing that the systems devastate the nature.

2.1.5.3. Traditional Forestry System

As oppose to modern forestry management system, indigenous people in many different part of this planet have developed traditional forest management systems such as sacred forests, community forest, local forests and community forests. In Southern China for example, local people recognize various categorization of forests including watershed forest, auspicious forest, sacred forest, shellac forest, village/clan boundary forest, fire protection forest, burial forest and swidden fallow forest (Long and Zhou, 2001). Forestry communities in Michoacán and Oaxaca, Mexico, incorporate their forests with their-owned logging business, sawmills and a furniture factory. The integration of timber processing with prudent community forest management system not only avoids the community forests from extensive logging pressures but also offers broad local employment opportunities (Alvarez-Icaza 1993, Klooster and Masera 2000). Instead of relying on timbers harvesting, Michon (2005) argues that traditional forestry systems commonly put more emphasis on reaping non-timber forest products.

Sacred forest is the most widely traditional forestry practice recognized by indigenous communities. For examples are Zambezi forest in northern Zimbabwe (Byers *et al.*, 2001), Iban traditional forest in West Borneo (Wadley *et al.*, 2004) and Karendi forest in Sumba, both in Indonesia (Fowler, 2003), and sacred forests in Mozambique

(Virtanen, 2002). The sacred forests have strong association with spirits, certain access rules and taboos (Byers *et al.*, 2001) and influence local people's behavior dealing with local resources. For example, people are not allowed to speak loudly, to loiter and to articulate the name of a sacred forest while they are in the forest (Fowler, 2003).

Without intending to romanticize the indigenous resource management system, it is obvious that indigenous people significantly contribute to conserve biodiversity and manage their traditional forests on sustainable bases (Nanang and Inoue 2000, Byers *et al.* 2001 and Virtanen 2002). Byers *et al.* (2001) notify the considerable less deforestation rate in the forests that considered as sacred forests. Moreover, the forests preserve wildlife by providing the affluence and various animals' feed. Another example, in Mozambique, traditional protected forests serve as fire refuges for some endangered species (Virtanen, 2002).

Most of the traditional forest management systems are corroborated by local cosmologies and customary systems (Nanang and Inoue 2000, Byers *et al.* 2001, Virtanen 2002, Fowler 2003). Virtanen emphasizes that spiritual aspect serves an essential role to support and sustain the traditional forest system. Fowler (2003) considers that spiritual values influence people behavior toward environment through mechanisms of resources use restriction and ritual management of culturally/historically valuable resources. The traditional resource management systems coincidentally evolve with the local spiritual values. The Shona people of Africa for example, they believe that their sacred forests are guarded by *Mhondoro*, ancestral spirits that frequently appears in the physical form as wild animals, particularly lion (Byers *et al.,* 2001). In Sumba, Indonesia, traditional forestry laws, endorsed by local worldviews, were much more effective than the national laws in controlling local natural resources (Fowler, 2003).

However, traditional worldview as well as local customary systems tend to weaken constantly, especially as consequences of the rapid development programs and the rampant dissemination of modern religions, particularly Christianity (Fowler 2003, Wadley *et al.* 2004, Virtanen 2002). Development initiatives over traditional forest territories frequently perceive forestlands as empty areas (Michon, 2005) and ignore the 'owner' of the forests (e.g., Klooster and Masera, 2000). The condition was worsened by traditional institutions that commonly powerless to enforce customary laws when opposing modern political systems (Byers *et al.,* 2001).

2.1.5.4. Traditional Agroforestry System

Huxley (1999) defines agroforestry as "a dynamic, ecologically based, natural resources management system that, through the integration of trees in farmland and rangeland, diversifies and sustain production for increased social, economic and environmental benefits for landusers at all levels". Another definition, agroforestry is a complex system (ecological and economic) that provides at least one ecological service function (shelter, shade, soil fertility etc.); consists of two or more species, where at least one is woody species; generates multiple outputs; and has cycle more than a year (Nair 1993, Huxley 1999). ICRAF (1997) defines agroforestry as "a dynamic, ecologically-based natural resource management system that, through the integration of trees in farms and in the landscape, diversifies and sustains smallholder production for increased social, economic and environmental benefits for land users at all levels".

Integrating crop farming with tree cultivation is an old farming system practiced by people in many different part of the world (Nair, 1993). Palaeo-ecological and archaeological facts confirm that the Empire of Inca in the Andes (AD 1000) had practiced agroforestry. In the middle ages, agroforestry was widely practiced in Europe especially in Finland and Germany (Nair, 1993). Today, a large number of indigenous groups still practice agroforestry. Examples include *quezungual* system in Honduras (Hellin *et al.,* 1996), acacia-rice agroforest in India (Viswanath *et al.*, 2000), *Streuobst* agroforestry in Europe (Herzog, 1998), milpa agroforest in Belize (Levasseur and Olivier, 2000), Mayan Homegardens in Mexico (De Clerck and Negreros-Castillo, 2000) and *Melia volkensii* agroforestry in Kenya (Blomley, 1994). Indonesia, in particular, has many examples of traditional agroforest systems such as the home garden system in Java (Christanty *et al.* 1996, Parikesit *et al.* 2004), *damar* agroforests in South Sumatra (Michon *et al.*, 2000), jungle rubber agroforests in Central Sumatra (Gouyon *et al.*, 1993) and *Tembawang* agroforests in Kalimantan (Marjokorpi and Ruokolainen, 2003) .

The agroforestry's role in conserving species is supported by facts that the system maintains the growing abundant different plant species, either planted or spontaneously grown. For examples, traditional Mayan homegarden agroforests maintain 150 useful plant including 26 herbs, 15 vines, eight creepers, 17 shrubs, three cacti, three grasses, six palms, 52 fruit trees and 20 timber species (De Clerck and Negreros-Castillo, 2000). Marjokorpi and Ruokolainen (2003) identify more than 230 plant species in *tembawang* agroforestry in West Kalimantan, most of them are grown naturally. Traditional homegardens agroforests in West Java are inhabited by 228 plant species, 64 of them are tree and bamboo species. In the same patches, the tree population reaches 1,020 individual per ha, whereas bamboo density is approximately 268 clumps per ha (Parikesit *et al.*, 2004). Beukema and van Noordwijk (2004) compare the richness of fern species in rubber plantation, rubber jungle agroforest and natural forest. Although the three landuses din not show significant different of fern species richness; jungle rubber confirmed the highest species variation whereby half of the population is categorized as forest fern species. In contrast, rubber plantations were dominated by sun-tolerance fern species.

Some traditional agroforestry is established through a process of enriching natural vegetation. Farmers plant a number of some commercial species and at the same time keep and modify the existence of some wild species for the benefit of these cultivated plants. Farmers shape their traditional agroforestry by selectively slashing cultivated plants' competitors and providing space, allowing the cultivated plants to develop their canopy (Michon, 2000). Alcorn (1999) observes that agroforestry is developed by controlling the process of succession whereby the growth of trees follows the crops or by maintaining forest patches separate from fields.

Traditional agroforestry do not only provide environmental services but also contribute significant economic gains for local livelihoods and conserve local culture as well. In a Maya community in Belize, agroforestry provides the main income for the local people. Their agroforestry also supplies most of families' needs of food and wood (Levasseur and Olivier, 2000). De Foresta and Michon (1994) state that traditional agroforestry essentially contributes to local economies by providing long-term regular and seasonal incomes, supplying local needs and generating local employment for processing and marketing agroforest products. Furthermore, De Foresta and Michon suggest that traditional agroforestry system have socio-cultural benefits by providing free access for local people to collect wild products such as small fruits, leaves, firewood and medicinal plants.

2.2. Protected Areas: Between Nature Conservation and Regional Development

2.2.1. History of Protected Area

Exploring the history of nature conservation on earth leads to track backward to the evolving concept a protected area. Jepson and Whittaker (2002) observe that the concept was initiated by the rising thought about the interaction between human and nature in western community in the period of 1860-1910. Latter on, the thought was brought into a public domain and implemented in the form of agendas to protect an area, to preserve wildlife and to involve international lobby and networking. The establishment of Yellowstone National Park in 1872 has monumentally put into action the new worldview of human-nature relationship. Yellowstone has been portrayed as a prototype of protected area development in many parts of the world (Stevens, 1997).

Following the establishment of Yellowstone, the number and area of protected areas grew rapidly throughout the world (Fig. 2.2). In the last congress of protected areas in 2003, the United Nation listed 102,102 sites covering 18.8 million km^2 of protected areas (Chape *et al.*, 2003). In addition, there are now more institutions involved in monitoring and development of the protected areas than ever before, including IUCN, UNEP, WCPA (World Commission on Protected Areas), WCMC (World Commission Monitoring Centre) and other international conservation agencies.

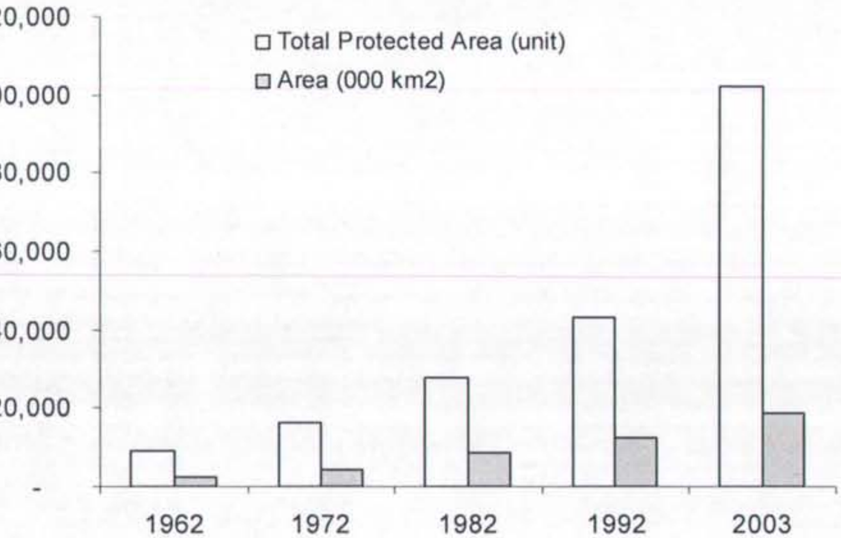

Fig. 2.2. The Progress of World's Protected Areas (Chape *et al.*, 2003)

Ideally, each country allocates 10% of its territory for nature conservation efforts (IUCN, 1993). However, Rodrigues and Gaston (2001) argue that there is no single value suitable to defining the minimum area for biodiversity conservation. Countries rich in biodiversity such as those in the tropical regions need much more space to protect all their species than any other regions.

The establishment of Yellowstone also instigated the development of nature conservation approaches. Norton (2003) classifies the nature conservation approach into three developmental stages: (1) single species protection, (2) biodiversity conservation and (3) ecosystem approach. Concepts of single species conservation evolved during the period of 1800 to 1980. The concept that was influenced by the *autecological* approach argues that the survival of a species relies on the characteristic of its individuals. The failure of single species theory to conserve nature, especially in a fragile ecosystem, led to the development of the biodiversity conservation approach. This concept which was popular within the period of 1980 – 1988, emphasizes that species diversity is a part of the diversity of life system. The last concept, the ecosystem approach, has evolved since 1988 and focuses more on the processes within the ecosystem instead of on its elements.

The above schools of conservation mainly focus on protecting nature and excluding the people. This conventional conservation approaches however fail to address economic, social and moral problems (Alberti, 1997). Establishment of a protected area in the beginning was dedicated to fulfilling outsiders' needs and concomitantly, it frequently marginalizes the sovereignty and cultural survival of indigenous people around protected areas (Wells *et al.* 1992, Stevens 1997, Machlis and Field 2000). Schelhas (2001) argues that national park development in the USA is a wrong lesson; therefore, it should not be portrayed as a model of nature conservation in the other countries. The growing conflict between people and protected area leads to shift nature conservation paradigm toward integrating people as an essential element of the nature conservation.

2.2.2. Indigenous People and Protected Area

Initiatives to incorporate local people into protected areas are still controversial. Adam and McShane (1992) argue that conservation objectives of a protected area will only be achieved by keeping the park pristine. Therefore no one, not even indigenous people are allowed to live inside the park (also Schwartzman *et al.* 1999, Redford and Sanderson 2000). In fact, many developing countries have developed large national forest protected areas by alienating indigenous people who have formerly occupied the areas (e.g., Poffenberger 1990 and Colchester 2000). Moreover, Colchester adds that some countries intentionally exclude local people in the hope that the nation will be able to keep the areas for future benefit of natural resources exploitation. Developmental approaches frequently justify the target community as "an empty vessel to be filled" without considering the many possible effects to the local community (Appell, 1988).

Numerous conflicts over protected areas have emerged throughout the world. For example, in Nicaragua, Nygren (2004) reported that conflicts among different park stakeholders in controlling and getting access to resources of the Indio-Maíz Reserve. In Kenya, Okello and Kiringe (2004) observed a number of park violations, such as wildlife hunting, stealing of reserve's resources and conflicts between people and wildlife. Conflicts of interest between protected areas and local people are also reported in Australia (Aplin, 2004), Mexico (Margoluis, 2004), Malawi (Orr, 2000), Philippines (Lynagh and Urich, 2002) and Indonesia (e.g., Harada, 2003).

Conflicts of interest over natural resources commonly occur in heavily populated regions. Therefore, conservation should consider the local political dynamics as well as local community needs (Nygren, 2004). Conventional protected area management systems have no power to address the emerged conflicts of interest between protected areas and local people (Wells *et al.*, 1992). Roth (2004) suggests a need to understand the history of local resource use trajectories in order to reduce conflicts between parks and local people.

Bodmer and Lozano (2001) point out that tropical conservation is an intersection point between conservation projects and rural development. However, there is "discord" between the two efforts. In early stages, a conservation program might impoverish local people's livelihoods. For example, a sustainable resource management project might force local people to reduce their resource harvesting in order to meet the maximum sustainable yield level. This is contradictory with the objective of a rural development program which is mainly assigned to generate and improve local people's income. There is a growing concern that preservation of plants and animal species and their habitat will be effective if local people's livelihoods are also being secured (Colchester 2000, Ghimire and Pimbert 2000). Meffe *et al.* (2006) argue that indigenous people who have long time resided in a protected area mostly bear a large body of knowledge about local natural history. The people usually also have historical and ethical attitude toward nature in the area. Initiatives striving to conserve culturally important sites will benefit not only the people but also the nature conservation. Chambers (1996) also urges the importance of considering local people's perspectives when designing development programs.

2.2.3. Some Initiatives of Human Sight of Protected Areas Conservation

Since the late 1960s, there is growing concern to involve local people in conservation efforts (Tuxill and Nabhan, 2001). Conservation organizations have developed some conservation schemes including biosphere reserve, ICDP (Integrated Conservation Development Program), CAMPFIRE (Communal Area Management Programme for Indigenous Resources) and extractive reserve in order to conserve wildlife resources without ignoring the right and prosperity of the local people.

Biosphere Reserve Program. This program integrates conservation of biodiversity resources with sustainable use of biological resources. Social scientists, conservation and development groups, management authorities and local people are working together to achieve the program objectives. The reserve program was commenced by UNESCO's Man and the Biosphere Program in 1974 (UNESCO, 2007). In the beginning, the program introduced a zonation approach, demarcated a protected area into strictly protected core zone, usually in the center, surrounded by buffer zones and transitional zones. The last zone allows local people to get access into the area to practice their traditional land and resources management system (Batisse, 1982).

The integrated design of biosphere reserve proposed a fascinating approach whereby park managers might facilitate local people in maintaining and improving biodiversity (Tuxill and Nabhan, 2001). Yet, there are some growing critiques to the implementation of the biosphere reserve program. Although the program has covered more than 300 biosphere reserves throughout this world, it has a minimum effect in developing buffer zones and transition areas (Wells and Brandon, 1993). Furthermore, there are only few cases that prove the credible accomplishment of the biosphere reserve program (1993).

Integrated Conservation Development Program (ICDP). ICDP was launched by the World Bank in order to provide more space for local people to participate in biodiversity conservation efforts. ICDP are mainly involved in three main aspects, including protected area management, buffer zone establishment and socio economic development (Wells *et al.*, 1992). To support the local socio economic development, ICDP focused on fostering the development of agroforestry, forestry, irrigation and water control and wildlife; providing community and social service, such as school and health clinics; strengthening ecotourism; building local infrastructure and directly employing local people (1992). Similar to the ICDP, the Asian Development Bank promoted Integrated Protected Area System (IPAS), involving some protected areas in Asian countries.

ICDPs were suitably implemented in some national parks, still there are some weakness regarding the implementation of the program. ICDP spent million dollars for conservation efforts; however, the program was less equipped with ecological monitoring system. As consequence, there were only 5 out of 36 projects being reviewed that showed positive impact to wildlife. ICDPs also did not provide significant socioeconomic aspects for the local people (Infield and Namara, 2001). On the field level, most ICDPs were paternalistic, lack of expertise, mainly dominated by conservationist agenda and pay only little attention to local people's perspectives (Chapin, 2004). McShane (2003) argues that conservation organizations did not have qualified expertise to deal with social and economic realms that make few success of ICDP. Moreover, the programs were not created for the benefit of local people; instead, they were designed and implemented to meet the conservationist's objectives.

<u>CAMPFIRE</u> (Communal Area Management Programme for Indigenous Resources). This program was successfully implemented in East Africa to resolve a long conflict over wildlife management between local people and park authorities. CAMPFIRE integrates wildlife protection and rural development. In Zimbabwe, for example, income generated by wildlife ecotourism is distributed to local villages around parks to develop public service facilities. In the small amount, local people also received cash from the ecotourism fund (McIvor, 2000).

CAMPFIRE has considerable impact on wildlife conservation and rural development as well. CAMPFIRE reduced poaching, revived local people positive perception of wildlife's value, increased local people income and allocated the revenue gained from wildlife as savings that will only be used in dealing with critical periods such as during a long drought period. Yet, CAMPFIRE is such a perfect conservation model; in the ground, it still deals with some problem such as the rigid local government administration system, disparity of wildlife abundance among regions and unfair revenue distribution among its stakeholders (Ghimire and Pimbert, 2000).

Extractive Reserve. Extractive resource management concept offers a framework to use forest resources on sustainable basis, in the same time preserving the resources by appropriating property right to local producer community (Allegretty and Schwartzman, 1986). The emergence of extractive reserve approach was inspired by *empates,* the movement of rubber tapper in Amazon to defend their rubber forest against deforestation efforts. After a long conflict with local farmers who wanted to convert the Amazon forest to developing ranchland and agricultural fields, finally the tappers got support and recognition from federal government for their right to extract non-forest timber products (NTFP), especially rubber, from the local forests (Rueda and Feitosa, 1999). Peters *et al.*. (1989) support the idea of extracting NTFP from forest reserves. The benefits gained from harvesting NTFPs (non-timber forest products) from a hectare of Amazonian rain forest is much more valuable than those gain from timber production or agricultural conversion in the same parcel of land. However, Salafsky *et al.* (1993) point out that the success of an extractive resource is very site specific; it greatly relies on ecological, socioeconomic and political condition in the local regions.

Besides the above conservation models, there are some other examples of integrating local people into nature conservation. In China, a panda conservation project contributes to rural development by allowing local people to collect medicinal plant from the park during certain times of the year. The project also provides hydroelectric power in order to reduce the need of fuel wood (Ghimire, 2000). In Zimbabwe, park authorities directly distributed income generated from wildlife ecotourism to local villages by improving local public facilities and services (McIvor, 2000).

Observing various conservation development programs, especially in developing countries, Capman (2003) assesses that such programs are rarely able to compensate for the reasonable non-cash value of the existing wildlife. Therefore, it is essential to involve international support to assure the consistent implementation of conservation programs in those countries. Given that most conservation areas save outstanding non-market resource value, Chapman proposes to develop an international park service to assist management or protected areas, mainly in developing countries.

2.3. Summary

Most indigenous people hold affluent traditional ecological knowledge, however, most of the knowledge is in the process of extinction. They rarely realize that they have and keep certain traditional ecological knowledge. In many cases they do some simple practices just as their ancestors did. Many different terms of local knowledge evolve concomitantly with the increasing concern on traditional ecological knowledge issues. However, the traditional knowledge is also under the process of extinction as a consequence of rapid rural development which mostly very centralistic and ignores local people's needs. A characteristic of traditional ecological knowledge which is mainly handed down orally making it more susceptible to many introduced dominant cultures and values.

The progress of protected area development over time indicates a gradual shift from a preservation approach to a more conservation-oriented approach. In the early era of park development, parks were devoted to protect nature and therefore excluded people from the area. This model was first implemented by Yellowstone Park and became the *blue print* of protected area development throughout the world. In the following periods, numerous problems and conflicts evolved as a result of development programs that excluded people from the parks. At the same time, various conservation approaches were also developed to address the evolving issues. Scholars and international organizations started to create more participatory approaches in order to involve local people in conservation efforts. The organizations offered some schemes such as ecotourism, co-management and integrated conservation development programs.

Paradigm of nature conservation has gradually shifted from nature preservation to sustainable use of biological resource. Local people that totally excluded in the first model of conservation are also gradually integrated into nature conservation initiatives. A number of community based conservation programs has been adopted to conserve biological resources in the meantime improving the live of people around a conservation area. The conservation areas in the tropic which are not only rich in terms of biological resources, but also have affluent cultural diversity and various vested-interests of people to deal with, challenge conservation and development bodies to come up with conservation agenda that properly accommodate the complexity.

CHAPTER 3

SERAMPAS: THE PEOPLE AND THE LANDSCAPE

"Seciap bak ayam, sedencing bak besi, serentak bak regam"

"As the uniform voice of a group of chick around their hen, as the harmonizing voice in iron percussion, flying in unison as a flock of regam (a local bird)". This adage implies that people should work hand in hand and have the same understanding in order to achieve a great community's goal. Local leaders usually cite the adage to persuade people to work together such as to repairing footpaths. In isolated area with low population density such as Serampas, working together is the main manner to undertake various mission, either individual or community projects.

3.1. Introduction

Concern about indigenous people is growing parallel to the rising awareness on the role of indigenous knowledge in managing natural resources (e.g., Wiersum, 1997). The term "indigenous" is increasingly adopted by a number entities and marginal people because they believe that the term bears some rights including right to their land, cultural and tradition preservation, language and practice and access to their natural resources (Colchester, 2000).

Scholars define indigenous people variously, and there is no a definition that widely accepted. Berkes (2001) and Stevens (1997) categorize indigenous people as descendant groups who firstly occupy an area, who are minority in politics, historically and culturally unique and perceive themselves as indigenous. The Working Group on Indigenous Populations under the United Nation describes indigenous people:

"Indigenous communities, people and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing in those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as people, in accordance with their own cultural patterns, social institutions and legal systems" (UN ECOSOC 1986).

People of Serampas are also struggling with gaining recognition of their ethnic identity as well as their land claim. This chapter will describe about the people and geographical characteristic of Serampas. In the last part of this chapter, I briefly describe of my fieldwork with the community.

3.2. People of Serampas

Besides referring to a region in the northwestern part of Jangkat, the term Serampas also refers indigenous people inhabiting the region. Instead of *Serampas* or *Serampei*, local people prefer using the term *Serampeh* to distinguish their group from other ethnic groups. The name Serampas may also be associated with the Serampas River which passes through the northern territory of Serampas. Some local elders mentioned that *Serampeh* may originate from *se* and *ampu,* meaning a group of unearthly, supernatural people. This notion was closely associated with the local socio-cultural environment in the earlier history of the Serampas. Neidel (2006) mentions that highlanders of Sumatra were cruel and precarious during the pre-colonial era. Each village was dictatorially ruled by the strongest person, typically measured by his supernatural power capability. Even today, shamanism is still apparent and Serampas is still widely portrayed as a sacred region (*daerah keramat*). Some outsiders, mainly young men, intentionally visit and spend some time in this region in order to acquire supernatural power under the guidance of local *orang tuos* (shamans).

There is a growing debate about the origin of Serampas. Cholif (1971) argues that people of Serampas are descendant of *Minang Kabau* (West Sumatra), as they share some similar socioeconomic and cultural values. However, the presence of some cultural properties, such as *redap gong* (a set of local traditional music instrument) and *Depati Pulang Jawo*, a title of the traditional leader of Renah Kemumu, suggests that the sub clan may be linked to the people from Java.

It is estimated that the current population of Serampas is the 13th generation to inhabit the area. Bonatz *et al.* (2006) argued that the people have inhabited the region since about eleventh to thirteenth centuries AD. Campbell's expedition in 1804 confirmed that the population in the region was extremely dense compared to the surrounding areas (Marsden, 1966).

People of Serampas use their own vernacular language, *bahasa serampeh,* for daily communication and at various local cultural events (the language is part of Malay language group). Although villagers throughout Serampas speak the same language, some vocabularies are exclusively used within a certain village. For example, the term *pucuk lumai* is widely used in *Tanjung Kasri* and *Renah Kemumu* to refer to *Solanum nigrum* Leschen ex Dunal, a common vegetable grow wildly in the region. However, in other villages, the same term is considered impolite because it has extremely different negative meanings. An interesting property of the language is that villagers always pronounce Serampas vocabularies in an abbreviated form. For example, instead of saying *pucuk lumai* to refer to the above vegetable, villagers pick up just the last syllables of each word; they pronounce it *cuk-mai*. Without understanding the root of a word, it is difficult for outsiders and beginners like me to catch the villagers' fast conversation.

Serampas still strongly adhere to their traditional cultural system, although the current political environment tends to dissipate the existence of *adat*. All important events, such as clearing a piece of land, establishing a house and initiating planting and harvesting of rice are carried out in such ways following *adat* guidance. While adhering to their traditional cultural system, the Serampas also practice Islamic values in their everyday's life. They "customize" some Islamic practices and incorporate them into the local *adat* system in order to reinforce the implementation of some Islamic values. For example, *adat* fines an amount of money to anybody who does not perform a weekly Friday prayer, a practice not recognized by most Moslems.

Another example is *selamatan ruso*, a ritual to bless bush meat, especially deer. Islam prohibits its followers from consuming some animals such as boar, dog, snake and tigers. To confirm that villagers consume the allowable meat (*halal*), *adat* forces villagers to perform *selamatan ruso* for all bush meat they get. Usually, a cooked head of the hunted wildlife is presented in that ritual. This tradition may have originated from an earlier ritual practiced by ancient pre-Islamic generations of Serampas. Marsden (1966) confirmed that the practice was widely practiced in the pre-colonial era. At that time, the only allowable place to kill animal in the region was a courtyard in front of village hall.

In addition to their adat and religion, the local worldview perceive the presence of *poyang* (ancestors), *orang gunung* (mountain people) *and jin (*genies*)* in the local landscape. These invisible creatures deeply influence the formation of the local worldview that ultimately defines the interaction between people and the local landscape (see Neidel, 2006). Serampas perform a number of rituals and have widespread oral traditions associated with the creatures. I will describe more about local cultural rituals associated with the creatures in Chapter 4.

Nenek Sigindo Balak and *Nenek Tigo Silo* are two of the most prominent ancestors of Serampas. They were buried in Tanjung Kasri and Renah Kemumu respectively. Villagers envisage both these graves and the surrounding areas as sacred sites. The graves become the main sites to perform meditation rituals for those interested in gaining supernatural power. Serampas also believe that their ancestors may appear in the form of a tiger to control the entire area of the local forests. Instead of having five fingers, the ancestor-tigers have only four fingers. Moreover, the tigers do not attack humans; instead, they would force wild tigers from the village. The people of Pulau Tengah (Nugraha, 2005), a neighbor village of Serampas, believe that the tiger has strong association with the local customary system. For example, a conflict between tigers and local cattle is interpreted as there being someone who has broken the customary law.

In addition to the ancestors, Serampas perceive the presence of *orang gunung* (mountain people) who occupy every mountain throughout Serampas. In the eyes of villagers, *orang gunung* develop invisible kingdoms and practice agriculture as well. Some villagers interpret a clump of white cloud that frequently appear on the mountains, as if it was haze emerging from shifting agriculture practiced by the *orang gunung*. These creatures may expose themselves physically in the form of humans but mostly just as spirits. The *orang gunung* may skim throughout the *umo* or *dusun* to grab some food or lure local young women. The *orang gunung* may take away a local woman and bring her to his community on the mountain to be married. In this case, the body of the woman may remain in the village but her spirit has gone, implying that the woman has passed away. In another case, the body of the woman may disappear mysteriously. In the latter case, villagers believe that someday she may come back to the village.

In terms of livelihood, Serampas make a living by practicing shifting cultivation, mainly to produce rice. Some of them also practice sedentary agriculture by growing rice on *sawah*, an irrigated rice field, especially in some villages that have vast flat land area and have enough water for irrigation. In the last decades, they have incorporated some cash crops, mainly cinnamon and coffee, forming a cinnamon-based agroforestry. I will describe more about the farming system in Chapter 7 and Chapter 8.

In terms of food, fishing and hunting constitute significant protein intake for Serampas. Some villagers are very talented in fishing while other are mastery in hunting wildlife especially bird, *ruso* (deer) and *kijang* (kind of small antelope). A number of traditional fishing techniques are employed to catch local fishes (see also Box 3.1). Villagers consume most fugivorous and insectivorous birds, such as *punai* (*Treron sp*), *engang* (*Buceros rhinoceros*) and *burung daun* (*Chloropsis sonnerati*). However, they do not consume most of aves and mammal- predator birds, such as *elang* and *sawai rimbo* (*Dicrunus sumatranus*).

In ancient *Serampas*, hunters shared the meat they got with their neighbors. However, since the population is growing and the wildlife is getting scarce, today, selling the meat to neighbors and/or people in adjacent villages is becoming common. In case of a lack of money, people still can afford the bush meat, for example by working for the game hunter for about two day for the expense of 1 kg of bush meat. People preserve some of the meat for another week or event in another year. They dry out the meat on smoke and/or ferment it to produce *kasam* (also see Box 5.1).

Box 3.1. *Ngarah*: A Traditional Fishing Technique

Rivers in Serampas not only deliver fresh water for irrigation and various domestic uses but also provide a large number of fishes that significantly contribute to the local diet. *Ikan Semah* (*Labeobarbus tambra)* and *ikan panjang* (a big eel, *Anguilla sp*.) are the most common fishes in the local rivers. Villagers employ a number of fishing techniques to catch these fish including fishing hooks, netting, trapping, shooting and *ngarah*.

Ngarah is a technique commonly employed sometime during a dry season and involves many people throughout the village. This event is usually organized by local leaders. People select a particular site that is shallow and divide the site longitudinally into two parts of about 200 m length. The width varies, roughly about half of the stream's width. Men, women and kids are involved in bringing stones to develop temporary dam, dividing the stream into two long sections almost equally (Fig. 3.1). Both end sides are closed to trap water as well as the fishes in it, whereas another side of the stream is kept open, allowing water to keep flowing through the side.

The trapped water looks like a long stony delineated pond. Starting from the downstream of the 'pond', the villagers strike a bunch of toxic vines of *tubo akar* (*Derris scandens* Roxb.) Benth., *tubo kiro* (*Derris sp*) and *tubo duduk* (*Spatholobus*

Box 3.1. (Continued) *Ngarah*: A Traditional Fishing Technique

maingayi Prain ex King) to poison the fishes. Right after the fishes are intoxicated, people, including women and children compete with one and another to collect those fishes. When the *ngarah* is done, people remove the stone wall thus restore water flow of the river. This *ngarah* is not only a way of fishing but also a way of entertaining people in an isolated region as the Serampas. A similar technique is also shared by Dayak Benuaq, an indigenous group of Borneo. However, they use another species of Derris, mainly *Derris eliptica* (Sardjono and Samsoedi, 2001).

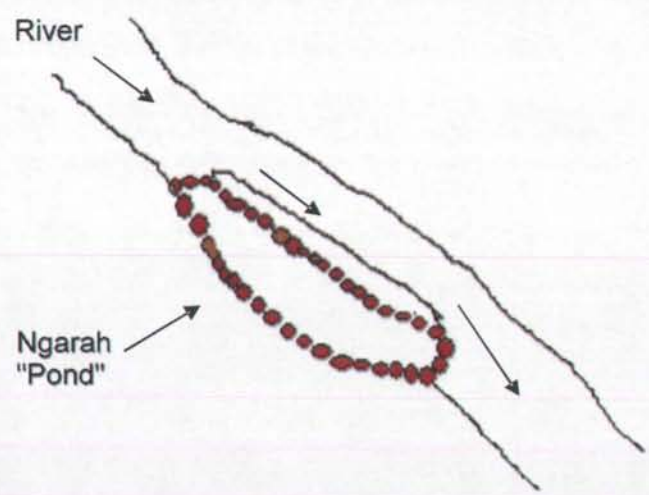

Fig. 3.1. Lay out of *Ngarah*

3.3. Geography, Landscape and Demography

Administratively, *Serampas* is part a group of villages in the *Jangkat* sub district, under the governance of Merangin District, in the Province of Jambi, Sumatra, Indonesia. The region is only about 150 km from Bangko, the district capital. However, it takes between seven and eight hours drive to reach the closest Serampas' village due to the poor and muddy road. Moreover, people have to walk across forested areas between three and fifteen hours to reach the other Serampas' villages.

Jangkat is mainly inhabited by two *marga* (sub clan) i.e., *Sungai Tenang* and *Serampas.* Colombijn (2003) defines marga as a "loose alliance of villages inhabited by certain clan or lineages." *Marga Sungai Tenang* occupies the southwest area of Jangkat, on the border of Kerinci Seblat National Park, whereas *Marga* Serampas inhabits the northwest region of the sub district.

Serampas consist of five villages i.e., (1) Renah Alai, (2) Rantau Kermas, (3) Lubuk Mentilin, (4) Tanjung Kasri and (5) Renah Kemumu. Fig. 3.2 depicts the spatial distribution of the villages of Serampas. The first three Serampas' villages are on the border of the KSNP; however, some of the agricultural fields of the third village overlap with the territory of the KSNP. The fourth and the fifth villages, the sites that I work with, have their entire area within the territory of the park. Originally, Serampas consisted of only three villages: Renah Kemumu, Tanjung Kasri and Renah Alai. The additional two villages (Lubuk Mentilin and Rantau Kermas) emerged from Renah Alai that grows into three different separated villages.

Table 3. 1. Villages' Population in the Jangkat Sub District

	Villages	Men	Women	Total	Density/ km²
Marga Serampas*):					
1	Ranah Alai	208	195	403	11.9
2	Rantau Kermas	166	159	325	7.4
3	Lubuk Mentilin	51	61	112	1.1
4	Tanjung Kasri	106	107	213	1.0
5	Ranah Kemumu	171	141	312	1.4
	Sub Total	702	663	1,365	2.2
Marga Sungai Tenang:					
1	Beringin Tinggi	286	289	575	6.8
2	Dusun Gedang	574	576	1,150	28.8
3	Pematang Pauh	539	533	1,072	32.5
4	Rantau Suli	531	495	1,026	15.3
5	Talang Tembago	371	307	678	12.6
6	Muara Madras	874	968	1,842	19.0
7	Lubuk Pungguk	425	438	863	11.5
8	Pulau Tengah	1,235	1,012	2,247	18.1
9	Dusun Baru	292	273	565	6.6
10	Tanjung Mudo	328	297	625	16.4
11	Muara Pangi	371	357	728	13.0
12	Rantau Jering	649	618	1,267	42.2
13	Tanjung Dalam	282	347	629	6.7
14	Koto Teguh	207	188	395	4.5
15	Sungai Lisai	175	181	356	10.5
16	Sungai Hitam	465	403	868	14.2
17	Koto Tapus	626	627	1,253	7.8
	Sub Total	8,230	7,909	6,139	5.0

(Statistic Office of Merangin, 2001, KSNP, 2006)

*) Density for Marga Serampas was calculate by combining data from Merangin Statistical Office and KSNP.

Sungai Tenang has better access and is more populated than any others in Serampas. In the last three decades the population of Sungai Tenang increased 2.6% annually, reaching up to 16,139 people in the year of 2000 (Tabel 3.1). However, during the same period, the population of Serampas just increased by 1.2% per annum. In the year of 2000, the population of Serampas was only 1,365 people (Cholif 1971 and

Statistic Office of Merangin 2000). Rapid and expansive horticultural farming in Sungai Tenang has driven labor immigration and population growth in this region.

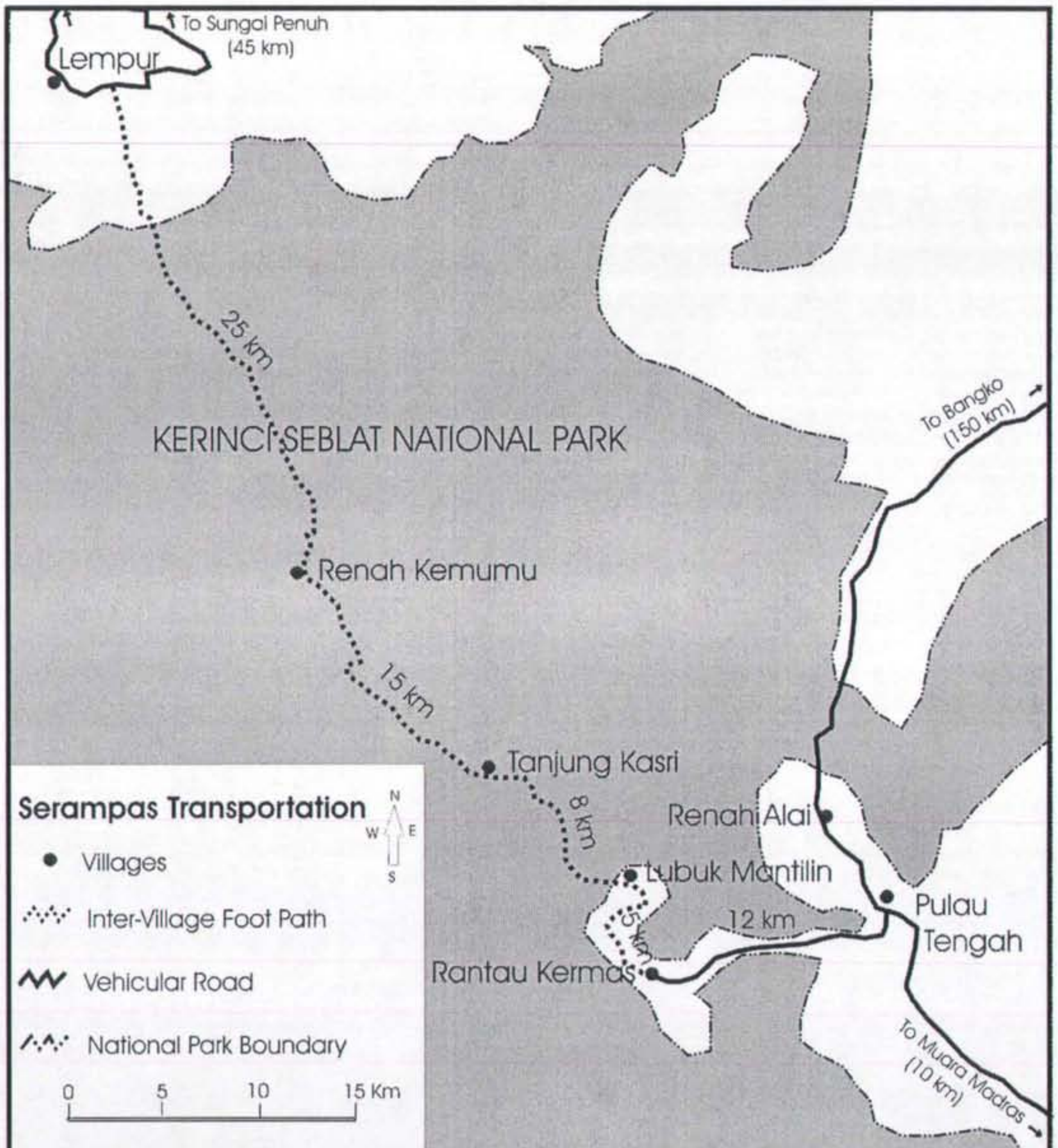

Fig. 3.2. The Villages of Marga Serampas
(Courtesy of David Neidel)

My census at the beginning of fieldwork recorded that the village of Tanjung Kasri was inhabited by 275 people in 71 households (3.8 people per household). The village of Renah Kemumu is more populated than Tanjung Kasri. As many as 302 people in the 83 households occupy the latter village (3.6 people per household). However, some villagers of Renah Kemumu are temporarily (some may permanently) leaving the village to seek a better livelihoods. They mostly migrate to Rantau Kermas and Renah Alai. Both are still Serampas' villages that are close to Sungai Tenang. There, they grow some new crops that are rarely planted in their village of origin, such as potatos, chili, ginger and rubber. Nowadays, the village of Renah Alai has become the most populated site in Serampas. The expansive business of growing potato in this village and the surrounding areas inevitably encourages labor immigration, either temporarily or permanently and significantly contributes to the local population's growth.

Walking on foot is still the main access reach Serampas villages. Motorcycle and packhorse were introduced to the region quite recently. It takes about three to six hours to walk from one to another adjacent village. The longest distance among the villages is about a 15 hours walk (about 45 km). Renah Alai, has the best access compare to the rest of Serampas villages; four-wheel vehicles can reach this village both in dry and rain season. Rantau Kermas, is less accessible than Renah Alai. A car may reach this village only during the dry season. In the rain season, streets are so muddy that impede four-wheel vehicles from reaching this village. Today, motorcycle is the most common vehicle to convey people as well as other stuffs throughout Serampas, except for Renah Kemumu. It takes about two hours by motor cycle to reach Rantau Kermas from Renah Alai. The access to Lubuk Mentilin is similar to Rantau Kermas, but its location is more isolated. It takes about one to two hour by motorcycle to get to Lubuk Mentilin from the latter village. The access to Tanjung Kasri is similar to that of Lubuk Mentilin, however, Tanjung Kasri is much more isolated and the access is more severe, especially during the rain season. In dry season, it takes about two hours to get to this village by motorcycle from Lubuk Mentilin.

Among the Serampas villages, Renah Kemumu is the most isolated one. The only access to reach this village is walking through footpaths across the KSNP territory. From Tanjung Kasri, people have to walk for about four to six hours through a shrubby, some times muddy footpath that is rarely traversed by people. The most common route to reach this village is walking through footpaths from Lempur, a more urbanize area in the adjacent district. Although this route is much further than the one from Tanjung Kasri, people prefer to pass through this route because Lempur provides some more benefits, such as better price for their agriculture/agroforest products and more supply and better price of some basic needs. It takes two days of walking to reach the Lempur and people usually stay over night in the forest on the way to go and back from Lempur. For this purpose, they built some wooden shelters in the forests in between the Renah Kemumu and Lempur.

The drastically drop of cinnamon price since the last decade inevitably reduces the rate of human and goods traffic between Renah Kemumu and Lempur. Human power is no longer reasonable to load agricultural products and other stuffs from and to *Renah Kemumu*. Instead, since 2004, outsiders, especially people from Kerinci, the closest neighbor district, have introduced packhorse to this village in order to provide a more efficient mode of transportation. Nowadays, villagers are accustomed to rely on the packhorses to transport cinnamon and other products mainly coffee, peanut and rice[1] to *Lempur* and the other sites.

The area of Serampas is dominated by undulating terrains which is a part of Bukit Barisan, a continued mountainous chain that stretches along the western coast of Sumatra. Serampas' villages mostly occupy the valley and establish *dusuns* (village) on the flattened sites of the valley. The *dusun* was surrounded by *umo*, the shifting cultivation fields. Nowadays the *umo* closed by the *dusun* is superseded by cinnamon agroforest. The *umo* is shifted away from the *dusun,* it takes about one to two hours to hike up and down through the hilly muddy footpaths to reach the current *umo* sites.

Serampas villages lay on different elevation, between 600 and 1,100 a.s.l. Traveling from Renah Alai to Renah Kemumu means moving toward lower elevation regions. In terms of food crops, there is a gradual shift of farming property as we move toward the lower elevation. People of Renah Alai and Rantau Kermas, the highest region in Serampas (900 to 1,100 a.s.l) transplant rice two months earlier than those in other Serampas' villages. It takes about eight months to grow rice at this elevation. Growing the same rice in Renah Kemumu takes two month shorter than those in the above two villages earlier. Moreover, some tree crops mainly coconut and durian are rarely produce fruit in such elevation as in Renah Alai and Rantau Kermas. People in these villages have to import those coconut and durian from the other villages.

People of Serampas highly rely on local rivers and springs to perform their daily activities, such as taking water for drinking and cooking, laundry and bathing. There are

[1] Selling rice was ascribed as *pantangan* (taboo), however since the drop of cinnamon price, some villagers have been forced to trade the rice, especially farmers who have plenty of rice such as the owners of rice milling units.

two main rivers across the area of Serampas i.e., *Nyabu* and *Mengkabu*. Some villagers use the streams to generate power to operate some tools, such as waterwheel rice milling and waterwheel electricity. Occasionally, villagers employ the streams to convey timbers from forests to *dusun*.

The area of Serampas also has many *grao* (hot springs) that are sparsely distributed throughout the region including *Grao Nguak, Grao Gas, Grao Kunyit, Grao Matahari* and *Grao Gadang* (Neidel, 2006). *Grao Gadang*, the largest hot spring, is considered as one of the scared sites of Serampas, located on the border between Tanjung Kasri and Renah Kemumu. Villagers believe that a large number of *jin* (genie) occupy the grao. Villagers also recognize the *grao* as *inum*, a spring or stream that has particular property of attracting wild animal, such as deer and tiger to drink. A number of *pantangan dan larangan* are applied in those sites. For example, people are not allowed to be haughty around the *grao*. The local hunters employ their knowledge about the *inum* and animal behavior to hunt wild animals that frequently drops by the *grao*.

A *dusun* of Serampas typically consists of housing, *bilik* (rice barn), *rumah gedang* (a community hall) and a mosque. The last two building usually are located in the center of the *dusun*. People use the *rumah gedang* for various gathering, mainly associated with customary events. Layout of Serampas settlement follows a particular arrangement called *larik jajo*, literally means in ordered lines (see Arifin, 2002). The houses that are dominated by wooden stage houses, mostly stand on west-east orientation, face to the north or the south. The houses face one another, usually separated by a small patch walk and the distance to the left/right adjacent house is quite close, roughly 5 m (see Fig. 3.3).

Villagers develop *biliks,* a small bamboo rice barn and concentrate the building in the eastern-end site of the *dusun*. They intentionally develop the *biliks* in a particular area separate from their houses in order to secure their food supply from certain disaster, especially fire. Setting those *biliks* in a cluster also allows the villagers to maximize monitoring those rice barns. While passing over or reloading rice from a *bilik,* a villager also monitor any deterioration that may take place on his neighbor's *biliks* especially dealing with rain water leaking and pest infestation. Any suspected condition will be reported to the relevant *bilik's* owner. Instead of placing the *bilik* in *dusun*, nowadays villagers get accustomed to establish the building in *umo* since the tremendous decrease of wild animal threat.

Fig. 3.3. The Village of *Lubuk Mentilin*: Typical Housing in *Serampas*

In addition to *bilik*, another common building found in Serampas is *pondok.* This is a temporary small bamboo building in an *umo*. The size is about 6 by 6 m, mostly consists of one bedroom and one multifunctional room. Most biliks are made from bamboo such as *mayan* (*Gigantochloa robusta* Kurz) and *betung* (*Dendrocalamus asper* Backer ex K. Heyne). During intensive working periods such as planting and harvesting season, instead of staying in the *dusun*, villagers spend most of their time in the *pondok* for the entire weekdays.

The current sites of Serampas villages are not the sites of which these villages were originally established. According to local elders, the villages throughout *Serampas* kept moving from one site to another over time when they encountered some environmental challenges, such as flooding, wildlife attack and epidemic diseases. For example, the village of *Tanjung Kasri* had moved at least three times before finally settling in the current location. Neidel (2006) reveals 23 abandoned villages around the current village of Renah Kemumu. Every time they moved their village, they would pick up a different name for the new site they occupy. They might move to an area in an adjacent site of the earlier village or to another area that quite far from the original village, mostly in a site that took less than two hours of walk from the previous village. However, since the implementation of government law No 5/1979 (*UU Pemerintahan Desa*), villagers accept the government's suggestion to stick on the current name although they may move to other different sites.

As mentioned earlier, the early Serampas were consisted of three villages i.e., Renah Alai, Tanjung Kasri and Renah Kemumu. These villages were built along a line from the southeast to the northwest, separated by forested areas. According to some local elders, in order to protect the people from wild animals and burglars, the villages were protected by deep moats (ca 2 m width and 4-5 m depth) that surrounded each of the villages (also see Neidel, 2006). Relics of the ancient villages are called *dusun parit* (the ditched hamlets). In that time, the only access from and to a village was a sliding bamboo bridge that were installed only during the day and moved into the settlement side during the night. There was a person who always in charge, under the command of local customary system, to guard the hamlet's gate and slide the bamboo bridge back and forth. In addition to the deep ditch protector, people also planted bunches of *aur duri* (*Bambusa blumeana* Hook. & Arn) encircling the villages. The clumps of the little prickly bamboo of *aur duri* created a thick thicket that protect the entire territory of the village (also see Box 3.2).

In addition to the sliding bamboo bridge and *aur duri* living fence, Campbell's mission to this region in the beginning of 19th century also identified the use of *ranjau*, bamboo spiked booby traps set around village to wound enemies.

> "Previously to our reaching this entrenchments some of the detachment got wounded in the feet with *ranjaus*, set very thickly in the ground in every direction, and which obliged us to be very cautious in our steps, until we arrive at the banks of a small rivulet, call the *nibong*, two or three miles beyond them. *Ranjaus* are slips of bamboo, sharpened at each end; the part that is stuck in the ground being thicker than the opposite end, which decreases to a fine, thin point, and is hardened by dipping it in oil and applying it to the smoke of a lamp near the flame. They are planted in the foot-paths, sometime erect, sometime sloping, in small holes, or in muddy and miry places, and when trodden upon (for they are so well concealed as not to be easily seen) the pierce through the foot and make a most disagreeable wound, the bamboo leaving in it a rough, hairy stuff it has on its outside, which irritates, inflames, and prevents if from healing. (Marsden, 1966:310)

People of Serampas still employ the "*ranjau* technology" mainly to trap short-tailed macaque that frequently destructs the food crops.

Box 3.2. *Aur Duri*: an Ancient Life Protector and Boundary Marker

Throughout the ancient hamlets within Marga Serampas, *aur duri* (a small thorny bamboo) was a prominent marker of a village. The species was intentionally planted by villagers and devoted to create a barrier to protect the people from wildlife and enemies (robbers) that used to came from the southern regions. Before the Dutch occupation, robbery was common throughout the area. For some periods, the whole bunch of the spiny dense thicket *aur duri* that encircled the settlement effectively secured the settlement as well as its people from the robbery (see Roxas 1995 for more detail property of the bamboo).

The Dutch started to directly control the region of Serampas and the surrounding areas in 1903 and sent its troops to delimit highlanders' support on Sultan Thaha's rebellion in the eastern of Jambi (Watson 1992, Znoj 2001 and Neidel 2006). At the beginning of Dutch colonization in that area, the Dutch had difficult time to access the Serampas villages that were surrounded by the clumps of *aur duri*. The Dutch tried to employ some approaches and techniques to enter the villages but they failed to pass through the *aur duri* barriers. Finally, they came out with a creative idea; they scattered a large number of pennies in between the *aur duri* clumps close by the villages' gates.

Knowing that there were plenty of pennies in between the aur duri clumps, villagers competed with one another to collecting the pennies. However, there was no other way to get the pennies laid down in between the prickly *aur duri* clumps without being injured except by removing the plants. The villagers ended up with cutting most of

Box 3.2. (Continued) *Aur Duri*: an Ancient Life Protector and Boundary Marker

the *aur duri* that grew along the perimeter of the villages. Since that time *Bambusa blumea* has retired from its duty to secure the entire borders of Serampas villages.

People throughout Serampas share a common history about the *aur duri*. Some bunches of *aur duri* clumps are still occur in some abandoned villages, such as those in *Dusun Baru,* close to the current site of Tanjung Kasri and *Tanjung Benuang*, close to the current site of Renah Kemumu. Nodaway *aur duri* has neither economic nor cultural values; people just abandon the remaining *aur duri*.

Fig. 3.4. Aur Duri (*Bambusa blumea*)

3.4. The Fieldwork

Respecting the villagers' high appreciation on their traditional rituals, as well as following the local leaders' suggestions, I performed *Ngisi Adat,* a cultural ceremony commonly undertaken to bless and culturally register a new inhabitant, at the beginning of my fieldwork in Renah Kemumu, the second village. I, together with a research assistant and my student from Jambi University who did fieldwork in the same village were considered as new inhabitants. For the villagers, *Ngisi Adat* proclaims the entire settlers of the village, including the invisible creatures, especially the ancestors, about the incoming of new inhabitants. The ceremony signifies that people of Serampas and nature will take care of the new inhabitants. For example, if we got lost in the jungle, the customary institution as well as the people would voluntarily provide search and rescue.

In Serampas, rain is almost everyday, annual precipitation about 3000 mm/year. The difference in precipitation levels between the rainy and dry seasons is not so conspicuous. However, villagers notified that access to Serampas' villages is less muddy in the dry season. Doing vegetation analysis in the highland tropical forests during wet rainy season was very challenging. Heavy rain occurred almost everyday, especially in the afternoons. Moreover, boar flea and leeches were everywhere and ready to hunt and bite one's legs and arms. There was no safe sites to stand and hide from the leeches. Before entering the forests, we used natural leeches repellant, employing some tobacco leaves that are commonly planted by villagers in their *umo*[2], squeezed then basted them through out our legs and arms. For some time, the tobacco leaves effectively protected our body from the leeches.

Taking into account that *Serampas* is located within the area of Kerinci Seblat National Park, people are very aware that their land rights are subjected to cancellation by the park at any time. Consequently, most villagers are wary to any unknown government officers who visit and stay in their village. They assume that the officers,

[2] *Umo* is shifting agricultural fields mainly grown by upland rice and a number of vegetables and spices. The Serampas uses the term *umo* interchangeably with *ladang*, but the first term is more common.

including my team and me, must have had certain associations with the park. Villagers are unable to distinguish whether a visitor is a student, researcher or a government officer. Moreover, they tend to presume that anyone who performs 'scientific' duties, such as writing on a notebook while in the farmland or forest must be a government officer or have an association with the government. The given local perception hampered my effort in developing a good rapport with the local people during the early period of my fieldwork in Tanjung Kasri, the first village.

Regardless of villagers' doubtfulness about my fieldwork, people in this area are always generous and willing to help each other. For example, a farmer who was harvesting peanuts would cook some of his newly harvested peanuts and invite any one who would pass through his field to drop by and taste some of his warm boiled peanuts. Moreover, villagers always share their meal to any visitor who comes by during mealtimes (three times a day). Once in a while, they also shared their fruits and vegetable with my team through my host family. At the end of my fieldwork, even one of the local *dukuns* (healers) shared her sacred mantra for curing diseases. Normally, the mantra is handed down exclusively within her descendants, therefore she warned me not to sharing the mantra with anybody else.

Working in a remote and isolated area as Serampas, I highly relied on human power and packhorses to mobilize some research-associated stuff. *Galeh panting*, a traditional bamboo back-carrier technology significantly facilitated the carrying of my stuffs within and between villages (Fig. 3.5). Villagers have employed the *galeh panting* to bring various goods over generations. Campbell's expedition to Serampas in 1804 witnessed the use of *galeh panting* to bring a number of tribute materials dedicated for the king of Jambi. He describes:

> "The people of this country acknowledge themselves the subject of the sultan of *Jambi*, who sometimes, but rarely, exacts a tribute from them of a buffalo, a *tail* of gold, and an hundred bamboos of rice from each village. They accustomed to carry burthen of sixty to ninety pounds weight, on journey that take them twenty or thirty days; and it astonishes a low-lander to see with what ease they walk over these hills, generally going a shuffling or ambling pace. Their loads are placed in a long, triangular basket, supported by a fillet across the forehead, resting upon the back and back part of the head, the broadest end of the triangle being uppermost, considerably above the head, and the small end coming down as low as the loins" (Marsden, 1966: 320)

Even a local strong man was capable to bring a heavy stuff, such as rice milling machine (about 150 to 200 kg), going up and down the long hills, passing a distance of about 30 km. Nowadays, introduced horses have gradually taken over the role of the *galeh panting*.

Fig. 3.5. *Galeh panting;* Traditional Bamboo Back-Carrier

Rice planting and harvesting season, either upland or irrigated rice, is the busiest period of the villagers' annual schedule. Most of them, especially those who practice shifting cultivation, would temporarily move their entire families to the field during weekdays. Only a few people remain in the village, mostly teachers, elders, school kids and the owners of local small shops. During this time, the village is so quiet as if it was an empty village. On Thursday afternoons, most villagers come back to their home, making the village lively again. In contrast to most villages in Indonesia, Serampas celebrate their weekend on Friday as oppose to Sunday. They usually enjoy the weekend by hanging around, sitting and chatting with other villagers, sharing their experience over the course of the week in the *gardu*, a shelter in the middle of the village that commonly used for informal gathering. Young men spend the weekend by playing football whereas the women play volleyball. However, due to the very low population, they rarely have enough people, even just to form a volleyball team. On Friday afternoons after performing a Friday weekly prayer, in the local mosque, most villagers return to their field, taking along their pets (mostly dogs), chicken and goats while heading a *kiding*, a multipurpose bamboo woven carrier, contains of some foodstuffs for the week.

Some days after the festivity of *Idhul Fitri*, the Moslem holiday to celebrate the end of one-month fasting, villagers perform *kenduri (p)sko,* an annual cultural ceremony (I describe about this annual ceremony in more detail in Chapter 4). *Idhul fitri* is equal to Christmas in Christian societies. During this season, most people in Serampas as well as those in other parts of Indonesia devote their time to stay together with their family and relatives and enjoy the holiday. I was so lucky to have a chance to attend and closely observed the remarkable annual cultural event. In most area of Indonesia, traveling during this period, especially to rural remote areas, is extremely difficult because people still enjoy the holiday thus public transports are very limited.

In order to obtain local knowledge about plants, I started to interview villagers in their own houses. At the beginning I was surprised by the fact that both men and women did not know much about the local plants. However, the result was extremely different when I asked some of them to give escort to going around the local landscapes while talking about the local plants. They were not only able to recognize any particular plants but also familiar with the utilization and ecological property of most plants. *Terap* (*Artocarpus elasticus* Reinw) for example, people entitle different names for the different life stages of the species. For its sapling, they name it *terap* whereas for the mature tree they call it *merat*. Another example is *kelu* (*Etlingera elatior* [Jak] R.M. Sm.), a common vegetable species that grows wildly in secondary forests. People use the term *kelu* to refer the flower and leaf of the species. They use the term of *rieh* to refer to its base fleshy stem. They commonly use the stem to generate a sour-taste of fish soup.

Throughout Serampas, all species of *jelatang* (*Laportea* spp.) are considered as the most notorious plants due to their itchy hairy leaves; regardless of the fact that these plants produce tasty edible fruits. The common species of *jelatang* includes *jelatang bulan* (*Laportea stimulans* Miq.), *jelatang ruso (Laportea sp.)*, *jelatang nyiru (L. sinuata* Bl. ex Wedd.) *and jelatang api* (*Laportea sp.*). Among the species, *jelatang bulan* is the most dangerous; a person who is exposed to the hairy leaves of this plant may get severe fever at least for about a week. Every time we went to the local forests, villagers would always warned us about the plants. Interestingly, a family possesses a descended trait of being resistant to any species of the *jelatang*. A member of the family helped us collecting and preparing some herbarium for the *jelatang* species.

Serampas utilize a number of edible plants that either grow wildly in the forest and shrub or planted in *umo*. They usually grow a number of fruit grow in their *umo* such as sugarcane, banana and papaya (Chapter 5 and 6 will further discus about these plants). The local forests and shrubs also provide plenty of food such as fruits from various species of rattans (Arecaceae), *puar* (*Alpinia* sp., Zingiberaceae) and *bungkul* (*Stelechocarpus burahol* Hook. f. & Thoms, Annonaceae). We frequently brought home some wild vegetable, such as *bayeh* (*Oncosperma* sp. Arecaecae), *sekentut'en* (*Lasianthus spp.*, Rubiaceae) and mushroom. Once in a while we would stay in a villager's *pondok*[3] closed by the forests while expecting the falling down of durian, the most locally prized fruit.

3.5. Summary

Serampas is an indigenous group who occupy a highland of mid-west Sumatra. They inhabit undulating terrains in the foot of *Bukit Barisan*, a continued mountainous chain that stretches along western coast of the island. They have lived in the region since 11 to 13th century. Instead of stick on particular area, they kept moving from one site to another within the region in order to escape from some environmental threats such as flood, wildlife attack and epidemic diseases. Serampas consists of five villages: Renah Kemumu, Tanjung Kasri, Lubuk Mentilin, Rantau Kermas and Renah Alai. The entire

[3] *Pondok* is a bamboo hut that usually erected in the upland rice farm (*umo*)

area of the first two villages are within the territory of Kerinci Seblat National Park, whereas, the others are on the border with the park.

People of Serampas make living mainly by practicing shifting cultivation to meet their subsistence needs. Some of them practice permanent wet rice cultivation, especially in some villages that have vast flat land area and posses enough water for irrigation. Fishing and hunting contribute significant protein intake for the people. In the last three decades, some cash crops, mainly cinnamon and coffee, have been incorporated into local shifting cultivation system. Furthermore, road development mainly in the villages of Renah Alai and Rantau Kermas in late 1990s has considerably shifted traditional farming systems in these villages to more modern horticultural farming systems.

Serampas' worldview perceives the presence of *poyang* (the ancestors), *orang gunung* (the mountain people) *and jin (*genies*)* in the local landscape (e.g see Neidel, 2006). These invisible creatures deeply influence the way Serampas envisions the nature and its interaction with people.

CHAPTER 4

ADAT: THE SERAMPAS CUSTOMARY SYSTEM

"Adat lamo pusako usang, lapuk diperbaharui, kumal disesah, elok dijago, lupo diingat, tinggal dijemput"

"The old adat and the ancient heirloom: the dilapidated is renewed, the rumpled is repaired, the beautiful is preserved, the forgotten is remembered, the left behind is fetched". Customary leaders usually cite this proverb when they propose to update an article of Serampas customary law or to convince people that the law is proper and always relevant with current situation.

4.1. Introduction

The above proverb portrays the way Serampas maintain their *adat*. Adat is commonly translated as "customary system of law"; it can also be envisaged as an entire structural system in a society, where the customary legal system constitutes just one of its elements. In a wider perspective, adat becomes the basis not only of ethical and legal judgment, but also of a reference point for social expectations (Abdullah, 1966). To some degree, Serampas share similar properties of their adat with the people of Minangkabau in Midwestern Sumatra (e.g., Abdullah, 1985). Serampas conserve ancient values of adat, while at the same time strive to adapt the adat to meet current changing circumstance. Just as the Serampas maintain sacred heirlooms such as the *kain suri biang matahari* (the Serampas ancient tailored cloth), they treat adat system as a piece of sacred cloth, which should be repaired as needed while also preserving its ancient beauty to be passed down to future generations.

The presence of an ancient customary system within Serampas society is subtle; however, by attending local ritual ceremonies, even the simplest ones, one will recognize the presence of the local ancient traditions. Some particular sayings are strongly associated with the customary laws and are widely recognized throughout the community. For example, a lawbreaker will be prosecuted under customary law and charged a certain amount of money or goods. *Beras satu gantang ayam seekor* ("one chicken and a *gantang*[4] of rice") is a common phrase used to refer to the lowest amount of adat system fine. This amount is collected for a number of customary law violations, such as wrangling with one's neighbor, picking durian by climbing the tree instead of letting the fruit fall and so on. If one mentions this phrase, people of Serampas, both young and old, will understand the implications. Local leaders keep the collected fines to finance some community projects such as renovating village halls and improving local roads.

As discussed in Chapter 2, people who depend closely on their local resources over long time periods tend to develop a vast body of knowledge about complex local ecological systems (e.g., Gadgil *et al.,* 1993). This knowledge may be embedded in the local language and art such as song and stories (e.g., Alcorn, 1999). The knowledge also drives the development of resource management practices that are adapted to local conditions (e.g., Berkes 1999). Furthermore, an integral component of a resource management system is local level institutions that govern resource use and social behavior. Adat includes a local customs, beliefs and practices serves as a local level social institution that administers people (Blackwood, 2001), especially dealing with

[4] *Gantang* is a metal container commonly used to contain and/or to deliver food. Villagers also use this utensil to measure rice and other grains. The *gantang* is widely accepted as a local measurement unit. A *gantang* is roughly equal to 2.5 kg of rice.

nature. Understanding the adat of Serampas is critical in order to understand the traditional resource management practiced by the community.

The Campbell expedition to Serampas and Sungai Tenang in the early 19th century recognized the presence of strong customary systems in the region. Killing an animal, for example, had to be performed by following the local customary law.

> "They have a custom here of never allowing any animal to be killed in any part of the village but the *balei* or town-hall; unless the person wishing to do otherwise consents to pay a fine of one fathom of cotton-cloth to the priest for his permission." (Marsden,1966).

The unique and persistent customary systems of Serampas and neighboring areas have generated some interest among scholars. Watson (1992) investigated kinship, property and inheritance of Kerinci, native groups in the northern Serampas. Znoj (2001) undertook a study about a matrilineal society in the highlands of Jambi. Neidel (2006) explored broad aspects of Serampas life, mainly related to people and park interactions. Bonatz *et al.* (2006) excavated some archeological sites and traced back the early history of the Serampas. Andaya (1993) enlightened a broader view of the modern history of Malays especially in Jambi and Srivijaya (Palembang). However, to date, very little is known about adat of Serampas.

Over the past decades a variety of changes have been taking place both inside and outside Serampas that ultimately influence the persistence of the Serampas customary system. These changes have also contributed to shaping the local ecological and socio-economic context as well. This chapter focuses on the customary system of Serampas and addresses the following questions: (1) What is the history of the Serampas customary system?; (2) What are the relationships between the customary system and resource use regulations?; (3) What kind of customary system and traditional practices do Serampas currently employ?; and (4) How has this customary system changed over time? The last part of this chapter describes *Kenduri Psko*, a well-maintained tradition of annual festival associated with rice harvest.

4.2. Methods

The research was undertaken with the community of Serampas, an ethnic group who inhabit the northeastern area of Jangkat in the district of Merangin, Jambi, Indonesia. Information on the existing customary system was mainly collected from the people of two villages, Tanjung Kasri and Renah Kemumu. Additional information was gathered from people in three other Serampas villages: Renah Alai, Rantau Kermas and Lubuk Mentilin. I also consulted historical manuscripts and previous study in Serampas. The overall fieldwork was carried out from July 2005 to March 2006.

In-depth interviews with informed consent (Appendix B and C) using open-ended questionnaire (Appendix D) were conducted with the 'local experts' to collect data associated with Serampas customary system and history. The respondents were customary leaders, shamans, midwives, farmers, the KSNP manager, local government officers and anyone who had gained knowledge about the Serampas history and customary system. The total number of respondents was 51 people, consisting of 15 respondents from Tanjung Kasri, 21 respondents from Renah Kemumu and another 15 key respondents from outside the villages, including Serampas associated scholars, government officers, non-government organization staff and park officers. The snowball method was applied to select the respondents (Bernard, 2002), starting with the *kepala* *desa*, or village head. In cases where a primary respondent suggested more than one secondary respondent, I clarified the person who was the respondent's strongest recommendation. Multiple interviews with at least two other key respondents were carried out to crosscheck and confirm the collected information. Some of the in-depth interviews were a back and forth process, meaning that an interview with a respondent was held more than once in order to get further clarification and/or additional information.

4.3. Results and Discussion

4.3.1. History of Adat

Understanding the Serampas' adat necessitates an examination of the history of this indigenous group. A number of studies in the literature indicate that the history of Jambi, the province where Serampas is located has been relatively well recorded since the colonial era. In 1615, the Dutch first sent its commerce mission to Jambi, mainly to obtain pepper. At that time, the region was controlled by Sultan Abdul Kahar. He was the first sultan (Islamic king) of Jambi. He was also titled *Sultan Agung Seri Ingalaga* (Kukushkin, 2004).

Prior to the sultanate era, Jambi was governed by a number of kings including Orang Kayo Pingai, Orang Kayo Pedataran and Orang Kayo Hitam. The terms *sultan* and *raja* (king) were used interchangeably; people use the term Raja Jambi (the king of Jambi) to refer to either the sultan or the king. The hierarchical structure from the sultan to the people was sultan *(raja)* – *jenang* – *temenggung* – *batin* – *rakyat* (people)

(Masjkuri, 1985). The sultans also issued a number of *piagams* (royal edicts), mainly associated with boundary for each *kalbu* or sub clan (Wolters 1967, Sari 1982 and Drakard 1999). These piagams ultimately became heirlooms of the associated indigenous communities, including Serampas (also see Neidel, 2006).

In the key informant interviews, some local elders mentioned that prior to the sultanate period the Serampas area was in darkness, as robbery and banditry were rampant throughout the region. Black magic was widely practiced not only to confiscate property, but also to kill innocent people. *Kecik betis gedang betis, kecik lengan gedang lengan* ("the strong suppressed the weak"), is a local proverb that precisely describes the earlier history of Serampas. Later on, the customary system that was introduced by the King of Jambi evolved within the community of Serampas. Local elders recount a story as to how adat system was introduced in the Serampas (see Box 4.1). The system has been gradually naturalized as a part of Serampas identity.

The Dutch trading mission that had settled in Jambi since 1615 gradually shifted their goals from trading in pepper to conquering the area of Jambi. The Dutch were combating a number of rebellions by the end of nineteenth century, especially the one lead by Sultan Thaha (Kukushkin, 2004), the most charismatic and prominent king of Jambi. Finally, the Dutch military took over the entire region of Jambi in 1903. Accordingly, the Dutch imposed the *Undang-Undang Jambi*, a codification of adat principles for Jambi in 1905, following a similar act that had been implemented in Java (Watson, 1992).

Box 4.1. History of Adat: People's Perspective

The origins of the Serampas customary system are explained in the following local folk tale. Back in the early history of Jambi, the king of Jambi lost his sacred *keris* (a wavy double-edged dagger) in a deep pool of a big stream near his palace. Nobody was able to find his *keris*. As a reward, he then offered to adopt as a son anyone who was able to find the *keris*. Three months passed, but there was no one interested in his offer.

Finally, *Piang Pion*, an elder of Serampas, went to the king to take the challenge. He wore bark cloth made from terap (*Artocarpus elasticus* Reinw.) and rode a banana-trunk raft. He accepted the offer and requested that the king provide seven pieces of banana for food during the journey to find the *keris*. His supernatural powers allowed him to predict that he would need seven days to find the *keris*. He dived all day long and ate a piece of the banana for each day. On the seventh day, he met a dragon at the bottom of the stream, entwined around the king's *keris*. After a tough struggle fighting the dragon, he was finally able to kill the dragon with his own *keris*. He took back the king's keris and delivered it to the king of Jambi.

The king kept his promise and asked *Piang Pion* to be adopted as his son. However, *Piang Pion* insisted that what he really needed was not recognition as a son of the king; instead, he needed something that would not crack due to the sun and would not degrade due to the rain (*tidak lekang kareno paneh, tidak lapuk kareno hujan*). Latter on the *Piang Pion* saying become common proverb in the region as it is quoted in the beginning of Chapter 2. The king concluded that what the Serampas elder really needed was an adat

Box 4.1. (Continued) History of Adat: People's Perspective

(customary system) for his people. Employing his supernatural powers, the king transferred his knowledge about customary systems to *Piang Pion* instantly. At the time communities around the king had implemented customary system; whereas communities in remote areas such Serampas did not have the customary system. *Piang Pion* went back to his community in Serampas and implemented the customary system he had gained. Since that time, Serampas has shifted from an "era of darkness" to an adat system.

The Dutch reconstructed the existing indigenous systems and formalized them as customary systems (McCarthy, 2005). Kingston (1991) argues that the colonial government manipulated the existing adat in order to gain legitimacy as well as to effectively expand their power. Indigenous people throughout Indonesia share a similar sense of adat; however the constituents of adat may vary across different ethnic groups (Kipp and Rodgers 1987). Religions, colonial and postcolonial state and relationships with other neighboring ethnic groups greatly influence the property of an adat.

In Jambi, the *marga* system (community council) was imposed and headed by *pamuncak* (the lowest level of government representative). The title of pamuncak was finally replaced by the term *pasirah* in 1937. The term and position of pamuncak have been incorporated into the local adat system, bearing the title *Depati Sri Bumi Putih Pamuncak Alam*, the highest Serampas adat leader (Neidel, 2006). Since the Dutch preferred to employ local elites to govern the community (McCarthy, 2005), the *pasirah* was gradually blended and incorporated into adat. The highest Serampas adat leader was automatically inaugurated as a *pasirah* by the colonial government. At the same time, the same person also bore a traditional title of *Depati Sri Bumi Putih Pamuncak Alam*. The *pasirah* governed the community as well as managed local natural resources up to the stipulation of the Village Governance Act in 1979 (McCarthy, 2000).

Other *depatis* assisted the *Depati Sribumi Putih Pamuncak Alam* to administer associated villages[5]. They were the *Depati Karti Mudo Menggalo, Depati Singonegaro* and *Depati Pulang Jawo* who controlled the villages of Renah Alai, Tanjung Kasri and Renah Kemumu respectively. In each village, a *kepala kampong,* a kind of minister of home affairs, assisted the *depati* and devoted himself to governing various internal affairs of a village, while the *depati* dedicated himself to addressing various external businesses. To be a *depati,* one had to possess Serampas lineage and gain enough support from the community. The inaugural ceremony of a new *depati* as well as other customary officers usually takes place at the same time as *Kenduri Psko*, an annual customary celebration discussed in the last section of this chapter.

The *piagam* or royal edicts of Serampas, issued by the earlier sultans of Jambi, to some extent still affect the people of Serampas. The *piagam* mainly describes the territory of each village. In addition to the *piagam,* adat also involves some customary regulation documents to govern the villagers' everyday lives. The *piagam* as well as other customary documents used to be announced once a year, mostly during *Kenduri Psko.* This oratory was to remind the villagers that some rules were still in effect.

[5] I am placing most of the description and analysis about customary system in the past tense due to ambiguity about the existence of customary values and practices in the current socio-economic-political setting. Some customary values and practices still exist, some do not, and the others are in between.

During this time, the rules were also reviewed (see *pangkal tahun* in the last section). Villagers discussed whether there were section(s) that should be revised or omitted to adapt to current socio-cultural changes, as stated by proverb quoted at the beginning of this chapter. The genealogy of villagers was also described at the feast. Unfortunately, adat customary laws other than piagam are not well documented. They were saved in people's memories and handed down to generations by means of oral traditions.

Depati and the other adat leaders enforced the implementation of adat laws and sentenced any person who broke the law. In addressing adat lawbreakers, for example in disputes between two villagers, adat law employed a unique approach that promotes educational and affectionate values between offenders. To do so, adat asked *tengganai*, the male representative of the extended families (usually the elder) from both sides, to resolve the conflict. If they could not resolve the dispute, adat would establish a customary court to settle the violation (also see Iskandar, 1984). On behalf of the community, depati together with the other customary leaders sat together with *tengganais* from both sides to investigate the dispute. In other cases such as burglary, adat court might charge a fine to the defendant and publicly announce the sentence of the prosecution. The fine for most adat misdemeanors was *beras satu gantang, ayam satu seekor* (a chicken and a *gantang* of rice). In the case of serious violation, such as a murder, the fine was *beras dua puluh [gantang], kambing satu ekor* (20 gantang of rice and a goat).

4.3.2. The Significance of Adat in the Serampas Community

Adat plays a significant role in most aspects of Serampas life. Prior to the coming of a Serampas baby on earth, adat already serves and takes care of him while he is in his mother's womb. In following the steps, a growing Serampas person will keep consulting adat for various purposes including marriage, seeking land for agriculture and establishing a house. Adat is also a body to consult in solving a number of inter-human conflicts. A number of changes have taken place and challenged adat however, the people of Serampas still adhere to and maintain their adat.

In terms of natural resource management, every piece of land throughout Serampas was under control of adat. To do so, adat implemented a number of rules associated with the land, which I will describe in more detail in Chapter 7. Although the role of indigenous systems in conserving natural resources is still debated (e.g., Redford, 1991), the Serampas traditional law appears to have promoted the equal distribution of local natural resources as well as to have promoted resource use on a sustainable basis in a number of different ways. Some of these ways are described below and the following chapters.

Adat of Serampas controls a number of locally important perennial fruit tree species called *jambak jambu kalko*. *Adat* prohibited villagers from cutting trees of the *jambak jambu kalko* wherever they grew, even if they grew on one's own farm. The *tambo anak*, an adat document from Renah Kemumu updated in 1969 (Neidel, 2006:230), listed some species of jambak jambu kalko including durian (*Durio zibethinus* Murr.), *petai* (*Parkia speciosa* Haask.), *juwo* (*Syzigium* sp.), *buah kereh* (*Aleurites mollucana* Wild.), *payang* (*Pangium edule* Reinw.), *bungkul* (*Stelechocarpus burahol*

Hook. f. & Thoms.), *enau* (*Arenga pinnata* Merr.), *seri* (*Ficus tinctoria* G. Forst. f.), *sirih* (*Piper betle* L.) and *gambir* (*Uncaria gambir* Roxb.) Some other fruit species, such as *jambu aye* (*Syzygium* sp.) and *nangko* (*Artocarpus heterophyllus* Lam.) were also regarded as *jambak jambu kalko* although they were not listed on the *tambo anak*. Respondents confirm that the *jambu kalko* fruits benefit not only people, but also other creatures including birds.

Adat law also applies to the raising of poultry, which is an economically and culturally important form of animal husbandry for Serampas. Chickens may serve as a safety net when a household is in severe economic condition. Moreover, various local ritual and cultural events, such as initiating rice planting, *kenduri psko* and establishing a new house, almost always involve the serving of chicken-based meals. To secure the population of the local chicken variety, *adat* law prohibited people from bringing in any chicken from the other regions.

Adat law was also applied to regulating fish resources. The local stream provided abundant fish to feed the community and occasionally people from different areas would intentionally come to the village just for fishing. In order to conserve the local fish, *adat* prohibited the application of any unsustainable practices, especially the use of electrical shock and chemical poisonous agents, such as pesticides.

Another example is the customary law which prohibited people from picking durian, the most prized fruit in this area. People had to allow the fruit to ripen completely and fall down naturally. The law endorsed fairer distribution among villagers of the fruit that mostly grows in secondary forests. From an ecological perspective, the law allows seedling recruitment to maintain population of the durian in the village. Allowing the durian to fall of its own accord also permits some mammals to enjoy the fruit, and more importantly, disperse its seeds throughout the local forest. Failing to obey the law, one would be charged one chicken and a *gantang* of rice.

The people of Sama Dua in northwestern Sumatra shared a similar customary rule dealing with the durian (e.g., McCarthy, 2005). Rather than enforcing a sanction with fines, Sama Dua attached a social stigma (*malu,* or shame) to breaking such a strongly held norm of village life. A villager would lose his credibility in his community by selling unripe or inedible durian or picking durian from a tree. The customary law elicited a good reputation for the durians from Sama Dua and the villagers enjoyed high appreciation and good prices for their durians in the nearby provincial town.

In the eyes of Serampas, the economic value of the customary fines was not a big deal. However, the social consequence of breaking adat law affected the defendant much more than the fine's economic value. A defendant would be ashamed of violating the customary law because people in the entire community would recognize his misdeeds. Moreover, the afore-mentioned traditional dispute resolution approach that involved extended family members from both sides prevented resentment from growing between an offender and other parties associated with the case. In some cases, both parties even developed a more intimate relationship and treated each other as a family after being prosecuted by *adat* law system. Such outcomes are rarely possible with conventional law systems. According to the interviews, most villagers are proud of their own customary laws and perceive that the law is proper and fits well with the local socio-cultural condition.

However, employing a traditional system such as adat does not always necessarily mean in living harmony with nature or that it benefits most of the people, as warned by Campbell (1999). There are some examples in which local leaders twisted the customary system, benefiting only their close families. Moreover, adat in the case of the *Sasi* in eastern Indonesia bears some weaknesses (e.g., Harkes, 1999). It is highly dependent on the wisdom of local leaders and very sensitive to population growth, urbanization and modernization.

4.3.3. Adat: Encounter the Changes

Adat has served the community over generations; however, Serampas are not a static community and a number of changes have taken place over time. One example is the Serampas market. The main market of Serampas had been located in Muko Muko, a small city in the west coast of southern Sumatra since the 1800s (Znoj, 1998). Villagers used to spend about three months to go to the market and return from there. During the 1960s, another market was opened in a closer village but villagers still had to walk for about two to three weeks to reach the closest market to procure basic goods, especially salt and clothes. In the early 1980s, the rapid development of infrastructure has enabled Serampas to reach Danau Pauh, another nearby market in much less time, between three and four hours' walk. For the last three years, the introduction of packhorses has eased the transportation of goods to and from Serampas, especially in the village of Renah Kemumu. Besides the improved market access, Serampas have also been exposed to modernization. For example, villagers have become used to some modern farming tools, such as chainsaws, that greatly reduce the time for preparing the land. Moreover, they also have started to grow more cash crops, primarily cinnamon and coffee, as opposed to subsistence agriculture.

More importantly, the implementation of Central Government Law No. 5/1979 (UU No. 5/1979) that standardized governance systems at the village level has significantly changed the Serampas traditional system. However, this was not the first exposure of Serampas to imposed external laws. As mentioned above, in the early period of Dutch colonialism in Indonesia, the colonial states also installed a formal legal structure based on the existing indigenous governance system. Interestingly, the imposed formal structure was gradually adopted and taken by the villagers as their own and ultimately became the main element of local customary system (adat). The naturalization itself was not exceptional; other indigenous groups in Indonesia experienced a similar process (e.g., von Benda-Beckmann 1985, Warren 1993, Kahn 1993, Peluso and Vandergeest 2001 and McCarthy 2005). On the other hand, adat was commonly employed to meet the colonial government's interests. For example, the Dutch attempted to employ and modify the existing indigenous adat system of Kerinci, an adjacent region to Serampas, mainly to maximize state's tax earning (Watson, 1992). The Dutch legislation to some extent tended to respect and consider existing adat rules more than the UU No.5/1979. Even under the Dutch imposed legislation, the role and existence of adat were still much more apparent – for example, adat controlled distribution and exploitation of local resources, including non-timber forest products (Colombijn, 2005). The colonial laws recognized the existing local governance systems but did not actually control the systems. This situation not only allowed the local people self-rule through their local systems but also strengthened the diversity of the existing indigenous governance systems (Zakaria 2000, Antlöv 2003).

In contrast, the law UU No. 5/1979 and its subsequent implementing decrees, regulations and technical guidelines introduced the kepala desa (village leader) and his apparatus, a completely new official institution, to govern communities at the village level. The policy did not take into account the existing customary institution (*adat*) that governed the local community over generations. Instead, the new system gave more mandate and power to the kepala desa, the official leaders. Adhuri (2002) argues that instead of representing villagers' interests, the 1979 law articulated more central government interest, especially during new order era.

4.3.4. Adat in Modern Day Serampas

Although adat is no longer the sole institution that governs people at the village level (e.g., McCarthy, 2000), it still exists and greatly influences the everyday lives of many indigenous groups including the Serampas. As a local elder argued, "unlike conventional national laws that easily change due to political interest, adat will persist as long as we native people inhabit our land". Sandjaya (1999) argues that adat is a locally autonomic governance. It will never die, degrade, or vanish even under government repression, suppression, co-option and threat. Adat is resilient to these threats, partly because it is quite dynamic and accommodating to change, for example by adopting external policies and adjusting the existing customary institutions to them (e.g., Fahmi 2002, Adhuri 2002 and McCarthy 2005).

However what resilient adat is, the continued pressures to marginalize and reduce the role of adat over long times have gradually weaken adat. For example, the central government policy to impose standardized village governance has marginalized the roles and influence of *adat.* The policy is eliminating the existing customary institution and ultimately altering the entire local socio-cultural settings (Kato, 1989).

Today, depati and other customary leaders still exist, however, they are no longer actively involved in governing a community nor in managing local natural resources. Instead, they devote their time just to addressing some cultural ritual events, such as *Kenduri Psko.* Moreover, as observed by local elders, the cooperation and coordination among adat institutions across different villages to address trans-boundary natural resource conflicts has become weak with the emerging dominance of the kepala desa. Such conflicts are difficult to define because although the current governance system does in fact promote cooperation and coordination to control natural resource across different villages, it is poorly implemented and employs a different sense of inter village cooperation.

As a consequence of this dualism in governance, the people of Serampas are in some ambiguity; they are neither enforcing nor ignoring most of their traditional practices and values. For example, adat law prohibited people from employing unsustainable fishing techniques, mainly the use of hazardous chemical agents (e.g., pesticides) and electricity. In fact, as reported by respondents, there are some indications that people, especially those promoted by outsiders, employ some destructive fishing techniques to catch as much fish as they can. Villagers witnessed several cases of the use of electrical shock and pesticides to catch the fish. On the other hand, people are no longer concerned about reinforcing their traditional system to resolve the violation comprehensively. Moreover, the current village government system pays less attention to this and is powerless to address such violations, especially when involving outsiders.

Prior to the current government system, the people of Serampas perceived that they were "a big family", although they may live in different villages. Indeed, most Serampas people across the villages have blood relationships. People kept an eye on any stranger who explored the region and were aware of any law violations that took place in other villages. *Depati Sribumi Putih Pamucak Alam*, the highest traditional leader of Serampas facilitated the coordination of local leaders from the villages, especially in addressing a lawbreaker. In the higher level, some traditions such as the *minum kawa* (see Box 4.2) were employed in order to facilitate the coordination.

Adimihardja (1999) supports the view that the current government dominant centralist policy over adat gives rise to the development of a 'split personality' among the local people. On one hand, people do not want to uproot their ancient culture and traditions; on the other hand, they cannot avoid the newly introduced values. People of Serampas respond to this ambiguity in power by perpetuating those traditional values and practices that benefit them without overlapping with the new governmental system (*Pemerintahan Desa*). For example, they process any paperwork in dealing with other villages or with government from higher levels, following guidance from the government. On the other hand, they continue to practice the traditional system, especially dealing with internal village affairs such as public health service (see also Chapter 5), marriage ceremonies and annual customary festivals. Inevitably, the policy has gradually and systematically pushed aside adat and all of its constituents from the community. The framework for enforcing and perpetuating traditional practices and values has gradually been detached. It seems to be just a matter of time to witness the disappearance of Serampas traditional legal system.

Box 4.2. *Minum Kawa*: An Ancient Way of Drinking Coffee

The ancient people of Serampas were easily recognized by their habit of chewing betel nut, smoking enau (leaf of *A. pinnata* Merr.) and drinking *kawa* (coffee leaf). *Coffea arabica* L. was the earlier introduced coffee species into the region. Later on, the species was gradually replaced by *Coffea robusta* L. Linden, another more disease-resistant species (Watson, 1992). The term *kawa* is rooted from *qahwa* (Arabic) that used to refer to wine (Seidel, 2000). The tradition of drinking *kawa* was widely practiced up to the 1960s. At the time, drinking *kawa* was as popular as drinking coffee today. Furthermore, the habit was closely associated with Serampas socio-cultural system. Most important negotiations, whether they involved big groups or just two people, were initiated by the tradition of drinking *kawa*. This was similar to the tradition of drinking *kava* (*Piper methysticum* G. Forst.), in Polynesian society (e.g., Tomlinson, 2004). *Kawa* and kava not only have similar names but also shared a common social role of promoting feelings of relaxation and sociability.

Local leaders from different levels of socio-political classes regularly facilitated community gatherings of drinking *kawa*. The events grew and became a "vehicle" for villagers to communicate with their leaders intimately. Villagers employed the occasions

Box 4.2. (Continued) *Minum Kawa*: An Ancient Way of Drinking Coffee

to express a number of important and crucial problems they faced. On the other hand, the leaders utilized the event to pass on important information from their boss. Unfortunately, the tradition is no longer in practice, especially since the implementation of the law 5/1979. The centralistic policy promotes patron-client relationships between government officers and their supervisors and does not promote the same kind of communication and exchange between villagers and leaders. Consequently, the policy indirectly vanquished some traditional values and practices, such as the tradition of drinking *kawa* that had persisted in Serampas for decades.

To produce a good *kawa,* people used coffee leaves that were neither too young nor too old. The leaves were then piled one by one in an orderly stack, clipped with a bamboo or wooden clamp and roasted on a fire until completely dried out and crunchy. The degree of burning defined the ultimate aroma of the coffee leaf. A talented *kawa* maker could stop burning the leaves at just the right point to produce the tastiest coffee leaf. The burnt leaves were crushed; their granules were put in a bamboo tube and covered with fibers of *enau* (*A. pinnata* Merr.). The kawa was then kept close to the fireplace for some days or months. To drink the *kawa,* people took out some *kawa* granules from the bamboo, put them in a coconut shell cup and mixed them with hot water without sugar. Those unfamiliar with the drink might not like drinking *kawa;* however, after some time, one would get used to it and enjoy the traditional coffee leaf drink.

Today however, there is growing concern and recognition by the Indonesian Government as well as other organizations concerned with native peoples about indigenous communities and their customary systems. The Village Governance Law No 5/1979 that standardized village governance systems was superseded by a series of government laws including UU No 22/1999 (*Undang-Undang Pemerintahan Daerah*), UU No 32/2004 and PP 72/2005. These regulations tend to better accommodate local people' aspirations and diversity. Article 93 of Law 22/1999, for example, states that villages can be formed, abolished or joined with consent of the district head and regional parliament. Some provinces have employed the policies to revive their traditional governance system such as West Sumatra (e.g., von Benda-Beckman and von Benda-Beckman, 2001). However, Antlöv (2003) suggests that decentralization policy is not enough; government and civil society should also assure that the newly released policies are not manipulated and guarantee the local people's participation.

Referring to the current Indonesian laws, revitalization of indigenous systems (adat) relies on initiatives of local government and parliament as well as indigenous people themselves. However, native people rarely have enough resources and power to revive their own traditions. In contrast to the case of West Sumatra above, in the province of Jambi whereby Serampas is located, discourse on revitalization of the traditional system so far is still a minor concern among scholars and local governments in the region. Moreover, local governments may have a different understanding and interest in the native group that ultimately discourages efforts to recovering adat.

4.3.5. *Kenduri Psko*: Linking the Ancestor Spirit with the Current Generation

One of the important features of adat that remains in Serampas today is the festival of *Kenduri Psko.* Once a year, people in every village throughout Serampas celebrate *Kenduri Psko*, an annual customary festival. The event takes place sometime between 7^{th}-15^{th} of *Syawal*, the 10^{th} month of Islamic calendar. *Kenduri Psko* (heirloom festivity) or *Kenduri Sesudah Nuai* (after-rice-harvesting feast) expresses villagers' gratitude to the creator for the health and wealth they have enjoyed over the course of the previous year. The ritual also articulates Serampas respect for nature and their ancestors as well. People of Lempur also share a similar tradition; however, they celebrate *Kenduri Psko* separately from *Kenduri Sesudah Nuai* (Watson, 1992). The Serampas *Kenduri Psko* might have originated from the same festival as that in Lempur. However, due to its small population and remoteness, Serampas might have combined the celebration of *Kenduri Psko* and *Kenduri Sesudah Nuai* into a single annual festivity.

During the three days and nights of *Kenduri Psko*, people devote their time and effort to various activities associated with the festival. In fact, people may spend much more time in the preparation and cleaning up before and after the festival. *Kenduri Psko* consists of a set of programs including cooking *lemang*, a common traditional food throughout Malay community in Sumatra and Malaysia, performing *redap gung* (a traditional music and dance), collective cooking of traditional meals, having lunch together, displaying and washing local *pusakos* (heirlooms) and *rapat pangkal tahun*, a meeting to discuss farming and other associated issues. The ceremony is held in the *rumah gedang*, a traditional village hall, and is attended by villagers throughout the village including elders and even young babies. People from neighboring villages also occasionally take a part in this annual festival. For the villagers, it is mandatory to attend the *Kenduri Psko*, otherwise they will be customarily fined. However, the fine is hardly necessary since, most people are very excited to attend the entertaining *Kenduri Psko*. In such isolated and forested regions as Renah Kemumu and Tanjung Kasri, *Kenduri Psko* is one (or maybe the only) of the few events that allow villagers to entertain themselves.

A day before the celebration, people in the entire village engage in making *lemang*. It is made by mixing white or brown sticky rice and coconut milk, then wrapping the mixture with young banana leaves, putting it into a bamboo tube and then baking (Figure 4.1). Some people vary the *lemang* by combining the sticky rice with some local foodstuffs, such as pumpkin, banana and durian to create more pleasing tastes and flavors. Villagers utilize various species of bamboo to cook the *lemang*, the most preferred species being bambu *kapal (Giganthocloa hasskarliana* Backer ex K.Heyne). The species has some properties that are best suited to making lemang, including moderate size (internodes length and stem diameter), thin bark that significantly shortens the burning time and abundance in local forests close by the village.

Fig. 4.1. Preparing *Lemang*: Filling up Sticky Rice into Bamboo Tubes

a) The First Day

Some people start baking the lemang early in the morning, between 1 and 4 AM while it is still dark, but most do it between about 5 to 8 AM. Most households bake the *lemang* in the front yards of their houses. It takes about two hours to bake the *lemang* completely. The bamboo tubes filled up with sticky rice are lined up on a long bamboo-pole lain down about 30 cm above the ground. To avoid burning, people make a hole on every internode of the bamboo-pole, then fill up each node with water. A pile of firewood is placed close by the bamboo, and then burnt to bake the *lemang*. Some families, especially the small ones, may share the fires with another family in order to save some firewood. While baking the *lemang*, people chat with their neighbors and invite other people, especially those who have come back to the village only to celebrate *Kenduri Psko*, with freshly cooked *lemang*. This type of food is delectable when eaten warm. During that day, the entire village is extremely polluted by the rampant smoke coming from the *lemang* baking fires, but people are very excited and enjoy this tradition.

Each household has to provide at least 20 tubes of *lemang* and bring them to *rumah gedang* for the *Kenduri Psko*, 10 tubes for the first night and another 10 tubes for the second night. Roughly, every household makes between 40 and 50 tubes of *lemang*, the larger the family the more *lemang* they make. The other *lemang* are kept for the consumption of each household.

A couple of hours after completing baking the *lemang*, local customary leaders initiate a ritual of *menurunkan pusako* (passing down the heirlooms) in the *rumah gedang*. The procession is initiated by taking out the *pusakos* (heirlooms) from their storage then bringing them to the *rumah gedang*. The heirlooms are shown publicly only during the *Kenduri Psko* season, once in a year. Each village has its own unique *pusako*. Tanjung Kasri for example, its *pusako* consists of *tombak kuno* (an antique spear), *kendi burung* (an ancient bird-shaped teapot), *tanduk kijang cupang tujuh* (seven branched antelope horn), *tanduk kambing hutan* (a wild goat horn) and *kain kuning tiang langit* or *kain suri biang matahari* (a piece of ancient cloth with a sunshine pattern). At a glance, the cloth appears as a piece of common brownish cloth, because the color has faded and its sunshine pattern is subtle. It just recognizable through close scrutiny. The cloth is tied to the ceiling of the *rumah gedang*, whereas the other *pusakos* are put on a high shelf on a front corner of the *rumah gedang*. All of the *pusakos* remain where they are placed over the course of *Kenduri Psko* festival.

People believe on the sacredness of the heirlooms. For example, the physical appearance of the ancient cloth being stuck on the ceiling symbolizes the living conditions throughout the village for the following year. A smooth appearance without rips or with only minor rips indicates that the village will prosper; the people will be healthy and their farming will succeed due to few pest and diseases infestations on their crops. On the other hand, a tangled appearance with many rips on the ancient cloth indicates the reverse.

The traditional art of *redap gung* is performed right after setting up the *pusakos*. *Redap gung* is a combination between folk song and traditional dances accompanied with three instruments of two *redap* (traditional drum) and a *gung* (gong). The songs actually are *pantau* or *pantun*, a traditional form of oral poetry commonly recognized throughout Malay culture. Most of the songs articulate the beauty of local nature, for example, they cite some animals (mostly birds) and trees commonly occurred in the local forests. The songs deliver a number of messages including advising people to behave properly, to respect to adat as well as the elders and to obey a friendship norm, especially between boys and girls. Fascinatingly, most vocalists of the *pantau* are elder women.

A local prominent *orang tuo* initiates the cultural performance by giving respect to the *pusakos* by bowing down his body, then stepping on a stage to perform *tauh*, a local traditional dance. Another *orang tuo* or traditional customary leader follows the first dancer; does as the same thing as the first dancer and starts to dance, pairing with the first dancer for about five to ten minutes. Before leaving the stage, each of them select and invite another traditional leader to dance by shaking hands with the expected person. This dancer recruitment system is applied over the course of this traditional art performance. In the first session the dancers are dominated by traditional leaders and their spouses, the others take part in the following section. Noticeably, a man always dances with another man, never in pair with a woman, not even with his spouse. The 'orchestra' of *redap gung* keeps going while the dancers are coming and leaving the stage. People enjoy the performance while devouring the *lemang* and drinking hot coffee.

After taking a break for about half hour, the second session performance is continued until the early morning, involving more common-people. The dancers are only people who are already married; I did not see any single man or woman dancing in this session. Occasionally, the dancers are inhabited by spirits of *orang gunung* (mountain people) who come from the surrounding mountain, such as *masurai* and *sumbing*. Each mountain has its own unique dance; *orang tuos* are able to recognize which dances originate from which mountain. The audiences easily recognize the incoming of an *orang gunung* spirit. For example, the dancing becomes extremely beautiful with smooth movement as if s/he was a professional dancer. In another case, the dancer becomes so wild, animalistic, sometime frightening and lasts for a much longer time than usual. *Orang gunung* dances involve gestures that are rarely performed by common people.

b) The Second Day

In the early morning of the second day, everybody leaves the *rumah gedang* to take some rest in his or her own houses. There is no specific activity associated with the *Kenduri Psko* during the second day. People just prepare-themselves for attending the youths'-modern dance performance on the second night. This performance was absent in earlier Serampas generations, however, in order to address the need of young people, since 1980s the youth modern dance has been incorporated into the program of *Kenduri Psko*. As the case in the first evening, all villagers also show up in the *rumah gedang* on the second night and stay there for the entire night, enjoying the youth modern dance.

The second night is dedicated to entertaining young people in the village including boys, girls and new couples. In the first session, a pair of boy and girl or a spouse of a new couple, sing a modern *pantau* alternately, accompanied with the *redap gung*. They may sing as the same song as the elders, however, in most cases they pick up *pantaus* of youth themes. The first singer sings a particular *pantau* then responded by the second singer. This tradition encourages young people, especially men, to learn more about the *pantau* in order to synchronically pairing a girl on the stage. A man will be ashamed if he cannot properly respond a girl's *pantau*. In the second session, they perform modern dances accompanied with pop music and/or *dangdut*, a genre of Indonesia popular music that partly derived from Arabic, Indian and Malay. Sometimes children are also involved in this session.

The youth also employ the event of *kendursi psko* to raise funds from the people, especially the local elites. For example, they make a pan of cake then bid to people in the *rumah gedang*. In this event, price of the cake may increase 10-fold to 20-fold than the normal price. They use the funds to support youth-associated projects such as procuring a soccer ball and a music instrument.

c) The Third Day

The third day is the climax and closing a series of programs of *Kenduri Psko*. This event consists of preparing and having lunch together in the *rumah gedang* and then followed by a ritual of washing the heirlooms. The program is initiated by a mass slaughtering of chickens in the front yard of *rumah gedang*. The chickens are mandatorily contributed by households throughout the village, one chicken per capita. Besides the chickens, every household also has to supply some mature coconuts, two *gantang* of rice (about 5 kg), two pieces of bamboo shoots mostly *betung*, (*Dendrocalamus asper* Backer ex K. Heyne), two bundles of plant leaves, mostly *daun baru* (*Hibiscus tiliaceus* L.) and/or *sapat* (*Macaranga tanarius* Muell. Arg.) for rice wrapping and a bundle of firewood. Local men and women work hand in hand to cook bamboo shoot chicken curry, the most sumptuous meal in that area. People only serve this kind of meal on very special occasions as *Kenduri Psko*.

While most people prepare lunch in the *rumah gedang*, another small team prepares a set of offering foods mainly devoted to their ancestors[6]. The team consists of two women and a man who have a good knowledge of the local traditional ritual system. Actually, the team prepares almost the same meal as is being cooked by most people in the *rumah gedang*. However, the team cooks more diverse food in smaller quantity, normally just enough to feed five people. For each item, they prepare food in three different colors i.e., black, white and yellow. They cook three different types of rice: white rice, black rice and yellow rice. For the curry, the team also cooks three different curries, using three chickens of different colored feathers: one black chicken, one white and one yellow. The rule is also applied to *lemang;* they bake white, black and yellow *lemang*. The black color is obtained by using black sticky rice, whereas, the yellow color is generated from *kunyit* (*Curcuma domestica* Val.).

Importantly, the small cooking team is prohibited from eating the offering food being prepared, not even to check the taste, yet the food has to be tasty. Pre-tasting the food implies disrespect of the ancestors, because then the team would be serving a meal left over by humans. They serve the food in a shelf close by the *pusako* in a front corner of the *rumah gedang*. Besides serving the offering food, this team also prepares a package of plants for the *pusakos* bathing ritual. The task of the team is essential and critical because inappropriate preparation of the offering food and the package plant may destroy the overall *Kenduri Psko* ritual.

In the afternoon, all villagers, including babies and elders, enjoy the holiday lunch of bamboo-shoot chicken curry in the *rumah gadang*. In this mealtime, the food offering

[6] The local worldview ascribes that their ancestor also attend and enjoy the meal of *Kenduri Psko* although people cannot not see their presence.

is taken down from a shelf closed by the *pusakos'* site and distributed to *orang tuos* as well as the local leaders. Right after the lunch, the most prominent *orang tuo* in the village initiates and guides the ritual of bathing *pusakos*, a closing ritual of *Kenduri Psko*. The other *orang tuos* assist in washing the *pusakos,* utilizing a package of plants prepared by the small cooking team. The *orang tuos* then return the *pusakos* into their storage case.

The ingredients of the package used to bathe the heirlooms consists of a number of plants (Fig. 4.2), including *kunyit melai* (*Zingiber purpureum* Rosc.), *sakrau* (*Enhydra fluctuans* Lour.), *sekumpai* (*Hymenachne amplexicaulis* Nees.), *sedingin* (*Kalanchoe pinnata* Pers.), *jerangau* (*Acorus calamus* L.), *pinang muda* (young betel nut, *Areca catechu* L.) and *pisang dingin* (*Musa* sp.). The plants are slashed into small pieces and put in a big washbasin. A quantity of water is added to the mixture. The above listed plants are abundant in the *umo*, people also use them for various purposes, such as medicines and cooking ingredients.

Fig. 4.2. A Package of Plants for Bathing the Heirlooms

Right after the *pusakos* washing ritual is over, villagers compete with each other to grab some of the washing water (liquid and small slices of medicinal plants) and spread it on one's head and/or save it for latter use. People believe that the *pusako* wastewater has peculiar property of protecting one's body from various diseases and bad spirits. People also spread some of the liquid on their crop fields in order to prevent various pests and diseases.

Although the *Kenduri Psko* has been customarily closed, villagers perform *rapat pangkal tahun* on the third night as an additional event which is still a part of the *Kenduri Psko* program. *Rapat pangkal tahun* is an initial planting year meeting where villagers discuss some issues associated with their farming for the following year. For example, they discuss the location of secondary forests that will be cleared for the next cycle of their shifting agriculture as well as rice-planting schedule for the coming season. The *rapat pangkal tahun* also addresses some related evolving issues, such as updating some dictums of customary laws. For example, the forum stipulated the status of cinnamon agroforest of a villager who migrate to another village.

Marga Sungai Tenang, a closely related sub clan and neighbor to Serampas, also celebrate *Kenduri Psko,* usually before initiating planting rice (Nugraha, 2005). They reserve a piece of beef specially cooked for that ritual and dedicate it to their ancestors. They put the beef in some border sites between forest and farming lands. This ritual is interpreted as respecting the owner of the forest, including the tiger, which is frequently personified as the spirit of the ancestor[7].

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[7] Following the similar worldview of people in Java, Bali, and Sumatra (Boomgaard, 2001) local worldview of Serampas also perceive that spirit of their ancestors also inhabits some tigers.

To outsiders, *Kenduri Psko* is not such an extraordinary celebration. However, in the eyes of the local people, including the youth, *Kenduri Psko* is a marvelous event that they always wait for, even though they have to spend a lot not only in terms of materials but also time and effort. According to some local elders, *Kenduri Psko* is an obligatory event, not just a festival. It is a medium that links the current generation with the ancestors by honoring them through dance, food offerings and ritual maintenance of heirlooms. Failure to perform the *Kenduri Psko* may hinder the entire community. For example in the early 1970s, villagers completed rice harvesting without performing the *Kenduri Psko*. Consequently, a tiger entered and destroyed the village to remind people to perform the *Kenduri Psko*. In another case, the presence of a tiger might also indicate that a *Kenduri Psko* was not performed appropriately. For example, the offering food was not properly served as it was supposed to be.

d) The Significance of *Kenduri Psko*

Kenduri Psko is one of the remaining traditions maintained by people throughout the Serampas villages. The festival encapsulates various socio-cultural aspects of the Serampas including adat, rituals, traditions and worldview. The role of adat in the tradition is subtle; it is embedded and dissolved in each stage of the annual festival. The program in the *Kenduri Psko* has changed over time, adapting to the current community context. Some agendas were taken out from the festival, such as the speaking out of Serampas family tree. On the other hand, some new programs have been incorporated into the festival such as popular dances. The *Kenduri Psko* bears some values associated with local socio-cultural traditions including some values that hold conservation principles. Perpetuating and promoting the *Kenduri Psko* tradition appears to benefit not only preservation of local culture but also conservation of nature of Serampas and the surrounding areas, including the KSNP.

4.4. Summary

People of Serampas recognize adat, an integrated traditional system that governs the society. Adat is a legacy from earlier generations of Serampas that has evolved since the era of Jambi's Sultanate. Adat has experienced competition and adjustment to meet the changing dynamics of the Serampas socio-cultural and environmental setting. Adat profoundly influenced almost every aspects of Serampas' daily life, including local natural resource management systems.

A number of changes, both inside and outside Serampas, challenge the existence of adat. Better market access inevitably fosters villagers' exposure to markets and gradually changes Serampas socio-cultural structure. Moreover, the centralistic policy of the Indonesian Government, especially the Government Act No. 5/1979 has greatly weakened adat and gradually marginalized the Serampas customary system.

The Serampas represent an ambiguous society in terms of preserving their traditions; they are neither enforcing nor ignoring their traditional practices and values. In one hand, they still adhere to and maintain their adat. They still apply social control, as well as customary court and fines in order to enforce the implementation of adat. On the other hand, they have had to adopt introduced governance system imposed by the government at both regional and central level.

Kenduri Psko is one of the few remaining prominent traditions that is still well maintained by Serampas. The *Kenduri Psko* illustrates the significant role of adat as well of the traditional leaders in the community. The ritual denotes Serampas' strong obedience to their traditional values. However, it also confirms that the tradition provides a space to adopt some new practices and values. More importantly, the *Kenduri Psko* conveys some of traditional knowledge and values of Serampas culture to younger generations. Conserving local traditions such as the *Kenduri Psko* can have significant implications for preserving the local culture as well as in conserving local natural resources. The *Kenduri Psko* can also serve as a vehicle to incorporate and to re-strengthen traditional practices as well as introduced values that promote conservation.

Although the centralistic government policies have been revised and replaced by rules which are more sympathetic to 'indigenous people' (e.g., UU 22/1999), these new rules still have not automatically revived the Serampas traditional system. Serampas as well as other native groups in Indonesia still have to struggle with regaining and revitalizing their own adat. Adat have served the community of Serampas over generations. Revitalization of traditional systems such as adat in the current context could help foster important collaborations between the local people and the government especially in achieving conservation objectives.

CHAPTER 5

LOCAL USEFUL PLANTS: FOOD, MEDICINE AND RITUAL

"Nutuh kepayang nubo tepian"

"Squeezing kepayang[8] to poison the stream"

5.1. Introduction

The above proverb refers to some activities of natural resource extratction that degrade/contaminate the environment. The proverb is just one of many others widely known throughout the community, and commonly cited by elders and local leaders in any cultural ceremonial event to warn people to use natural recourses, including plants in sustainable ways. In this chapter I will describe the plants that have significant economic and cultural value for the Serampas and how some kinds of plant use has changed over time.

As mentioned in Chapter 3, the remoteness of Serampas from surrounding societies over a long period has driven local people to rely on local resources, including plants and animals to meet their needs. In terms of ethnobotanical research in this area, Marsden (1966) provides the earliest and most complete work. His classical work "History of Sumatra" portrays the ethnobotanical status of the island of Sumatra, including Serampas, during 1783 to 1784. Marsden was astonished by the abundance fruits on the island such as mangosteens (*Garcinia* spp), salacas (*Salacca* spp.), jack fruit

[8] Although *kepayang* (*Pangium edule* Reinw.) is an edible fruit, its unprocessed fruit is very toxic due to high cyanide content.

(*Artocarpus heterophyllus* Lam.), mangos (*Mangifera* spp.), durians (*Durio* spp.), lansehs (*Lansium* spp.), rambutans (*Nephelium* spp.), tamarinds (*Tamarindus* spp.) and so forth, "..... no region on the earth can boast an equal abundance and variety of indigenous fruits" (Marsden, 1966).

Marsden also revealed that some plants played essential roles in local cultural and ritual systems. An example is *enau* or *anau* (*Arenga pinnata* Merr.), a species that commonly grows in local secondary forests. The species was an essential element of some important customary events, such as the approval of peace agreements. The Campbell expedition to Sumatra in the early 18th century describes how people utilized the *enau* leaf to take oaths:

> "Their method of swearing was as follows: The young shoots of *anau*-tree were made into a kind of rope, with the leaves hanging, and this was attached to four stakes stuck in the ground, forming an area of five or six feet square, within which a mat was spread, where those about to take the oath seated themselves. A small branch of the prickly bamboo[9] was planted in the area also, and benzoin was kept burning during the ceremony. The chiefs then laid their hand on the Koran, held to them by priest, and one of them repeated to the rest of the substance of the oath, who, at the pauses he made, gave a nod of assent; after which they severally said: 'may the earth become barren, the air and water poisonous, if we don't fulfill what we now agree to and promise' " (Marsden, 1966:322).

Later on in this chapter, I describe how the cultural significance of the *enau* has been taken over by pinang (*Areca catechu* L.), another palm species.

In addition to Marsden's work, a number of other ethnobotanical studies were undertaken in other regions of Sumatra. However, these studies mostly focused on a

[9] The prickly bamboo most probably refers to aur duri (*Bambusa blumeana* Hook. & Arn.), the common thorny bamboo in Serampas (see Box 3.2). This additional footnote is from the author.

particular taxa or a specific plant use. Research on medicinal plants has been relatively better represented than other ethnobotanical aspects. For example, Mahyar *et al.* (1991) and Grosvenor *et al.* (1995) investigated medicinal plants in the Province of Riau. Elliott and Brimacombe (1987) documented medicinal plants in Gunung Leuser National Park, North Sumatra and Susiarti *et al.* (2005) explored Malay's medicinal plants in the Eastern Coast of Jambi.

Non-medicinal ethnobotanical works include Maloney (1984), who explored weeds in fallowed lands in the highlands of North Sumatra, Siebert (1989) who investigated the dilemma of decreasing rattan resources in Kerinci, a sub-district next to Serampas and Purwanto *et al.* (2005a) who investigated the ethnobotany of benzoin (*Styrax* spp.). Aumeeruddy (1994) carried out research on agroforestry but also covered some ethnobotanical aspects of Kerinci. Purwanto *et al*, (2005b) traced non-timber forest products in conservation forest plots belonging to a timber plantation company in lowland of Jambi. One final, important work, Zahorka (2004), was conducted on poisonous plants with the indigenous people of Siberut, an outer island of Sumatra. However, there have been no ethnobotanical studies in Serampas since Marsden's work in 1811 and no information on how ethnobotanical uses may have changed over the past two centuries.

This chapter and the following chapter will address two main questions; (1) what kinds of plants are used by Serampas today? and (2) how has plant use probably changed over time? Specifically, this chapter discuses the plants used by Serampas for (1) food crops, (2) wild edible plants and (3) cultural-ritual associated materials. This dissertation does not focus on agrobiodiversity and I do not discuss or distinguish between locally recognized varieties of crops mentioned here, such as bananas, rice and others

I classify the local plant uses into seven main groups consisting of (1) food crops, (2) wild edible plants, (3) medicines, (4) cultural-ritual associated materials, (5) construction materials (6) tools materials and (7) other uses. The last three plant use categories are presented in the next Chapter. Following Prance *et al.* (1987), this research generally excludes the use of plants for firewood because most woody plants generally can be used as firewood. However, Chapter 6 covers some firewood plants that have specific properties, for example a wood that easily flames while it is wet.

5.2. Methods

The research was undertaken with the community of *Serampas,* a sub clan who inhabit the northeastern area of Jangkat Sub District, Merangin, Jambi, Indonesia. The knowledge about the local plant uses was mainly collected from people in the villages of Tanjung Kasri and Renah Kemumu; additional information was also gathered from people in three other Serampas villages including Renah Alai, Rantau Kermas and Lubuk Mentilin. The overall fieldwork was carried out in the period of July 2005 to March 2006.

In-depth interviews with informed consent (Appendix B and C) using an open-ended questionnaire (Appendix D) were conducted with the 'local experts' to collect data about plant use. The respondents included customary leaders, shamans, midwives, farmers, the park manager, local government officers and anyone who had gained traditional ecological knowledge. The total number of respondents was 51, consisting of

15 respondents from Tanjung Kasri, 21 respondents from Renah Kemumu and another 15 key respondents from outside the villages, including Serampas scholars, government officers, non-government organization staff and park officers. A snowball method was applied to select the respondents (Bernard, 2002) beginning with the village leader. In cases where a primary respondent suggested more than one secondary respondent, I clarified the person who was the respondent's strongest recommendation. All plant uses mentioned in this chapter were reported by at least three respondents. Some of the in-depth interviews involved repeated sessions with a respondent in order to obtain further clarification and/or additional information.

Participant observation with informed consent (Appendix B and C) was also conducted with selected individuals in their private homes, *umo* (shifting cultivation rice field), *sawah* (wetland rice field) and at local cultural events such as *selamatan ruso, negak rumah* and *kenduri psko* to observe the common plants used. Individuals were selected for participant observation based upon their vast knowledge about Serampas natural resource management practices.

Plants recorded during the interviews were collected in each village (Tanjung Kasri and Renah Kemumu). Vouchers were sent and identified by plant taxonomists at the Herbarium Bogoriense, Bogor Indonesia. The vouchers are stored in the Biology Laboratory, the University of Jambi. Taxonomic grouping and scientific naming of the vouchers was consulted with Index Kewensis under the online International Plant Name Index (www.ipni.org/).

5.3. Results

The Serampas utilize at least 318 plant species belonging to 89 families; these consist of medicinal plants (131 species), wild edible plants (73 species), food crops (73 species), tool plants (60 species), construction plants (53 species), ritual plants (32 species) and plants for other uses (34 species) (Fig. 5.1). Some species are listed in more than one use category (see Table A.10 and A.11 and Table A.17 to A.21). Together with food crops and wild edible plants, medicinal plants constitute the most of locally used plants.

5.3.1. Food Crops

A food crop here is defined as a plant that is deliberately planted by people, either in their yard, *umo, sawah,* or agroforest to produce food. In contrast, the wild edible plants include plants that are not cultivated, are not purposely planted, nor intensively managed by humans. However, following Colfer *et al.* (1997), I have included in the latter domain a number of species that are categorized as semi-wild-plants by Concklin (1954), Chin (1984), Posey (1992) and Etkin and Ross (1994), such as *payang* (*Pangium edule* Reinw.), *pucuk lumai* (*Solanum nigrum* Leschen ex Dunal) and some grasses. Serampas cultivate at least 73 species of food crops belonging to 30 families, to supply their food needs. The complete list of food crops is presented in Table A.1.

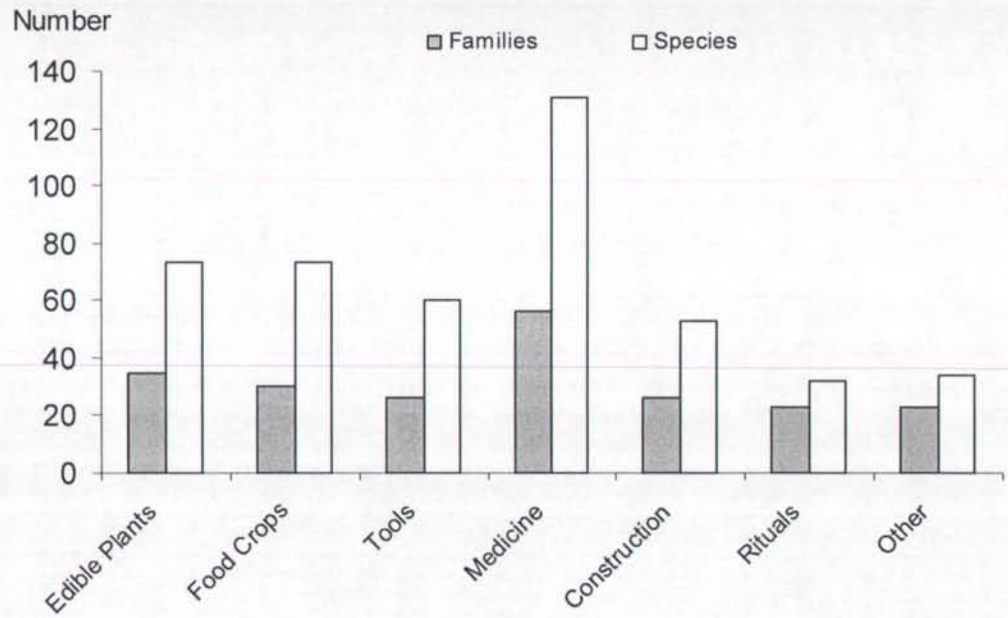


Fig. 5.1. The Number of Families and Species of Locally-Used Plants

Rice is the main food for Serampas, it is always present in the local daily meals (three times a day). In addition to rice, people also consume other sources of carbohydrate such as taro, yam, sweet potato, corn and cassava. However, because of high crop damage from competition with wild boars, villagers rarely succeed in growing those latter crops, unless they are kept close by settlements or under the farmer's intensive guard. People consider the above non-rice foods as snacks rather than as main meals. Even if they have consumed a great quantity of a non-rice carbohydrate, they will still have to eat rice later.

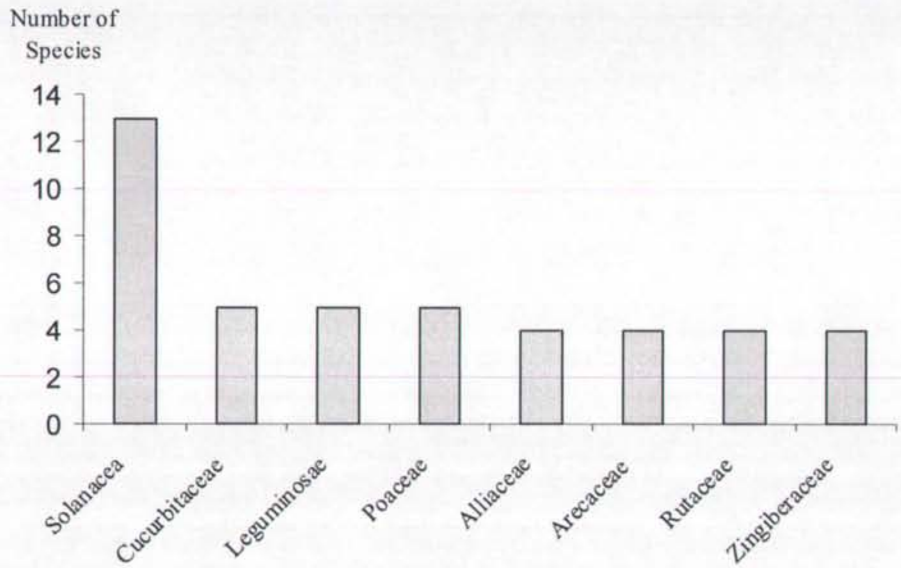


Fig. 5.2. The Most Common Families of Serampas Food Crops

Solanaceae together with Cucurbitaceae, Fabaceae, Musaceae and Poaceae constitute the most common families of food crop species in the Serampas diet (Fig. 5.2). While nurturing their rice in *umo*, Serampas grow a number of food crops, either in a specific block separate from the rice, or in between the rice crop. In the *umo*, while nurturing the rice and initiating the establishment of cinnamon agroforests, people grow a great number of vegetables and spices around their *pondok* such as cassava leaf, chili, tomato, eggplant, pumpkin, potato, cucumber, papaya and bitter melon (see Chapter 8).

The daily diet of Serampas comprises of cooked rice and *sambal*[10]. *Kasam* (see Box 5.1) is a common *sambal* present in the local dishes. *Pucuk lumai* (*S. nigrum*

[10] Most people in Indonesia recognize *sambal* as hot sauce made mainly from chili and other ingredients such as tomato, fermented shrimp (*terasi*) and so forth. *Sambal* is considered as a condiment, rather than a vegetable, fish, or meat dish. People just eat *sambal* a little, mainly to generate palatability of their meal. However, the Serampas define *sambal* rather differently from most Indonesians. For Serampas, *sambal* is any food that accompanies cooked rice during a meal, it could have vegetables, fish, or meat, and more importantly, the taste is always hot. To some degree, *sambal* shares similar property with *lekai* in Borneo; a

Leschen ex Dunal) a wild species that grows abundantly in the open space of *umo* right after land clearing and *paku ikan* (*Diplazium esperum* Bl.) are also important constituents for the *sambal*. Serampas almost always grow *cabe kecil* and *cabe kriting* (*Capsicum annuum* L.) in every *umo* because they are an essential element of *sambal*.

Box 5.1. *Kasam*: A Traditional Food Preservation

Literaly *kasam* refers to any kind of food with a sour-taste. *Kasam* is a traditional technique to preserve local foodstuffs by employing a process of natural fermentation. There are several types of *kasam;* the naming refers to the main constituent of food material being fermented. The common *kasam* includes *kasam ruso* (*kasam* of venison), *kasam payang* (*kasam* of *payang, Pangium edule* Reinw.), *kasam durian* (*kasam* of *durian, Durio zibethinus* Murr.) and *kasam ikan* (*kasam* of fish). The making of *kasam* is a local technology to address fluctuating food supplies, especially for animal protein.

In fact, *kasam* not only preserves the local foodstuff but also diversifies the taste and flavor of the food. For example, people use *kasam* durian as a cooking ingredient which produces a unique durian flavor when used in fish curry. However, the notoriously strong flavor of the *kasam* is frequently embarrassing to villagers, which makes them hesitate to share the food with outsiders. *Kasam* durian is very durable; it can be kept at room temperature for one year without degrading its edibility and palatability.

Kasam is prepared by cleaning and slicing foodstuffs into small pieces. To generate different taste, some people add young leaves of *surian tanam* (*Toona sinensis*

small quantity of food that generate flavor of the main meal (e.g., Dove 1985, Colfer *et al.* 1997, and Gollin 2001).

Box 5.1. (Continued) *Kasam*: A Traditional Food Preservation

M.Roem), a species that commonly planted in the local cinnamon agroforest. The mixture is then put into a bamboo tube and the top is covered with leaves of *molaseten* (*Villebrunea rubescens* Bl.) to prevent maggot infestation. The *kasam* is kept at room temperature for about four days to allow natural fermentation to take place. The *kasam* is then ready to cook into different kinds of meals.

Fig. 5.3. Fermentation of *Kasam Ikan*

Besides consuming the *C. annuum*, the Serampas employ some other techniques in order to generate palatability of the local food. For example, they use some local appetizers such as *jengkol* (*Archidendron pauciflorum* [Benth.] I.C. Nielsen) and *petai* (*Parkia speciosa* Haask.) that mostly grow in secondary forest and *umo*. Another way to develop the food flavors is by combining the regular vegetables with a strong-tasting vegetable, mainly the bitter and the sour taste. For example, people serve in the same plate a mix of regular eggplant and another bitter eggplant (*Solanum melongena* L.) that were boiled separately to maintain their distinct taste.

Given the close distances between houses in the Serampas settlements, rarely people have enough space to grow crops in either back yard or front yard. Accordingly, fruit yielding trees are less available in the village. There are a small number of fruits around the settlement's perimeter including *limau kapas* (*Citrus aurantifolia* Swingle), *nangko* (jackfruit, *A. heterophyllus* Lam.), *limau padang* (*C. lemon* [L.] Burm. f.), *pauh* (*Mangifera applanata* Kosterm.) and *gelimbing* (*Averrhoa carambola* L.).

Most of the locally important fruits are grown in *umo* e.g., banana, papaya, guava, *terong pirus* (*Cyphomandra* sp.) and sugar cane (in this area this plant is regarded as fruit). Durian (*Durio zibethinus* Murr.) grows in cinnamon agroforest, *umo* and secondary forests as well. Most of the durians are old trees, planted by the earlier generations of villagers. Serampas prize the durian most highly, however, because the local climate is rarely dry over the years, this species does not produce fruit regularly and normally just fruits once in two to four years. In peak seasons, durian is abundant and attracts people from other villages. However, the durian does not generate economic income for the Serampas; since the durian is recognized as common property; everyone has a right to enjoy the strong smelling fruit, including outsiders.

5.3.2. Wild Edible Plants

Serampas forests offer a great number of food plants, mainly fruit and vegetables over different seasons. Serampas recognize no less than 73 species of wild edible plants that grow either in old-growth forests, secondary forests, agroforests, or *umo.* The complete list of wild edible species is presented in Table A.2. Arecaceae together with Moraceae, Zingiberaceae, Euphorbiaceae, Myrtaceae and Urticaceae constitute the most common families of the wild edible species (Fig 5.4).

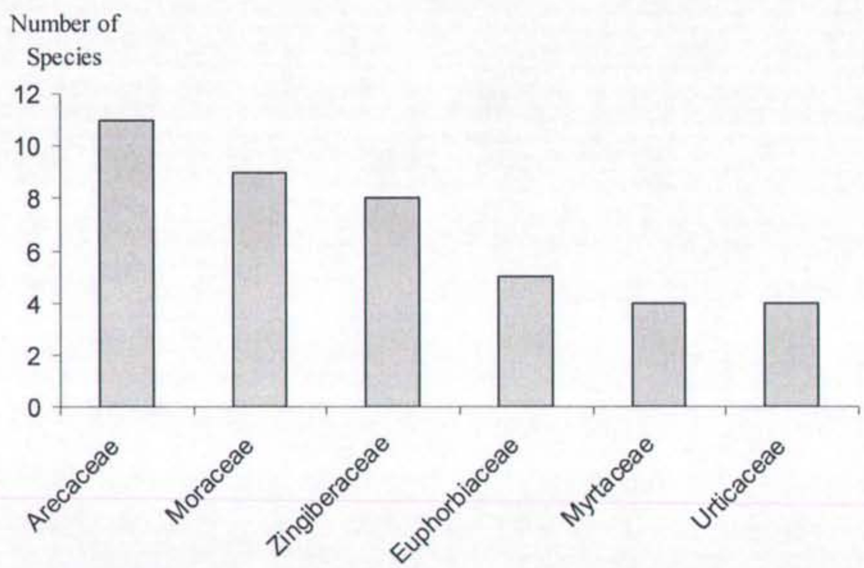


Fig. 5. 4. The Main Families of Wild Edible Plants in Serampas

Most Arecaceae species that occur in Serampas are edible; people eat either the fruit or young shoot of these species. Some species belonging to genus of *Calamus* and *Daemonorops* supply a large number of sweet-sour fruits. Most of Arecaceae palms heart are edible however, people commonly consume the palm heart of *bayeh*

(*Oncosperma* sp.), another Arecaceae species, that mainly serves as a 'famine vegetable'. This palm may grow as high as coconut tree. As the case in other Arecaceae species, harvesting this palm is very destructive because people must fell the tree in order to get the palm heart.

Enau (*A. pinnata* Merr.) is another important Arecaceae species for Serampas. This palm used to be involved as an essential element of Serampas ritual-cultural traditions. Its starchy stem provides sago that is especially important during periods of food crisis. Fiber of the *enau* is good material for thatch and some housewares such as brooms and ropes. People also tap the sap of this plant and process it to produce a brown sugar which is more highly prized than the similar sugar from coconut or sugarcane.

Enau also produces edible fruits, although I never saw people eat this fruit over the course of my fieldwork. The Serampas, mainly the men, smoke *rokok enau*, a traditional handmade cigarette, employing the leaf of the *enau*. Although it is rare, people also weave the leaf of this plant to produce thatch for temporary building and some household items such as mats and baskets.

While going through local forests, occasionally some Serampas people deliberately set fire to the old dried fiber that covers the base sheath of *enau* and leave the flaming *enau* trunk to burn by itself. They are not afraid if the fire spreads over the surrounding area and provokes a forest fire. Indeed, according to my respondents, there is no known history of wild forest fire in this area. The high humidity and heavy precipitation over the years may prevent extensive wildfires. People believe that burning the old dried *enau* fiber will promote growth and regeneration of the palm. This practice may have originated from the earliest stage of agricultural development in Serampas; a transition era between hunting-gathering and shifting cultivation.

Puar (*Alpinia* sp.), is a species of Zingiberaceae that commonly grows in clumps and dominates the shrub layer of early secondary forests. It provides sweet tubers when ripe; however, people frequently have to compete with boars in order to get the tubers. *Buah matahari* (*Curculigo latifolia* Dryand, Hypoxidaceae) is an understorey species which produces small sweet-sour globular fruits. Another vernacular name of this fruit is *penelap tidur* (sleep inducer). Local elders use fruits of this species as a medicine to ease babies and children who have sleeping disorders. People also employ leaves of this species as "natural plates" when they eat meals in the forests. In addition to the *buah matahari*, *semat baju* (lit. "shirt' button", *Stauranthera caerulea* Merr., Gesneriaceae) is another common fruit in Serampas; its shape and size is as similar as big shirt buttons. In addition to food, people utilize this fruit to improve male libido.

Another prominent fruit-producing species in Serampas is *bungkul* (*Stelechocarpus burahol* Hook. f. & Thoms., Annonaceae). Remarkably, this cauliflorous species grows conspicuously only in the forests of Renah Kemumu, not in other areas of Serampas. Besides the *bungkul*, *Kepayang* (*P. edule* Reinw.), a semi-wild species that mostly grows in fallowed lands and secondary forests, also produces edible fruits. Serampas usually soak the seeds of this plant for several days, then cook or ferment it to produce *kasam* (see Box 5.1).

Surian tanam (*Toona sinensis* M.Roem, Meliaceae) is another species that grow semi-wild in fallowed lands, cinnamon agroforests, or secondary forests. Besides producing a good quality of timber, the species also produces edible tender leaves.

Serampas use the young leaves of the *surian* as a vegetable and as a spice which adds a unique flavor to *kasam* (see Box 5.1). Moreover, villagers employ some *surian* leaves to reduce the bitterness of papaya leaves.

The other edible plants include bamboo shoot (mainly *Dendrocalamus asper* Backer ex K. Heyne), *kelu* (*Etlingera elatior* (Jack) R. M. Sm..), *sampul* (*Caryota rumphiana* Mart.), *pisang ungko* (*Musa acuminata* Colla), *pisang karok (Musa salaccensis* Zoll.*) and sempaung* (*Baccaurea lanceolata* Mull. Arg.). People also harvest some species of mushroom that grow in the forests (the mushrooms are not included in this dissertation).

5.3.3. Medicinal Plants

Traditionally, the Serampas community has provided its own health care system to the people, which combines knowledge and practices about local medicinal plants and shamanism, under the guidance of the local customary system (*adat*). Adat requires some *dukuns* (mostly elders) to serve as a "customary medical team", providing health service for the whole community. The *dukuns* mostly obtained their skill and knowledge through apprenticeship with their relatives and elders. The customary inauguration of the medical team usually takes place with a *kenduri psko* celebration (see Chapter 4). The team is called *dukun berempat jantan dan berempat betino* ("the four shaman women and four shaman men"), although this does not necessarily mean that the team must always consist of four men and four women.

In addition to the *dukun berempat jantan dan berempat betino*, there is another separate medical team entitled *dukun bulian tangan.* This team consists of midwives who devote their time to care for pregnant women and their babies. They provide health services to women from four-months of pregnancy up to 15 days after giving birth. Villagers perform *syukuran bayi*, a thanksgiving ritual to celebrate the newborn baby, usually around 15 days after the birth. In this ritual, a *dukun bulian tangan* who is taking care of the mother and the baby is rewarded a set of gifts, consisting of a *gantang* of black sticky rice and regular rice, a whole cooked chicken, a whole set of some items needed to make *pinang-sirih and* some money. The amount of the gift money is voluntary, depends on the ability and willingness of the baby's family.

In terms of medicinal plants, Serampas recognize two types of medicine i.e., *obat rajo* (king's medicine) and *obat ditawar* (enchanted medicine). *Obat rajo* refers to medicinal plants that pose general efficacy; common people may use the *obat rajo* without the auspices of a *dukun*. For example, if someone is wounded while slashing bushes for shifting cultivation, one just grabs some leaves of *rumput bungo* (*Eupatorium inulaefolium* H.B. & K.), squeezes them and puts it on the injury. Serampas believe that knowledge of these medicinal plants was handed down from their ancient kings.

Obat ditawar is used to address any disorder caused by the external domain, mainly associated with supernatural powers. To prepare this medicine, a *dukun* uses certain medicinal plants such as *bungo panggil* (*Clerodendrum buchanani* [Roxb.] W. G. Walpers) and *rumput sembuang* (*Eleusine indica* Steud.), as media to convey his enchantments to cure a patient. Medicinal plants that commonly used for *obat rajo* and/or *obat ditawar* are presented in Table A.5.

In addition to the *obat ditawar*, people also perform some practices in order to prevent harm from the 'external domain' especially the supernatural powers. For example they keep a piece of *kunyit melai* (*Zingiber purpureum* Rosc.) with them, especially when traveling across the local forests, to protect them from bad spirits. People believe that the *kunyit melai* waste from washing heirlooms at a *Kenduri Psko* has much stronger efficacy for this purpose than regular rhizomes which have not been used in a chant. Serampas also cultivate *pandan singkil* (*Pandanus furcatus* Roxb.) in their back yards to keep bad spirits from coming around the house.

Besides *obat ditawar*, Serampas also recognize *bertenung*, a specific ritual to diagnose and heal a patient with acute disease. It frequently involves a process of communicating with Serampas ancestors. After performing the ritual, a *dukun* usually gets an idea about a medicinal plants formula to cure the patient. The healing may employ both *obat ditawar* and *obat rajo*.

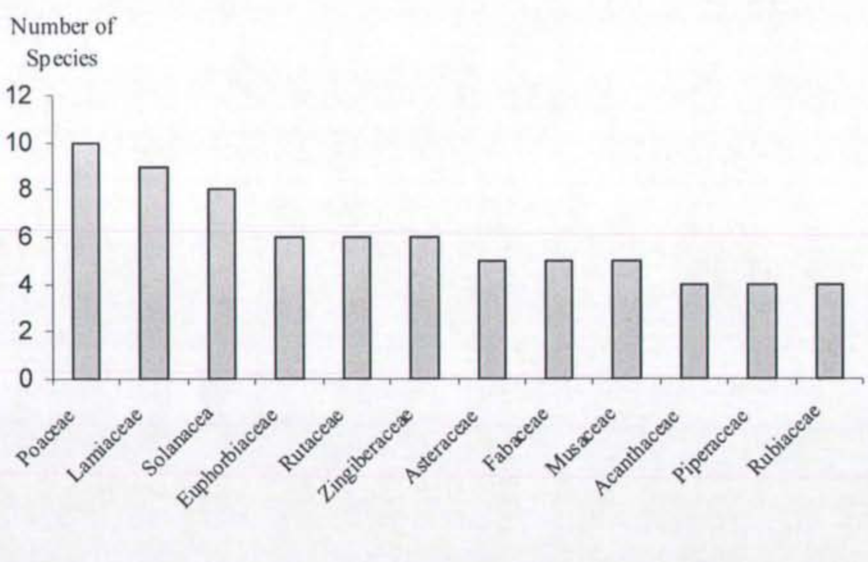


Fig. 5.5. The Main Families of Serampas' Medicinal Plants

Serampas employ at least 131 species of medicinal plants belonging to 49 families. Medicinal plants are well represented over all other categories of locally used plant, constituting about 41% out of 318 species of local useful plants. Poaceae together with Lamiaceae and Solanaceae constitute the most medicinal plants species (Fig. 5.5). Moreover, more than half of the medicinal plants are cultivated species (62%). They mainly grow in *umo* and secondary forests (Table 5.1). The complete list and habitat of Serampas medicinal plants is provided in Table A.5.

Table 5.1. The Habitats of Medicinal Plants used by Serampas

No.	Vegetation	Number of Species	%
1	*Umo*	69	53%
2	Secondary Forest & *Umo*	31	24%
3	Old-growth forest & Secondary Forest	18	14%
4	*Umo & Sawah*	4	3%
5	Old-growth Forest	2	2%
6	Old-growth forest & Secondary Forest & *Umo*	2	2%
7	*Sawah*	2	2%
8	Secondary Forest	2	2%
9	Secondary Forest & *Umo & Sawah*	1	1%
	Total	131	100%

Serampas utilize a number of medicinal plants that grow in various vegetation zones including old-growth forests, secondary forests, *umo* and *sawah* (irrigated rice fields). Although Serampas have lived in an area close to and surrounded by forests, interestingly, most medicinal plants they used are obtained in *umo* (Table 5.1). This vegetation type contributes about 83% of total Serampas medicinal taxa. On the other hand, only two medicinal plant species grow exclusively in local old-growth forests or very old secondary forest i.e., *manau* (*C. mannan* Miq.) and *jemban* (*Donax grandis* ([Miq.] Ridley, Marantaceae). The sap of the *manau* is used to cure *sariawan* (ulcers), whereas fruit of the *jemban* is commonly used to treat abscesses.

5.3.4. *Uras*: The Ritual Plants

In Serampas language, *uras* or *ureh* refers to a package of plants used for special purposes such as blessing a particular project and to cure or to protect humans, livestock and crops from "diseases" and bad spirits. To some degree *uras* overlaps with the aforementioned *obat ditawar*. *Uras* is (always) present at every important cultural occasion. Different occasions require *uras* in different quantities and plant compositions. Local *orang tuos* guide the common people for the formula of a particular *uras*, although commonly *orang tuos* themselves procure plant materials for the *uras*. A number of traditional events that involve *uras* include establishing a new house, initiating slashing the forest or shrub to develop *umo*, initiating rice planting, protecting rice crop from "pests" and diseases, initiating the rice harvest, initiating rice storing in the *bilik*, exorcising bad spirits inhabiting someone's body and bathing local heirlooms in *Kenduri Psko* (Chapter 4).

The *uras* plants include at least 32 species belonging to 23 families (Table 5.2). The main *uras* families are Arecaceae, Lamiaceae, Poaceae and Rubiaceae. As mentioned in the beginning of this chapter, *pinang* (*A. catechu* L.) is used extensively for various purposes. The nut is not only chewed by people, but also present in almost important cultural-ritual events. In addition to *pinang*, *sekumpai* (*Hymenachne* *amplexicaulis* Nees., Poaceae), *sakrau* (*Enhydra fluctuans* Lour. Asteraceae), *kunyit melai* (*Z. purpureum* Rosc. Zingiberaceae) and *jerangau* (*Acorus calamus* L., Acoraceae) are the most common ritual plants, especially to deal with expelling or protecting from a bad spirit. The complete list of the *uras* plants is presented in Table A.6.

Table 5.2. The Families of *Uras* Plants used by Serampas

No	Family	Species	%
1	Arecaceae	3	9%
2	Lamiaceae	3	9%
3	Poaceae	3	9%
4	Rubiaceae	3	9%
5	Acanthaceae	2	6%
6	Acoraceae	1	3%
7	Actinidiaceae	1	3%
8	Asclepiadaceae	1	3%
9	Asteraceae	1	3%
10	Convallariaceae	1	3%
11	Costaceae	1	3%
12	Crassulaceae	1	3%

No	Family	Species	%
13	Cyperaceae	1	3%
14	Lauraceae	1	3%
15	Liliaceae	1	3%
16	Marratiaceae	1	3%
17	Moraceae	1	3%
18	Musaceae	1	3%
19	Opiliaceae	1	3%
20	Piperaceae	1	3%
21	Rutaceae	1	3%
22	Tiliaceae	1	3%
23	Unidentified	1	3%
	Total	32	100%

Besides *kenduri psko* (see Chapter 4), Serampas recognize another annual customary ritual that involves a number of *uras* plants and is held in the *rumah gedang* on the 12th of *Rabiul Awal*, (the fourth month of the Islamic calendar). This event involves many more *uras* plants than that of *kenduri psko* and engages people throughout the village. Besides commemorating the birthday of Prophet Muhammad (most Serampas are Moslem), the event is dedicated to formulate and to produce "mass *uras*" to bless the whole community. Every household prepares a number of *uras* plants and brings them to the *rumah gedang* to be blessed by the local *orang tuos*. Right after the ritual, villagers take the consecrated *uras* plants and spread them in some points of their rice fields as well as other farmlands. Villagers believe that the *uras* will help protect their crops from diseases and pests, including "the invisible pests".

Jemput padi or rice harvesting initiation is another common ritual that employs the *uras*. The purpose of this ritual is to secure the entire process of rice harvesting from destruction of bad spirits, especially the *orang gunung* (see Chapter 3 for more discussion about *orang gunung* and other Serampas' worldviews). The local worldview holds that *orang gunung* are present everywhere, although people cannot identify their presence. Villagers believe that the *orang gunung* also want to enjoy the yellowish matured rice being nurtured by the villagers. The ritual of *jemput padi* is devoted to avoid any intervention of the *orang gunung* over the course of a harvesting season. Normally, the season lasts between a week and a month. Some elders believe that failing to perform the ritual will enable the *orang gunung* to come and take part in harvesting the rice invisibly; causing a great quantity of the rice to disappear mysteriously. Different *orang tuos* may employ different lists of plants for the ritual. The commonly used plants are *patawa* (*Costus speciosus* Sm.), *sepiding* (*Scleria purpurascens* Benth.) and *kayu hijau* (*Lepionurus sylvestris* Bl.).

5.4. Discussion

Serampas use slightly more useful species than other indigenous groups who live in the same region (318 species). Purwanto *et al.* (2005), who did research with a Malay community in the region, recorded 300 plant species commonly used by local peoples. The species were mostly utilized for food, medicine and construction (timber).

Comparing the plants used by the Malay and the Serampas, notably both the indigenous groups use very different plant species, even though they live in the same region (central Sumatra). The two cultures share about 40% of their useful plants. In the Atlantic forest coast of Brazil, Hanazaki *et al.* (2000) recorded 214 species of plants that commonly used by local people.

In contrast, in northern Borneo, Christensen (2002) found many more useful species than in Serampas; the Borneans use between 650 and 686 species of plants, consisting of semi-managed, naturalized and wild species; excluding cultivated plants. Furthermore, Christensen (2002) suggests that, ideally, recording plant use by a community requires an intensive ethnobotanical study over a long field period. Taking into account the nature of this research, more intensive fieldwork may portray a more comprehensive knowledge about Serampas useful plants.

The following sections of this chapter discuss more specific categories of useful plant in Serampas and their comparisons with some other cultures. However, the diversity of useful plants across different habitats as well as the proportion of useful plants in each habitat will be discussed further latter on in Chapter 10.

5.4.1. Food Crops and Wild Edible Plants

Serampas use plants for food from wild species as much as from cultivated crops (73 species). The wild species are obtained from old-gowth forests, secondary forests, agroforests and *umo.* The Bribri and the Cabecar, indigenous people who inhabit the Caribbean coast of Costa Rica, utilize a smaller number of edible plants and smaller proportions of wild species; 49 domesticated species and 35 wild species (Garcia-Serrano & Monte, 2004). Although those two aboriginal communities have no connection with Serampas and live in extremely different socio-cultural and environmental settings, conspicuously, they share about half of their domesticated plants (21 species). The common cultivated plants shared by both communities include *Zingiber officinale* Rosc., *Sacharum officinarum* L., *Psidium guajava* L., *Piper nigrum* Lam. ex Link, *Dioscorea alata* L. and some other species. This tendency illustrates how indigenous groups enrich their local food crop diversity by incorporating alien species into their farming. Hanazaki *et al.* (2000) identified 214 species for various uses including food in Caiçara Communities from the Atlantic Forest Coast, Brazil. Two thirds of the plant are wild species and the rest are cultivated.

Solanaceae together with Cucurbitaceae, Fabaceae, Musaceae and Poaceae constitute the most common families of Serampas food crops. In Costa Rica, Solanaceae and Cucurbitaceae also contribute the main families of local food crops (Garcia-Serrano & Monte, 2004). While nurturing their rice in *umo*, Serampas grow a number of food crops, either in a specific block separate from the rice, or in between the rice crop such as cassava, chili, tomato, eggplant, pumpkin, potato, cucumber, papaya and bitter melon.

In term of wild edible species, Arecaceae together with Moraceae, Zingiberaceae, Euphorbiaceae, Myrtaceae and Urticaceae constitute the most common families of the Serampas wild food. In the eastern coast of Sumatra, people mostly employ some wild species of Euphorbiaceae, Anacardiaceae and Sapindaceae for their wild edible fruits, and Arecaceae and Fabaceae for vegetables (Purwanto *et al.*, 2005). Euphorbiaceae is an important source of wild edible food for both Serampas and the eastern coastal people; however, the list of edible plants in both groups is quite different.

Serampas recognize more wild edible species compared to some other cultures. Cotton (1996) summarizes the use of wild edible plants over indigenous groups from different cultures who practice either agriculture or hunter-gathering. For example, the Bardi in Northern Australia use 63 species, Ayoreo in Paraguay 33 species, Khasi/gari in Northeast India 45 species, Chippewa in Minnesota USA 39 species and aborigine people in the western desert of Australia 54 species.

Indigenous people in Derashe and Kucha Districts, South Ethiopia recognize 66 wild species of edible plants (Balemie and Kebebew, 2006). The Mapuche community in Western Patagonia harvests and consumes 42 species of local plants that grow wild (Ladio & Lozada, 2004). They mostly belong to Umbelliferae, Polygonaceae and Rosaceae. In northeastern Peru, local forest reserves provide a number of wild edible plant species, mostly belonging to Arecaceae, Mimosaceae (including Papilionacae, Mimosaceae and Papilionaceae) and Sapotaceae (Pinedo-Vasquez *et al.*, 1990). Those families not only have more edible species but also provide more quantity of food due to their higher number of individual trees per hectare.

However, Serampas use a smaller number of species compare to Sari in Baja California USA who use 84 species and Waimiri Atroari in Amazonia who consume 90 species of edible plants (Cotton, 1996). People in the Southern Ecuador who live in a very high species diversity region even consume much more wild plants (Van-Den-Eynden *et al.*, 2003). They utilize at least 354 species of wild edible species.

Within the Serampas, families of wild edible plants are extremely different from those of cultivated food crops. Zingiberaceae is the only family found in both the wild edible plants and the food crops. Still, within the Zingiberaceae itself, there is not even a single species found in both plant use categories. This is a result of the fact that most of the Serampas planted crops are exotic, not domesticated from the local forests. This finding is corroborated by the high similarity of food crop species between Serampas and other cultures including the Bribri and the Cabecar (Garcia-Serrano & Monte, 2004).

Pinang (*A. catechu* L.) is one of the most prominent species throughout Serampas. Aumeeruddy (1994) who undertook her research in Kerinci, a neighbor district to Serampas, also corroborates the cultural importance of the species. The *pinang* constitutes an essential ingredient of *pinang-sirih*, a complete package of betel for chewing, consisting of *pinang* (betel nut, *A. catechu* L.), leaf of *sirih* (*Piper betel* Blanco), dried extract juice of *gambir* leaf (*Uncaria gambir* Roxb.), *kuyang* (diluted lime from mollusk shell) and (occasionally) a piece of dried tobacco. The habit of chewing betel is not exclusive to the Serampas, it is widespread throughout Indonesia and Malaysia (Reid 1985 and Christensen 2002). However, the Serampas practice of chewing betel differs slightly from people in Java. In that island, people mostly employ the dried extract of *gambir* juice (*U. gambier* Roxb.) as an ingredient for the betel, whereas Serampas utilize the boiled leaves of the vine. The abundance of *gambir* in Serampas may be the reason that people consume the fresh boiled *gambir* leaves rather than using the dried extract as in other areas. Aboriginal people in the North Kalimantan also share as this practice (Christensen 2002).

Pinang-sirih is always involved in the various locally important cultural events. Numerous people, especially elder women, chew betel most of the time and always take the *pinang-sirih* wherever they go. *Pinang-sirih* is also strongly associated with rituals of birth, death, courtship and marriage (van der Vossen and Wessel, 2000). Reid (1985) argues that betel chewing produces a sedative or relaxant effect, as does smoking, and stimulates other metabolic and nervous functions as well. In terms of beauty, the use of *pinang* has anti-aging (Lee and Choi, 1999a), anti-inflammatory and anti-melanogenesis effects (Lee and Choi 1999b). Chewing betel is not just a personal preference but also has an essential social niche in the local community. Refusing to take or to share the betel is envisaged as a serious insult to other people (Marsden 1966 and Reid 1985). Etkin (2006) emphasizes that *pinang sirih* chewing becomes a social medium that connects not only people to one another but also between humans and gods, spirits and other extra-human entities.

Any cultural gathering such as a wedding party, thanksgiving ceremony, or planting and harvesting feast is always initiated by serving the *pinang sirih*. Even to invite *kepala desa*, the head of village, to witness a particular family agreement, a villager has to serve the *pinang sirih* before articulating his intention. It is mandatory for the *kepala desa* to chew the *pinang sirih*, even just a little, before asking about the intention of his guest. In this case, chewing the *pinang sirih* implies that the *kepala desa* has customarily accepted the villager's request. This practice is symbolically similar to the official archiving of an incoming document in modern administration systems. To some extent, the *pinang sirih* has taken over the traditional role of *enau* (*A. pinnata*

Merr.) in Serampas society, as described by Marsden (1966) in the beginning of this chapter.

In terms of wild edible food, Serampas rarely go to the forest with the sole purpose of gathering fruits; instead, while passing through local forests for other purposes such as fishing, hunting, trapping birds or collecting rattan, they may harvest the available forests fruits. Local children might intentionally visit the close by secondary forest to get some fruits. They tend to eat a larger variety of fruits, including some species that are rarely eaten by adults due to their very sour taste such as *sawang* (*Ficus sp.*). Children in Borneo also have similar habits for dealing with fruits (e.g., Gollin, 2001); Etkin (1994) categorizes such fruits as "children's food".

Serampas use a great number of Arecaceae species, especially those belonging to the genus of *Calamus* and *Daemonorops*. An example is *bayeh* (*Oncosperma* sp.) that may grow as high as coconut tree. People harvest the palm heart of this palm as a vegetable. The species is also a common vegetable for the Dayak community in Kalimantan (Suluk *et al.*, 2001).

In the lowlands of Sumatra, many species of Arecaceae are also common edible plants, especially the palm heart parts (Purwanto, 2005). The Iban and the Kelabit in Sarawak North Kalimantan employ much more Arecaceae species than the Serampas for their daily food (e.g., Christensen, 2002). The people of Lao domesticated a wild species of rattan (*Calamus tenuis*) for edible shoot production, shifting the species from a non-timber forest product into a cash crop (Evans & Sengdala, 2002).

Pucuk lumai (*S. nigrum* Leschen ex Dunal) a wild species that grows abundantly in the open space of *umo* right after land clearing and *paku ikan* (*D. asperum* Bl.) are also important constituents of Serampas vegetables. People in India also eat young shoots of the prior species as a vegetable (Gowda, 2004), while people of Himalaya (Sundriyal and Sundriyal, 2004) and Borneo (Suluk *et al.*, 2004) consume another species of *Diplazium* (*D. esculentum*) for vegetable too. *Surian* (*T. sinensis* M. Roem) that is widely recognized as good timber also produces edible leaves for vegetable and spices. Young leaves of the surian are commonly used for vegetable and spices. Young leaves of this species are also a common vegetable throughout China (Weckerle, 2006), although the leaves are only available during spring time.

Serampas use *enau* (*A. pinnata* Merr.) for several purposes including food, tools and construction materials. People from different cultures in Indonesia employ nearly every part of this plant for many purposes (e.g., Mogea *et al.*, 1991). Interviews reveal that during severe crises, the earlier Serampas consumed piths of the *enau* and gathered a number of edible plants from the forest. Similarly, the Hanunóo in Mindoro, Philippines also consumed starch of the palm as emergency staple food (Conklin 1957). *Enau* is also a common sugar-producing plant in Thailand (Chantaraboon, 2005) as well as in North Sulawesi and Lombok, both in eastern Indonesia (Belcher *et al.*, 2005). Aboriginal people of Northern Kalimantan tap the inflorescences of enau to produce a traditional alcoholic drink (Christensen, 2002) whereas, people on the island of Bali consider enau to be one of the most important species (Astuti *et al.*, 2000). Besides producing palm sugar and a traditional alcoholic drink, the Balinese utilize many parts of the species for various purposes including containers (leaf sheaths), musical instruments (trunk and leaf midrib), weaving tools (trunk, leaf stalk) and some ritual ceremonies. Interestingly, the aforementioned Serampas practice of burning *A. pinnata* indicates a continuum between wild and cultivated plants. The wild palm was/is managed to increase production and population size.

Kepayang (*P. edule* Reinw.), one of plants that is protected by the Serampas customary system, produces seeds that are commonly eaten. The seeds of this Flacourtiaceae species are strongly poisonous due to the presence of cyanogenic glucosides (Burkill, 1935). Serampas usually soak the seeds of the plant for several days, then cook or ferment it to produce *kasam*. The spontaneous fermentation increases the concentration of an antioxidant (γ-tocotrienol) and induces protein hydrolyzation, which generates a unique flavor in the *kasam* (e.g., Andarwulan *et al.,* 1999). Such traditional fermentation not only enhances the food's digestibility and enriches its nutrient content but also reduces the undesirable toxic components of the raw materials (Etkin, 2006).

In Java, the dried seeds of *payang* constitute the essential spice of *nasi rawon* (Roemantyo and Zuhud, 2002), a popular dish eaten mainly on the east of the island. To produce the spice, the seed is immersed in water for about an hour, covered with wood fire ash and then buried in the ground for about 15 days (Wibowo, 1992). People in Sulawesi employ the *payang* seed to produce *kecap pangi*, a soy sauce-like product (Andarwulan *et al.,* 1999). Dayak Kenyah in East Borneo use the species for condiment and poison (Gollin, 2001). The ancient Serampas used to extract oil from the *payang* seed to produce cooking oil.

Most edible plants that Serampas consume today were also common edible species in Sumatra during Marden's work in the early 18th century (Table 5. 3). However, some prominent edible species today were not mentioned in Marsden's list including *bungkul* (*S. burahol* Hook. f. & Thoms.), *payang* (*P. edulis* Reinw.) and *petai*

(*P. speciosa* Haask.). *Bungkul* may be restricted to the Serampas; it not widely distributed in the other regions in Sumatra; whereas *payang* and *petai* might have been introduced after Marsden.

Table 5. 3. The Change of Serampas' Edible and Medicinal Plants Compare to those Listed in the Marsden's History of Sumatra

Local Name	Scientific Name	Family	Uses	
			Marsden's Era	**Serampas Today**
Manggis	*Garcinia mangostana* L.	Clusiaceae	Edible fruit	Edible fruit
Durian	*Durio zibethinus* Murr.	Bombacaceae		
Sukun	*Artocarpus incise* (syn *A. altilis* [Parkinson] Fosberg)	Moraceae		
Nangka	*Artocarpus integrifolia* (syn. *A. heterophyllus* Lam.)	Moraceae		
Champadak	*Artocarpus integrifolia**) (syn. *A. integra* Merr.)	Moraceae		
Mangga or mamplam	*Mangifera indica* L.	Anacardiaceae		
Jambu merah	*Eugenia malaccensis* L.	Myrtaceae		
Pisang	*Musa paradisiacal* L.	Musaceae		
Nanas	*Bromelia ananas* (syn. *Ananas comosus* [L.] Merr.)	Bromeliaceae		
Siri kaya	*Annona squamosa* Vell.	Annonaceae		
Nona	*Annona reticulata* Sieber ex A.DC.	Annonaceae		
Kaliki	*Carica papaja* (syn. *C. papaya* L.)	Caricaceae		
Samangka	*Cucurbita citrullus* L.	Cucuribitaceae		
Nior	*Cocos nucifera* L.	Arecaceae	Cookery, cosmetic, lighting, broom	Cookery, edible fruit, broom
Anau	*Borassus gomutus* (syn. *Arenga pinnata*, Merr.)	Arecaceae	Palm wine, thatch, sagoo	Brown sugar
Petai	*Parkia speciosa* Haask.	Fabaceae	Not known	Edible fruit
Kepayang	*Pangium edule* Reinw.	Flacourtiaceae	Not known	Edible fruit

*) Marsden used the same scientific name for *nangka* and *champada*

Table 5. 3. (Continued) The Change of Serampas' Edible and Medicinal Plants
Compare to those Listed in the Marsden's History of Sumatra

Local Name	Scientific Name	Family	Uses	
			Marsden's Era	**Serampas Today**
Bungkul	*Stelechocarpus burahol* Hook. f. & Thoms.,	Annonaceae	Not known	Edible fruit
Lagundi	*Vitex trifolia* L.	Lamiaceae	Anti-bad spirit, medicine	Medicine, rituals
Laban	*Vitex altissima* L.f.	Lamiaceae	Medicine	Unknown
Paku lamiding	*Polypodium* sp.			Unknown
Lada Panjang	*Piper longum* L.	Piperaceae	Medicine	Unknown
Pisang ruko	*Mussa* sp.		Medicine	Edible inflorescence
Sikaduduk	*Melastoma* sp.	Melastomataceae	Foot disorder	Unknown
Galangale	*Kaempferia galanga* L.	Zingiberaceae	Medicine	Medicine
Ampadu-bruang	*Foliis serratis*		Disorders in the bowels	
Sudu-sudu	*Euphorbia neriifolia* L.	Euphorbiaceae	Medicine, posion	Unknown
Kachang prang	*Dolichos ensiformis* L.	Fabaceae	To cure pleura	Unknown
Daun sedingin	*Cotyledon laciniata* (syn. *Kalanchoe laciniata* [L.] DC)	Crassulaceae	Headache, fever	Medicine, rituals
Tummu	*Costus arabicus* Roscoe ex Spreng.	Costaceae	Medicine	Medicine
Golinggang	*Cassia alata* L.	Fabaceae	To cure ringworm	Medicine
Lampuyang	*Amomum zerumbet* L.	Zingiberaceae	Medicine	Medicine
Chapo	*Conyza balsamifera* L.	Asteraceae	Medicine	
Siup	Unknown	Unknown	To cure leprosy	Unknown
Kabu	Unknown	Unknown	To cure itch	Unknown

Salak (*Salacca edulis* Bl.) is a common edible Arecaceae fruit in Sumatra; however, this species is quite recently introduced to Serampas. The potato had been introduced to the region close to Serampas, especially Kerinci, prior to Marsden's visit to Serampas. Today the potato is widely cultivated in Kerinci as well as in some villages of

Serampas and significantly contributes to the local economy. As Serampas is gradually exposed to a market economy, I expect that there will be more cash crop species adopted by the Serampas in the near future. Nilam (*Pogostemon cablin* Benth., Lamiaceae), an essential oil producing species is an example of plant that just was introduced to Serampas over the period of my field work.

Although Serampas have a large number of edible plants, they gain little economic value from selling them because of the poor transportation infrastructure. Serampas mainly generate their cash income from cinnamon and coffee. Over the last decade, Serampas have started to trade a small quantity of their traditional food crops, especially peanuts, rice and chili. In the closest market, Serampas rice is recognized for producing *beras payo*, a (nearly) organic wetland rice variety. The market prizes this rice variety more than the other varieties not because of its low agrochemical use but for its good taste and flavor.

5.4.2. Medicinal Plants

A complete understanding of Serampas medicinal plants necessitates an understanding of some local Serampas concepts on health and disease. The Serampas perceive that health and sickness not only deal with human physical entities but are also influenced by surrounding creatures. Serampas beliefs imply that a harmonic relationship between people and nature, including invisible creatures, is required in order to keep people healthy.

Indigenous groups in other parts of this earth share a similar conception about a disease. The Samburu, a traditional people who inhabit Mt. Nyiru, South Turkana, Kenya perceive that an illness is when a kind of pollutant hinders or blocks one's digestion. The pollutant could be contaminated food, infection by sick people and witchcraft as well (Bussmann, 2006). The Asheninka in Western Amazonia perceive that a complex network of intertwined wills defines human health status, as well as hunting and agricultural yield. Any discordant relationship such as an attack or harmful influence may induce an illness (Lenaerts, 2006). The Shuhi in Southwestern China believe that health and illness are associated with various kinds of spirits. A ritual is required in order to please the spirits (deities), to expel malicious spirits and to assure their support for human health (Weckerle *et al.*, 2006). People in northwestern Argentina perceive that temperature (hot and cold balance) defines one's health status. External factors such as wind, sun, or over-consumption of certain foods that are considered "hot" or "cold" may change one's body temperature and induce a disease (Hilgert and Gil, 2007).

Ahmad (2002) observes that people in Malaysia and some regions in Indonesia mostly influenced by Islam categorize disease into three main groups including common disease, uncommon/artificial disease and fate. Diseases in the first group include some illness provoked by environmental factors, bad diet, germ and fatigue. Uncommon diseases are mostly caused by bad spirit and supernatural influences; whereas diseases in the latter group are perceived as an individual destiny.

Some scholars have classified indigenous beliefs about disease into two main domains i.e., naturalistic origin (disease caused by the nature) and personalistic origin (disease caused by human and/or supernatural) (e.g., Foster 1976, Nurge 1977, MacFarlane 1981, Florey and Wolff 1998 and Gollin 2001). In Serampas, the origin of diseases is similarly categorized into two main domains: internal factors (caused by the human body) and external factor (caused by the "nature"). However, it is slightly different from the above naturalistic origin category, in which spirits are considered as part of nature's domain. The internal factors consists of two main elements: cleanliness and fatigue, whereas the external factors includes supernatural powers (*orang gunung, poyang* and *jin*) and extreme weather or climate conditions such as a drastic change of local weather, very hot or cold weather and/or too much (heavy) rain (see Chapter 3 for more discussion about Serampas worldviews). Serampas say that supernatural powers may overlap with extreme weather conditions. Fig. 5.6 illustrates Serampas' cognition map regarding the causes of a disease.

The afore-mentioned *obat ditawar* (enchanted medicine) and *obat rajo* (king's medicine) are compatible with Serampas' perceptions of disease causation. *Obat rajo* is mainly used to cure diseases associated with internal domain whereas *obat ditawar* mostly used to treat diseases associated with external domain. A tradition of *bertenung* that involves communication with the ancestors is a comprehensive healing combining the use of *obat rajo* and *obat ditawar*. A patient who recovers from a disease through the *bertenung* ritual has to perform *kenduri*, another ritual to express one's gratitude for their release from a serious disease. In doing so, the patient's family invites and serves a dinner for a number of people; mainly one's extended family and close neighbors (see also Anas, 2006). People believe that failing to perform the *kenduri* may induce the disease to "re-inhabit" the patient. On that feast, the *dukun* who cures the patient is rewarded with a chicken and a *gantang* of rice.

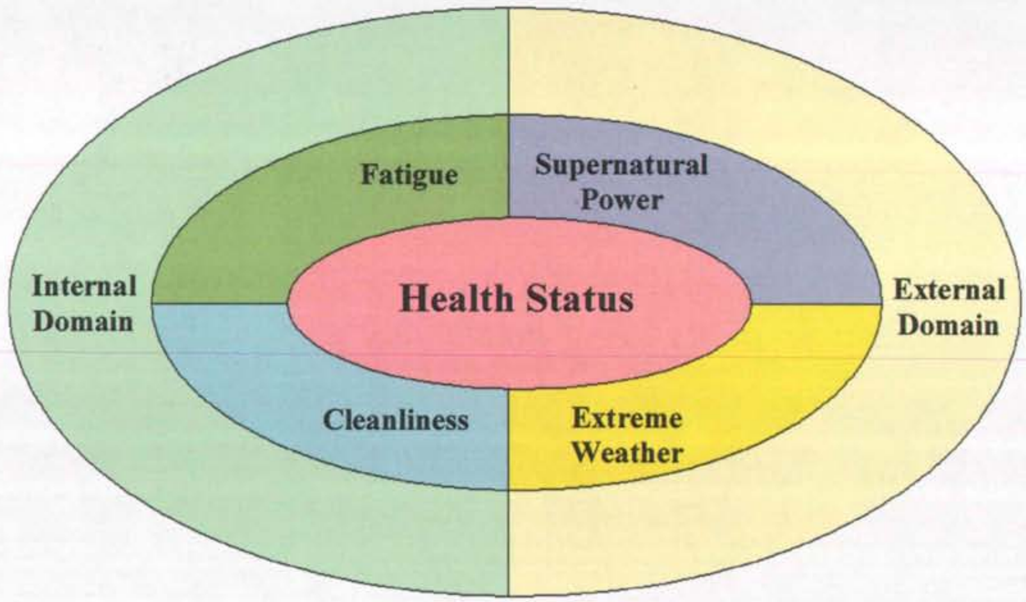


Fig. 5.6. A Conceptual Map of Serampas View on Health and Diseases

A similar technique of diagnosis is also practiced by the Dayak Ngaju and the Dayak Benuaq, indigenous groups of Central and Eastern Borneo (Klokke 1998, Sodikin 2005 and Susiarti 2005). Surprisingly, the local government in the latter region promotes the conservation of the traditional healing ritual, because it attracts tourists to visit the region (Susiarti, 2005). In Western Amazon and Peru, to diagnose a disease, a local shaman enters a trance and gives up his own embodiment using a hallucinogenic *ayahusaca* plant (*Banisteriopsis caapi,* Malpighiaceae). This allows the shaman to temporarily access the associated spirits (Desmarchelier *et al*. 1996 and Lenaerts 2006).

Knowledge about *obat rajo* is widely distributed among the people of Serampas and is common knowledge. In contrast, knowledge about *obat ditawar* is restricted to the local *dukuns*. It is handed down over generations exclusively within the *dukun'* line of descendants. In general, young people are not interested in learning about *obat ditawar,* but a few young women have become interested in practicing shamanism through apprenticeships.

Similar to Serampas, shaman and healer across different cultures tend to hold more knowledge about medicinal plants. Specialists in the Nepali side of the Himalaya not only hold more knowledgeable about local medicinal plants than common people but also use the plants more frequently (e.g., Ghimire *et al.*, 2004). In the community of Bogany in Northern Sulawesi, knowledge of medicinal plants is mainly held by local healers (Simbala *et al.*, 2005) who learn by means of dreams and apprenticeships. Like the Serampas, healers in this community traditionally are not allowed to receive money for any medicinal service they provide; otherwise their healing efficacy will vanish and they would not be able to cure patients.

Serampas knowledge of medicinal plants is mainly handed down by word of mouth. It is common that local people and *dukuns* have different understandings about the efficacy of some medicinal plants. This is also a common phenomenon in Eastern Amazonian traditional medicines as well (see Voeks, 1996). The Serampas approach to healing is quite different from that of the Shuhi, a native people of Western China (Weckerle *et al.*, 2006). The Shuhi highly depends on the *dumbus,* local shamans, in addressing various local diseases. Instead of using medicinal plants, the *dumbus* employ more ritual practices than other methods for healing. As a consequence, local knowledge about medicinal plants is not well developed among the Shuhi.

Along with local traditions, the lack of government medical service in Serampas over a long period might have further driven the development of local medicinal knowledge to address their evolving medical problems. The local government installed *Puskesmas Pembantu*, a small health service center in the village of Tanjung Kasri in 1995. The centre is solely operated by a temporary government-paid midwife. Still, people from other Serampas' villages such as Renah Kemumu have to walk for about four to six hours to reach the center. It is common that the center closes for several months because of the lack of a mid-wife who willing to be settled in an isolated region such as Serampas. Given these conditions, people still highly depend on traditional medicine. In a case of serious disease they will visit a hospital in the closest city. However, taking into account the access and cost to reach the hospital, only rich people may able to afford it.

Among the 131 species listed in Serampas pharmacopeia, *kunyit melai* (*Z. purpureum*) is one of the most extensively used to heal various diseases. People use the *kunyit melai* either as *obat rajo* or *obat ditawar*. This Zingiberaceae species is also essential component for various *uras*, including for bathing the Serampas heirlooms (see Chapter 4). A Malay ethnicity in the eastern Coast of Sumatra also use *kunyit melai* (or *bunglai*), as well as *Campferia galanga* and *Acorus calamus* to protect from bad spirits, especially for children (Susiarti *et al.*, 2005). Marsden (1966) also reported a similar practice of using charm to protect people, especially children from a "disease" risk.

The 131 medicinal species used by Serampas is higher than that reported by some other groups. For example Bussmann (2006) documented 80 species of medicinal plants used by the Samburu in Mt. Nyiru, South Turkana, Kenya. The plants mainly belong to Asteraceae, Poaceae, Lamiaceae, Cyyperaceae, Fabaceae and Malvaceae. The Dayak Benuaq in Eastern Borneo use 60 species of medicinal plants (55 genera of 31 families).

The plants mostly belong to Euphorbiaceae, Fabaceae and Zingiberaceae (Susiarti, 2005). In Eastern Amazon, Voeks (1996) identified 100 taxa of local medicinal plants. In contrast, the Ransa Dayak in Western Borneo are reported to use many more medicinal plants than Serampas; 250 species belonging to 75 families (Caniago and Siebert,1998).

People in the eastern Amazon list a high proportion of cultivated plants (58%) in their medicinal plants (Voeks, 1996). Asteraceae, Lamiaceae, Euphorbiaceae, Piperaceae and Verbenaceae constitute the main species in the local pharmacopeias (Voeks, 1996). Similar to the Amazoian, Serampas also use a high percentage of cultivated medicinal plants (62%). Hanazaki *et al.* (2000) corroborate the high proportion of cultivated species in indigenous pharmacopeias.

The continued widespread practice of shifting cultivation has driven the Serampas to engage more with *umo* and secondary forests than with other vegetation. In terms of distance, *umo* and secondary forests are also much closer to settlement than the old-growth forests. The resulting intense interaction with these vegetation types over many generations may have enabled Serampas to develop a deep ecological knowledge associated with the *umo* and the secondary forests, particularly on medicinal plants.

Salick *et al.* (1999) who worked with the *Orang Dusun* of Mount Kinabalu Malaysia and Weckerle *et al.* (2005) who undertook ethnobotanical study in the Hengduan Mountains of South China, also found that people tend to collect plants in sites closer to their villages. Furthermore, Salick *et al.* (1999) suggest that people tend to collect and use plants closer to their homes because of more intense interaction with the plants, richness of useful plants near human settlements and human tendency to stay close by the habitats of highly useful species.

The Highland Maya of Chiapas in Mexico rely on disturbed areas to supply their needs of medicinal plants, even for some communities who live in the periphery of primary forests (Stepp, 2000). Stepp and Moerman (2001) corroborate that primary forest is not the main source of native medicinal flora. Furthermore, they argue that pharmacopeias of the Maya as well as other natives of North America are characterized by a high proportion of weeds in their medicinal plants list. Secondary forests/weeds are preferred due to proximity and potentially to biochemical reasons.

However, Poaceae is an exception from their argument; this family is less represented in the above natives' pharmacopeias. In contrast to the Steppe and Moerman findings, Poaceae is an important family of Serampas medicinal plants (see Fig.5.5). Species belonging to the family constitute about 8% of Serampas pharmacopeias. *Serai* or lemon grass (*Cymbopogon nardus* Rendle ex L., Poaceae) is an example. The species is widely used to treat many different ailments including back pain, beriberi, diabetes, hepatitis, malaria and to induce health recovery after giving birth. In Sabah, Malaysia, lemon grass is used to cure headache and high fever (Ahmad and Raji, 2007). The grass performs antifungal activity against human pathogens (Yousef *et al.* 1978 and Rodov *et al.* 1995) and possess bactericidal properties (Asthana *et al.* 1992 and Kim *et al.* 1995).

In addition to *serai*, a Serampas midwife uses a young stem of *buluh kapal* (*G. hasskarliana* Backer ex K.Heyne, another Poaceae species) to ease the birthing process. She fills up three internodes of the *buluh kapal* with water from a local river, and then enchants the water. A pregnant woman drinks the water over the course of her pregnancy to ease her delivery. Serampas also utilizes a boiled stem of *buluh betung* (*D. asper* Backer ex K. Heyne, Poaceae) to treat beriberi. People in Lombok Island, Eastern

Indonesia use the same species to treat high fever, although alkaloid tests of the leaves and stems of the bamboo do not show positive results (Hadi and Bremmer, 2001). *Rumput sembuang* (*E. indica* Steud.) is another common medicinal grass species in Serampas. Some *dukuns* employ leaves of this grass to expel bad spirits. In Trinidad and Tobago, people utilize roots and leaves of the same grass to treat urinary diseases (Lans, 2006).

Although globally Poaceae is not a major family of medicinal plants, research confirms its representation in local pharmacopeias, especially in Southeast Asia. Elliot *et al.* (1987) documented some species belong to Poaceae in Gunung Leuser National Park, North Sumatra, including *Cymbopogon citratus* Stapf., *Eleusine indica* (L.) Gaertn, *Leptaspis urceolata* (Roxb.) R.Br., *Oryza sativa* L., *Paspalum conjugatum* Berg. and *Sacharum officinarum*. Mahyar *et al.* (1991) recorded the use of *Imperata cylindrica* P.Beauv. as a decoction to cure muscle pain by the people of Seberida, Sumatra. People of Minahasa in the Northern Celebes employ some Poaceae species including *C. citrates, C. nardus and I. cylindrica* for post-natal care (Zumsteg and Weckerle, 2007). People in Central Laos also list some species of Poaceae in their pharmacopeias including *E. indica* and *Bambusa vulgaris* Schard. (Libman *et al.*, 2006). Poaceae is also one of the most important medicinal plant families of Kenyah Leppo' Ke in eastern Borneo (Gollin 2001, Gollin 2004)).

A number of medicinal plants that commonly used in Sumatra were also listed in the Marsden's History of Sumatra. However, a great proportion of scientific names for the plants were unknown in Marsden's period. Instead, he listed vernacular names for most of the medicinal plants. Since most of the vernacular names are not recognized in today's Serampas flora, it does not allow for tracing the change of medicinal plants from the Marsden age. However, Marsden provided scientific names for some species of the medicinal plants (see Table 5.3). A few taxa in the list are still commonly used as medicinal plants including *kayu timah* (*Vitex trifolia* L.), *sicekur* (*Kampferia galanga* L.), *gelinggang* (*Cassia alata* L.) and *sedingin* (*Kalanchoe laciniata* [L.] DC). For the last plant, Serampas used different species from that mentioned by Marsden (*K. pinnata* Pers.).

Conspicuously, a great portion of plants that compose Serampas pharmacopeias are also common edible plants. Among 131 species listed in the pharmacoepias, 53 species (40%) are edible plants, mostly belonging to cultivated taxa (41 species). This notion is corroborated by Etkin and Ross (1991) who worked with Hausa in Nigeria. They found that 40% of 107 plants that commonly used by the Hausa to treat gastrointestinal problems are also used as food. Logan and Dixon (1994) suggest that people learn the medicinal value of plants in their endeavor to obtain food. Agricultural people gain vast ethnobotanical knowledge as they shift from hunter gathering towards sedentary state.

5.4.3. *Uras*: The Ritual Plants

To some degree *uras* plant overlaps with medicinal plant of *obat ditawar*. A mixture of *uras* plants is commonly used to protect and cure living beings from unresolved diseases and bad spirit. Knowledge of the *uras* plants likely emerged in association with the Serampas worldview about nature. Serampas extensively use the *uras* plants in various rituals, especially dealing with local farming.

Elsewhere, people from different cultures who engage in shifting agriculture commonly perceive the presence of rice spirits (e.g., Dove 1985, Christensen 2002). They practice some traditional rituals using a number of plants to protect the crops from spirits and for other purposes as well. In Southeastern Mexico, people employ ritual plants for festivities, incense and thanksgiving (Torre-Cuadros and Islebe, 2003). For that purpose, they commonly used some plants including *Lonchocarpus catilloi* (Fabaceae), *Machaoina lindeniana* (Rubiaceae), *Crescentia ujete* (Bignoniaceae) and *Thrinax radiate* (Arecaceae). Dayak Kantu in Western Borneo recognizes *utai*, a number non-rice cultigens planted in their fields, similar to Serampas' *uras* plants (Dove 1985). The plants include *Curcuma domestica* Valeton, *Camferia galanga* L., *Symplocos* sp., *Derris* sp., *Croton tiglium* L., *Cymbopogon citrates*, (DC) Stapf. and *Eurycles amboinensis* (L.). The last species is also locally known as *sikenyang*, a plant that is recognized for its property of predicting shifting cultivation yields. A great yield of the bulb implies that the farm will produce plenty of grain.

Serampas recognize at least 32 species of *uras* plants, mainly belonging to Arecaceae, Lamiaceae, Poaceae and Rubiaceae. The number of *uras* species used by Serampas is similar to reports elsewhere. For example, the nomadic pastoral Loita Maasai people in eastern Africa use 24 species for ritual events including circumcision, naming, fertility and blessing ceremonies and to settle disputes (Maundu *et al.*, 2001).

In contrast, the Dayak Iban and the Kelabit, indigenous groups who inhabit Northern Borneo, use many more *uras* plant; 97 and 111 species respectively (Christensen, 2002). In those communities, *Cordyline fructiosa* is conspicuously present at nearly every religious event, mainly to communicate with spirits. The species is also considered a culturally important species throughout the Polynesian islands (e.g., Ehrlich, 1999).

5.5. Summary

This research documented 318 plant species belonging to 89 families that are commonly used by Serampas. In terms of food, Serampas consume wild edible species and cultivated crops in an equal portion (total 146 species). The wild foods together with food crops dominate most of the Serampas useful plants. The food crops are mostly dominated by species belonging to Solanaceae; whereas the edible plants species mostly belonging to Arecaceae, Moraceae and Zingiberaceae.

Rice is the main food of Serampas. In addition to rice, people consume a number of crops and wild species that grow in *umo*, secondary forests, cinnamon agroforests and old-growth forests. Knowledge about edible species is relatively better preserved than that of species for other use categories. Most edible species mentioned by Marsden are still common fruits in the modern day Serampas.

Medicinal plants are also well representative in Serampas flora; they use 131 species of medicinal plants. The main families of medicinal plants include Poaceae, Lamiaceae and Solanaceae. Furthermore, Serampas utilize no less than 32 species of ritual plants for various purposes. The main families of rituals plant include Arecaceae, Lamiaceae, Poaceae and Rubiaceae. A great portion of the ritual plants is overlap with the medicinal plants.

Serampas collect medicinal plants mainly from human made ecosystem including *umo* and secondary forest, instead of old-growth forest; very few medicinal plants that grow exclusively in the latter forest. A great portion of the medicinal plant is also commonly recognized as food plant (40%). Knowledge about medicinal plants is held by healers as well as common people, although healers tend to bear the knowledge more. The lack of government sponsored health service in an isolated region as Serampas may drive people to retain their practices and knowledge associated with the medicinal plants. In doing so, Serampas keep their traditional health care system which is institutionalized within the Serampas customary system.

Serampas perform a number of rituals either communal rituals that involve most people in the region or individual rituals. The latter rituals are mainly associated with blessing villager's projects such as establishing a house and initiate harvesting or planting of a crop. Serampas use different plants during the different rituals, the most common being *pinang* (*A. catechu* L.), *sekumpai* (*H. amplexicaulis* Nees.), *sakrau* (*E. fluctuans* Lour.), *kunyit melai* (*Z. purpureum* Rosc.) and *jerangau* (*Acorus calamus* L.).

CHAPTER 6

LOCAL USEFUL PLANTS: CONSTRUCTION, TOOLS AND FIBERS AND OTHER USES

"Ke hutan bebungo kayu ke aye bebungo pasir"

"The forests gain timbers whereas the streams gain sand". Customary leaders usually cite this adage to persuade people to exploit natural resources wisely and to pay the exploitation levies.

6.1. Introduction

Campbell's expedition to Serampas in 1804 reported that people lived in stage long houses (ca 37 meter length), borne on elephant fern (tree fern) for the poles and utilizing fibers of *enau* (*Arenga pinnata* Merr.) for roofing (Marsden, 1966). Serampas developed the stage houses in order to protect themselves from wildlife, especially tigers, that would roam around the village frequently. At that time, the tree fern houses contrasted strongly with the rest of the settlement which was mostly dominated by bamboo houses.

The people of Serampas today still relly on local plants to fulfil their various needs, including materials for house construction. However, the plants they use today are quite different from the time of Campbell's visit to the region two centuries ago. A great proportion of plants mentioned by Marsden in 1783 are either no longer used or are used for other puposes. There has been no ethnobotanical study in the Serampas since Marsden's work.

This chapter focuses on the uses of plants for construction, tools, fiber and some other uses. Similar to Chapter 5, this chapter addresses two main questions; (1) what kinds of plants are used by Serampas today? and (2) how has plant use changed over time?

6.2. Methods

The research was undertaken with the community of *Serampas,* a sub clan who inhabit the northeastern area of Jangkat Sub District, Merangin, Jambi, Indonesia. The knowledge about the local plant uses was mainly collected from people in the villages of Tanjung Kasri and Renah Kemumu; additional information was also gathered from people in three other Serampas villages including Renah Alai, Rantau Kermas and Lubuk Mentilin. The overall fieldwork was carried out in the period of July 2005 to March 2006.

In-depth interviews with informed consent (Appendix B and C) using open-ended questionnaire (Appendix D) were conducted with the 'local experts' to collect data about plant use. The respondents included customary leaders, shamans, midwives, farmers, the park manager, local government officers and anyone who had gained traditional ecological knowledge. The total number of respondents was 51, consisting of 15 respondents from Tanjung Kasri, 21 respondents from Renah Kemumu and another 15 key respondents from outside the villages, including Serampas scholars, government officers, non-government organization staff and park officers. The snowball method was applied to select the respondents (Bernard, 2002), beginning with the village leader. In cases where a primary respondent suggested more than one secondary respondent, I clarified the person who was the respondent's strongest recommendation. For all plant uses mentioned in this chapter are at least reported by three respondents. Some of the in-depth interviews were a back and forth process, meaning that an interview with a respondent was held more than once in order to get further clarification and/or additional information.

Participant observation with informed consent (Appendix B and C) was also conducted with the people of Serampas in their private homes, *umo* (shifting cultivation rice field), *sawah* (wetland rice field) and at local cultural events such as *selamatan ruso, negak rumah* and *kenduri psko* to observe the common plants used. The plants recorded from the above methods were collected in each village (Tanjung Kasri and Renah Kemumu). Vouchers were sent and identified by plant taxonomists at the Herbarium Bogoriense, Bogor Indonesia. The vouchers are stored in the Biology Laboratory, the University of Jambi. Taxonomic grouping and scientific naming of the vouchers was consulted with Index Kewensis under the online International Plant Name Index (www.ipni.org/).

This research was not solely designed to investigate Serampas' knowledge of plant use; rather it forms just a part of a larger research endeavor attempting to reveal a broader perspective of Serampas traditional ecological knowledge and its relationships to forest conservation.

6.3. Results

6.3.1. Construction Materials

Serampas use at least 51 plant species for construction materials, mostly belonging to Lauraceae, Meliaceae, Euphorbiaceae and Moraceae (Fig 6.1). They use the word *medang* to refer to various good timber species, mostly belonging to Lauraceae. Examples are *medang Giring* (*Persea rimosa* Zoll. ex Meisn.), *medang serumput* (*Litsea mappacea* Boerl.), *medang telampung kuning* (*Litsea robusta* Bl.), *medang burung* (*Litsea umbellate* Merr.) and *medang gambung* (*Litsea garciae* Vidal). The complete list of species for construction in Serampas is presented in Table A.3.

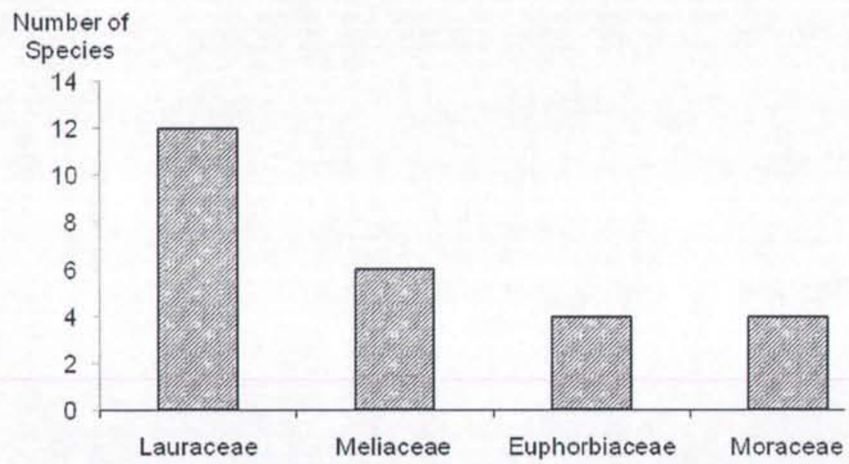


Fig. 6. 1. The Most Common Families of Plants Used for Construction in Serampas

Serampas consider *asal* (*Elaeocarpus stipularis* Bl., Elaeocarpaceae), *telap* (*Morus* sp., Moraceae), *medang giring* (*P. rimosa* Zoll. ex Meisn., Lauraceae) as the best lumber due to their durability and resistance against termites. Many wooden house poles remain in good condition for several decades, and accordingly, people commonly reuse such timber poles in renovating or establishing a new house. In Renah Kemumu, people prefer to use *asal* rather than *telap* because the latter species tends to crack when nailed.

Serampas use local timber species to meet their subsistence needs. However, as the demand for the three top-class timber species continues to grow due to local population growth, these timber species are becoming rare in the local forests. In Tanjung Kasri, for example, *asal* is very difficult to find; instead, people deem *medang giring* for lumber (see also Chapter 10). In Renah Kemumu, although *asal* still exists, to find the species one must go farther from the village. Accordingly, it is very difficult to bring *asal* lumber even to the local settlement.

The other common timbers are *surian rimbo* (*Toona sureni* [Blume] Merr.) and *surian tanam* (*Toona sinensis* M.Roem); both are in the family Meliaceae. These two species are considered as middle-class timber; however, since they are quite abundant, grow easily and have multiple usages, they have become the most common timber species throughout Serampas and are commonly used for flooring and walling. *Surian rimbo* grows wild in both the old-growth forest and secondary forest.

In addition to poles and boards, the Serampas use both *surian* species as *asal* to produce *lapeh* (wooden roofing). The consistent longitudinal grain of *asal* and *surian* wood makes them easy to slice evenly for roofing. To do so villagers use the robust stem of *limau keling* (*Luvunga eleutherandra* Dalz., Rutaceae) as a chisel. *Asal* roofing may last for about 20 years whereas *surian* roofing lasts a bit less (about 15 years).

Building a New House in Serampas

The first step in establishing a new house is to obtain the best timber in adequate quantities. To do so, a villager searches in the local forests, mainly secondary forests and primary forests, and marks suitable trees as a claim of property right, for example by notching the stem with a machete. In selecting the appropriate timber, one considers not only the wood quality but also the physical appearance of a particular tree in association with the surrounding environment. He must also take into account some local taboos associated with selecting and cutting a tree (see below). A villager gradually collects timber and stores the logs downstairs of his house or saves them in a neighbor's or relative's house. Storing the timber in this way allows it to dry steadily, thus preventing it from shrinking or swelling after construction. On average, it takes between one and four years to collect timber for an entire new house.

Fig. 6.2. Establishing a New House

Establishing a new house is a long-term project to provide a comfortable environment (physically, socially and physichologically) not only for the current family but also for one's descendants. Therefore, it is extremely important to ensure that materials being used as well as design and construction of a house are in harmony with the environment. For example, the setting of a pole has to follow the orientation of the former living tree as in its original habitat. The shoot-side of a pole should be put on top of the house whereas the root-side of the pole should be placed on the bottom of the house. This orientation symbolizes that the tree is being used for the pole as if it were kept growing in the house. It is common knowledge that local woodcutters always clearly designate a marker on the topside of a piece of lumber. Serampas explain that a single house including its occupants represents "a living system". Misplacing the pole orientation will induce disharmony among the components of the system. Consequently, this may promote an undisclosed sickness of the occupants of the house.

Serampas recognize some *pantangan dan larangan* (taboos) dealing with timber cutting. For example, the local worldview prohibits villagers from cutting timber during the phases of leaf rejuvenation and flowering. They find that such lumber is more susceptible to deterioration by termites and other insects. Furthermore, the local worldview leads villagers to avoid cutting any trees that show "unusual" growing forms, including:

- *kayu bekisut* (crying trees) – these are trees which stand overlapping with another tree. When the wind comes, the trees may touch one another and create noises that sound like crying.

- *kayu minum* (drinking trees) - these trees grow on steep land; however, instead of standing erect, they slants toward the valley, as if struggling to reach drinking water down in the streams. Using the *kayu minum* may cause the people who live in the house to fall sick with an indeterminate illness over time.
- *jung tunggul* (entangled stumps) – this refers to trees which have been cut and lain down completely, but the stem remains attached to the stump.
- *kayu dililit* (entwined tree) – this is a tree which is almost entirely entwined by liana, vines, or climbers. Local worldview holds that a house that utilizes the *kayu dililit* tends to be visited by various snakes.
- *kayu tunggal* (an emergent tree) – these tree grows in multilayered forests, where it solely occupies the top layer. The other trees are much shorter and stand in lower layers. The presence of *kayu tunggal* is conspicuous, even from a distance. Villagers believe that such trees are inhabited by *jin* (bad spirits), and they always avoid cutting this kind of tree. However, in cases where there is no other qualified tree other than the emergent tree, villagers are still able to cut the tree with a help of an *orang tuo*. To do so, the *orang tuo* performs a local ritual chant to exorcise the *jin* before cutting the tree; otherwise, the woodcutter may get sick.

6.3.2. Fibers and Tools

Fiber and tool plants include a number of plants commonly used to make some basic house and farming-related implements, mainly *kiding* and mats. Serampas use at least 45 plant species for fiber and tool materials. The implements employ a number of species belonging mainly to Arecaceae and Poaceae (Figures 6.3). The commonly used Arecaceae include *Caryota rumphiana* Mart., *A. pinnata* Merr. *and* some species of rattans mainly *Calamus* spp., *Korthalsia laciniosa* Mart. and *Daemonorops angustifolius* Mart. The Poaceae family mainly consists of some bamboo species including *Gigantochloa* spp., *Schizostachyum* spp., *Dendrocalamus asper* (Schult. & Schult. f.) Backer ex K. Heyne *and Bambusa multiplex* Raeusch.

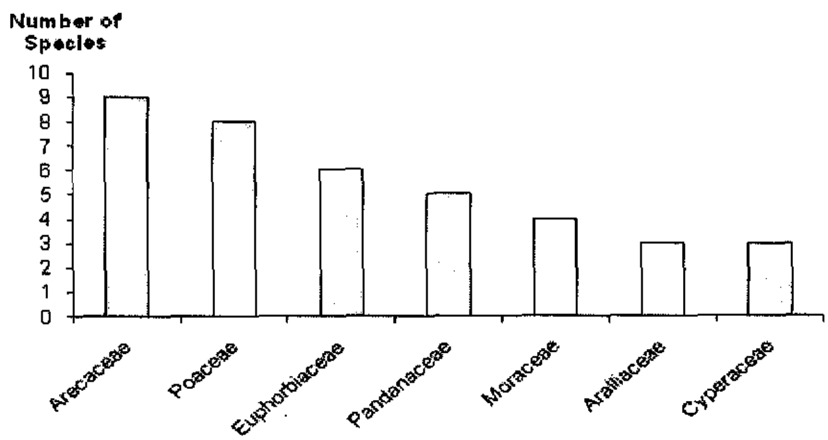


Fig. 6.3. The Main Families of Plants Used for Fibers and Tools by Serampas

Most Serampas houses are covered with hand-woven mats. Chairs are hardly present in Serampas; instead, people just sit or sleep on the hand-woven mats. Most villagers, especially women, are skilled and knowledgeable about weaving mats. They spend their spare time, for example while staying awake in the late night, weaving the mats. They employ some species of grass and *Pandanus* species (Fig 6.4), mainly *bigau* (*Lepironia articulate* Domin), *buku* (*Scirpus mucronatus* Host), *menjiang* (*Scirpus* *grossus* L.F.), *pandan* (*Pandanus* sp.), *pandan singkil* (*Pandanus furcatus* Roxb.), *umbai*[11], *njeman* (*Pandanus* sp.), *jegeh* (*Pandanus* sp.) and *mengkuang* (*Pandanus* sp.). Serampas grow the *bigau, buku* and *menjiang* in fallow wetlands around irrigated rice fields, while *pandan* is usually planted around settlements or *pondoks*. The other species are collected from *umo*, secondary forests and primary forests. Villagers also utilize the aforementioned plants to hand-weave other products such as purses, small bags and *pinang-sirih* boxes. When a local *rumah gedang* requires new mats, a group of about 30 women go to the forests to collect mat materials, especially *umbai.* In terms of quality and durability, the best mat is obtained from *umbai,* followed by *bigau, njeman* and *menjiang* in sequence.

Fig. 6.4. Preparing Pandan for Mat Weaving

[11] Unidentified (Voucher BHRK 56)

Another major implement for Serampas is *kiding,* a multipurpose bamboo woven container (Fig 6.5). *Kiding* are made from *rotan getah* (*D. angustifolius* Mart.), *rotan seni* (*Calamus sp.*), *manau* (*Calamus manna* Miq.) and bamboo, especially *mayan* (*Giganthocloa robusta* Kurz.), *betung* (*D. asper* Backer ex K. Heyne) and *serik* (*Giganthocloa serik* E.A.Widjaja). The rattan species, including the giant rattan (*Calamus manan* Miq.) are still abundant in Serampas forests.

Fig. 6.5. Weaving a *Kiding*

Both men and women are involved in weaving the *kiding*, as opposed to weaving mats which is considered women's domain. Women weave the bamboo parts while men do the finishing, including framing and tying the *kiding* with *manau* sheets and *rotan seni* (*Calamus* sp.). Throughout Serampas, the activity of weaving *kiding* becomes more intensive for some weeks prior to rice-harvesting season. A villager may spend five days (part time) to completely weave a *kiding*. A good kiding may last between three and four years. Occasionally, villagers partially repair a *kiding* by reconstituting each of its corners, the most susceptible parts, using some divided pieces of *rotan sikai* (*Calamus* sp.).

Serampas develop *kiding* into several different sizes, designs and functions. In term of size, there are three common types of *kiding* i.e., *buyang* (the largest), *tapan* (the medium) and *sandang* (the smallest). Mostly *buyang* contain about 50 liter of rice. Villagers employ the *buyang* mainly to bring various items from home to the *pondok* and to harvest some agricultural products. A belt of *terap* bark (*Artocarpus elasticus* Reinw.) is embedded and tied on top rim of the *buyang* and *tapan* as well. People carry the *buyang* by placing it on their backs and adjusting the belt on their foreheads. Obviously, *buyang* is also the most common unit to measure one's farming yield or to estimate the acreage of a farmland. To estimate the size of a farmland, people count the total amount of seeds being planted and/or the amount of harvested grains in terms of *buyang*.

Sandang, the smallest size of kiding, may contain three liters of rice and is commonly made from *bambu tangkal* (*Schizostachyum latifolium* Gamble). People, mostly women, use the *sandang* to carry rice to local streams to wash it before cooking.

Occasionally, they also use the *sandang* to bring gifts, food and other items to cultural ceremonies or to bring and share their food with neighbors. To make the *sandang* more interesting, villagers decorate the *sandang* with *serawai*, various local painted designs. The term *serawai* is originated from the name of a local beautiful aromatic flower. Some elders reported that the species went extinct about ten years ago. People perceive that the flower was a mythical flower; a representation of *dewa* (deity). They believe that the species may still be present in local forested mountains.

The common *serawai* patterns include *siamang berjabat* (the handshaking gibbon), *cuk rebung* (bamboo shoot), *letuk pisang* (banana inflorescence) and *ular manjat* (the climbing snake). Traditionally, Serampas employed sap of *batang bintang* *(Bischofia javanica* Bl.) to create the dark-red color of the painting. Today, synthetic paints have gradually replaced the traditional dye of *batang bintang*.

The *kidings* with various interesting designs used to be regarded as highly valuable properties; villagers saved them on a shelf in their living rooms to show visitors their belongings. *Tapan*, the medium-sized kiding, has multiple functions; it may support the *buyang* or, on some occasions, replaces the role of a *sandang*.

In addition to *kiding* and mats, villagers employ various plants to make some basic tools, mainly for farming, fishing and hunting. The sucker of *rotan sendahan* (*Korthalsia laciniosa* Mart.) provides a robust and durable material very suitable for making a holder for a *parang* (machete), a very important tool and always a part of everyday villagers' lives. *Beliung* (hatchet) is another important tool to chop firewood. Villagers use the trunk of some plants including *manggus hutan* (*Garcinia celebica* L. and *G. lateriflora* Bl.), *menien saluang* (*Orophea hexandra* Bl.), *mendap'en* (*Aralia* *dasyphylla* Miq.) and *batang sedam* (*Schefflera polybotrya* R.Vig.) to make a *beliung* holder. Early in a shifting cultivation stage, villagers cut down grasses, bushes and shrubs, using a tool called *pengait* (hook). The branches of *tiruk* (*Palaqium hexandrum* Engl.) and *merenai* (*Antidesma cuspidatum* Mull. Arg.) are the most common materials used for making this *pengait.* To grind rice and other local grains, people make an *antan* (pestle) mainly using hardwoods of *rukam bubur* (*Flacourtia rukam* Zoll. & Mor.) and *temeras* (*Memecylon sp.*). For broom, Serampas employs fibers of *sampul* (*Caryota rumphiana* Mart.) and *enau* (*A. pinnata* Merr.).

Tools for Hunting and Fishing

For hunting, Serampas benefits greatly from the strong and elastic properties of *mangli* (*Arytera xerocarpa* [Blume] Adelb.) and *kayu manau* (*Celtis philippinensis* Blanco) to snare wild game, especially *rusa* (deer) and *kijang* (small antelope). Boar and short-tailed macaque are overwhelming pests that devour most of Serampas crops. To trap and kill these pests, *Serampas* use *buluh umpo* (*Schizostachyum sp.*) which is very sharp (thorny) and poisonous.

For some Serampas families, bird meat supplies a noteworthy amount of protein intake. *Punai* (*Treron oxyura*) is recognized as the most delicious bird meat in Serampas. They employ different techniques to catch the bird including netting, trapping and shooting. Throughout Serampas, *pikat*, a technique to trap birds using the sap of some plants is the most common practice to catch the birds. The most common plants producing sap for this purpose include *kiro nasi* (*Ficus stupenda* Miq.), *semloen*

(*Homalanthus giganteus* Zoll. & Mor.), *aro* (*Ficus variegate* Bl.), *kirau pulut* (*Ficus parientalis* Bl.), *gitan* (*Adenia macrophylla* Koord.) and *terap* (*A. elasticus* Reinw.).

To make the *pikat*, people make a large number of small bamboo sticks (ca 30 cm length, 5 mm width); mostly use *buluh tangkal* (*S. latifolium* Gamble). Then they cover the top half of the sticks with the sap and set the sap-covered sticks on some branches of particular trees in which the birds usually drop by. The bird trapper then silently waits under the tree while observing the incoming birds. A bird that sits on the sticky bamboo will strongly attach to the stick, will no longer be able to fly and then falls down.

For fishing, Serampas utilize some poisonous vines, mainly *Derris scandens* (Roxb.) Benth. (see Box Ngarah in Chapter 3). Another fishing tool is a *lukah*, a fish trap made from various species of bamboo. To catch eels in the irrigated rice fields, villagers make small *lukah,* mainly using a species of *buluh kapal* (*Giganthocloa hasskarliana* Backer ex K.Heyne). They also weave the trunk of *bemban* (*Donax cannaeformis* Rolfe and *D. grandis* [Miq.] Ridley) to make *tangguk*, a fish catching basket.

6.3.3. Other Plant Uses

This section discusses the use of some plants that were not covered in the earlier sections. It includes a number of plants used for trade, firewood, wrappers, soil conservation and cosmetics. This plant use category consists of 32 plant species belonging to 23 families. Cinnamon and coffee are the major source of plants for trade. Other than the two cash crops, useful plants for other uses are dominated by some pioneer families that commonly grow in *umo* and secondary forests (Table 6.1).

Table 6.1. Families of Plants for other Uses

No	Family	Species
1	Moraceae	4
2	Euphorbiaceae	2
3	Lamiaceae	2
4	Lauraceae	2
5	Meliaceae	2
6	Oleaceae	2
7	Pandanaceae	2
8	Rubiaceae	2
9	Rutaceae	2
10	Acanthaceae	1
11	Annonaceae	1
12	Burseraceae	1

No	Family	Species
13	Fabaceae	1
14	Liliaceae	1
15	Magnoliaceae	1
16	Melastomataceae	1
17	Meliosmaceae	1
18	Styraceae	1
19	Ulmaceae	1
20	Unidentified	1
21	Urticaceae	1
22	Verbenaceae	1
23	Zingiberaceae	1
	Total	32

Serampas use a number of plant species for firewood; in fact any kind of woody species can be used as firewood. The abundant wood residue of debarked cinnamon greatly supplies the local needs of firewood. For long-term uses, villagers store their firewood either in *umo*, agroforest, or below their houses. Most Serampas prefer to use firewood from decayed bamboos of many species, because they are easily burnt, regardless of their durability. Other than the cinnamon and bamboos, Serampas prefer to use some firewood species such as *antoy* (*Litsea* sp.), *mang (Macaranga triloba* Muell. Arg.) and *kayu serabut* (*Chionanthus sp.*), especially during a wet rainy season or when one has stayed overnight in a very wet forest. These three species produce good flames even if freshly cut from living trees. The list of the most preferred firewood plants is presented in Table 6.2. While serving a dinner in a *pondok*, occasionally a woman burns some leaves of *petehen* (*Actinodaphne sp.*) in her fireplace. The burning leaves produce a chain of explosions (a bit weaker than firecracker) which entertains her children(s) as they wait for dinnertime.

The wood of *damar* (*Canarium pilosum* A. W. Benn.) also burns well although Serampas rarely use this species to make fire. Instead, the sap of this tree replaced kerosene for lighting, especially during a fuel crisis, which was the case in the 1960s. People tapped resin of the tree then dried it in the sun, grind it, then put it in a bamboo tube. A piece of bamboo (about 20 cm length and 7 cm width) full of the dried granulated *damar* sap produces enough lighting for three nights. Notably, while producing the light, the flame not only burnt the dried granulated sap, but also gradually burnt the bamboo. Therefore, one had to clean the top of the torch in order to keep the torch lit.

Table 6.2. The Preferred Firewood Plants

Vernacular Name	**Scientific Name**	**Family**
Antoy	*Litsea sp.*	Lauraceae
Kayu Kacang	*Dysoxylum alliaceum* Seem	Meliaceae
Kayu Lilin	*Microdesmis caseariaefolia* Planch. ex Hook.	Pandanaceae
Kiro Muting	*Nauclea calycina* Bartl.ex DC.	Rubiaceae
Kayu Nasi	*Styrax benzoin* Dryand.	Styraceae
Kayu Serabut	*Chionanthus nitens* Koord. & Valet., *Chionanthus oliganthus* (Merr.) R. Kiew	Oleaceae
Loloy	*Ficus* sp.	Moraceae
Mang	*Macaranga triloba* Muell. Arg.	Euphorbiaceae
Molesaten	*Villebrunea rubescens* Bl.	Urticaceae
Mutah	*Aglaia argentea* Bl.	Meliaceae
Narung	*Trema orientalis* Bl.	Ulmaceae
Seri	*Ficus tinctoria* G. Forst. f.	Moraceae

Leaves of various local plants provide remarkable materials to contain and wrap food and other items. Plastic wrappers are quite scarce; Serampas keep and reuse any plastic bags from industrial products. For example, people reuse a noodle plastic wrapper for various purposes including to make container for tobacco and *rokok (e)nau* (handmade cigarettes from *arenga* leaf) and to wrap meal on trips to *umo* or other sites. People also reuse the plastic wrappers to make a tool to expel birds in rice fields. They employ a large number of plastic wrappers from different sizes and colors, arrange them on a long rattan and tie on some poles. People shake the long chain of colorful plastic to drive away the birds that may approach rice crops.

Although the use of various plastic bags is gradually growing, leaf wrappers still dominate food packaging in this area. Wrapped rice is an important article present in the everyday lives of the Serampas. For example, a host family always provides some leaf-wrapped packet rice to any guest who leaves the family, even without any request from the guest. It is common knowledge that leaving Serampas villages, especially Renah Kemumu and Tanjung Kasri means traveling across the forests for at least half a day. Thus every one has to have enough food supply for the journey. In addition, wrapped rice is also one of the main meals in any local feasts, gathering, or ceremonies. A farmer who spend a whole day in *umo* or forest also bring along a piece of wrapped rice. To wrap rice and other food, people mostly use leaves that grow wild in shrubs and forests. The most common wrappers are leaves of *baru* (*Hibiscus tiliaceus* L.) and *sapat* (*Macaranga tanarius* Muell. Arg.). Some other plants also produce good leaves for wrappers including *daun bentang jelapak* (*Calanthe sp.*), *daun kitab* (*Cephalomappa maloticarpa* J.J. Smith) and *daun matahari* (*Curculigo latifolia* Dryand.).

Serampas also commonly use *upeh*, the dried base stalk of *pinang* (*Areca catechu* L.) to wrap the rice (Fig 6.6). The *upeh* is quite durable and can be reused several times.

People just wash the used *upeh* and save it for another forthcoming uses. On special occasions, villagers use leaves of *keladi air* (*Colocasia esculenta* Schott) to wrap *tapai,* a fermented meal made of black sticky rice.

Fig. 6.6. *Upeh*: Rice Wrapper from the Dried Betel Base-Stalk

In an urgent situation, for example staying overnight in the forest without any cooking tools, people utilize any living materials available in the forest to prepare their food. They commonly cook rice by baking it in a piece of bamboo (*lemang*); employing the same technique as baking the *lemang* for the *kenduri psko* (see Chapter 4). In addition to bamboo, they use a number of forest plant leaves including *pisang kayak* (*Musa* sp.), *daun matahari* (*Curculigo latifolia* Dryand), *daun kitab* (*Cephalomappa. Maloticarpa* J.J. Smith) and *manau* (*Calamus manan* Miq.) to wrap the *lemang*. Among those species, the leaf of *manau* is the most preferred wrapper because it also produces the tastiest aromatic cooked rice. For plates, Serampas frequently use leaves of *mang* (*Macaranga triloba* Muell. Arg.) and *daun matahari* (*C. latifolia* Dryand). For salads, they pick a bunch of young leaves such as *sekentuten* (*Lasianthus rigidus* Miq. and *L.*

pseudo-stipularis Amsof. ex Bakh. f.), understory species that widely grow in the local forests.

Plants for Social Purposes and Cosmetics

Serampas recognize some plants that have prominent socio-environmental functions. The plants include several species that are commonly used for boundary markers, for conserving biodiversity (especially bird diversity) and for protecting steep land from landslide. *Jeluangan* (*Cordyline terminalis* Kunth.) and *puding* (*Graptophyllum pictum* Griff.) are remarkable species used to create live fences and to delimit land ownership on farmlands, agroforests and shrubs. Some people are also concerned with "managing" species that can support wildlife, especially birds, because they constitute significant levels of protein for some Serampas families. In the village of Tanjung Kasri, people maintain some *seri* trees (*F. tinctoria* G. Forst. f.) that grow wild in fallowed lands and agroforest patches. *Seri* produces a large number of fruits that feeds most of local frugivorous birds. The species then grow and spread widely throughout the village.

In terms of cosmetics, fruits of *limau purut* (*Citrus hystrix* D.C.) and *limau keling* (*Luvunga eleutherandra* Dalz.) provided alternative materials for shampoo. To produce a good shampoo, the fruits are immersed in a cup of water for about three to four days before using. For soap, people employed *ngelo* fruit (*Plectronia horrida* K. Schum.) that produces foam after soaking and has dirt-removing properties. Some villagers still produce *kasai*, a traditional body powder made of rice flour mixed with aromatic plants such as *pandan* (*Pandanus* sp.), *peladas*[12] and *bungo cempako* (*Talauma candollii* Bl.). The complete list of plant for other uses is presented in Table A.7.

6.4. Discussion

6.4.1. Construction Materials

In the lowlands of Sumatra, Lauraceae, Meliaceae and Euphorbiaceae are the most common and important sources of timber for housing, as well as for tools, crafts and boats (Purwanto *et al.*, 2005). The families also constitute the main timber species for Serampas. However, in the lowland forests there are a lot more diverse timber species than those in Serampas. Moreover, the species of Dipterocarpaceae (including some species of *Hopea, Shorea and Dipterterocarpus*) that constitute an important economic timber in most regions of Southeast Asia (e.g., Wilie *et. al.* 2004, Yulita *et al.* 2005) are absent in the Serampas forests.

The glossy surface of bamboo *serik* (*G. serik* E.A.Widjaja) and mayan (*G. robusta* Kurz)) – which are commonly used for roofing in Serampas are good for protecting a *pondok* from rain. People in West Java usually use the *mayan* for water-carrying vessels (Widjaja, 1995). To develop the *pondok* roof, Serampas just split the bamboo stem into two halves and install them in pairs, with one half facing up and the other half facing down. Such roofing may last for about three years; however, it is quite vulnerable to leaks, especially during heavy windy rains. A thick wall of *D. asper* which

[12] Unidentified (Voucher BHRRKD 101)

is very strong and durable (e.g., Dransfield and Widjaja, 1995b) is commonly used for poles and floors.

Implications of Taboos for Construction Materials

Some *pantangan dan larangan* (taboos) that are applied to particular timber exhibiting unusual growth form may drive people's preference of timber species. Moreover, taboo of cutting some local trees may have conservation value, although (as argued by Posey 1992) local people commonly cannot provide satisfying ecological explanations for the cultural practices. Taboo is a resource management tool widely practiced by native people over different cultures to manage local resources (e.g., Byers *et al.* 2001, Virtanen 2002, Fowler 2003 and Wadley and Colfer 2004). Colding and Folke (2001) add that many taboos have great influence in controlling natural resource exploitation (resource habitat taboos). Although taboos are traditional institutions, Colding and Folke (2001) suggest that they could be made as more formal institutions in a contemporary society and used as formal conservation measures.

Furthermore Colding and Folke (2001) categorize resource and habitat taboos into six main categories including segment taboos (regulate resource withdrawal), temporal taboos (regulate access to resources in time); method taboos (regulate method of resource withdrawal), life history taboos (regulate withdrawal of vulnerable life history stages of species), specific-species taboos (total protection to species in time and space) and habitat taboos (restrict access and use of resources in time and space). Such human taboo-plant interaction may promote a "pattern of harmony in the landscape" (Hamilton 2002). The Serampas timber cutting taboos is consistent with Colding and Folke's categorizations of resource withdrawal regulation and life history taboo and may have important conservation outcomes.

Serampas perceive that a *kayu tunggal* (emergent tree) hosts bad spirits. From an ecological perspective, the tree may provide space and shelter for some high canopy niche-specialized organisms. Thus protecting the *kayu tunggal* may conserve other organisms associated with the tree. Cardelùs & Chazdon (2005) observed the microenvironment of emergent species *Hyeronima alchorneoides* and *Lechythis ampla* in La Selva Biological Station. They found microclimate heterogeneity in the inner-crowns of both species. Following the study, Cardelùs (2006) suggests that such great microclimate heterogeneity may promote epiphyte diversity in the crowns of those emergent trees.

In terms of *kayu dililit* (entwined trees), a number of lianas, vines, or climbers species spend their lives on the *kayu dililit.* Some of those plants have medicinal and economic significance for Serampas, such as *Millettia sericea* Wight. & Arn., *Merremia peltata* Merr. and *Poikilospermum suaveolens* Merr. ex Bl. (all are medicinal plants) and *Cissus nodosa* Bl., a common rope material used to tie cinnamon and other local agricultural products. Felling *kayu dililit* not only implies removing the timber but also destroying a number of (other) useful species on that tree.

Lianas, vines and climbers may also drive the direction of succession in a particular patch of forest because they interact with other living beings especially around their host tree (Schnitzer *et al.*, 2000). Furthermore, Schnitzer *et al.* observe that in many types of tropical and temperate forests, succession is followed and initiated by liana-dominated trees. About 7.5% of annual gaps in an old-growth tropical forest on Barro

Colorado Island in Panama follow the succession pattern. Perez-Salicrup (2001) found that lianas hamper the growth of tree species seedlings differently and concluded that they may ultimately drive species composition of the seedlings. Schnitzer *et al.* (2000) observed that lianas tend to inhibit non-pioneer tree survival while indirectly enhancing pioneer trees. Lianas also tends to occupy slow-growing trees rather than fast-growing trees (Putz, 1980); although there is no significant correlation between growth rate and proportion of trees with the liana (Putz, 1984). Protecting entwined trees, as it was prescribed by Serampas, may be interpreted as a legacy of earlier generations to keep the slow-growing trees and to prioritize the use of other fast-growing trees.

6.4.2. Fibers and Tool Materials

The Iban and the Kelabit in Northern Borneo produce more diverse fiber products than Serampas, employing a greater number of plants (104 species), mostly Arecaceae. Moreover, they produce specific mats for different purposes, including mats for sleeping, everyday sitting, special occasion sitting, dining table and regular mat for carpet (Christensen, 2002). Serampas use 45 plant species for this use category and only recognize mat for sleeping and sitting. The Solferino in southeastern Mexico use at least 21 species to produce local handmade handicrafts, including baskets, furniture, doors, ashtrays, napkin rings, musical instruments, cooking utensils, brooms, traps and adornments (Torre-Cuadros and Islebe, 2003). Unlike the Serampas and the Bornean communities, the Solferino use significant number of Bignoniaceae species for the handicraft materials.

Species of Arecaceae and Pandanaceae contribute essential fiber and tool materials for the Serampas. Rattans are used to provide additional income for the Serampas, however, since the current government initiatives to more seriously prosecute forest poachers, Serampas no longer collect the rattan for cash. People around KSNP also harvested the rattan for various purposes. People in the village of Sungai Lisai and Sungai Tutung for example, have collected some species of rattan (*Calamus* sp.) over generations to produce *jalik* (rattan mat), basket and general binding (Siebert 1989 and Giripurwo *et al.* 2001). People just visit the forests and collect the rattan any time they need. Contradictory to Serampas, in an urbanized area of Kerinci, the rattans are becoming extinct due to over-exploitation, mainly for export since the mid-1970s (Siebert, 1989).

Serawai is a type of rattan basket that is ornamented with some colorful painting designs, in which some local dye plants including *batang bintang (B. javanica* Bl.) are employed. However, people today prefer to use synthetic paints. *Daun tarum* (*M. tinctoria* G. Forst. f.) that used to be a common dye-producing plant in the region (e.g., von Brenner 1894, Marsden 1966) is no longer recognized as a coloring material. The relatively poor knowledge of Serampas about dye plants today suggests that either it was never well developed or it might have disappeared. Serampas knowledge about plants for dye vanished more quickly than the knowledge of plants for other use categories (I further describe in the last part of this chapter). As a comparison to Serampas, aboriginal people Sierra Leone use about 40 plant species for dye (McFoy, 2004).

In terms of tool materials, Serampas share a common practice with other indigenous groups in Indonesia in using poisonous vine for fishing. However, most of them use another species which is *Derris elliptica.* It has been reported to be used by people in Siberut (Zahorka, 2004), Memberamo (Boissiere *et al.* 2004) and Dayak (Dove 1985, Sardjono and Samsoedi 2001, Christensen 2002 and Susiarti 2005). Before the emergence of chemical pesticides, the latter poisonous vine played a significant role in supplying the international market of pesticides (e.g., Isman 1997). The US imported 6700 tons of the root of *Derris* from Southeast Asia in 1947.

6.4.3. Other Plant Uses

Firewood species constitute a significant proportion of the species under the category of plant for other uses. In fact, Serampas use nearly all kind of species for fuel wood, and they do not recognize taboos for firewood. However, in rare occasions where there is lack of dried wood, Serampas use special woods that easy to flame even if they are just cut from a living tree. In contrast to the Serampas who have no preferences for particular species for firewood, the Gourounsi in Burkina Faso prefer to use some species for firewood, at the same time avoid using a number of plants for the purpose (Kristensen and Balslev, 2003). People avoid using at least 29 local species for firewood. There are many reasons for not burning these plants, including bad luck, cultural taboos, plants were not used by their ancestors, totem plants, holy plants, plants that burn poorly, plants that make one faint and plants having the same name as one's child. In the last case, burning the wood of such a tree is considered akin to killing the child that bears the plant's name.

Serampas rarely cut a tree merely to obtain firewood. They mainly use dead wood from the felled trees in shifting agricultural fields and also dead bamboos. Cinnamon that latter on is incorporated into local shifting cultivation also provides a great quantity of firewood. The abundant firewood in Serampas might explain why Serampas do not recognize firewood-taboo as the case in Burkina Faso.

Some plants have important social functions mainly for boundary marker including *jeluangan* (*Cordyline terminalis* Kunth.), *puding* (*Graptophyllum pictum* Griff.). *Jeluangan* is suitable for living fence because it is resistant to fire and grows strictly on its original site without broadening, although it may fall down if stepped on by animals. *Puding* also has as same function as the *jeluangan.* However because *puding* may grow around and away from its original planting site, especially when it laying down; people prefer *jeluangan* rather than *pudding* for the fence and boundary marker.

In addition to the *jeluangan* and *puding, ranjau ruso* (*Justicia gendarusa* Blanco) and *aur cino* (*Bambusa multiplex* Raeusch.) are also used for the boundary. Besides delineating a land, the latter species forms a compact hedge (Dransfield and Widjaja, 1995a) and develops a broad rooting system that keeps the land from severe erosion. People use this species mainly to delineate and conserve steep farming lands. The species is also a common boundary marker plants in Kerinci and Borneo (Aumeeruddy 1994, Gollin 2001).

Plants Associated with Bird Hunting

People of Serampas conserve a number of fruit-producing plant that feed local birds. People maintain that allowing the *seri* (*Ficus tinctoria* G. Forst. f.) to grow implies that they nurture the various frugivorous birds. Ultimately the birds will provide animal protein for the people, not only for the current generation but also for the following generations. Accordingly, conserving the *seri* will also perpetuate the welfare of the whole village community. Some elders stated that the name of their village, Tanjung Kasri, is associated with some giant *seri* that grow in their abandoned villages. In addition to *seri, kiro muting* (*Nauclea calycina* Bartl.ex DC.), *kiro bayan* (*Ficus cf. ribes* Reinw. ex Bl.), *nulang* (*Glochidion obscurum* Bl.) and *gitan* (*Adenia macrophylla* Koord.) also produce plenty of fruit preferred by the local birds (see Sartika, 2006).

In terms of bird hunting, besides employing their knowledge about some plants to produce trappers and other tools associated with the hunting, Serampas also develop and use their knowledge about the association between birds and plants. Bird trappers are very knowledgeable about when, where and which trees are usually visited by a particular bird. Similar to the Serampas, indigenous people in Western Arnhem Land Australia have vast of ecological knowledge about rock kangaroo, one of the common animals in the region. They burn *Trodia* grass to drive out the mammal from hiding. The burning also encourages re-growth of the grass, which is an important feed for the mammal (Telfer and Murray, 2006).

6.4.4. The Emergence and Disappearance of Local useful Plants

In ancient Serampas, as reported by some respondents, there were many more plants used than they are today. Children of the ancient Serampas employed the fruit of *sekambing* (*Clerodendron fragrans* Vent.) to make soccer balls. They also wore chains of *kayu kapeh* fruits (*Meliosma ferruginea* Sieb. & Zucc. ex Hook. f.) as necklaces. The juices of *seduruk hitam* (*Melastoma malabathricum* Jack) and *peladang* (*Coleus sp.*) produced traditional ink for writing letter and other purposes. Moreover, the sap of *batang bintang* (*Bischofia javanica* Bl.) mixed with charcoal, provided a traditional varnish to paint *serawai* and other tools.

During periods of political and economic crisis, for example during the Japanese occupancy in the World War II, young trees of *terap* (*Artocarpus elasticus* Reinw.) provided an elastic bark that could be sewed for "emergency" clothing. Leaves of *baru* (*Hibiscus tiliaceus* L.) provided natural yarn to sew the *terap* bark. To make it interesting, a new bark cloth was immersed in mud to create black color. A yellow color might be obtained from the color of *kunyit* (*C. domestica* Bl.). Although the bark cloth lasted for only about ten days, it remarkably relieved Serampas basic needs during difficult times.

During the crisis, Serampas used sap of *damar* (*C. pilosum* A. W. Benn.) for lighting. Today *damar* sap is an important industrial raw material for printing ink, surface coatings for textile and paper, incense, waterproofing material and insect repellent (Fernandezs, 2001). However, Serampas do not exploit the existing dammar for cash. Lack of market information about the *damar* and uncertainty about the right to use such forest products discourage Serampas to harvest the existing NTFPs.

Some of the useful plants listed in the Marsden's History of Sumatra are still being used in the modern day of Serampas and some are not (see Table 6.3). The cinnamon that is widely grown today was also mentioned in the Marsden's list. Although Marsden description of useful plants in Sumatra two centuries did not merely focus on Serampas, there are obvious changes in terms of plant use compare to the Serampas plant use today. In term of edible plants, most fruit species listed by Marsden are still common fruits for Serampas and people in the surrounding areas (see Chapter 5). Knowledge

Table 6.3. The Change of Serampas' Useful Plants Compare to those Listed in the Marsden's History of Sumatra

Local Name	Scientific Name	Family	Uses	
			Marsden's Era	Serampas Today
Puhn Upas	Arbor toxicaria R. *Antiaris toxicaria* Lesch.	Moraceae	Poison	Not used
Enau	*Arenga pinnata*, Merr.	Arecaceae	Roofing (fiber), fermented drink, cultural (oath)	Brown sugar, cigarette
Kelapo	*Cocos nucifera* L.	Arecaceae	Cookery, lighting, cosmetic, fermented drink, utensil (shell)	Cookery, cosmetic
Paku Tiang	*Cyathea* sp.	Cyatheaceae	House pole	Not used
Damar	*Canarium* sp. *)	Burseraceae	Lighting	Not used
Labu Guci	*Lagenaria siceraria* Standl.	Cucurbitaceae	Utensil	Ornament
Kaluwi	*Artocaprus* sp.	Moraceae	Clothing	Edible fruit, kiding belt.
Kananga	*Uvaria canangioides* Rchb.f. & Zoll. Ex Miq.		Fragrance, hair assesory	Cosmetic
Champaka	*Michelia champaca* L.	Magnoliaceae	Hair assesory	Ornamental plant
Bunga Tanjong	*Mimusops elengi* L.	Sapotaceae	Body ornament	Ornamental plant
Pachah-piring	*Gardenia florida* L.	Rubiaceae	Fragrance	Ornamental plant
Bunga Raya	*Hibiscus rosa-sinensis* L.	Malvaceae	Shoe polisher	Ornamental plant
Bunga Malati	*Nyctanthes sambac* L.	Oleaceae	Body ornament	Ornamental plant
Kamboja	*Plumeria obtusa* L.	Apocynaceae	Grave plant	Grave plant
Tarum	*Indigofera tinctoria* L.	Fabaceae	Dye	Not used
Tarum Akar	*Marsdenia tinctoria* R.Br.	Asclepiadaceae	Dye	Medicine
Kasumba	Carthamus tinctorius L.	Asteraceae	Dye	Not used
Kasumba Kling	*Bixa orellana* L.	Bixaceae	Dye	Not used
Sapang	*Caesalpinia sappan* L.	Fabaceae	Dye	Not used
Mangkudu	*Morinda umbellate* L.	Rubiaceae	Dye	Not used
Kataping	Terminalia catappa L. (GCI)	Combretaceae	Dye	Not used
Champadak	*Artocarpus integra*, Merr.	Moraceae	Dye, edible fruit	Edible fruit

*) Marsden did not provide scientific name for this species. The species might be *Canarium* sp. since the species was commonly use for the same purpose

about edible plant is better preserved than that for other use categories. People in the Atlantic Forest Coast of Brazil also indicate consistent consensus of knowledge about edible plants, but not for other uses (Hanazaki *et al.,* 2000). Marsden also listed some plants for medicinal purposes. However, since most of the plants were listed only their vernacular names that are not recognized by the Serampas today; it does not allow tracing the change in the use of the medicinal plants from the Marsden's year.

Contradictory to the edible plants, a number of dye plants that were commonly used during the Marsden's era are no longer use as dye source materials. In 1870 Marsden found *tarum akar*, a climbing plant with leaves from three to five inches in length, thin, of dark green and discolored when dried. This species, which was used for most of the local dyes, was not known by Western botanists at the time (see also von Brenner, 1894). Later on, his name was used to scientifically name the species, *Marsdenia tinctoria* R.Br. As an honor for his passionate and extensive work, the Wernerian Society of Edinburgh adopted his name for the genus to which the plant belongs: Genus Marsdenia, Asclepiadaceae (Marsden, 1966). Today Serampas recognize the *daun tarum* for its medicinal values more than its values as a dye.

Interestingly, *batang bintang* (*B. javanica* Bl.) that was commonly used dye prior to current generation was not listed in the Marsden's plant list. It seems that there is a missing link in term of dye plants knowledge between the current generation and the Marsden's generation. Cultural devaluation of *serawai,* a local hand-woven rattan basket that used to employ some dye-producing plants (see section 6.3.2) together with the widespread synthetic paint have marginalized the use of traditional dye materials and depleted local knowledge associated with the dye. Reyes-García *et al.* (2005) suggest that intensive exposure to market has replaced some traditional local use of plants with commercial products.

As mentioned in the beginning of this chapter, tree ferns (*Cyathea* sp.) and the fiber of *enau* (*A. pinnata* Merr.) were important housing construction material for Serampas. Given that the early Serampas only recognized simple carpentry tools such as *parang* (machete) and *beliung* (adze) (see Marsden, 1966); using the *Cyathea* species would ease working on the tree fern for house poles. Introduction of saw, a carpentry tool that was not recognized during the Marsden's fieldwork, might have shifted people's interest of construction materials towards high class timbers. Similar to the tree fern poles, *enau's* fibers was also replaced by wood roofing, mainly using the species of *surian* (*Toona* spp.) and *asal* (*Elaeocarpus* sp.). Ultimately, some Serampas people gradually replaced the wood roofing with corrugated zinc. Fibers of the *enau* are still being use to knit rope and to make broom.

Marsden's fieldwork in Sumatra indicated that most women used coconut oil for their hair care. Moreover, they also commonly utilized some ornamental flowers for fragrance and accessories such as *kananga* (*Uvaria cananga* L.), *champaka* (*Michelia champaca* L.) and *bunga tanjong* (*Mimusops elengi* L.). Some of the flowers are still in used but not as intensely as in Marsden's time. *Kamboja* (*Plumeria obtusa*) is still widely recognized as *bunga kuburan* (graves' flower).

Puhn upas (*Antiaris toxicaria* Lesch., Moraceae) is a very prominent plant that produces a very poisonous latex (Marsden, 1966). However, Serampas do not recognise this species. On the other hand, *kayu ular* or *akar tunggal* (*Goniothalamus macrophyllus* Miq., Anonaceae) is widely known throughout Serampas to treat snake bite and to expel snakes. The species was not included in Marsden's list. The *kayu ular* has a potential cytotoxicity against colon cancer, breast cancer and lung carcinoma (Wattanapiromsakul *et. al,* 2005).

6.5. Summary

Serampas use at least 51 species for construction, 60 species for tool and fibers and 34 for other uses. Local important timber species are mostly recognized as *medang*; referring to some species belonging to Lauraceae. Besides the Lauraceae, the other Serampas important timber families include Meliaceae, Euphorbiaceae and Moraceae. In addition to species preferences, Serampas also recognize a number of *pantangan dan larangan* dealing with obtaining timber from the local forests, some of which appear to have important conservation implications.

In terms of tools and fibers, Arecaceae, Poaceae and Euphorbiaceae constitute the most species of useful plants for the categories. Some species of rattan, especially *Calamus* spp. and *Giganthocloa* spp. are widely used to produce local important implements. Species of Pandanaceae and Poaceae contribute the main material for weaving sitting and sleeping mats.

Overall, Serampas knowledge on useful plant indicates a decline over time; the ancient Serampas used many mores plants than they are used today. In contrast to knowledge of edible plants (Chapter 5), knowledge associated with dye has disappeared most quickly, following the declining in the use of some product associated with the dye. None of the dye plants used by the earlier generations is still in used today. The status of ethnobotanical knowledge for other plant use categories lies in some points between that of the edible plants and the dye plants. Given that knowledge of useful plants is preserved by means of keeping using the species, preservation of local knowledge as well as conservation of biodiversity should go along with promotion to use the local plants.

Serampas use various local plants mainly dedicated to meet their subsistence needs. Efforts to harvest plants for cash are challenged by the legal status of the area, which is located in the territory of the Kerinci Seblat National Park. A clear arrangement between local people and the KSNP in terms of the rights of local people to harvest timber and non-timber forest products may not only improve livelihood of the Serampas but also facilitate to preserving traditional knowledge associated with the forest products.

CHAPTER 7

UMO: A SHIFTING CULTIVATION

"Padi ditanam tumbuh lalang, ayam di pautan ditangkap elang, ikan di pemanggangan tinggal tulang, di semak rimau menghadang, di air pun buayo mengarang"

"The farmlands were greenish, but people were not sure whether the green growing plants were either imperata grass or rice. Banditry was everywhere and people were gloomy due to uncertain conditions. Eagles were predating chickens in villagers' backyards, fishes in roasters were gone leaving just their bones, tigers were waiting in the bush, while crocodiles kept screaming in local streams". The above adage articulates a chaos situation as a result of local leaders who no longer adhered to their adat, disrespected their own adat, and acted as they wish.

7.1. Introduction

Shifting agriculture has, in large part, vanished throughout the island of Sumatra (e.g., Tomich and van Noordwijk 1995). Today, only a few ethnic groups on the island still practice this traditional farming system, one of them being Serampas who have performed shifting cultivation over generations and have internalized the practice into local cultural values and beliefs. Shifting agriculture covers a broad range of traditional agricultural techniques (e.g., Spencer 1966; Conklin 1957). In Sumatra, some shifting cultivation methods have evolved, incorporating a number of cash crops and other valuable species and forming a complex agricultural (agroforest) system (e.g., Mary and Michon 1987, Gouyon *et al.* 1993 and Angelsen 1995).

Worldwide, there is debate about the benefits and consequences of shifting cultivation for both the local people and the environment. For example, Myers (1993) argues that shifting agriculture is the largest driving force behind deforestation. On the other hand, Alcorn (1990) observes that shifting agriculture is a way to control deforestation. Although the practice involves the removal of the trees, it does not entail the removal of forests. She notes that shifting cultivators employ the process of succession to produce resources, improve and conserve soil and reduce pest and weed problems. Shifting cultivation is thought to have played a role in the earliest domestication of some crops and has led to agricultural development (Pelzer, 1978). Over generations, shifting cultivators observed the ecology of the food species they originally collected and learned to manage and ultimately to cultivate the edible species (Stanton, 1969).

Some studies related to shifting cultivation as well as other farming systems have been undertaken in Serampas and the surrounding areas. Werner (2001) found that people around Kerinci Seblat Nasional Park (KSNP) have formed a detailed knowledge of their environment, particularly in association with local plants and soils. Dendi *et al.* (2005) traced the evolution of shifting cultivation in West Sumatra. They argue that the changes in shifting cultivation in the region are greatly influenced by the emerging market of some agricultural products as well as institutional incentives. In his study in Riau Central Sumatra, Angelsen (1995) argues that in addition to change in the markets; land scarcity as well as land property rights and government claims on local lands have significantly contributed to transforming the traditional practice of shifting cultivation into an expansive rubber cultivation system. Darmanto (2006) investigated a variant of shifting agriculture in Mentawai, an island in the west coast of Sumatra. Instead of slash and burn agriculture, people on that island practice slash and mulch, mainly to produce some tuber crops. Burgers (2004) worked with people in the buffer zone of the KSNP showed that local livelihoods have been shifted from a subsistence-based agriculture into an integrated food crop and cash crop agriculture. Market integration and interactions with broader social, economic and political networks have significantly influenced the transition in local livelihoods.

No research to date has been on the practice of shifting agriculture of Serampas. However, given that Serampas is an enclave within a national park, it is especially important to understand the dynamics of Serampas shifting cultivation as well as its implications for conservation of KSNP resources. By understanding the needs, the knowledge, the traditions and the successes and/or failure of the strategies of traditional farmers, scientists and policy makers can develop alternative resource management plans that can be consistent with the conservation of biodiversity. This chapter describes land use and land tenure practices of Serampas, with a specific focus on the traditional knowledge and traditional management practices associated with Serampas shifting cultivation. Specifically it addresses the following questions:

(1) How do Serampas classify land use and how have Serampas landuse patterns changed over time?

(2) What land tenure arrangements do Serampas have and how have these changed over time?

(3) How is shifting cultivation practiced today and what kind of traditional knowledge is associated with the practice?

In the following chapter, I describe the newest adaptation of Serampas agroforestry, the cinnamon agroforest, and assess some of its ecological impacts.

7.2. Methods

Research on shifting cultivation was undertaken with the community of *Serampas,* an indigenous group who inhabit a northeastern area of Jangkat Sub District, Merangin, Jambi, Indonesia. Local knowledge and practices about shifting cultivation as well as plant uses were collected mainly from people in the village of Tanjung Kasri and Renah Kemumu. Additional information was also gathered from other Serampas' villages including Renah Alai, Rantau Kermas and Lubuk Mentilin. The overall fieldwork was carried out during the period of July 2005 to March 2006.

In-depth interviews using open-ended questionnaire (Appendix D) were conducted with 'local experts'. They were customary leaders, shamans, midwifes, farmers, park manager, local government officers and anyone who has specialized knowledge about Serampas socio-cultural context. The snow ball method was applied to select the respondents (Bernard, 2002), starting with the *kepala desa* (village leader). The in-depth interviews were performed with 51 respondents who consisted of 15 respondents from Tanjung Kasri, 21 respondents from Renah Kemumu and the other 15 people were key respondents outside both villages. Multiple interviews with other key respondents, at least two respondents, were carried out to cross-check and confirm the collected information. Some of the in-depth interviews were a back and forth process; meaning that interview with a respondent was held more than once in order to gain further clarification and/or additional information.

To verify information collected from the above in-depth interview, I undertook a structured interview with a questionnaire (Appendix E) to explore local knowledge, practices, values and beliefs associated with shifting cultivation and agroforestry. I randomly selected 29 households out of total population of households in both Tanjung Kasri and Renah Kemumu. This number represented 18-20% of the total umber of households in both villages. Respondents interviewed were husbands or wives from the selected households. They consisted of 13 people from Tanjung Kasri (7 men and 6 women) and 16 people from Renah Kemumu (7 men and 9 women). Although I intended to interview just a husband or wife from a particular household, in some cases I could not avoid additional responses (intervention) from one's couple.

I also carried out participant observation with the people of Serampas in their private homes, *umo, sawah* and local cultural events, such as *selamatan ruso, negak rumah* and *kenduri psko*. Respondent participation for this method as well as for the other methods employed in this research were recruited on voluntarily basis with informed consent (Appendix B and C).

The plants elicited from the above methods were collected from each village. Vouchers were sent and identified by plant taxonomists at the Herbarium Bogoriense, Bogor Indonesia. The vouchers are stored in the Biology Laboratory, the University of Jambi. Taxonomic grouping and scientific naming of the voucher was consulted with Index Kewensis under the International Plant Name Index available online at www.ipni.org/.

7.3. Results

7.3.1. Land Uses

Serampas inhabit undulating terrains which are part of Bukit Barisan, a continued mountainous chain that stretches along the western coast of Sumatra. Land cover in this area consists of three main land use categories: forest, *umo* (shifting cultivation) and *ladang kulit* (cinnamon agroforest). Although *sawah* (wet land rice farm) is of economic importance in some villages, it contributes little in terms of cover to the local landscape.

Most of Serampas' lands are covered by forests, both KSNP forests and community forests. Serampas recognize three different types of forests: primary forest, customary forest and secondary forest. I describe ecological characteristics of the forest more specifically in Chapter 9. *Rimbo gano* is a local term that commonly used to refer to primary forests. Some very old secondary forests, usually more than 30 years old, are difficult to distinguish from primary forest. So they also fit within the category. Villagers employ some species that commonly grow in the *rimbo gano* to recognize this type of forest such as k*iro (Ficus sp.), surian rimbo* (*Toona sureni* [Blume] Merr.), *kelat* (*Helicia rostrata* Foreman), *bawang* (*Aporusa lucida* [Miq.] Airy Shaw), *nulang* (*Glochidion obscurum* Bl.) and *lalan nasi* (*Zingiber sp.*).

In addition to the *rimbo gano*, Serampas recognize *ulu ayi*, customary forests mainly devoted to protect watershed areas. Most steep forested lands prone to landslide have also been declared as *ulu ayi*. The term of *hutan adat* (customary forest) has become widely known to refer to the *ulu ayi*, especially after a KSNP's initiative to promote forest zoning in Serampas. The terms *ulu ayi* and *hutan adat* are used interchangeably to refer to the same forest type.

In terms of secondary forest, Serampas categorize the forest into *sangkan* and *rapohen. Sangkan* is a piece of cleared land originated from primary forest (*rimbo gano*) that has been cleared, but the owner fallows the land and lets it regrow into secondary forest, without ever planting a single crop on the land. In many cases, villagers unintentionally develop the *sangkan*. A lack of manpower and/or the engagement in other more profitable opportunities are common reasons for a villager to leave a piece of cleared *rimbo gano* (primary forest) that ultimately grows into a *sangkan*. Villagers indicate that *sangkan* is mostly dominated fast growing tree species, such as *mendarung* (*Trema orientalis* [L.] Bl.), *tutup* (*Macaranga tanarius* Muell. Arg.) and *kulit angin (Mallotus paniculatus* Mull. Arg.). Some *rimbo ganos's* species also frequently occur in *sangkan* such as *terap (Artocarpus elasticus* Reinw.) and *lalan nasi* (*Zingiber* sp.).

Rapohen is a fallowed land of shifting agriculture that turns into a secondary forest. Serampas further divided the *rapohen* into *sesap jerami* (shrub), *blukar mudo* (young secondary forest) and *blukar tuo* (old secondary forest). *Sesap jerami* is a fallowed land up to 4 years old; it is dominated by some fast growing shrubs. *Blukar mudo* is fallowed land between 4 and 10 years old and *blukar tuo,* is fallowed land of more than 10 years old. Some *blukar tuos* grow into very old secondary forests (more than forty years old), apparently almost as same as the *rimbo gano*. The presence of some cultivated plants such as durian in *blukar tuo* conspicuously distinguish the *blukar tuo* from the *rimbo gano*. Villagers identify the *rapohen* by the presence of some pioneer species including *molesaten (Villebrunea rubescens* Bl.), *semloen (Homalanthus giganteus* Zoll. & Mor.) and *kelu* (*Etlingera elatior* [Jack] R. M. Sm.) (see Table 7.1). In addition to the wild plants, some domesticated plants are commonly found on this land including *durian* (*Durio zibethinus* Murr.), *petai (Parkia speciosa* Haask.) and *kepayang* (*Pangium edule* Reinw.).

Table 7.1. Some Plant Species that Commonly Occur in *Rimbo Gano*, *Sangkan* and *Rapohen*

Rimbo Gano **(old-growth forest)**	***Sangkan*** **(never cultivated secondary forest)**	***Rapohen*** **(secondary forest)**
Kiro (*Ficus* sp., Moraceae)	*Narung* (*Trema orientalis* (L.) Bl., Ulmaceae)	*Molesaten* (*Villebrunea rubescens* Bl., Urticaceae)
Surian rimbo (*Toona sureni* [Blume] Merr., Meliaceae)	*Tutup* (*Macaranga tanarius* Muell. Arg., Euphorbiaceae)	*Semloen* (*Homalanthus giganteus* Zoll. & Mor., Euphorbiaceae)
Kelat (*Helicia rostrata* D. B. Foreman, Proteaceae)	*Kulit angin* (*Mallotus paniculatus* Mull. Arg., Euphorbiaceae)	*Mentalet'en* (*Acalypha caturus* Blume, Euphorbiaceae)
Bawang (*Aporusa lucida* [Miq.] Airy Shaw, Euphorbiaceae)	*Terap* (*Artocarpus elasticus*, Reinw., Moraceae)	*Puar* (*Alpinia* sp, Zingiberaceae)
Nulang (*Glochidion obscurum* Blume, Euphorbiaceae)	*Lalan nasi* (*Zingiber* sp.), Zingiberaceae	*Kelu* (*Etlingera elatior* [Jack] R. M. Sm., Zingiberaceae)
Terap (*Artocarpus elasticus* Reinw., Moraceae)		*Lolo* (*Hornstedtia* spp.), Zingiberaceae
Lalan nasi (*Zingiber* sp.), Zingiberaceae		*Durian* (*Durio zibethinus* Murr., Bombacaceae)
Manau (*Calamus mannan* Miq., Arecaceae)		*Petai* (*Parkia speciosa* Haask., Fabaceae)
		Payang (*Pangium edule* Reinw., Flacourtiaceae)

Besides *rapohen*, another widespread land use in Serampas is *umo*. The term *umo* refers to a rice-base farming system on either irrigated lands or uplands. In some villages in which inhabitants' livelihoods depend highly on shifting cultivation, *umo* mostly refers to upland rice field (farming). In contrast in some villages where local livelihoods are dominated by irrigated rice farming, the term *umo* is also commonly used to refer to both wetland and upland rice fields. In these villages, people also use the term *sawah* interchangeably with the *umo* to refer to the wetland rice field. For this dissertation I use the term *umo* exclusively to refer to the upland rice farmland, whereas the term *sawah* is exclusively used to refer to the irrigated farming lands.

Since the incorporation of cinnamon into shifting cultivation in the beginning of 1970s (Chapter 8), the sites of swidden agriculture have widely spread away from *dusun* (local settlements) whereas the fallowed areas close to the settlement have gradually shifted into mature cinnamon gardens. Although the price of cinnamon agroforesty has been drastically decreased in the last decade, the total planted area of this commodity still indicates an increment. Cinnamon dominates most of cultivated uplands throughout Serampas' villages.

In addition to the *umo*, some people of Serampas also practice rice farming on *sawah*. In the village of Tanjung Kasri and Lubuk Mentilin *sawah* is not dominant; it just contributes about 10% of local rice production. Meanwhile, the village of Rantau Kermas is in a process of following Renah Alai, the most modernized of Serampas villages, to grow more horticultural cash crops with an expense of leaving their rice farming. They abandoned the existing *sawah* and engage in growing some vegetable cash crops. In contrast to the above villages, Renah Kemumu has the most extensive *sawah* and is the main rice basket of Serampas. Instead to shifting cultivation, 88% of respondents in this village confirmed that they grow rice in *sawah*. In general the area of *sawah* in Serampas and the surrounding areas has tended to decrease over time, *umo* has remained relative stable meanwhile, the horticultural crops have increased (Fig. 7.1).

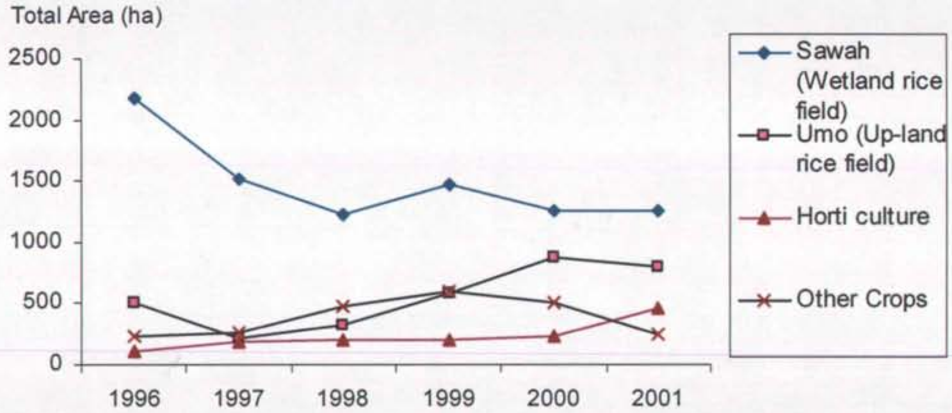


Fig. 7.1. Total Farming Area by Commodity in Jangkat Sub District*) (Statistics Office of Merangin, 2001)

*) Horticultural crops include potato, chili, cabbage, red kidney bean, snake bean, peanut and mungbean. Other crops include corn, soy, cassava and sweet potato.

Cinnamon is still an important commodity for Serampas and the surrounding areas; unfortunately, the progress of the crop was not recorded in the local statistical office. The total area of cinnamon most probably is included under the category of *umo* (shifting cultivation) since the cinnamon frequently overlaps with the *umo* (I will discuss this further in Chapter 8). Although the local statistical data may not be very accurate, it still reveals the trends of growing horticultural crops and cinnamon in the Jangkat region. In the same period, the acreage of *sawah* and other crops (sweet potato, corn, cassava and soybean) decreased. Taking into account that rice and other crops are grown mainly to meet subsistence needs, the Fig 7.1 clearly indicates a gradual shift of the farming system in Jangkat, from subsistence system towards a more cash oriented farming system.

7.3.2. Land Tenure

The above Serampas' land use categories are associated with different arrangements of land entitlement. In Serampas, most of the lands are controlled by adat and regarded as a common property, except for *sawah*; it has been treated as a private property. Adat used to manage most of Serampas' lands to assure that everybody acquires enough land for farming as well as for housing. People have a right to use the lands; however, they are not allowed to privately own and/or sell the land. Every abandoned land, including fallowed lands of shifting cultivation (*rapohen*), automatically becomes the common property of the local people. Outsiders are still eligible to use and settle on the Serampas lands; however, they have to undertake *ngisi adat*, a cultural ritual commonly performed to bless and to culturally register a new inhabitant.

Adat law traditionally prohibited villagers from growing any tree cash crops on the uplands, especially in villages that relied very much on shifting cultivation such as *Tanjung Kasri*. This traditional rule allowed fallowed lands of a shifting cultivation to re-grow into secondary forest and to recover their fertility, benefiting the subsequent cycle of shifting cultivation. According to local elders, a piece of shifting cultivation land needs at least four years of fallowing in order to enable another cycle of shifting cultivation. However, in practice most villagers fallowed the lands at least for ten years before re-cultivating the lands.

The process of securing land to farm is initiated as soon as a family has been established. During the wedding ceremony, right after a customary inauguration of a new couple, local elders and adat executives usually perform a ritual of *ajum arah*, advising the new couple on various aspects associated with initiating marriage-lives. In that ritual, elders share their knowledge and guide the new couple to any pieces of vacant land, mostly secondary forests, that might be suitable for shifting cultivation and fit with the new couple's desire. The ritual also encourages a new couple to start the planning of establishing a new house separate from their parents. The land obtained through *ajum aruh* is also regarded as common property.

Serampas land ownership has gradually shifted from largely common property into more "private property", mainly since the development of the widespread practice of incorporating cinnamon into local shifting cultivation (Chapter 8). The presence of cinnamon trees on a piece of fallowed land has become a conspicuous marker of land ownership. As a consequence, the ownership of a cinnamon agroforest patch becomes transferable from person to person, a practice that was not recognized by earlier generations of Serampas. For example, a poor household that has urgently needs cash for basic needs or for child school fees may "sell" their cinnamon agroforest to local capitalists (the change of land entitlement has also created few local land capitalists). Instead of using the term *menjual* (selling), villagers recognize such transaction as *ganti rugi* (compensation fees for land clearing and cinnamon planting).

In contrast to the above shifting cultivation land, *sawah* has been considered private poverty since it was developed by earlier settlers. The property is subject to be passed down to one's descendants. Serampas inheritance system perceives the *sawah* as well as a house as *harta berat* ("heavy possession"). The *harta berat* is subject to be passed down exclusively to one's daughters only, as opposed to both sons and daughters. A son will only inherit *harta ringan* ("light possession"); it includes any crops growing on agroforest and *umo* as well as tools for farming and other purposes.

Most of the existing *sawah* were developed and owned by the earliest settlers of Serampas. The *sawah* has been passed down and is now the private property of their heirs. The total area of *sawah* has remained relatively stable while the population of Serampas keeps growing over time. As a consequence, the *sawah* is no longer enough to feed the entire population of Serampas. Rather than divide the *sawah* into smaller pieces of land, heirs of the *sawah* keep intact the land. Serampas have developed (adopted) *ganti gilir* (a rotational system) that regulates a right to cultivate a piece of *sawah* among its inheritors. Each of them has access to cultivate the land, mostly once in every two or three years, depending on the number of inheritor of the land. Those who do not take a turn in cultivating the *sawah* usually practice a shifting cultivation.

Taking into account that most area of Serampas is within the territory of KSNP, ownership of the land is regulated by a number of laws associated with the national park. In the case of Tanjung Kasri and Renah Kemumu, the entire area of these two villages is within the boundary of KSNP. Thus by law, every piece of land in those two villages is owned and under control of the Ministry of Forestry, the Government of Indonesia. There is a growing conflict about land ownership in this area since KSNP is quite recently established, whereas the Serampas have occupied the region for centuries. I will address more about people and park interaction in Chapter 11.

7.3.3. Shifting Cultivation

Shifting cultivation is still widely practiced by people of Serampas, mainly in the villages of Tanjung Kasri and Lubuk Mentilin. In these villages, rice paddy fields are very limited and mostly owned by the local elites. Therefore people in these villages mostly rely on shifting cultivation to secure their food needs. Villagers initiate shifting cultivation mainly by clearing *rapohen* and occasionally *rimbo gano*. Most respondents said that they prefer to practice shifting agriculture on *rapohen* than on rimbo gano. Some of them occupy inherited fallowed lands passed down by their parents, including parent in laws. For this purpose, villagers employ some plant species indicators to easily recognize the different between *rapohen* and *rimbo gano* (Table 7.1).

Throughout Serampas, *rapohen* is less available, mainly since the incorporation of cinnamon into local practice of shifting cultivation (Chapter 8). Most of *rapohen* close by villages has been converted into cinnamon agroforests as an outcome of a gradual shift of land ownership from adat common property toward more private ownership. Thus, rapohen for shifting cultivation are getting scarcer and are located further from the villages. To some extent, a villager has to compete with the others in order to obtain an arable piece of land for shifting cultivation.

Villagers usually clear *rapohen* and develop shifting cultivation in a group of three to five of households. The group is commonly based on closed kinship, and works together on a particular block of *rapohen*. In a remote and isolated farming area, working in a group greatly benefits villagers in some aspects including reducing risks of pest and wildlife attack, enabling labor sharing and providing some social network in case of emergencies.

A farmer usually secures a block of forested land that enables them to practice, mostly between two and four phases of shifting cultivation. He partially clears the forest and keeps the other forested lands for the subsequent phases of shifting cultivation.

Given that each phase takes about two years to complete, he may remain working on the particular forest block for about four to eight consecutive years.

Site Selection

To identify a suitable plot for shifting cultivation, some farmers analyze biophysical characteristics of the soil and vegetation. For example, they dig a span of soil to characterize its physical condition. Flat and black soil is envisaged as the most preferred soil for farming, whereas white and stepped lands are always be avoided due to their lower fertility. The presence of some plants such as *jelatang* (*Laportea* spp.) and *dadap duri* (*Erythrina subumbrans* Merr.) indicate a fertile land. Most species of *jelatang* are very remarkable throughout Serampas; they not only indicate soil fertility, but also notorious due to their itchy hairy leaves (see Chapter 5). Villagers also consider closeness to a stream and a settlement in selecting a location for the shifting cultivation.

Occasionally villagers develop shifting cultivation by clearing *blukar mudo* (young secondary forest). In order to recognize the eligibility of such land for farming; they assess the successional stage of the *blukar mudo*. For example, a dominant vegetation of *rumput kinat* (*Paspalum conjugatum* Berg.) indicates that such *blukar mudo* still needs additional fallowing period to be able to cultivate. Based on their experience, being forced to employ such *blukar mudo* for farming will greatly reduce its yield. On fertile soil, a four year fallow period is normally enough to recover lost nutrients; thus it is ready to support the following cycle of shifting cultivation. A dominant vegetation of *rumput bungo* (*Eupatorium inulaefolium* H.B&K.) confirms that such a fallowed land has reached a succession stage suitable for shifting cultivation.

Melambeh

Besides assessing the land's biophysical properties, Serampas perform a tradition of *melambeh* before initiating a shifting cultivation. This tradition is commonly practiced when villagers develop shifting cultivation on *rimbo gano*. *Melambeh* involves establishing a plot of about 10 by 10 m on a particular block of *rimbo gano* that is going to be cleared for shifting cultivation. The villagers clear the plot of any shrubs and seedlings. Villagers usually set the plot of *melambeh* on a point that easily seen by people passing by the forest. It is widely and customarily recognized that the presence of the *melambeh* (a cleared plot) in *rimbo gano* implies that a parcel of forested land around the *melambeh* plot has been claimed and is going to be cleared and cultivated by someone in a fairly short time, usually less than three months. *Melambeh* may also be interpreted as a temporary customary land entitlement of a parcel of forested land; thus excluding other people from occupying the land. If the forested land around the *melambeh* is not cleared within three months, the temporary customary entitlement of *melambeh* land is no longer valid. The effort to secure the forested land is lost. The forested land then automatically returns to its status as common property; all villagers are eligible to occupy and cultivate the former *melambeh* land.

According to Serampas' worldview, *melambeh* is interpreted as informing the universe that a farmer has a strong intention to inhabit and cultivate a parcel of a forested land. By performing *melambeh*, a farmer expects to gain signs of agreement as well as objections to his intention. People usually allow a period of three months to get a response from the universe. They frequently bring home a handful of soil from *melambeh* plot and place it underneath their sleeping pillow in order to increase their sensitivity to communicating with spirits. During the period, a bad dream for example, implies the presence of resistance of bad spirits that occupy the land. A farmer who gets undefined sicknesses also confirms the presence of similar resistances. Those kinds of sicknesses commonly inhabit people who try to occupy a land within or close by areas considered as sacred sites. The absence of negative hints after performing *melambeh* such as bad dream or sickness confirms that the universe allows a farmer to clear and occupy the proposed forested land.

In case there is resistance from bad spirits dealing with a farmer's intention to occupy a forested land, there are at least two common solutions to address this problem. First, the farmer can leave the land and seek another piece of forested land. Second, they can address the bad spirit by having an *orang tuo* to perform *ngisi tanah,* a ritual to chase the bad spirits away from the land.

Land Preparation and Seeds Sowing

After securing land for shifting cultivation, a villager starts to carry out a series of work to establish an *umo.* In general the process consists of the following activities, which are described in more detail below: (i) *merancah* or *nebas* (cutting bushes), (ii) *nebang* (cutting big trees), (iii) *manduk* or *melateh* (cutting trunks and twigs), (iv) *nisik* (weeding), (v) *nugal* or *najak* (sowing rice/seeds) and (vi) *nuai* (harvesting). A small household, comprised of a wife and husband, may spend an entire month to completely develop an *umo* of about one hectare. During this intensive working period, villagers stay in the *pondok* hut during the weekdays and return to their village only during the weekend (see Chapter 3).

(i) *Merancah* or *nebas* involves slashing thicket shrubs and understorey using a machete. In addition to the machete, people use *pengait*, a hook, commonly made from a twig of *tiruk* (*Palaqium hexandrum* Engl., Euphorbiaceae) and *merenai* (*Antidesma cuspidatum* Muell. Arg., Euphorbiaceae), to facilitate cutting the shrubs with the machete. *Merancah* is normally performed during the end of dry season, to facilitate drying out the shrubs for burning.

(ii) *Nebang* involves cutting big trees selectively. Villagers keep some locally important useful trees, mainly timber and fruit producing species, such as *durian* (*D. zibethinus* Murr.), *petai* (*P. speciosa Haask.*), *surian tanam* (*Toona sinensis* M.Roem and *kepayang (Pangium edule* Reinw.). Before the introduction of the chainsaw about ten years ago, people merely used *beliung* (axe) for cutting the big trees. Today the introduced chainsaw has greatly reduced time needs for preparing the land.

(iii) *Manduk* or *melateh* involves cutting trunks and twigs and putting them on particular sites, allowing the sun light to reach them and gradually dry out the debris. Villagers then burn the dried debris. In case there is still high rain within this period, villagers just put the debris on a side of their farm (*dilungguh*). Dealing with big trees (dbh 50 cm up), villagers just keep the felled trees in their existing site and let them degrade naturally. *Manduk* is the most intensive and exhausted work in establishing an *umo*.

(iv) *Nisik* is the last work of land preparation before planting a crop. Nisik is weeding and clearing the land from grasses and root-mats from previous vegetation.

(v) *Nugal/najak* involves sowing the seeds. Villagers dig shallow holes using a wooden stick then place some seeds in the holes. The *nugal* is usually performed in *sapar*; the second Islamic month. *Nugal* is quite labor intensive, a villager usually invites a number of people, mainly his neighbors/relatives to help doing the *nugal*. The host farmer provides meals, normally breakfast and lunch, for all villagers who come to help.

Nugal is commonly initiated by a ritual of *diturun* performed by an *orang tuo*. This *orang tuo* articulates a mantra while digging the first seven holes in a circle, using a wooden stick of *seri* (*Ficus tinctoria* G. Forst. f.,Mor aceae) or *sampadi* (*Saurauja nudiflora* DC., Ernstroemiaceae). These two species have the property of having abundant and dense leaves. Employing a wooden stick from such species implies that villagers expect that the planted seeds (rice) will grow fast and have abundant and dense leaves, following the property of those digging stick species.

After completing the ritual, the host farmer as well as villagers who come to help follow the shaman, and sowing the seeds and complete the work for the entire farming area. A household usually plants between 10 and 15 gantang of seeds (15 to 25 kg). Since modern units of area measurement are not yet common in Serampas, people usually estimate the size of shifting cultivation based on the average amount of seeds sowed.

According to local beliefs, the ritual of *diturun* is very crucial; it prevents "mountain people" and other bad spirits from taking apart in the procession of *nugal*. Failing to perform the ritual may enable the mountain people to invisibly eat meals being served for the helpers. In this case, Serampas believe that the *orang gunung* join the meal time invisibly. As a consequence, the helpers do not get enough food and feel powerless to continue working after the lunch.

After completing the *nugal*, the *umo* does not require intensive labor - a farmer just takes care of the growing rice. In this period, he mostly spends times developing or fixing his *pondok* (a staged bamboo hut) and *bilik* (a traditional rice barn made from bamboo) located around the *umo*. He may also engage in other activities such as working on his ladang (cinnamon and/or coffee agroforest).

Rice Harvesting

Another period that requires intensive labor is before and during the rice harvest. It includes the job of *menghalau burung*, forcing out sparrows, about two months before rice harvesting. In this period, villagers spend most of their time in their rice fields, either in *umo* or in *sawah* to protect their rice from severe invasion of the local rice-eating birds. Villagers employ some techniques to chase the birds. For example, they create noisy sounds employing bamboo, used-cane and other stuff they installed in scattered points of the rice field and link to the bamboo hut. For this purpose, people commonly use small rattans, especially *rotan seni* (*Calamus* sp). From a *pondok*, villagers wave the rattan up and down to produce the noisy sounds any time they recognize the birds approaching the rice.

To harvest the rice villagers use *tuai*, a traditional knife to cut the rice stalks one by one. This rice harvesting is very labor intensive, villagers allocate all labor resources they have, even asking some relatives and/or neighbors to help complete the harvesting. In fact, employing modern harvesting tools such as a machete and a sickle is much more efficient than using the *tuai*; however, using those tools is culturally unacceptable; it is considered taboo. The Serampas local worldview ascribes that all varieties of rice being cultivated in Serampas are recognized as *padi jantan* (male rice). Improperly treating the *padi jantan* may chase the spirit of the rice away, returning to its site of origin and never coming back to Serampas.

Rice harvesting is initiated by a ritual of *jemput padi* (see also the section of *uras* plant in Chapter 5). The harvested rice including its stalk then directly loaded into a *bilik*, a traditional bamboo rice barn, without pre-drying. Villagers always put the newest rice on top and eat the new one first ("first in last out"); because the new rice is much tastier than the old one. As a result of this practice, a *bilik* may consist of many layers of rice from different harvesting years, the oldest in the bottom and the newest on top. It is common that a large number of rice from some earlier harvesting years is still being stored in the same *bilik* because villagers produced a lot more rice than they consume. Moreover, although it changes over time, selling rice, to some extent, is still considered *pantangan* (taboo). Interestingly, even some local elders still keep rice that was harvested more than fifty years ago. The very old rice is still edible although less tasty and yellowed. Villagers usually utilize this kind of rice for feeding a large number of people in some traditional gatherings such as *kenduri psko* (Chapter 4) and wedding parties.

Villagers perform *umo* in a particular site for two years before moving to another site to initiate a new *umo*. Traditionally they abandon the old site for a number of years, thus allowing natural vegetation restoration to take place. They might or might not comeback to exactly the same site of the abandoned *umo*. For each *gantang* of sowed seeds, people reap 10 kiding of rice (250 kg). With average sowed seed of 10 *gantang*, farmers harvest 100 kiding of un-husked rice (2500 kg). The yield will be lower in cases of severe pest and diseases attacks.

7.4. Discussion

7.4.1. Land Uses

The early Serampas inhabited some hamlets on top hill areas stretched throughout the region. The top hills also serve as strategic regions for defending from enemies (see also Neidel, 2005). In those areas, they practiced shifting cultivation by slashing and burning primary or secondary forests to develop *umo*, an upland rice-based farming system. In the following periods, they sought wetlands to establish a more permanent farming system. They developed *sawah,* rice paddy field, on some fertile valleys. However, the valleys were too small to sufficiently feed the population of Serampas. As a consequence, in addition to the *sawah*, they keep practicing shifting cultivation not only to meet their needs of rice but also to produce some vegetables, spices and fruits.

Today, *umo*, secondary forest and primary forest are the main landuse categories throughout the Serampas landscape. The rampant growing of cinnamon since the beginning of the 1970s has gradually transformed the Serampas landscape. On the one hand, the practice has added a significant area of cinnamon agroforest fields; on the other hand, the cinnamon has escalated the rate of forest conversion (primary and secondary forest) to establish *umo* which are then ultimately converted to cinnamon agroforest.

As mentioned in Chapter 3, some Serampas villages kept migrating mainly from one site to another site to address some environmental challenges, such as flood, wildlife attack and epidemic diseases. The other reason for the migration was their endeavor to find arable wetland to grow rice. As an example, people of Renah Alai migrated to the current site in 1980 mainly to cultivate some lowland areas close by the current village site. At the same time they kept growing *umo* and cinnamon on uplands.

In the late 1990s, following the improvement of the road access to the capital of Jangkat Sub-district that passes through the village of Renah Alai, some vegetable crops, mainly potato and chili, were introduced to the village. Together with Rantau Kermas, Renah Alai gets greater economic benefit from the road improvement than other Serampas villages. The road significantly facilitates the transporting of perishable cash crops as well as farming input materials especially to Bangko, the closest city.

As people get used to cultivating the cash crops, land cover in these villages has gradually shifted from complex cinnamon-umo-secondary forest to mostly horticultural crops. Moreover, the current cash crop boom appears to seriously threaten the local forests. In fact, the two villages growing cash crops have the least forest cover as compared to the other Serampas villages (Fig. 7.1). The rate of forest conversion in these villages has reached its highest level since the extensive growing of the horticultural cash crops.

It appears that in Serampas, as people are more intensively exposed to the market economy, they tend to leave their traditional farming systems and develop less diverse species farming systems. People of Renah Alai quickly abandon wetland rice fields that used to be the main goal of their migrations, and prefer to engage in cultivating cash crops. Dendi *et al.* (2005) argue that the change in farming systems highly corresponds with the promising market and institutional incentives. Moreover, Abdoellah *et al.* (2006) suggest that commercialization of the agricultural sector drives farming systems towards less biodiversity, higher risks, higher external inputs, higher instability and lower social equitability. How long the people will keep practicing the new farming system? People of Renah Alai as well as in other Serampas villages are in the process of experiencing a new farming system and in discerning resource management systems that will best fit with their local socio-cultural economic setting over a long term.

7.4.2. Land Tenure

Traditionally, most of the lands in Serampas were controlled by adat and regarded as a common property. Adat has administered the land for generations. The role of adat in controlling access to land is not unique to Serampas; it is shared by some other cultures throughout Indonesia (see Chapter 4). For example, Adat in Western Sumatra also governs the right of access and to use land in West Sumatra (Dendi *et al.*, 2005). However, there is great variation among adat arrangements dealing with land tenure in the region. Ostrom (1985) argues that small groups of people who have depended on moderately scarce resources over a long period of times commonly have developed institutional system to manage the resource as a common property.

There was some variation in the land tenure imposed throughout Serampas villages. The land tenure was (mostly) adapted to the different natural conditions that exist in each village. For example in the village of Tanjung Kasri, due to the lack of lowland paddy fields, people in this village rely on shifting agriculture to fulfill their needs for rice. In order to assure that every household acquires enough land to practice the agriculture on sustainable bases, the local customary law banned people from growing tree cash crops in their *umo* (see Chapter 4). Similar to the Serampas ancient rule, people in customary council in Nagari Lubug Gadang and Silayang in West Sumatra re-introduced regulation of the prohibition of planting trees in some areas dedicated for shifting agriculture (Dendi *et al.*, 2005). The latter regulation follows a general trend of decentralization taking place in the region by reviving traditional governance system (e.g., von Benda-Beckman and von Benda-Beckman, 2001).

The afore-mentioned process of obtaining land entitlement has been internalized into local cultural traditions such as in the ritual of *ajum arah*. This ritual is also a common tradition throughout Serampas as well as in the surrounding areas. People of *Lempur* in an adjacent district to Serampas used to practice a similar tradition (Watson, 1992). However there, the community regarded any land granted from the ritual as private property as opposed to common property. Moreover, due to the lack of forested land, the Lempur have no longer practiced tradition of *ajum arah* since the late thirties.

The above-mentioned incorporation of cinnamon into shifting agriculture not only changes the Serampas landscape, but also gradually transforms land tenure in the region. Land ownership that used to be dominated by common property land is undergoing transition to "more private land ownership". The term private ownership may be misleading since by law the land is owned by the government. People use the existence of cinnamon stands as a claim to land entitlement. Belcher (2005) suggests that the practice is a common strategy in forest garden systems to bestow long-term use right on particular land.

In contrast to shifting cultivation lands that are recognized as common property, *sawah* has been considered as private poverty since it was first developed by early settlers. For the *sawah*, Serampas also share a common inheritance system with the people of Kerinci (see also Watson 1992 and Neidel 2006). *Sawah* as well as a house which is recognized as *harta berat* ("heavy possession") is subject to be passed down limited to one's daughters only, as opposed to both sons and daughters. Alternatively, a son will only inherit *harta ringan* ("light possession") that includes any growing crops on agroforest and *umo* as well as tools for farming and for other purposes.

Most of the current cultivators of the *sawah* inherit the land from their earlier generations. The *Ganti gilir* system that provides temporary access to land, appears to offer a fair distribution of a piece of *sawah* among its inheritors. The system also keeps the land from ownership fragmentation and therefore to eases management and exploitation of the land. Burgers (2005) argues that such a kinship traditional resource management system is an effective way to manage the *sawah* on a sustainable basis.

People of Serampas have inhabited and controlled their land over generations. However, since 1992 Serampas' entitlement over their land has started to be challenged. The central government urged the development of a people-free park and planned to move Serampas from KSNP territory (see e.g., Neidel 2006). Taking into account a number of government agrarian and park-related laws (e.g., UU No.5/1967, UU No.41/1999); the government accused the people of Serampas of encroaching the forest. After a long and complicated conflict and debate, finally, Serampas was incorporated as a part of KSNP. However, still there is no clear plans or arrangements made for dealing with Serampas' land and their future. Today people of Serampas keep paying tax for their lands (*Pajak Bumi dan Banguan*) on an annual basis; however, this does not necessarily mean that they have secured their lands. In short, Serampas today are in a state of ambiguity, not only in terms of perpetuating their cultural traditions (Chapter 4), but more importantly, in terms of ensuring security and tenure over their land.

7.4.3. Shifting Cultivation

Although Serampas have practiced *umo* (shifting cultivation) for centuries, the future of the *umo* is now in question since the location of Serampas is within the territory of a national park. The questioning around uncertain future of shifting cultivation is encountered not only by the Serampas but also by a number of indigenous groups worldwide, especially in the tropics. In a broader view, there is a growing debate about the ecological implications of shifting cultivation. Some scholars argue that shifting cultivators are the main driving factor of deforestation (e.g., Myers 1993). Moreover, Varma (2003) argues that the farming system is extremely inefficient from the social point of view, and therefore it should be banned. However, Tacconi and Vayda (2006) argue that Varma's recommendation is faulty thus can not be sustained. Some national governments also accuse the shifting cultivation mostly practiced by indigenous people as the main player in forest destruction (e.g., Dove 1985b, Rambo 1996). People of Serampas are fully conscious about negative impressions of "outsiders", especially the government, with respect to their practice of shifting agriculture.

Other scholars believe that shifting cultivation can be an environmentally sound technology that fits with local natural and social conditions. Colfer and Dudley (1993) observe that the contribution of shifting cultivation to deforestation is insignificant. Moreover, based on their systematic and intensive studies with Dayak Kenyah in Borneo, Macky *et al.* (1986) found no evidence that shifting cultivation practiced by the indigenous people led to any permanent forest destruction. Alcorn (1990) argues that this farming system is a local strategy to manage deforestation. Kleinman *et al.* (1995) confirm that shifting agriculture is ecologically sustainable, although there are some minor derivative effects on the soil. However, the authors maintain that they do not reduce long-term yield and suggest implementing a proper soil management in order to keep soil degradation at minimal level. Indeed, shifting cultivation is a "neo" - paradigm to manage tropical forests (Fox *et al.*, 2000).

Instead of slashing *rimbo gano* (old-growth forest), Serampas make more use *rapohen* (secondary forest) for their shifting cultivation. Some elders argue that *rapohen* has thinner and less root debris than *rimbo gano*, thus saving significant time and effort for preparing the land. Moreover, they argue that soils of *rapohen* are more fertile than that of *rimbo gano*. Based on his research in East Kalimantan, Soedjito (1985) supports the Serampas preference on employing *rapohen* for the shifting cultivation. He reveals that secondary forests are more fertile than primary forests because their soils have a higher concentration for most important soil nutrients.

In contrast to Serampas, people of Long Segar and Tanah Merah in Eastern Borneo prefer to develop shifting cultivation on old-growth forest, rather than secondary forest (Colfer *et al.*, 1997). Some factors support the Bornean preference for old-growth forest including the availability of chainsaws that greatly help forest clearing, less weeding and creating a land claim. The lower rainfall also facilitates a good burn in old-growth forests.

Prior to the introduction of the saw, cutting big timber trees especially those entangled by numerous lianas, was a big deal. Marsden (1966) reported that people usually cut a number of trees halfway through, on the same side. They then cut nearly all the way through a very large tree and directed it to fall on the half cut trees. The falling timber as well as the interconnected liana web would force the half cut trees to fall down. This technique greatly saved labor and time during forest clearing.

Fire is a common tool used in shifting agriculture in many places in Southeast Asia (e.g., Conklin 1957, Dove 1985b, Colfer 1997). However, Serampas do not depend on the use of fire to establish an *umo*. Since Serampas follow the Islamic calendar (lunar cycle based calendar), the period of land preparation for shifting cultivation does not always take place at the same time as the coming of the dry season. Prior to the introduction of Islam in this region, the schedule for sowing was regulated by stars, especially the appearance of *bintang banyak*; pleiades (Marsden, 1966).

Although Serampas as well as other people in Indonesia recognize two different seasons i.e., dry season and rainy season, rainfall in this region is unpredictable. Rain occurs all year round, and even within the period of dry season high rainfall is still common. To deal with the rain, Serampas just collect twigs and debris, put them on particular block of their *umo*, and let them degrade naturally.

Indigenous people of Mentawai in the western coast of Sumatra do not use fire but also employ the process of natural degradation for their shifting agriculture (Darmanto, 2006). In contrast to most swidden agriculture commonly practiced in Sumatra, the Mentawaian mainly cultivate sweet potato, instead of rice. This practice may be a relic of the ancient agricultural practice in the region. Hill (2004) reveals that people in this region mainly grew tubers and sago, with little or no rice, at the time of first western contact.

Having practiced shifting cultivation over long periods, Serampas have developed a practical knowledge system associated with farming. For example, they employ some key species to identify a successional stage of fallowed land. They also use some indicator species to analyze land suitability for their farming. Similar practices are also performed by the indigenous people of Mentawai (Darmanto, 2006). The Dayak in Borneo have a tradition of *meluluri*; they grow a particular rice variety merely to renew stock of the rice seeds thus keeping their viability (Soedjito, 1999).

For Serampas, the practice of shifting agriculture is not only designed to obtain the highest yield of rice. Serampas practice their farming in such a way that attempts to keeps a harmonic relationship with all living and non-living creatures, including the invisible ones. The practice of shifting agriculture holds relevance for Serampas from multiple perspectives or dimensions, including maintaining the well-being of the land, the people and the spirits (Fig. 7.2). The horizontal dimension includes the interaction between a person and the society and between a person and the environment. Serampas seek to maintain good relationships with their neighbors. They attempt to treat properly anyone who helps and is involved in their shifting agriculture. The environment such as the soil and its vegetation determines whether a piece of land is suitable for farming. In terms of environment, Serampas make decisions associated with their shifting agriculture by observing some environmental indicators such as soil characteristics and vegetation (indicator species). They avoid cultivating fragile lands, instead, proscribing such land as customary forest.

Moreover, adat's recognition over shifting cultivation fields as common property allows fallowed lands to re-grow into secondary forests and to recover the fertility. This practice not only assures a sustainable cycle of shifting cultivation over long term, but also holds social implication of promoting equality of land access. Every villager is eligible to occupy and cultivate on a particular area of secondary forests.

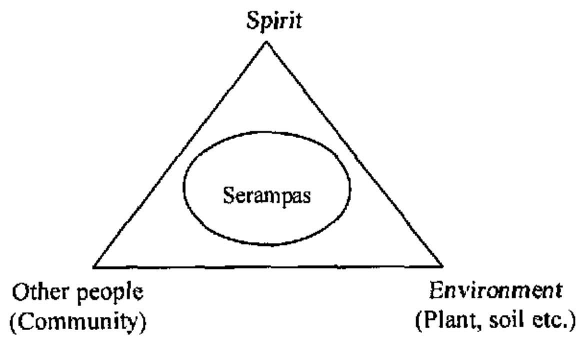


Fig. 7.2. Three Dimensional Perspectives of Serampas Shifting Agriculture

The vertical dimension is associated with Serampas understanding about the creator and the spirits. This dimension is articulated in a number of transcendental rituals that are performed from the early intention of establishing an *umo* until conveying the yield to a rice barn (also see Chapter 3 and Chapter 4). Some other swidden farming cultures also share similar traditions (e.g., Conklin 1957, Dove 1985b, Lahajir 2001, Darmanto 2006). Furthermore, Lahajir argues that swidden people typically never address the physical environment directly, instead they engage in employing symbols, values and norms.

7.5. Summary

Landuse of Serampas is mostly dominated by forested land of secondary forest and primary forest. However, forest cover has decreased over time, especially in some villages that now have good access to transportation. Cinnamon agroforest dominates landuse in areas close to villagers' settlement. In addition to the cinnamon, customary forests have allowed for the maintenance of forested lands around the settlements, especially on some fragile landscapes. The cinnamon planted area is growing and has significantly influence the local landscape.

Traditionally, Serampas perceive local lands, including secondary forest and shifting cultivation fields as common property; whereas rice irrigated lands are recognized as "a private property". However, since most of Serampas land, mainly in the villages of Tanjung Kasri and Renah Kemumu, are within the territory of Kerinci Seblat National Park, by law, any piece of land in the two villages is under control of the park. This is despite the fact that Serampas claimed the land long time before the park was established. There is a persistent conflict about status of the Serampas land. Regardless the legal status of the land, land tenure in this region has gradually shifted from largely common property towards more private property. Slowly but surely, Serampas also have transformed from a subsistence society into a more economic-oriented community.

Having practice shifting cultivation for generations, Serampas have internalized knowledge associated with the shifting cultivation into local socio-cultural practices, values and beliefs. Moreover, adat (local customary system) has institutionalized the knowledge and practices of the shifting cultivation. The customary system appears to promote a sustainable practice of natural resource management and at the same time encourage a more equal access of the resource.

CHAPTER 8

LADANG KULIT: A CINNAMON AGROFOREST

"Bak membolah betung sebolah diijak sebolah gi diangkat tinggi-tinggi"

"As though dividing a bamboo, a piece was stepped on, another piece was lifted highly". The proverb illustrates an unjust leader who treats people differently for example in distributing access to natural resources.

8.1. Introduction

In tracing the history of agroforestry, Chepstow-Lusty and Winfield (2000) state that the Inca Empire in Mexico was practicing agroforestry by 1000 AD. Agroforestry was also widely practiced in Europe before the Middle Ages (King, 1987). Today agroforestry is still practiced by a great number of ethnic groups, especially in tropical countries.

Agroforestry is defined as a complex system (ecological and economic) that provides at least one ecological service function (shelter, shade, soil fertility etc.); consists of two or more species, where at least one is woody species; generates multiple outputs; and has cycle more than a year (e.g., Nair, 1993 and Huxley, 1999). Some types of agroforestry actually represent an adaptation to swidden agriculture by incorporating some valuable trees (e.g., Mary and Michon 1987, Gouyon *et al.* 1993, Angelsen 1995 and Marjokorpi and Ruokolainen 2003).

Some studies related to agroforestry have been undertaken in Kerinci, a neighbor district to Serampas. Aumeeruddy and Sansonnens (1994) observed that the evolving complex agroforestry system in the region is a local strategy to assure the sustainable supply of forest/agroforest products as a response to the limited land resources that are becoming insufficient and scarcer. Murniati *et al.* (2001) observed the effects of different farming systems on people's reliance on national park resources. They concluded that Kerinci households that do both agroforestry and wetland rice farming system are much less dependent on park resources than households who just practice either agroforestry or wetland rice farming.

In other parts of Sumatra, some researchers have revealed the important role that agroforestry can play in conserving biodiversity. Beukema and van Noordwijk (2004) observe that rubber agroforests support more forest pteridophyte species than do rubber plantations. The rubber agroforests can contribute to conserving a number of primary forest species, especially in areas where primary forests have vanished. García-Fernández *et al.* (2003) conclude that traditional benzoin agroforests in North Sumatra represent a low intensity of forest disturbance and maintain vegetation structure and species diversity over a long time. Although traditional agroforestry systems are not equivalent to primary forest, they can be an appropriate compromise between conservation and sustainable use of a biodiversity resource (Thiollay, 1995). Moreover, those systems can also serve as a shelter between source and sink populations of some species.

Most of the above-mentioned studies were undertaken in agroforest patches close by or on the edge of forest borders. However, few studies have explored the ecological properties of agroforestry that takes places within the enclave of tropical forests. In addition, no studies to date have been undertaken on Serampas agroforestry. Understanding the Serampas cinnamon agroforest is essential in order to assess ecological consequences of this farming system within the KSNP and to provide policy alternatives that properly address not only the needs of local people, but also the objective of nature conservation.

The aims of this chapter are to describe the practice of cinnamon agroforestry as a new adaptation to Serampas shifting cultivation practices, and assess some of its ecological implications. Specifically this chapter addresses:

(1) How was the cinnamon agroforest developed in Serampas?

(2) What kinds of cinnamon agroforestry systems exist in Serampas?

(3) What are some of the ecological implications of cinnamon agroforestry? Specifically,

(3.1) What is the vegetation structure, species diversity and species richness of cinnamon agroforests and how do these vary across different villages, specifically between high density versus low density plantings?

(3.2) How does species composition, structure, diversity and richness of the cinnamon agroforest compare to old-growth forests of Serampas?

8.2. Methods

Research about cinnamon agroforest was undertaken with the community of *Serampas*, an indigenous group who inhabit a northeastern area of Jangkat Sub District, Merangin, Jambi, Indonesia. Local knowledge and practices associated with the agroforest as well as plant uses were collected mainly from people in the village of Tanjung Kasri and Renah Kemumu. Additional information was also gathered from other

Serampas' villages including Renah Alai, Rantau Kermas and Lubuk Mentilin. The overall fieldwork was carried out during the period of July 2005 to March 2006.

8.2.1. Ethnographic Studies

In-depth interviews using an open-ended questionnaire (Appendix D) were conducted with 'local experts'. These were customary leaders, shamans, midwifes, farmers, park manager, local government officers and anyone who has specialized knowledge about Serampas socio-cultural context. The snow ball method was applied to select the respondents (Bernard, 2002), starting with the *kepala desa* (village leader). The in-depth interviews were performed with 51 respondents consisting of 15 respondents from Tanjung Kasri, 21 respondents from Renah Kemumu and the other 15 people outside both villages. Multiple interviews with other key respondents, at least two respondents, were carried out to cross-check and confirm the collected information. Some of the in-depth interviews were a back and forth process; meaning that interview with a respondent was held more than once in order to gain further clarification and/or additional information.

To verify information collected from the above in-depth interview, I undertook a structured interview with a questionnaire (Appendix E) to explore local knowledge, practices, values and beliefs associated with shifting cultivation and agroforestry. I randomly selected 29 households out of total households' population in both Tanjung Kasri and Renah Kemumu. The number represented 18-20% of the population of households in both villages. Respondents interviewed were the husband or wife from the selected households. They consisted of 13 people from Tanjung Kasri (7 men and 6 women) and 16 people from Renah Kemumu (7 men and 9 women). Although I intended to interview just a husband or wife from a particular household, in some cases I could not avoid additional response (intervention) from one's couple.

The associated plants elicited from the above methods were collected from each village. Vouchers were sent and identified by plant taxonomists at the Herbarium Bogoriense, Bogor Indonesia. The vouchers are stored in the Biology Laboratory, the University of Jambi. Taxonomic grouping and scientific naming of the voucher was consulted with Index Kewensis under the International Plant Name Index available online at www.ipni.org/.

8.2.2. Ecological Assessment

In addition to the above ethnographic data, a field ecological assessment was undertaken to evaluate ecological characteristics of local cinnamon agroforests. The assessment included measurement of plant species diversity, richness, structure and cinnamon density. I randomly selected 3 patches of cinnamon agroforest in each of the villages of Tanjung Kasri and Renah Kemumu for further vegetation analysis. The patches are cinnamon agroforests that were developed through upland rice – mixed crop – (coffee) – Cinnamon model. The selected agroforest patches had to meet two criteria: (1) they had to be at least seven years of age (in order to avoid over representation of coffee stands that commonly dominate midstory and understory taxa at the young cinnamon agroforest stage) and (2) they had to cover an area of at least 8000 m^2 (in order to enable the establishment of an intact sample unit and to reduce edge effects). I consulted local experts as well as owners of the agroforest patches to confirm properties of the selected patches.

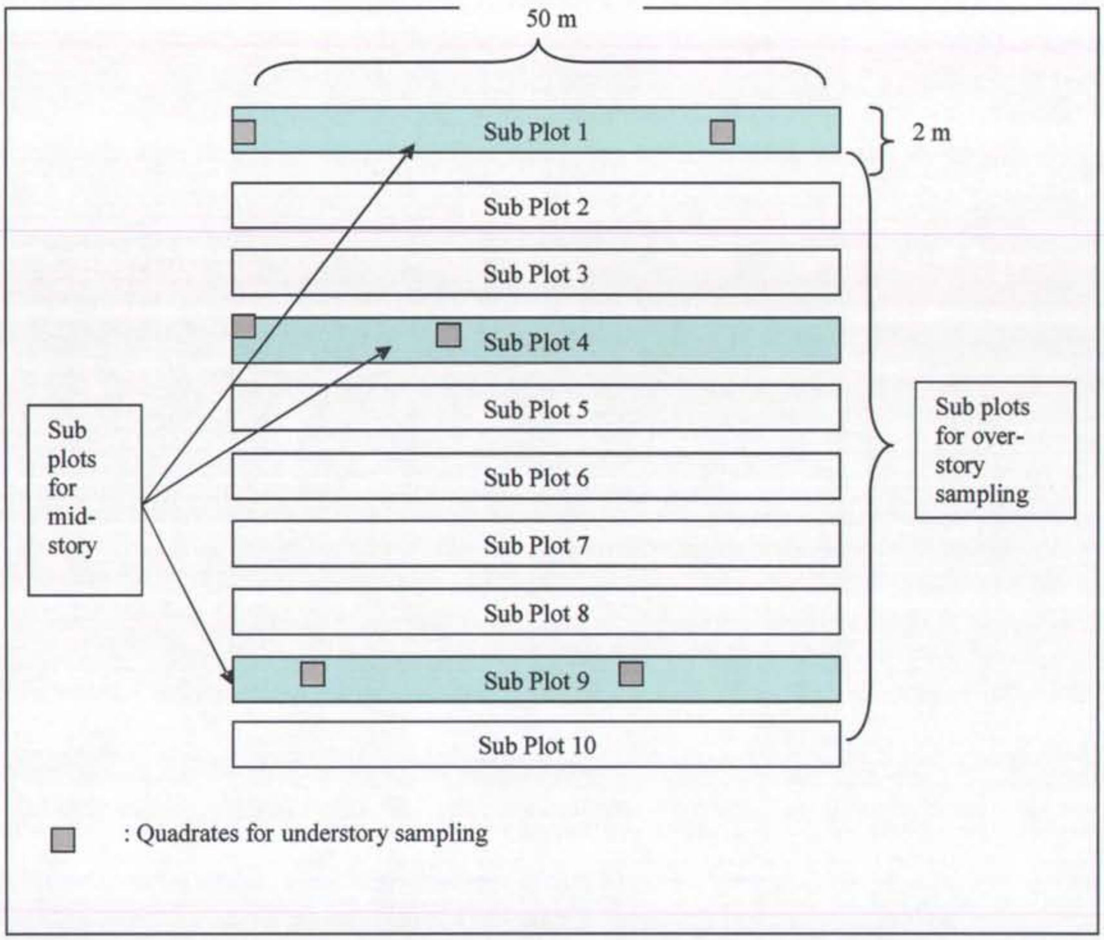


Fig. 8.1. Sampling Frame Outline

I used and modified methods developed by Gentry (1982) and Murali *et al*. (1996) for the vegetation analysis. Three plots of 1000 m^2 were established in each of the above selected forest patches. The 1000 m^2 plots consisted of 10 parallel subplots of 50 x 2 m, thus there were 30 subplots for each forest type in each village. The distance between sub plots was kept at least 10 m to avoid sample resonance (Fig. 8.1).

All plants $\geq$ 10 cm dbh were counted in all of the plots and categorized as overstory. Furthermore, I randomly selected three of the ten subplots in each plot and sampled all midstory individuals (individual plants between $\geq$ 1 cm and < 10 cm dbh). In the same subplot I randomly established two quadrates of 1 x 1 m and sampled all understory plants within the quadrats. For each individual in the plots, I recorded dbh, local name and also collected voucher specimens. This vegetation assessment employed two local ethnobotanists to help identify plant specimens with vernacular names and to provide information of local uses and culturally significance of the specimens. I also consulted other local experts for specimens that were not recognized by the employed ethnobotanists.

The collected quantitative vegetation data were encoded and then processed to compute Shannon plant biodiversity index, richness, similarity, structure and density. I employed estimateS 8.0 to compute the Shannon Biodiversity Index, Chao-Jaccard-Raw Abundance-based similarity index and abundance-base coverage estimator species richness (Colwell 2006). I employed the log-linear model of goodness of fit (Sokal and Rohlf, 1995) to statistically compare agroforest plant community structure between high density and low density cinnamon agroforests. I employed two-way ANOVA (SAS version 9.1) followed by Duncan tests to compare the above mentioned ecological indicators over different villages and plants' habits. Statistical tests of biodiversity indices over different vegetation types was performed by bootstrapping with 1000 sampling with replacement (Efron and Tibshirani, 1993). The adjusted estimator of Shannon index with 95% confidence interval was calculated following Pla (2004).

In addition to the above analyses, I compared some ecological properties of cinnamon agroforest with the similar properties of Serampas forests; especially old-growth forests (see Chapter 9). Moreover, I also developed cross tabulation of some variables, especially for quantitative data, to reveal relationship between them, including any association that might exist between ethnographic data and botanical and/or ecological assessments. I ascertained reliability and validity of the collected ethnographic data by confirming with other data collected from different sources and different methods, as suggested by Handwerker and Borgatii (2000) and McNabb (1990). For example, I confirm the property of a plant taxon with a number of different people and checked the collected data with findings from the botanical inventory.

8.3. Results

8.3.1. History and Development of Ladang Kulit

The history of cinnamon (*Cinnamomum burmanii* [Nees & T. Nees] Bl.) in Serampas dates back to the beginning of 1970s. In that period, the people of Serampas learned and followed people of Lempur (in the neighbor district) in growing the cinnamon. The spice plant had been observed in the region in 1721, but mostly grew wild (Colombijn, 2005). According to local elders, in the early days of establishment of cinnamon agroforest in Serampas, people collected cinnamon seedlings that grew wild in local forests and transplanted them to their fields. Neidel (2006) argues that cinnamon agroforests in Serampas grew expansively following the termination of the United States and North Vietnam trade relationship in the late 1960s. Given that the US is the largest cinnamon consumer in the world, the breaking of the US-Vietnam trade connection created a big demand for cinnamon in the international market. Cinnamon growers in West Sumatra and the highlands of Jambi, including Serampas, took the market opportunity by growing a vast area of cinnamon.

The commonly traded cinnamon species include *Cinnamomum zeylanicum, C. burmanii*, C. *cassia* Bl. and *C. loureiroi* Nees. In international trading, the first species is considered as "the true cinnamon", while the others are recognized as cassia. C. *zeylanicum* is mainly produced by Sri Lanka; the other species are produced by Indonesia, China and Vietnam respectively (Smith, 1986). The most common cinnamon in Indonesia is *C. burmanii* which is native to Indonesia and Southeast Asia. In Indonesia, West Sumatra and highlands of Jambi, including Serampas are the main growing areas for the cinnamon. Cinnamon from Indonesia is also commonly recognized as Korintji Cassia (e.g., Stelle *et al.* 1994 and Anderson *et al.* 2004) to refer to Kerinci, the highland district next to Serampas.

Production of cinnamon in Indonesia is mainly dominated by smallholder farmers as oppose to big-size plantations. Since production of the cinnamon is mainly concentrated in the Province of Jambi and West Sumatra, rapid growth in cinnamon in these regions significantly contributed to the overall cinnamon production in the country. The emerging international market of cinnamon during the late 1960s stimulated the escalation of cinnamon planted areas. The total production and planting area of the spice in Indonesia has increased significantly since the early 1970s (Fig. 8.2). In 2005 cinnamon production reached a level of 88,300 tones, more than 15 times production in 1971.

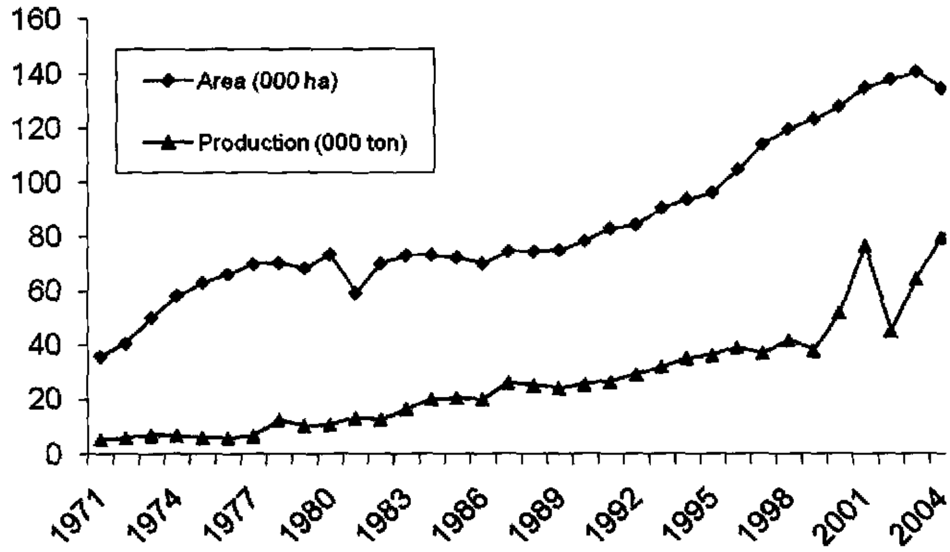
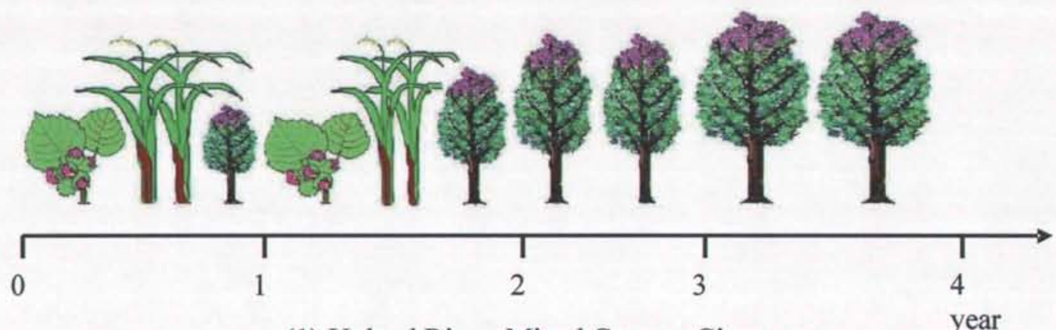


Fig. 8.2. Total Planting Area and Production of Cinnamon in Indonesia 1971-2005
(Statistics of Indonesia, several years)

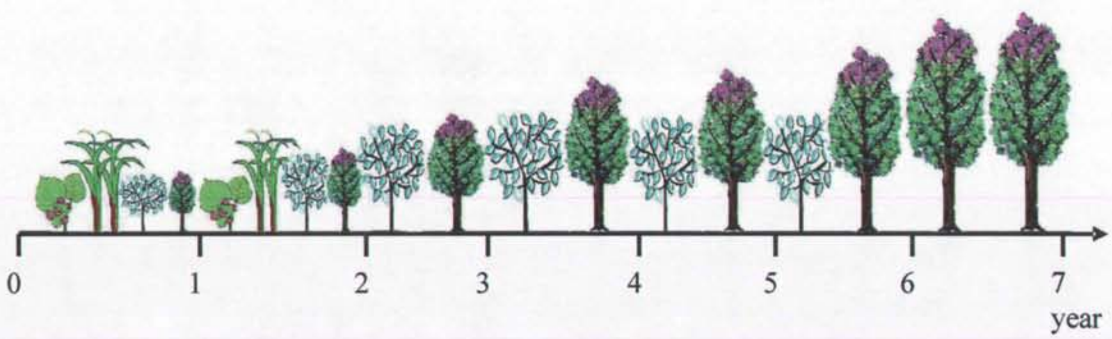
8.3.2. Cinnamon Agroforest System

Most people of Serampas develop their cinnamon agroforest by incorporating the spice into their traditional practice of shifting agriculture. While taking care of their upland rice, villagers nurture the cinnamon trees they plant in between the rice. This farming technique saves significant labor because a farmer does not have to allocate special time and effort to grow cinnamons. This strategy works well in isolated areas as Serampas, where labor is very limited.

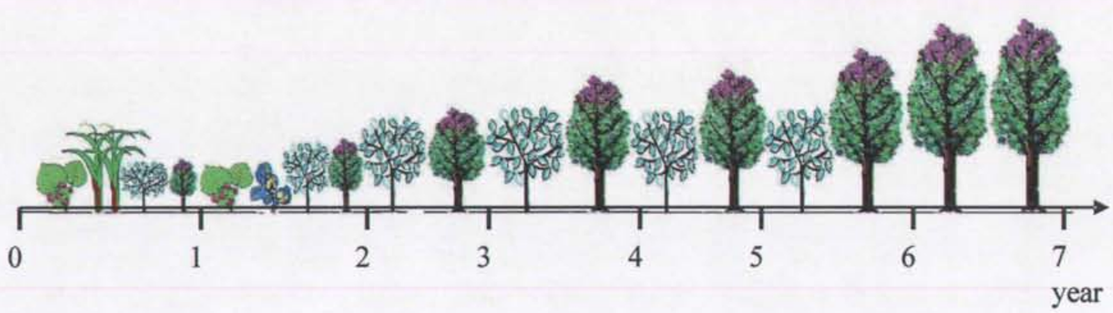
Other types of cinnamon agroforests have been developed in Serampas since the significant decrease in cinnamon bark price, especially early nineties. Villagers have responded to the fall of cinnamon prices by intensifying land use and incorporating more crops, mainly coffee and peanuts in the cinnamon agroforests. This multi-cropping system not only intensifies the use of land but more importantly provides an alternative source of income during an economic crisis. Some common cinnamon-based agroforests developed by Serampas include (i) upland rice - mixed crops – cinnamon, (ii) upland rice – mixed crop – coffee – cinnamon, (iii) peanut – mixed crops – upland rice – coffee - cinnamon and (iv) upland rice – mixed crops – coffee. The cycle and sequence of each system are illustrated in Fig. 8.3.



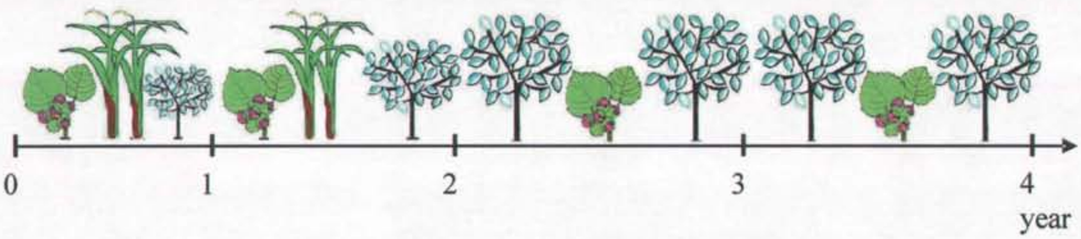
(1) Upland Rice - Mixed Crops – Cinnamon



(2) Upland Rice – Mixed Crop – Coffee – Cinnamon



(3) Peanut – Mixed Crops – Upland Rice – Coffee – Cinnamon



(4) Upland Rice – Mixed Crops – Coffee.

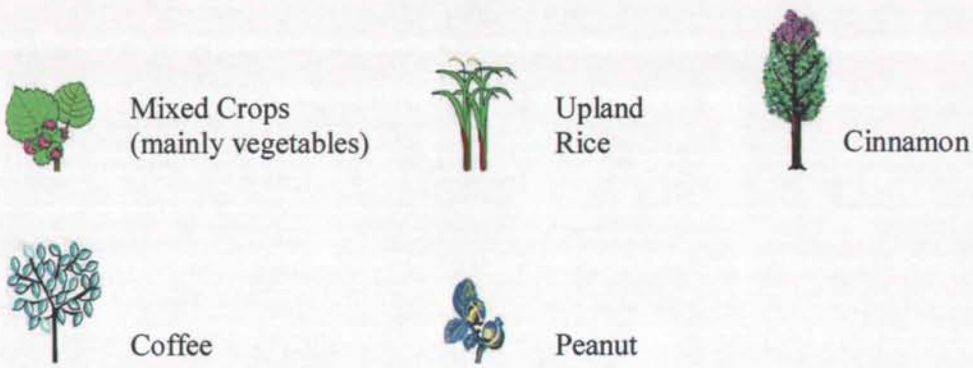


Fig. 8.3. Agroforest Types in Serampas

(1) Upland Rice - Mixed Crops – Cinnamon. In the first year, following the establishment of *umo*, villagers plant cinnamon in between the rice. Cinnamon planting materials are mainly recruited from seedlings that grow wild under local existing cinnamon agroforests. Since the upland rice grows much more rapidly than the cinnamon, the young cinnamon plants are barely seen; they are almost totally covered by the dense greenish leaves of the growing rice. To avoid stepping on the young planted cinnamon trees, villagers usually install a small pole marker of about 20 cm length next to each cinnamon stand, mostly made from bamboo. Villagers apply neither fertilizer nor

pesticide for their *umo* and agroforest other than *uras,* "natural pesticides" obtained from *kenduri psko* and other rituals (Chapter 4).

In addition to the cinnamon and upland rice, villagers grow a mixed crops garden, a kind of home garden, in particular blocks around their *pondoks*, mainly to meet each household's subsistence needs. The mixed crops garden is the equivalent of a grocery store for city people; it provides not only food and ingredients but also medicine, tools, ornamental plants and the other villagers' basic needs. Some crops that commonly are planted around a *pondok* are presented in Table 8.1 below. Most of them belong to the family of Solanaceae and Cucurbitaceae (also see Chapter 5).

After growing rice and mixed crops for two years consecutively, villagers move to another plot and start to establish another *umo,* leaving the cinnamon to grow. Based on their experiences, villagers argue that growing upland rice on exactly the same plot for more than two rounds will greatly reduce its yield. The soil fertility declines, at the same time pests and disease attacks become more extensive and severe (Chapter 7).

Villagers plant a high density of cinnamon in between the upland rice, about 2,500 to 3,000 seedlings per hectare. Serampas gradually thin out the growing cinnamon trees in the following years. Normally, after 7 years of age, the cinnamon trees are eligible to be harvested. Villagers thin out the cinnamon by harvesting selectively, especially when its price allows them to gain some economic benefits. As a result of a series of thinning, the cinnamon trees are much less dense at maturity, between 180 and 300 trees per hectare.

Table 8.1. Mixed Crop around Pondok

No.	Local Name	Scientific Name	Family	Uses
1	*Tarak Katu*	*Sauropsus sp.*	Euphorbiaceae	Vegetable
2	*Terong*	*Solanum sp.*	Solanaceae	Vegetable
3	*Peladang Abang*	*Pogostemon menthoides* Bl.	Lamiaceae	Medicine
4	*Sereh*	*Andropogon nardus* L.	Poaceae	Condiment
5	*Kacang Kra*	*Phaseolus vulgaris* L.	Fabaceae	Vegetable
6	*Ubi Manis*	*Ipomoea batatas* (L.)Poir.	Convolvulceae	Snack
7	*Ubi Kayu*	*Manihot utilissima* Pohl	Euphorbiaceae	Snack
8	*Keladi*	*Colocasia esculenta* Schott.	Araceae	Vegetable
9	*Terong Kelapo*	*Solanum sp.*	Solanaceae	Vegetable
10	*Tomat*	*Solanum licopersicum* Blanco	Solanaceae	Condiment
11	*Tomat Pipit*	*Solanum sp.*	Solanaceae	Condiment
12	*Cabai Rawit*	*Capsicum frutescens* L.	Solanaceae	Condiment
13	*Cabe Besar*	*Capsicum annuum* L.	Solanaceae	Condiment
14	*Timun*	*Cucumis sativus* L.	Cucurbitaceae	Vegetable
15	*Tembakau*	*Nicotiana tobacum* L.	Solanaceae	Cigarette, Medicine
16	*Terung Pilo*	*Carica papaya* L.	Caricaceae	Vegetable
17	*Sirih*	*Piper betle* L.	Piperaceae	Chewing betel nut, medicine
18	*Labu Siam*	*Sechium edule* (Jacq.)Sw.	Cucurbitaceae	Vegetable
19	*Bunga Kunir*	*Lantana camara* L.	Verbenaceae	Ornament
20	*Peladang Anyit*	*Coleus amboinicus* Lour.	Lamiaceae	Medicinal plant
21	*Sedingin*	*Kalanchoe pinnata* Pers	Crassulaceae	Medicinal plant
22	*Prenggi*	*Cucurbita moschata* Duchesne	Cucurbitaceae	Vegetable
23	*Asam*	*Rumex sagittata* Thunb.	Polygonaceae	Condiment
24	*Terong Pandan*	*Solanum melongena* L.	Solanaceae	Vegetable
25	*Tabu Hitam*	*Saccharum officinarum* L.	Poaceae	Fruit
26	*Pisang*	*Musa sp*	Musaceae	Fruit, Snack
27	*Ubi Arang*	*Dioscorea alata* L.	Dioscoreaceae	Snack

Villagers do minor maintenance on their cinnamon agroforest. Once in a while they visit the abandoned cinnamon for collecting some fruits and other parts of plants that grow in between the cinnamon such as *petai* (*Parkia speciosa* Haask), *jering* (*A.*

pauclorum [Benth.] I.C. Nielsen), *nangko* (*Artocarpus heterophylus* Lam.), *durian* (*Durio zibethinus* Murr.), *surian tanam* (*Toona sinensis* [A.Juss.] M.Roem) and *nyeman* (*Pandanus sp.*).

(2) Upland Rice – Mixed Crop – Coffee – Cinnamon. This type of agroforest is a further enhancement of the first agroforest type. Villagers plant the upland rice, mixed crops, coffee and cinnamon simultaneously in the first year. Similar to the first type mentioned above, villagers grow and harvest just two rounds of upland rice during the first two years. Villagers employ various cinnamon–coffee ratios, mostly between 3000:500 and 3000:2000. The coffee starts to produce in the third year and continues producing for the following four years. The coffee reaches its highest production level in the fourth year and then gradually declines as the growing cinnamon canopy steadily covers the coffee. The cinnamon canopies totally shade most understory species, including the coffee, in the seventh year. The cinnamon takes over and dominates the agroforest vegetation. The coffee is no longer productive in such a microenvironment and produce very low yield. It disappears gradually from the cinnamon agroforest.

(3) Peanut – Mixed crops – Upland Rice – Coffee – Cinnamon. This type of agroforest evolves as a result of villagers' efforts to gain cash in a relatively short time. There are some variants of this agroforest type; villagers may initiate growing upland rice in the first round then grow peanuts in the second round or the reverse. In another scheme, they may grow both upland rice and peanuts together during the first year but in separate plots. Villagers also may not grow upland rice at all, devoting their land to the peanut. The last model is mostly practiced by villagers who have secured their needs of

rice for several seasons, for example one who cultivates peanut in uplands and at the same time grows rice in wetlands or one who still has enough stock of rice. In the third year and onward, management of this agroforest type is performed in the same manner as the previous agroforest types above.

(4) Upland Rice – Mixed Crops – Coffee. This agroforest type is mostly practiced by local elites who possess affluent resources and have good knowledge of the market of cash crops, especially coffee. They initiate the agroforest by planting upland rice, mixed crops and coffee simultaneously. They may grow upland rice for only one round then devote their time and effort for growing coffee in the following years. It seems that they have adopted a coffee farming system widely practiced by smallholder sedentary coffee farmers in some sub districts in the eastern of Serampas such as Lembah Masurai.

8.3.3. Floristic of Serampas Cinnamon Agroforests

The cinnamon agroforest is quite a new farming system for Serampas; it has been widely practiced for no more than 40 years. Some patches of the first developed cinnamon agroforest are still there and have not been harvested yet. However, slowly but surely, cinnamon has been incorporated into Serampas traditional resource management system and significantly contributed to the local landscape. Although the current cinnamon price provides less incentive to develop cinnamon agroforests, the total area of cinnamon has stabilized over the years. The large and stable presence of cinnamon agroforests may have some ecological implications for Serampas natural resources. In this section, I analyze some ecological aspects of the cinnamon agroforest including (i) density and size-class distribution, (ii) species richness, (iii) species composition and similarity and (iv) species diversity.

Density and Size-classes distribution

As mentioned earlier, Serampas initiate agroforests by planting a high density of cinnamon, then gradually thin out the cinnamon stands, leaving about 200 to 300 mature cinnamon trees. However, different villages tend to develop different cinnamon densities at maturity. People in the village of Tanjung Kasri conspicuously grow denser cinnamon than that of Renah Kemumu. In Tanjung Kasri, the average density of mature cinnamon is about 296 ± 61 stands/ha; whereas in Renah Kemumu is much less dense; only 183 ± 58 stands/ha.

Comparing agroforest properties between Tanjung Kasri and Renah Kemumu is therefore equivalent to comparing high density versus low density cinnamon agroforest. The different cinnamon (overstory) densities between Renah Kemumu and Tanjung Kasri ultimately promote different plant community structure of the cinnamon agroforest in both villages. Although this comparison could be considered a type of pseudoreplication, it was not possible to resolve this issue as it is not possible to find different densities of cinnamon within a single village.

The cinnamon agroforests of Renah Kemumu are constituted by cinnamon of greater dbh class than that of Tanjung Kasri (Fig 8.4a, Fig. 8.4b and Fig. 8.5). Moreover, less dense cinnamon stands in Renah Kemumu agroforest also provide more space for other species (mainly wild species) to grow. The different agroforest management systems in the two villages shape vegetation structure differently. A log linear analysis of overstory species demonstrated that agroforest size class distribution between the two villages differ significantly (G=10.88, P=0.028, d.f.=4).

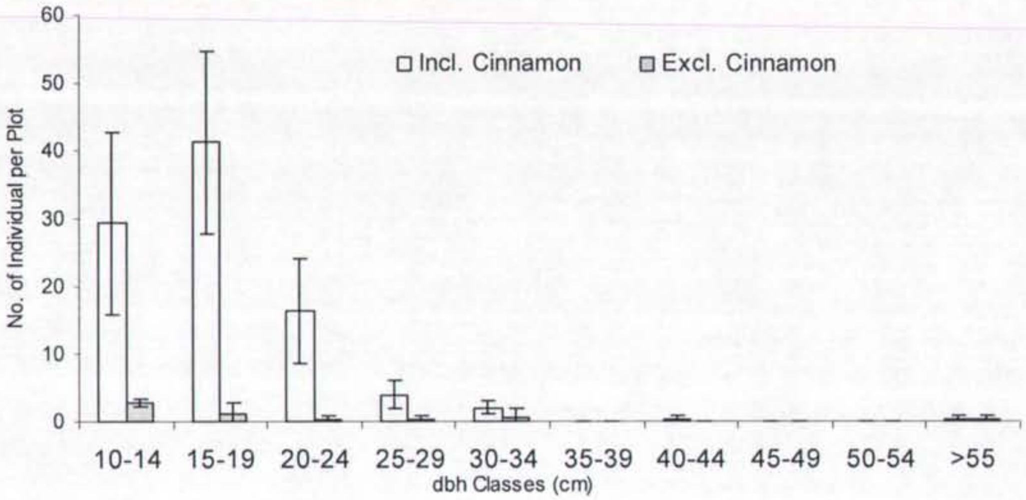


Fig. 8.4a. Overstory dbh Class Structure of Cinnamon Agroforest in Tanjung Kasri: (high density cinnamon)

The distribution of size-classes of the overstory of cinnamon agroforest of Tanjung Kasri is significantly different from that of old-growth forest (G=11.77, P=0.019, $d.f._4$). However, the size-class distribution of agroforest in Renah Kemumu is not significantly different from that of old-growth forest (G= 6.63, P= 0.1570, $d.f._4$).

In terms of midstory and understory stems, the agroforests of Renah Kemumu consistently bear more individuals of midstory (Fig. 8.5). However, agroforests of Tanjung Kasri support more understory individuals. On average, density of understory individuals under the agroforest in Tanjung Kasri is 58 ± 48 per m^2, whereas in Renah Kemumu is slightly lower (46 ± 69 per m^2).

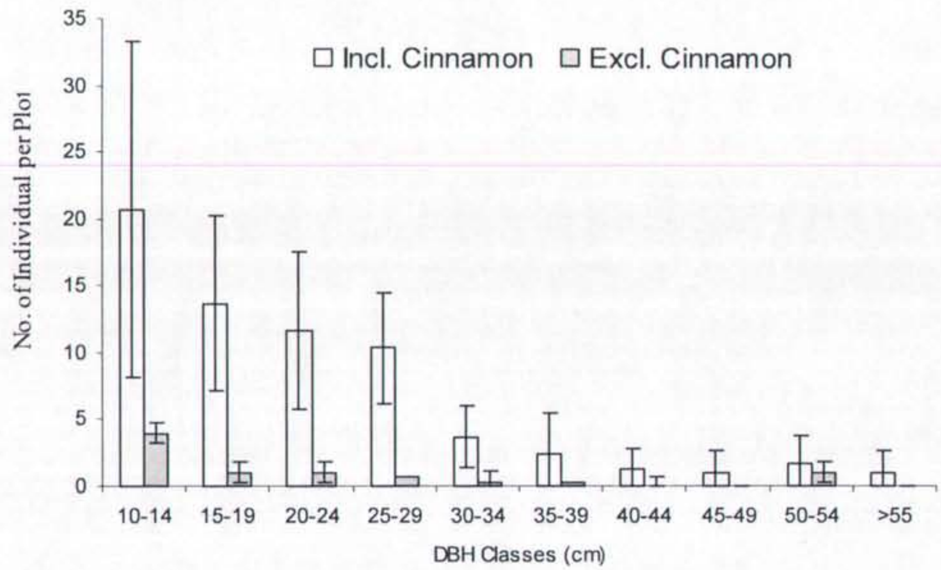


Fig. 8.4b. Overstory dbh Class Structure of Cinnamon Agroforest in Renah Kemumu: (low density cinnamon)

In Renah Kemumu, some big cinnamon trees of more than 80 cm in dbh occur in a cinnamon agroforest that is mostly dominated by cinnamon of 32 cm in dbh. Such trees may yield about 500 kg of sun-dried cinnamon bark. However, on average both cinnamon agroforest structure in Renah Kemumu and Tanjung Kasri share the similar property of the presence of few big trees in between the cinnamon. For example, in Tanjung Kasri, few individuals of big durian of more than 100 cm in dbh commonly grow in between the cinnamon.

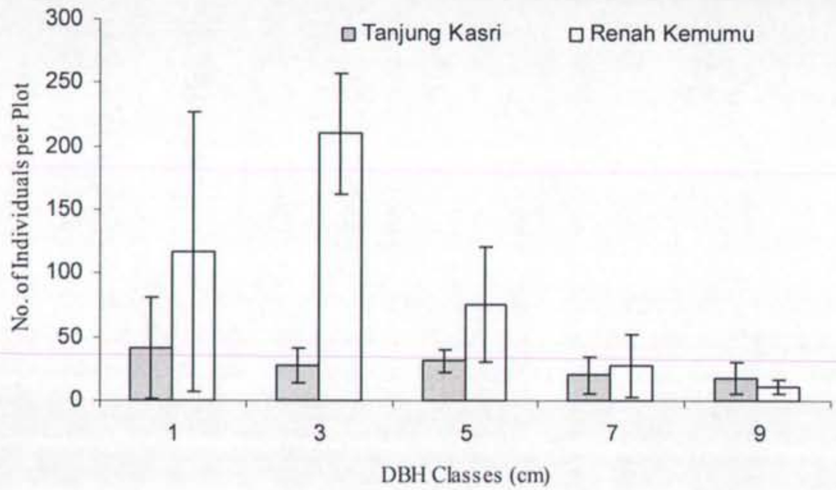


Fig. 8.5. Midstory dbh Class Structure of Cinnamon Agroforest: Tanjung Kasri VS Renah Kemumu

Species Richness

Other than cinnamon, there are about seven to fourteen overstory species that commonly occur in cinnamon agroforests, consisting of cultivated and wild species such as *payang* (*Pangium edulis* Reinw.) and *surian rimbo* (*Toona sureni* [Bl.] Merr.). Midstory and understory species in the cinnamon agroforest are much richer than the overstory species. The number of midstory taxa is between 21 and 41 species; whereas understory taxa is between 33-34 species. Cinnamon agroforests in the village of Renah Kemumu are richer in overstory and midstory species than that of Tanjung Kasri. The prior village has a significantly greater number of overstory species than the latter village (Fig. 8.6).

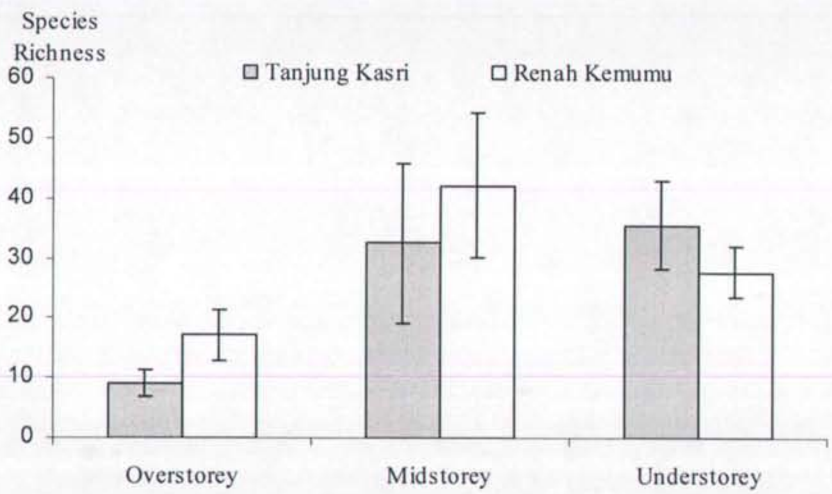


Fig. 8.6. Species Richness of Cinnamon Agroforest in the Villages of Tanjung Kasri and Renah Kemumu*)

*) Each value is mean of three replicates ± SE.

Species Composition and Similarity

Species composition of the cinnamon agroforests of Tanjung Kasri and Renah Kemumu are more dissimilar than similar. The Jaccard classic similarity index (occurrence based similarity index) indicates that the two villages share less than 11 % of common species for overstory, midstory, or understory species (Fig. 8.7). Taking account species abundance, another index, Cao-Jaccard abundance based similarity index, indicates that the two villages have a more similar overstory species composition (83%). For midstory and understory species, the abundance-based index provides similar results to the Jaccard classic similarity index.

As compared to old-growth forest, species that compose cinnamon agroforest in both Tanjung Kasri and Renah Kemumu are very different from that of old-growth forest (Fig 8.8). Old-growth forests and cinnamon agroforests share less than 2% of their overstory species (Chapter 9 will discuss more about species similarity across different land use categories). Even in Tanjung Kasri, no overstory taxa occurring in this agroforest belong to old-growth forest taxa. Overall, the cinnamon agroforests of Renah Kemumu has greater species similarity to the old-growth forest than those of Tanjung Kasri.

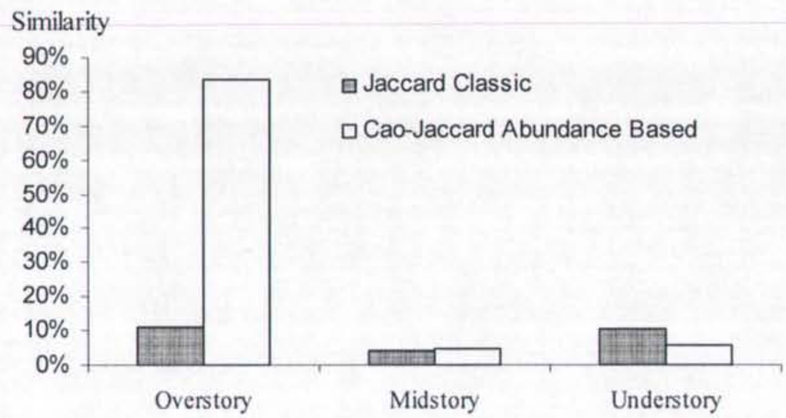


Fig. 8.7. Plant Similarity Index between Tanjung Kasri and Renah Kemumu Agroforests

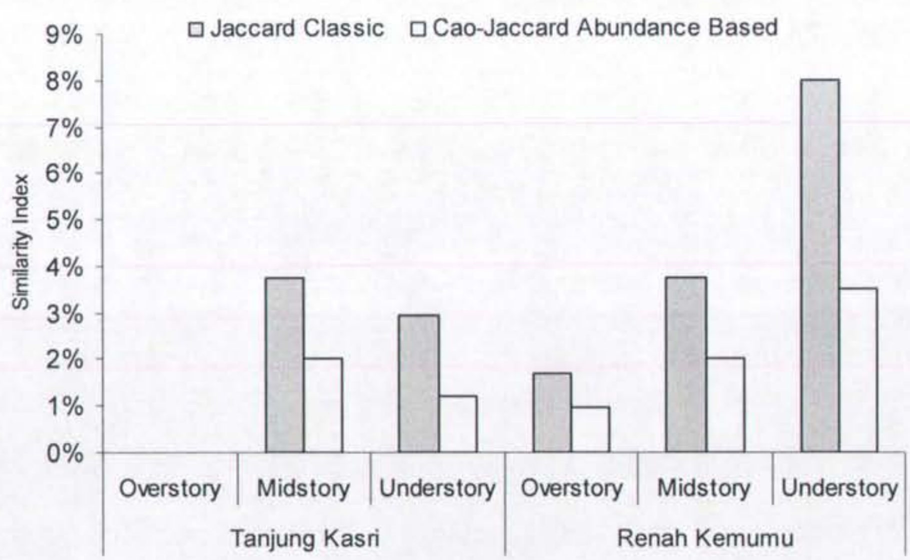


Fig. 8.8. Plant Similarity Index between Cinnamon Agroforests and Old-growth Forest

Species Diversity

In terms of species diversity, cinnamon agroforests in Serampas represent more of a monoculture plantation than a complex agroforestry. The Shannon biodiversity index of overstory species in the Tanjung Kasri and Renah Kemumu agroforests is just between 0.2 and 0.6 (Fig. 8.9). The species of *C. burmanii* is over represented in this agroforest. However, midstory and understory species in this agroforest are more diverse than the overstory species.

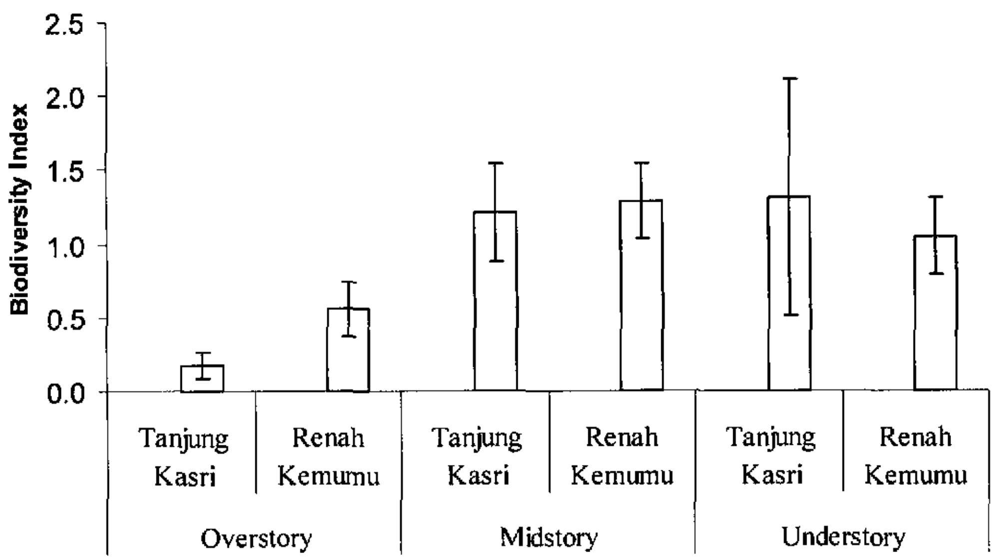


Fig. 8.9. Shannon Biodiversity Index of Cinnamon Agroforest: Tanjung Kasri vs Renah Kemumu*)

*) Each value is mean of bootstrap with 1000 time sampling with replacement ± confidence interval.

Although species diversity in this agroforest is very low, in general, the village of Renah Kemumu has more diverse species than that of Tanjung Kasri. Fig 8.9 indicates that the Renah Kemumu has a significantly more diverse overstory than that of the

Tanjung Kasri; whereas species diversity for midstory and understory species, in those two villages is not different statistically.

8.4. Discussion

8.4.1. Agroforest System

Cinnamon is native to Southeast Asia and Indonesia (e.g., Smith 1986, Aumeerudy and Sansonnens 1994); however the rampant growing of the spice is Serampas is quite recent. As mentioned earlier, Serampas have only started to grow the cinnamon extensively since the beginning of 1970s, and the total production and planted area of cinnamon has significantly increased since that period. Although villagers grow and produce a large number of cinnamon trees, interestingly, they rarely use bark of the spice. Among the 267 entities of plant species and their efficacies in local medical prescriptions that I recorded, cinnamon is listed only once, the use being to cure stomach problem (Table A.5). Cinnamon also is not listed either as an ingredient or spice in various local recipes. The very limited use of the cinnamon bark may confirm the Serampas' recent exposure to the spice. The only common use of cinnamon is its debarked wood. The abundant debarked cinnamon wood provides a cheap fuel wood for daily cooking.

The widely practiced cinnamon agroforestry undoubtedly provides an alternative source of income for Serampas. During the cinnamon boom in the late 1980s, villagers gained significant economic benefits from the species. Serampas were also enjoying the fantastic price of cinnamon in the beginning of Indonesia's economic crisis in the late

1990s. They invested their significant extra income to renovate their houses, to send their schoolchild to school in close-by cities, to buy some luxurious items such as televisions and electric generators and to perform pilgrimages to Mecca, the fifth Islamic foundation.

However, since 2004, the cinnamon planting area throughout Indonesia has tended to decrease as a response to the drastic drop in price. The sudden cinnamon boom in the beginning of Indonesia's economic crisis in the late 1990s was followed by steadily decreasing price in the following years. Although the cinnamon planted area has stabilized, its production keeps increasing. This is because a number of cinnamon farmers keep harvesting and cutting their old cinnamon trees, regardless of the lower benefit they now get due to very low cinnamon price. Moreover, some other farmers harvest cinnamon by clear cutting all cinnamon stands in order to convert the cinnamon to other more profitable crops. These practices keep increasing total cinnamon production throughout the country.

In Serampas, most of the existing cinnamon has been established by incorporating the spice to shifting cultivation. Farmers plant the cinnamon in between rice, while taking care of the food crop. This farming technique saves significant labor and works well in isolated areas such as Serampas, where labor is very limited. This situation is supported by Belcher *et al.* (2005) who argue that an agroforest system is sensitive to labor supply; it may no longer be competitive when its opportunity cost increases.

Potter (2001) suggests that local people's initiatives to advance shifting cultivation usually will come out with tree-based agroforestry. It may or may not be supported by food crop intensification. Integrating crop farming with tree cultivation is in fact an old farming system; it has been practiced by people in many different parts of the world (Nair, 1993). Palaeo-ecological and archaeological facts confirm that the Empire of Inca in the Andes (AD 1000) had practiced agroforestry. They cultivated crop species incorporated with a number of tree species especially *aliso* (*Alnus acuminata*), *chachacoma* (*Escallonia* spp.), *q'euna* (*Polylepis* spp.), *quishuar* (*Buddleja incana*) and *molle* (*Schinus molle*) (Chepstow-Lusty and Winfield, 2000).

The Krui in Southern Sumatra developed a system that ultimately resulted in *damar*, a complex Dipterocarpaceae-based agroforest, after practicing a series of cropping systems including rice cultivation (Mary and Michon, 1987). In the lowland Jambi, shifting cultivation resulted in rubber "jungle" agroforests (Gouyon *et al.*, 1993). Belcher *et al.* (2005) observed that there a number of predisposing factors that most likely drive the establishment of an agroforest in certain areas, including a local customary system that provides some level of land security, a local economy that is in between a subsistence and cash economy, abundant land but limited labor and lack of a formal risk coverage management system such as insurance.

The conditions in Serampas meet Belcher *et al.* (2005) preconditions for developing an agroforest system. With population density between 1.0 and 1.4 people per square kilometer (Chapter 3), Serampas still have enough land to allow them to practice an extensive farming system. However, this circumstance also provides less incentive to develop a sophisticated farming system such as a complex multi layer agroforest (e.g McCarthy, 2005).

The price of cinnamon was at its lowest level when I was undertaking this field work. Most people just abandoned active care of their cinnamon and kept the cinnamon living in the field, setting them aside as safety nets in case they needed cash for emergencies (also Neidel, 2006). Schroth *et al.* (2003) recognize such practices as "agroforest style", a logical consequence of minimum investment farming system, as the case of rubber agroforest in the Tapajós River, Brazilian Amazon. The people there tap the rubber when the price is high and just abandon the tree crop when they get less economic benefits from tapping the rubber (Dean, 1987).

The evolving cinnamon agroforest in Serampas could be interpreted as an effort to accommodate a number of changes encountered by Serampas by maximizing land productivity and at the same time securing a greater area of lands. Land entitlement uncertainty may encourage people to secure more land. In other regions in central Sumatra, people expand their rubber garden, even extending into old-growth forests, as reactions to some socio-economic changes including the increasing economic gains from rubber, the lack of land and the need for land entitlement (Angelsen, 2005).

Responding to a number of changes taking place in the last decade, Serampas strive to search for agroforest models that fit with their changing local socio-cultural and environmental setting. They have developed and modified the current agroforest system, "upland rice (*umo*) - mixed crop – cinnamon" by, for example, incorporating some profitable cash crops in order to minimize the risk of solely depending on cinnamon. Conspicuously, mixed-crops are present in all of the agroforest models developed by the Serampas. The mixed-crop garden produces a large number of vegetables and food that are essential for Serampas.

Some progressive villagers keep exploring other crops that fit with the Serampas environment. For example, they have initiated planting *nilam* (*Pogostemon cablin*

Benth.) together with mixed crops and coffee. They incorporate the volatile oil plant in the second round of their upland rice and mixed crops farming. They learn cultivation and processing of the *nilam* from people in the neighboring villages. The practice has been gradually followed by other villagers. When I was undertaking this fieldwork, even villagers did not know how to process leaves of the *nilam*. The high price of the *nilam* tempts the villagers to grow the Lamiaceae species to replace the cinnamon. Aromatic oil extracted from the *nilam* leaves is a raw material for some industries including cosmetic, food and pharmacy. Collectors of cinnamon and other agricultural products in the village level usually also trade the *nilam*. Indeed, the plant is widely planted in most villages of Sungai Tenang, neighbors to Serampas. The extremely low price of cinnamon has promoted villagers in the Sungai Tenang to grow other crops such as *nilam* (Kompas, 2005).

In analyzing the changes of the above agroforest types over time (Fig. 8.3 and Fig. 8.10), it becomes clear that villagers have progressively shifted into more market oriented farming systems. They have been practicing different agroforest types and keep seeking a system(s) that best fits with their local socio-cultural and environmental settings. The fact that villagers keep the presence of mixed crops in all systems underlines the economic and cultural significance of the mixed crop for the people of Serampas.

In addition to shifting cultivation and cinnamon agroforests, some people, especially the local elites, establish *pelak*, a patchy small garden close by the village, mainly planted with vegetables, spices and medicinal plants. The *pelak* is envisaged as minor faming land. In contrast, people of Kerinci, the closest neighbor district to

Serampas, have developed a more sophisticated *pelak* that refers to a complex multilayer agroforest system (Aumeeruddy, 1994).

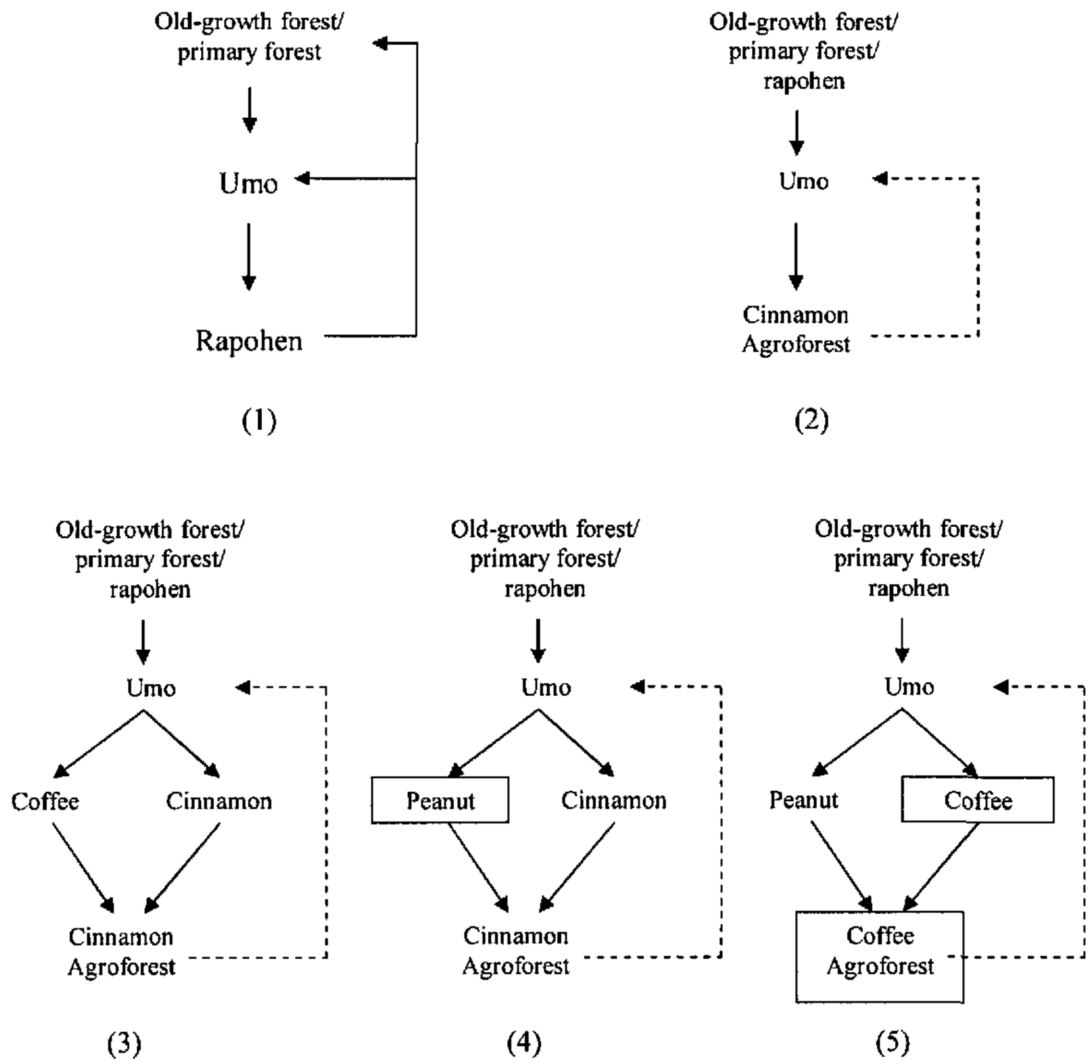


Fig. 8.10. The Changes of Serampas Agroforest Pattern over Time[13]

Pelak in Kerinci could be interpreted as an evolving local resource management practice to adapt to the lack of resources, especially land availability. Aumeeruddy &

[13] Following Marry and Michon (1987). Dash lines indicate that a farmer may develop *umo* or re-grow the same agroforest crops after harvesting and clearing an agroforest.

Sansonnens (1994) observe that the locally developed complex agroforestry systems evolve partly in response to changes in land availability and labour constraints. Such practice commonly develops through trial and error processes and sometimes is integrated within the local worldview (Gadgil *et al.* 1998 and Alcorn 1999). Berkes and Folke (1998) suggest that a community that has succeeded in addressing a resource crisis commonly possesses affluent practical management knowledge associated with the resources. In contrast to Kerinci, as mentioned earlier, Serampas still have abundant land that may discourage people there from developing such a complex agroforestry system.

8.4.2. Floristics of Serampas Cinnamon Agroforests

Density and Size-classes Distribution

Although Serampas transplant a high density of cinnamon to create agroforests, about 2,500 to 3,000 seedlings per hectare, they gradually harvest the cinnamon, usually after 7 years. They employ the harvesting strategy in order to gain economic benefit (in case of good price), and at the same time to thin out the agroforest; leaving about 180 to 300 stems per hectare. The people of Sri Lanka grow much denser cinnamon, about 13,500 seedlings per hectare (Pathiratna and Perera, 2006). However, in contrast to Serampas, the cinnamon species commonly planted in Sri Lanka is *Cinnamomum verum.* In that country, cinnamon is harvested for the first time in the third year after establishment, and is then followed by annual harvesting. Furthermore, a study in Sri

Lanka suggests that an increasing planting density up to 17,500 per hectare still increases total cinnamon bark production per ha ((Pathiratna and Perera, 2006).

The cinnamon agroforests in Tanjung Kasri clearly have a much denser overstory than that of Renah Kemumu. The less available *sawah* in Tanjung Kasri may encourage people to intensify their uplands for example by planting more cinnamon in every cycle of their shifting cultivation. In the case of forest garden system, Belcher *et al.* (2005) argue that land scarcity is an important factor that drives intensification of the system.

The size-class distribution of cinnamon agroforests in Tanjung Kasri is significantly different from those of Renah Kemumu. The lower density of cinnamon in the latter village significantly contributes to a difference in structure. On one hand, the less dense cinnamon reduces competition between the cinnamon trees thus allowing the stems to grow faster. On the other hand, the less cinnamon density also provides more space and better microenvironment for other plant species to grow. To some degree, the vegetation dynamics in this low density cinnamon agroforest mimics that of an old-growth forest. As a result, the vegetation structure of the cinnamon agroforest in this village is not significantly different from that of *rimbo gano* (old-growth forest).

Although the village of Renah Kemumu has a vast area of cinnamon agroforest, rice cultivation on irrigated land is still the backbone of the village economy. People dedicate most of their time to cultivating the land and allocate less of their time to cinnamon. De Jong (1995) concludes that management intensity significantly influences agroforest structure and its species composition. Moreover, Murniati *et al.* (2001) reveal that households that do both agroforestry and wetland rice farming system are much less dependent on forest resources compared to ones who just practice either agroforestry or wetland rice farming. People of Renah Kemumu who depend more on wetland rice rather than *umo*, perform less intensive agroforest management and thus indirectly contribute to shaping agroforest structure that is close to that of the *rimbo gano* structure.

Species Richness, Similarity and Diversity

Cinnamon agroforests of Serampas accommodate wild species and domesticated species such as *surian tanam* (*T. sinensis* M.roem) and durian (*D. zibethinus* Murr.). These tree crops are planted concomitantly with the cinnamon transplanting. In many cases, those species occurred in the plant community prior to the establishment of cinnamon agroforest. Such species might have been planted by earlier generations of Serampas. Some old-growth forest species such as *T. sureni* Merr., a local important timber, also commonly stand in the cinnamon agroforest. Serampas manage these kinds of species by keeping them when they clearing forests for shifting cultivation. Atta-Krah *et al.* (2004) note that farmers commonly plant and/or control tree species in agroforest that have significant value.

However, the Serampas cinnamon agroforest is relatively poor in species when compared to other landuse categories in Serampas, especially old-growth forests (see Chapter 9). I recorded only eight overstory species in Tanjung Kasri and fifteen species in Renah Kemumu. Moreover the Serampas cinnamon agroforest is much poorer in species than most of other agroforest types (e.g., Michon *et al.* 1986, Gouyon et al. 1993, Aumeeruddy and Sansonnens 1994, Kaya *et al.* 2002 and Marjokorpi and Ruokolainen 2003).

The dominant cinnamon in the agroforest hinders other species from growing in between the cinnamon trees. Kueffer *et al.*, (2007) argue that cinnamon develops a layer of dense topsoil roots, thus increasing its competitiveness to absorb scarce nutrients especially in poor soils. Moreover, the ability of cinnamon to be easily propagated by both seeds and vegetative means (Flach & Siemonsma 1990) also enables the species to suppress other seedlings in the plant communities. Based on his research in a Hawaiian Island, Horcher (2000) argues that ecological properties of cinnamon make this has ecological properties a great potency to change the local forest community.

The cinnamon agroforests in Renah Kemumu are significantly richer in species than that of Tanjung Kasri, especially for overstory species. Moreover agroforest in those two villages are mostly composed by different species – the Jaccard similarity index of overstory species in those agroforests is less than 18%. People in the prior village manage their agroforest by regulating cinnamon planting density and thinning out (selective harvesting) the growing cinnamon. As a consequence of the less dense over storey, agroforests in Renah Kemumu provide more space and light thus allows recruitment of more species from the surrounding forests. However, at the landscape level, considering the abundance of each species that occur in that agroforest, cinnamon agroforests in those two villages are quite similar; the Cao-Jaccard abundance based similarity index of overstory species in the two villages is 88% (Fig. 8.7).

The species diversity of cinnamon agroforests shows a similar pattern to aforementioned species richness. Midstory and understory species are more diverse than that of overstory species. However, in general, cinnamon agroforest has very low species diversity as compared to old-growth forest and other landuse categories (see Chapter 9).

The biodiversity of Serampas cinnamon agroforest is also much lower than other agroforest types. For example, a home garden in Saparua, Eastern Indonesia has Shannon overstory biodiversity index (H`) 2.73 (Kaya *et al.*, 2002). Indeed, in other cinnamon-based agroforest type, the main plant diversity is mostly in the form of epiphytes, small lianas and understory plants (Michon *et al.*, 1986, Aumeeruddy and Sansonnens, 1994).

Serampas have developed agroforests by incorporating cinnamon into their traditional shifting agriculture. Some types of cinnamon-base agroforests have evolved to adapt to local needs as well as the market demand. Unfortunately, the agroforest breaks the sustainable practice of shifting cultivation in that it automatically transforms a fallowed period of shifting cultivation into a permanent cinnamon agroforest field. Therefore, villagers establish a cinnamon agroforest plot every time they move to a new farming site. As a result, the acreage of cinnamon agroforest steadily increases over the years. The ongoing expansive growing of the cinnamon threatens the biodiversity of the local forest as well as the Kerinci Seblat National Park.

The cinnamon agroforest is very poor in species diversity, especially for overstory taxa. Placing the agroforest in the biodiversity and productivity diagram of van Noordwijk *et al.* (1987) and Belcher *et al.* (2005), Serampas cinnamon agroforest is closer to a monoculture plantation rather than forest garden or extractive reserve.

The current cinnamon based agroforest will not be the final system; Serampas strive to seek agroforest models that best fit with local socio-cultural-economic and environmental setting. Understanding a trade-off between biodiversity and productivity (Belcher *et al.*, 2005) may help to improve and develop the Serampas cinnamon agroforest. Decreasing the cinnamon planting density concomitantly with enriching the local agroforests with more diverse and valuable species (economically and culturally) in the long run may benefit not only the local economy but also the local culture and local biodiversity as well.

8.5. Summary

Cinnamon agroforest has evolved in Serampas since 1970s following the similar agroforest practiced by the surrounding communities especially the Kerinci. The growing international market of cinnamon had also promoted the rapid expansion of cinnamon agroforest in the region. People have adopted the cinnamon by incorporating the spice into the local practice of shifting cultivation. Traditionally, a villager cultivated a parcel of land for two consecutive years then fallowed the land for several years; allowing the land to grow into secondary forests. The insertion of cinnamon into the shifting cultivation has skipped the fallowing period and importantly has broken the sustainable practice of shifting cultivation. Instead of leaving fallowed land in the third year, villagers leave a young cinnamon agroforest before moving to another land to start another shifting cultivation.

The current practice of cinnamon agroforest in Serampas is very expansive and threatens the local forests. Theoretically, a villager is able to develop a parcel of cinnamon agroforest in every two years. Moreover, cinnamon agroforest represents almost a monoculture plantation; it is very poor in species diversity (H' 0.2 – 0.6).

People of Renah Kemumu who more depend on wetland rice fields for the food supplies, have develop less dense cinnamon agroforest than that of Tanjung Kasri. The ecological properties of the Renah Kemumu's cinnamon agroforest (size-classes distribution, species richness, species similarity and species diversity) are closer to old-growth forest than that of Tanjung Kasri. The current Serampas' cinnamon based agroforest is not the ultimate system. People keep searching and trying to agroforest model that best fit with the given socio-cultural-economic and environmental conditions.

CHAPTER 9

THE FORESTS OF SERAMPAS

"Kalau samo tinggi kayau di rimbo mano pulo tampaik angin lalau"

"*If all trees in the forest are the same in height then there would not be a space for the wind to blow*". This adage articulates local notions about the importance of maintaining diversity - not only in terms of biodiversity, but also in terms of socio-economic and cultural diversity.

9.1. Introduction

Serampas is one of few communities in Sumatra that still lives within intact tropical rain forests. The people of Serampas have lived with, stayed closed to, and maintained the forest for generations. However, a number of changes such as greater exposure to modern technologies and the development of a more market-oriented economy have taken place both inside and outside Serampas and appear to challenge the sustainability of the Serampas' forests. On a broader scale, rampant forest encroachment and deforestation are taking place in many areas along the border of Kerinci Seblat National Park (KSNP), and these activities are threatening biodiversity and the resources of the park.

Some ecological research has been carried out in the forests around Serampas as well as in other parts of Sumatra. For example, Ohsawa *et al.* (1985) investigated altitudinal zonation of forest vegetation of Kerinci Mountain. They revealed different plant assemblages that occupy different altitudinal zones between 1750 m and 3100 m a.s.l. of the mountain. Employing a rapid ecological assessment, Gillison *et al.* (1996)

also recorded differences in floristic characteristic over different altitudinal zones of the Kerinci Mountain. They indicate that plant species richness increase with increasing elevation.

In his classic Vegetation of Sumatra, Laumonier (1987) argued that each region of the island holds distinct floristic characteristics. Species of Diperterocarpaceae are mostly well represented in altitude below 800 m a.s.l. Rennolls and Laumonier (2000) analyzed species diversity structure of two tropical rain forest plots in Sumatra. They argue that employing two diversity measures including the species density (Ho) and the Berger-Parker index (H) is enough to portray diversity of the regions. Stolle *et al.* (2003) observed fire vegetation of Jambi, Central Sumatra. The vegetation includes land use and and land cover types where wild fire commonly takes place. They suggest that the forest fires that frequently occur on the island are determined by predisposed conditions including climate, elevation and suitability for specific tree crops and human-related causes. Using satellite imagery, Linkie *et al.* (2004) analyzed forest loss in an area that overlaps with KSNP and identified the site most susceptible to illegal logging.

Forests and the associated products are still important livelihood elements for people in Sumatra, although the contribution to the total economy has tended to decrease over time. Siebert (1989) recorded the declining population of rattan (*Calamaus pilosellus* Becc.) in Kerinci due to over-exploitation. Soehartono and Newton (2002) identified the shift of *gaharu* (*Aquilaria* spp.) exploitation sites, from Sumatra and Borneo to other eastern islands in Indonesia. Moreover, they argue that *gaharu* harvesting in Sumatra and Borneo is unsustainable. McCarthy (2005) observed the dynamics of local social institutions associated with forests in Sumatra. He concluded that government and local institutions keep interacting and adjusting to each other, regardless of the fact that they frequently compete to control the direction of social changes. They keep monitor each other and frequently produce some intertwined rules.

To date, neither ecological nor ethnoecological studies have been carried out in Serampas forests. Given that Serampas inhabit an important conservation area (KSNP), understanding local management of Serampas forests and assessing some of their ecological impacts is essential for identifying which practices may be consistent or not with biodiversity conservation goals. Moreover, recognizing local knowledge, values and practices associated with forests that hold conservation value may instigate culturally appropriate initiatives for forest conservation in Serampas as well as in other parts of the KSNP and elsewhere.

This chapter analyzes the socio-economic and ecological characteristics of the Serampas forests. Specifically, it addresses five main questions: (1) What is the state of Serampas forest cover? (2) What is the socio-economic value of forests to Serampas? (3) What kinds of locally-recognized forest types exist in Serampas?, (4) What are traditional management practices associated with Serampas forests? and (5) What are the ecological characteristics (horizontal structure, composition, species richness and species diversity) of the forests and how do they compare across the existing forest types?

9.2. Methods

Research on local forests was undertaken with the community of *Serampas,* an indigenous group which inhabits an area administratively in the region of Jangkat Sub District, Merangin, in the Province of Jambi, Indonesia. Local knowledge and practices associated with the forests, including the useful plants that grow in the forests, were documented mainly from people in the village of Tanjung Kasri and Renah Kemumu. The overall fieldwork was carried out during a period from July 2005 to March 2006.

9.2.1. Ecological Methods

A field ecological assessment was undertaken to evaluate and compare the ecological characteristics of each locally recognized category of local forests, including *rapohen* (secondary forest), *hutan adat* (customary forest) and *rimbo gano* (old-growth forest). The assessment included measurements of species composition, diversity, richness, structure and density. I randomly selected three patches of forested area for each forest type in each village for vegetation analysis.

I established three vegetation plots of *rapohen* and *hutan adat* in each village. The *rapohen* plots are randomly selected from the existing *rapohen* that have been fallowed for at least five years. For *rimbo gano*, only three plots were established in the area of KSNP that is closest to the villages, to represent old-growth forest vegetation. The selected forest patches had a size at least 30,000 m^2 to enable the establishment of an intact sample unit and to reduce edge effects. I consulted local experts to confirm the properties of the selected patches. I used and modified methods developed by Gentry (1982) and Murali *et al.* (1996) for the vegetation analysis, which is explained in detail in Chapter 8. In this chapter, I also incorporate the cinnamon agroforest data presented in Chapter 8 in order to include a more complete comparison of ecological characteristics across the various landuse categories occurring in Serampas.

The collected quantitative vegetation data were encoded then processed to compute plant biodiversity index, richness, similarity, structure and density. I employed estimateS 8.0 to compute Shannon Biodiversity Index, Chao-Jaccard-Raw Abundance-based similarity index and abundance-base coverage estimator species richness (Colwell 2006). I employed a log-linear model of goodness of fit (Sokal and Rohlf 1995, Caswell 2001) to statistically compare forest community structure among different forest types. I also employed two-way ANOVA (SAS version 9.1) followed by Duncan's multiple range tests to compare density and species richness among different villages and plants habits. In addition, I used the Kruskal-Wallis test to compare species density and richness between *rimbo gano* and other forest types. Statistical tests of biodiversity index differences among different vegetation were performed by bootstrap (1000 sampling with replacement) (Efron and Tibshirani, 1993). An adjusted estimator of Shannon index with 95% confidence interval was calculated following Pla (2004).

9.2.2. Ethnographic Methods

In addition to the above vegetation analysis, I conducted in-depth interviews with local experts using an open-ended questionnaire (Appendix D). The experts included customary leaders, shamans, midwifes, farmers and anyone who had specialized knowledge associated with Serampas' forests and local useful plants. The snowball method was applied to select the respondents (Bernard, 2002), starting with the *kepala desa* (village leader). The in-depth interviews were performed with 36 respondents consisting of 15 respondents from Tanjung Kasri and 21 respondents from Renah Kemumu.

Associated plants from the aforementioned vegetation analysis as well as those elicited from the above-mentioned ethnographic methods were collected. Vouchers were sent to the Herbarium Bogoriense, Bogor Indonesia and identified by plant taxonomists. The vouchers are stored in the Biology Laboratory, the University of Jambi. Taxonomic grouping and scientific naming of the vouchers was consulted with Index Kewensis under the International Plant Name Index available online at www.ipni.org/.

9.3. Results

9.3.1. Socio-Economic and Cultural Aspects of Serampas Forests

The forests of Serampas stretch along the eastern side of the Bukit Barisan mountain chain in a series of undulating hills with altitude ranging from 750 m to 1100 m above sea level. Forests still dominate most regions of Serampas, especially the most isolated regions such as Tanjung Kasri and Renah Kemumu. However, in the last thirty years, some of the forests have been cleared and converted to other land uses, mainly for modern intensive agriculture. The villages of Renah Alai and Rantau Kermas, for example, not only have the smallest village territory but also hold the least area of forested lands compared to the other Serampas' villages (Fig. 9.1). Forest conversion in both villages has taken place at a significant rate. In the period of 1985 to 2002, the two villages lost 30 and 33% forests of their forest, respectively. An expansion of intensive horticultural farming, especially, potato (*Solanum tuberosum*) in these two villages has greatly contributed to the high rate of forest conversion in the region.

Outside Serampas, most forests on the border of KSNP are under threat of more severe deforestation. Sungai Lalang, an area at the foot of Masurai Mountain, a KSNP area close to Serampas, is an example. A number of migrants, mainly from Southern Sumatra, have illegally occupied the region and have established a vast area of smallholder coffee plantations by clearing old-growth forests (personal observation). Up to the period of this fieldwork, the KSNP as well as local governments have not been able to control the growing encroachment and deforestation in that region effectively.

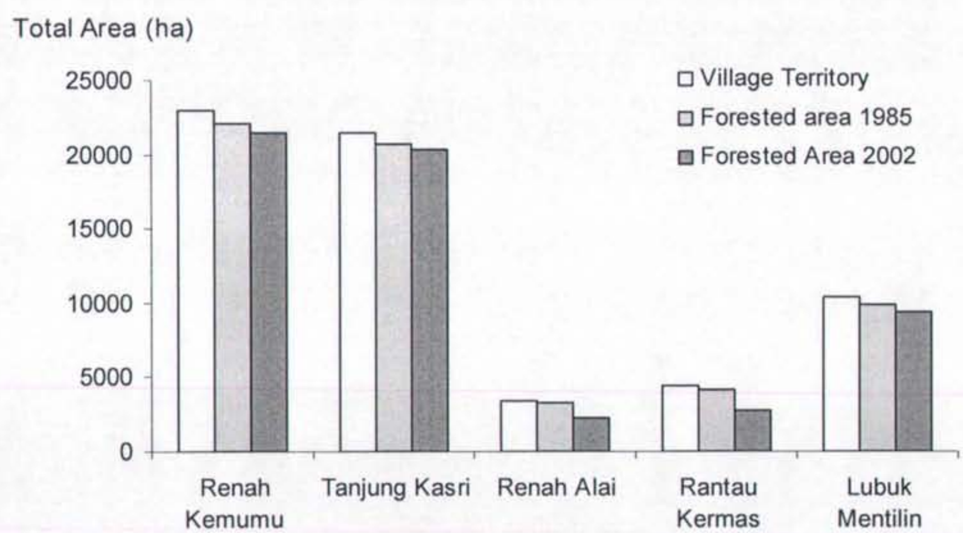


Fig. 9.1. The Changes of Serampas' Forest Cover from 1985 to 2002 (KSNP, 2006)

For the Serampas, the forest not only offers potential lands for their agriculture, but also provides a number of forest products and services including timber and non-timber forest products as well as ecological, cultural and psychological services. Taking into account that shifting agriculture still dominates local livelihoods, most people of Serampas perceive that forests, either old-growth or secondary are potential area for future expansion of their agriculture. The legal declaration of KSNP at the beginning of 1990s that claimed Serampas traditional forests as a part of the park's territory has not changed people's attitudes towards their traditional rights to the local forests.

KSNP has made an initiative to recognize the traditional rights of Serampas' lands by declaring the region as an enclave within the park territory. In doing so, the park has recognized the right of local people to use the forest by zoning forest around Serampas into a special use zone (*zona pemanfaatan khusus*) and a traditional use zone (*zona pemanfaatan traditional*) (KSNP, 2007). The former zone is composed of forested and non-forested areas that are allocated for current agricultural and agroforest fields and reserved lands for agricultural expansion. The latter zone mainly covers Serampas traditional land uses such as land for the current settlement. Temporary border lines of the zones have been installed by marking some big trees with red paint. The establishment of the zones has been initiated in some villages including Tanjung Kasri, but not in the other Serampas villages such as Renah Kemumu.

9.3.2. Serampas Traditional Forest Management

Serampas harvest some timber and NTFPs mainly to meet their subsistence needs. As mentioned in Chapter 6, Serampas esteem some locally high-class timber species for construction such as *asal* (*Elaeocarpus* sp., Elaeocarpaceae) and *medang giring* (*Persea cf. rimosa* Zoll. ex Meisn., Lauraceae) that commonly occur in the local forests. Besides the species, families of Lauraceae and Meliaceae also constitute a significant number of locally important timber species.

Some important non-timber forest products from Serampas include rattan, *manau* and *gaharu*. The rattan and *manau* used to contribute significant additional income for some Serampas' households. However, a law enforcement initiative to control illegal logging as well as other forest-related violations imposed by the government of Indonesia, especially in the beginning of President Yudoyono reign, has discouraged people from engaging in forest-extraction-related businesses. Some outsiders had explored the Serampas' forests and exploited some high-value forest products, especially *gaharu*. Serampas' lack of knowledge about market and properties of the *gaharu* product had discouraged them from collecting the forest product.

Similar to the Serampas customary system (Chapter 4), the traditional forest management of Serampas is subtle. Most of rules, values and norms associated with forest are encoded in local oral traditions; very few rules are saved in a written format. Moreover, most of the rules, values and norms not only deal with forest-related issues in particular, but are also applicable to address some other common issues of Serampas daily life.

Given that Serampas is almost completely a subsistence society, the Serampas traditional forest management mainly deals with forest conversion to other land uses, mainly for (shifting) agriculture, and conservation efforts to preserve the local landscape, as opposed to addressing some issues associated with extraction of commercial forest products. So far the market for forest products, especially timber, is not developed due to the location of Serampas, which is very remote and isolated. Moreover, the site of

Serampas which is deep in the interior of the KSNP territory discourages people from commercially exploiting its forest products.

Pantangan dan larangan (taboos) and proverbs are the most common kind of Serampas' tradition that embeds values associated with forest resources. The designation between *pantangan dan larangan*, proverbs and customary system is blurred; in fact, some of the proverbs are derived from customary systems. An example is "*Kehutan bebungo kayu ke aye bebungo pasir*". This proverb implies that harvesting of timber and other forest products, even for subsistence use, can only be performed after obtaining permit from a customary leader and paying some money of customary levy. A proverb such as this reminds people of an associated article of customary law and facilitates the dissemination and perpetuation the principle of the customary law system.

Serampas prescribe *pantangan dan larangan* for some forested lands as well as the extraction of some products from the forest. For example, Serampas' worldview suggests that people should not clear and cultivate a sacred site. They believe that doing so may result in the associated person contracting an unknown sickness or even dying. The *pantangan dan larangan* is effective in preventing people from clearing and converting such local sacred sites. People are afraid of not only clearing and cultivating these sites but also of harvesting forest products from the sites.

In addition to the sacred sites, a similar *pantangan dan larangan* for preserving *ulu ayi* (watershed areas) is widely known by Serampas as well as other indigenous groups in Sumatra. Later on, the term *ulu ayi* was replaced by *hutan adat* (customary forest, see Chapter 7). The *pantangan dan larangan* intermingles with the Serampas' customary law that prohibits people from clearing and cultivating any piece of land that is considered as *hutan adat.* However some *pantangan dan larangan* and customary laws that govern the *hutan adat* are less effective in protecting the land than the taboos associated with sacred sites. I describe the *hutan adat* in more detail the Section 9.3.3.

Serampas also proscribe *pantangan dan larangan* for cutting some trees that exhibit particular growth forms (Chapter 6). Some *pantangan* (another form of taboo) are also promulgated to promote respect to the forest. For example, people are not allowed to eat food directly from a pan without using a plate. Eating standing upright is also avoided when people stay in the forests. Some wild animals such as the rhino are also protected by *pantangan.* Serampas believe that killing the animal will encourage *bano*, a loss of a family member as a compensation of the killing.

Most of the lands in Serampas, including forested lands, are recognized as common property (Chapter 7). People hold the right to cultivate piece(s) of the land but are prohibited from selling the land. Any fallowed land automatically becomes the common property of the local community. Moreover, the adat banned people from planting any tree cash crops on *rapohen* in order to avoid people's claim on the secondary forest and at the same time to assure the sustainable practice of shifting cultivation.

Some articles of customary law, such as the prohibition of clearing and cultivating a particular land were documented in *stambuk* (customary documents). The *stambuk* also documented some revisions or changes to a particular article of the customary law. The *stambuk* including its change and/or revision used to be publicly pronounced once in a year in the celebration of *Kenduri Psko* festival (Chapter 4). However, with the weakening of Serampas customary system, the customary law is less enforced and subject to manipulation, especially by local elites. For example, one of the local elites has cleared and cultivated forest that has been recognized as *hutan adat*. He argued that the *hutan adat* was no longer effective in serving its role as water protection area. Common people are aware about the customary law violation; however, they do not have enough power and support to dispute such violations.

9.3.3. Locally-Recognized Forest Types

As noted earlier, Serampas recognize at least three type of forest including *rimbo gano* (old-growth forest), *hutan adat* (customary forest) and *rapohen* (secondary forest) (see Chapter 7). *Rimbo gano* includes old-growth forests legally controlled by the KSNP and those that are traditionally managed by Serampas. As also mentioned earlier in this chapter, KSNP has delimited the forests of Tanjung Kasri to distinguish it from the park's forests and to control people from further 'encroaching' into the forest; whereas in Renah Kemumu, such demarcation has not been initiated.

Hutan adat (customary forests) include forests that were protected by adat (Serampas' customary law) mainly due to their ecological services. As mentioned in the Chapter 7, these forests are mainly dedicated to conserving water catchments areas and to keep steep and fragile areas from severe erosions. *Hutan adat* is a source of water for some local streams that are important for domestic uses. Some *pantangan* are applied in this type of forest, for example, people are not allowed to urinate and contaminate the streams in the *hutan adat*. As mentioned earlier, Serampas' adat prohibits people from clearing and cultivating the forest. However, people are still allowed to harvest timber and non-timber products from the forest for subsistence use.

Most of the time *hutan adat* consists of old-growth forest; however, adat also declares a number of secondary forests such as steep forested lands as *hutan adat* after recognizing destructive ecological consequences of clearing and/or cultivating such forests. A trial and error process seems to have induced the establishment and the revival of some *hutan adat*. For example, people of Renah Kemumu want to recover a patch of earlier-mentioned *hutan adat* after it has suffered from the decline of water level in a local stream. They believe that the conversion of the *hutan adat* to farmland is responsible for the reducing water level of the stream.

The last type of Serampas' forest is *rapohen,* mostly consisting of human-induced secondary forest as a result of shifting cultivation practices. Both young secondary forest (*belukar mudo*) and old secondary forest (*belukar tuo*) of the *rapohen* are abundant and distributed widely throughout Serampas. However, since the integration of cinnamon into local shifting cultivation practice, the remaining *belukar tuo* forest tends to be concentrated in some sites away from settlements (see Chapter 7). Meanwhile the *belukar mudo* forests are almost no longer available since most fallowed lands that would grow into secondary forests have been directly converted to cinnamon agroforest.

A *rapohen* area used to be a common property of the local people. However, the growing and rampant integration of cinnamon into Serampas' shifting agriculture in conjunction with the weakening of customary system has gradually shifted ownership of the *rapohen* toward the implementation of a 'private property' model (see Chapter 7). In order to decide who has the right to use a piece of land, people trace the history of the use of the land involved. The one who first cleared and cultivated the *rapohen* or his descendants deserves the first priority for a use-right for the land.

Serampas occasionally visit the *rapohen* to harvest some semi-cultivated fruits as well as other useful wild species. Some species of old-growth forest such as *manau* (*Calamus mannan* Miq., Arecaceae) commonly occur in a very old *rapohen* and make the latter forest almost indistinguishable from a *rimbo gano*. However, the presence of some cultivated plants such as *durian* (*Durio zibethinus* Murr.) and *petai* (*Parkia speciosa* Haask.) distinguish *rapohen* from *rimbo gano*.

9.3.4. Structure, Density, Composition, Diversity and Richness of Serampas Forests

9.3.4.1. Density and Horizontal Structure

Hutan adat in both Tanjung Kasri and Renah Kemumu has the highest density of overstory species when compared to the other forest types sampled (Fig. 9.2). The *hutan adat* has a density of 783 ± 23 overstory trees per hectare. In the village of Renah Kemumu, density of the overstory trees reaches 804 ± 39 per hectare. Some woody overstory taxa attain a relatively large diameter (> 150 cm dbh); these include species such as *kiro munting* (*Nauclea calycina* Bartl.ex DC., Rubiaceae), *tajam tumpul* (*Castanopsis javanica* A.DC., Fagaceae), *kiro nasi* (*Ficus stupenda* Miq., Moraceae) and *mening* (*Lithocarpus pseudo-molucca* Rehder, Fagaceae).

Some domesticated species such as *petai* (*Parkia speciosa* Haask., Fabaceae) grow spontaneously in this adat forest. *Bemban* (*Donax cannaeformis* Rolfe and *D. grandis* [Miq.] Ridley), grows abundantly, mainly in wet regions of the forest. Serampas use these Marantaceae species as an indicator of an old-growth forest.

Rimbo gano has a lower tree density than that of *hutan adat* ($P < 0.02$, Fig. 9.2), especially for the stands of >40 cm dbh class (Fig. 9.3). The average overstory stand density in this forest is 612 ± 74 per hectare. However, obviously, individuals that constitute the class in the *rimbo gano* are much larger in dbh than those in other forest types. Some giant figs such as *kiro pulut* (*Ficus parientalis* Bl.) commonly occur and become a conspicuous marker for *rimbo gano* vegetation. Locally prominent timber species such as *asal* (*Elaeocarpus* sp.) and *medang giring* (*P. rimosa* Zoll. ex Meisn.) are sparsely distributed in this old-growth forest.

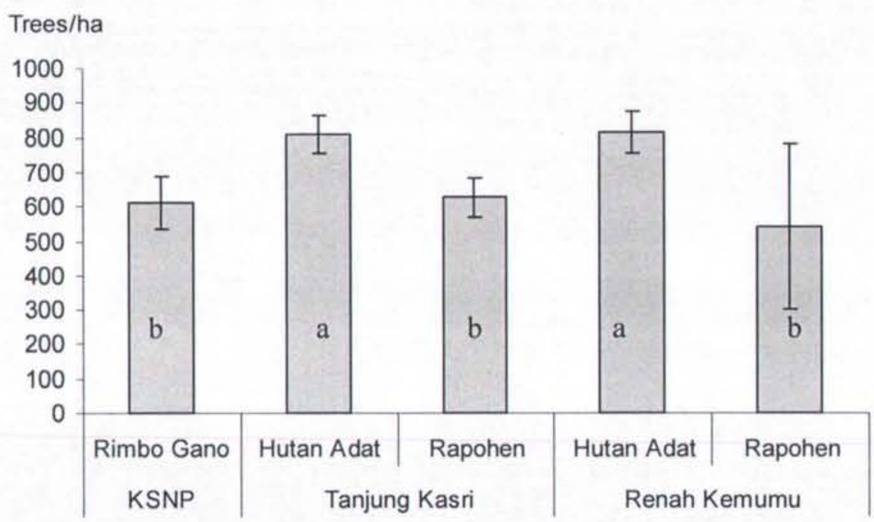


Fig. 9.2. Tree Density in Serampas Forest*)

*) *Rimbo Gano* : Old-growth Forest, *Hutan Adat* : Customary Forest, *Rapohen* : Secondary Forest, KSNP: Kerinci Seblat National Park. The bars with the same letter are not significantly different at α=0.05

Rapohen has a significantly lower tree density than the *hutan adat* ($P < 0.01$); however, tree density in this secondary forest is not significantly different from that of *rimbo gano* (Fig. 9.2). *Rapohen* of Tanjung Kasri contains more overstory trees than that of Renah Kemumu. Within 3000 m^2 plots established in Tanjung Kasri, on average, there are 61 individual overstory trees (627 ± 59 individuals/ha), whereas the similar plots in the *rapohen* of Renah Kemumu have only 543 ± 240 individuals per ha. However, the tree density in *rapohen* in these two villages is not significantly different.

In terms of horizontal structure results, the different forest types as well as the plots in the different villages do not have significantly different dbh structures (Table 9.1, Fig 9.3). *Hutan adat* in the village of Tanjung Kasri is composed of more larger trees (dbh >40 cm) than has the *rimbo gano*; but it does not different significantly ($P < 0,18$; $P < 0.37$).

Table 9.1. Comparison of the Distribution of Individuals in Different Size-classes across Different Forest Types and Villages using Log Linear Analysis.

Effect tested	Contrasts *)	ΔG^2	Δdf	p-value
Forest	FV, S vs FV, FS	6.07	4	ns
Village	FV, S vs FV, VS	5.07	4	ns
Village given Forest	FV, FS vs FV, FS, VS	6.24	4	ns
Forest given Village	FV, VS vs FV, VS, FS	5.24	4	ns
Forest x Village	FV, VS, FS vs FVS	2.00	4	ns

*) V (village, two levels): Tanjung Kasri and Renah Kemumu, F (forest type, two levels): Secondary forest and customary forest, S (size class, four levels): <21, 21-30, 31-40, 41-50, >50 cm.

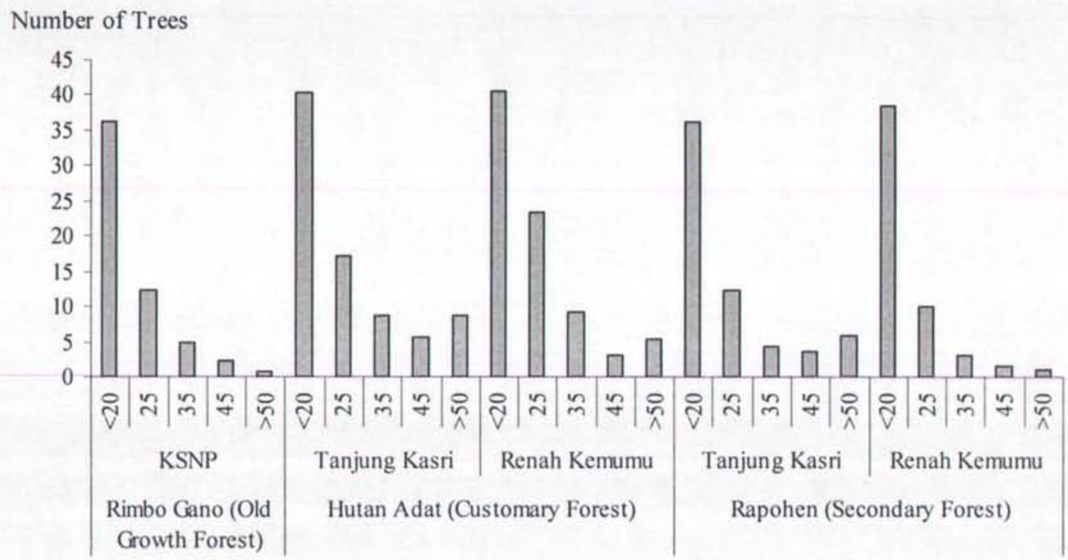


Fig. 9.3. Comparison of dbh Structure across Different Types of Forests in Serampas

9.3.4.2. Species Richness

The total number of identified plants in the plots sampled (15,000 m^2) was 360 taxa. The species belong to 94 families and consist of 172 overstory taxa, 287 midstory taxa and 182 understory taxa. Overstory consists of all individual pants, including trees, vines, and liana taxa with dbh $\geq$ 10cm; understory includes all plants < 1 cm dbh (including woody and herbaceous taxa) and midstory is between overstory and understory (10 > dbh $\geq$ 1 cm). The number of species in individual plots ranged from 6 to 40 (overstory), 15 to 82 (midstory) and 12 to 34 (understory). The complete list of plants occurring in Serampas forests is presented in Table A.12 to A.16. HARKM1, a plot of *hutan adat* in the village of Renah Kemumu, had the highest species richness with 42 overstory, 84 midstory and 34 understory taxa. RG1 (a plot of *rimbo gano*) was as rich in understory species as the HARKM1 plot. The poorest species richness was found in two *rapohen* plots in Renah Kemumu, plots were RAPRKM2 (6 overstory taxa) and RAPRKM3 (17 midstory taxa and 11 understory taxa). In general, forests of Renah Kemumu had significantly more species than that of Tanjung Kasri ($P < 0.038$, Fig 9.4). Moreover, *hutan adat* is also significantly richer in species than the *rapohen* ($P < 0.004$).

Rimbo gano is the richest in plant species as compared to the other forest types. At least 169 species of plants belonging to 60 families (including overstory, midstory and understory taxa) were recorded in the *rimbo gano* plots of 3 x 1000 m^2. For overstory species, no less than 65 taxa occur in these plots. The most abundant overstory species include *Aglaia odoratissima* Lour. (Meliaceae), *Syzygium sp.* (Myrtaceae), *Dysoxylum parasiticum* (Osbeck) Kosterm. (Meliaceae) and *Litsea mappacea* Boerl. (Lauraceae). The last two species are also common species in the *hutan adat*.

The *hutan adat* of Tanjung Kasri has 113 species whereas the *hutan adat* of Renah Kemumu has 158 taxa. The number of overstory species in this forest type ranges from 59 species (in Tanjung Kasri) to 76 species (in Renah Kemumu). The most dominant overstory species include *Lithocarpus pseudo-molucca* Rehder (Fagaceae), *Nauclea calycina* Bartl.ex DC. (Rubiaceae), *Persea cf. rimosa* Zoll. ex Meisn. (*Lauraceae) and Pyrrenaria serrata* Bl. (Theaceae). On average, *hutan adat* has fewer species than the *rimbo gano*. However, species richness between the two forest types is not different significantly.

Rapohen has the lowest number of species compared to other forest types (rimbo *gano* $P < 0.03$; *hutan adat* $P < 0.04$). However, this forest type does have many more species than cinnamon agroforest (Fig. 9.4). The number of species that occur in *rapohen* ranges from 71 species (in Tanjung Kasri) to 152 species (in Renah Kemumu). For overstory taxa, the number of species is between 53 (in Tanjung Kasri) and 82 species (Renah Kemumu). The most common overstory species in *rapohen* include *Helicia rostrata* D. B. Foreman (Proteaceae), *Macaranga tanarius* Muell. Arg. (Euphorbiaceae) and *Trema orientalis* (L.) Bl. (Ulmaceae).

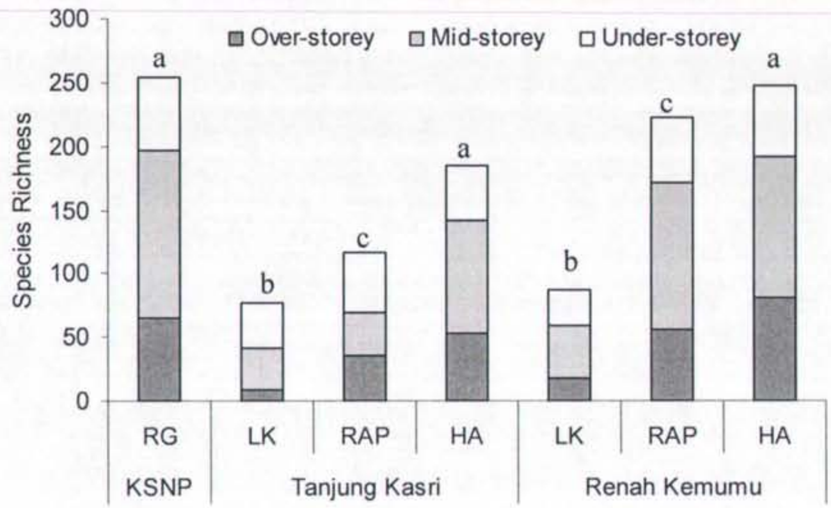


Fig. 9.4. Abundance-Base Coverage Estimator Species Richness over Different Habits, Forest Types and Villages in Serampas Forests*)

*) RG = *Rimbo Gano* (Old-growth Forest), LK= *Ladang Kulit* (Cinnamon Agroforest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest), KSNP = Kerinci Seblat National Park)
The bars with the same letter are not significantly different at α=0.05

Statistically, the *hutan adat* is significantly richer in species than the *rapohen*. Species richness in the *hutan adat* in both Renah Kemumu and Tanjung Kasri is not different significantly from that of *rimbo gano* ($P < 0.06$). However, since difference in richness between these two forest types was close to significant, the results should be interpreted with caution since there was a lot of species variability within the *hutan adat* plots, especially in the village of Tanjung Kasri.

In terms of species richness, forests in the village of Renah Kemumu are richer in species than those of Tanjung Kasri ($P < 0.038$). For example, three plots of 1000 m^2 of Renah Kemumu's *hutan adat* are estimated to have 82 overstory species. Similar plots in Tanjung Kasri bear fewer overstory species (53 species).

9.3.4.3. Species Composition and Similarity

Plant composition of Serampas' forests is typical of tropical medium hill (450–800 m) and sub montane (800-1400 m) vegetation, according to Lauumonier's classification of vegetation of Sumatra (1987). Some species of *Ficus* such as *kiro malau* (*Ficus stupenda* Thunb.), *seri* (*Ficus tinctoria*, G. Forst. F.), *kiro bayan* (*Ficus cf.* ribes Reinw.), reach very large diameters and constitute important overstory species in the forests. These species support a large number of epiphytes, liana and climbers individuals. In mature forests, some rattans such as *manau* (*Calamus manna* Miq.) and *rotan seni* (*Calamus* sp.) reach a length from ca 20 m to 40 m, overlap on forest floor and climb on some high trees. The rattans compete with other plants, especially high canopy trees, to obtain sun light in a dense forest that almost closely covered by canopy of various trees.

Lauraceae together with Euphorbiaceae and Arecaceae constituted the main family of taxa occurred in Serampas forests (Fig. 9.5). Species of Lauraceae are important woody taxa in both the *rimbo gano* and the *hutan adat*. Serampas recognize some prominent timber species belonging to this family such as various types of *medang*

(*Beilschmiedia* spp. and *Litsea* spp.). *Medang giring* (*Persea rimosa* Zoll. ex Meisn.) which is perceived to be the most valuable timber in Tanjung Kasri also belongs to this family. Species of Euphorbiaceae occur abundantly in *rapohen* and in forest gaps of *rimbo gano*. *Macaranga* spp. occur widely in some vegetation types from early succession of shifting cultivation to secondary forests. Serampas use the wide leaves of these fast-growing species mainly for food wrappers. A number of Arecaceae species grow abundantly in all forest types. *Calamus mannan* Miq. which may grow up to 40 m in length mainly grows in old- growth forest whereas *Dendrocalamus angustifolius* Mart. is a widespread in *rapohen* and frequently creates an impenetrable thicket in this secondary forest.

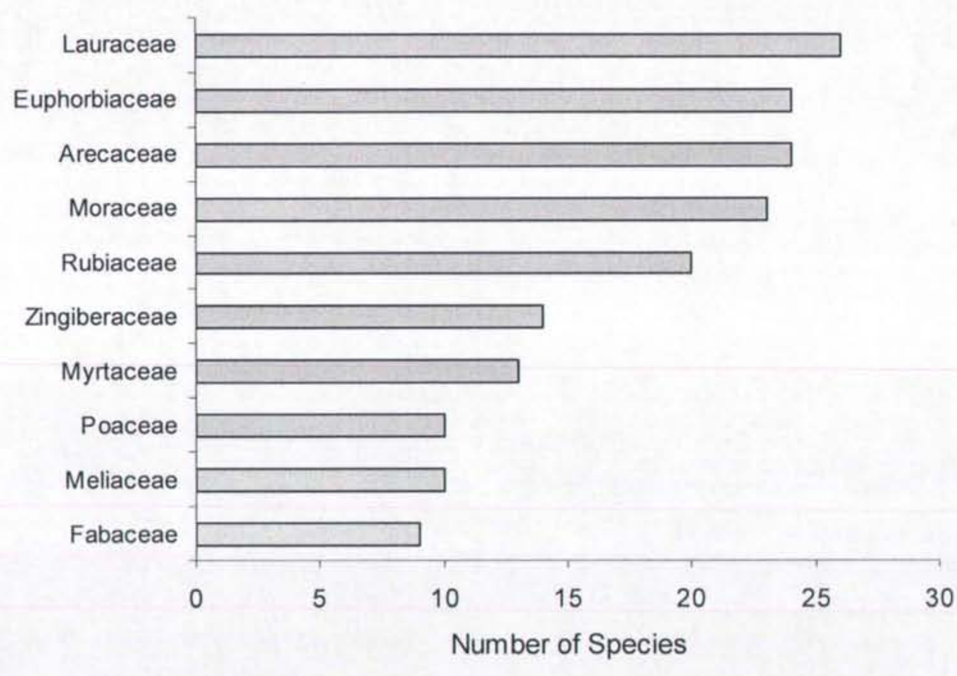


Fig. 9.5. Ten Most Represented Plant Families in Serampas Forests

Most of the forest types are composed of plants from different taxa. For example, the flora of *rimbo gano* is closer in species composition to that of *hutan adat*, especially the *hutan adat* of Renah Kemumu than to the other forest types. However, these two forest types just share only 16 to 39 percent of their overstory flora (Fig 9.6). Some plants that are commonly shared by these forests include *Artocarpus nitida* Treck. and *Ficus albipila* (Miq.) King (both belonging to Moraceae), *Phyllagathis rotundifolia* (Jack) Bl. (Melastomataceae) and *Planchonella nitida* Dubard (Sapotaceae). The flora of *rapohen* is also closest in composition to the *hutan adat*, especially for understory taxa, yet, they have less than 50 percent of flora in common (Fig. 9.7).

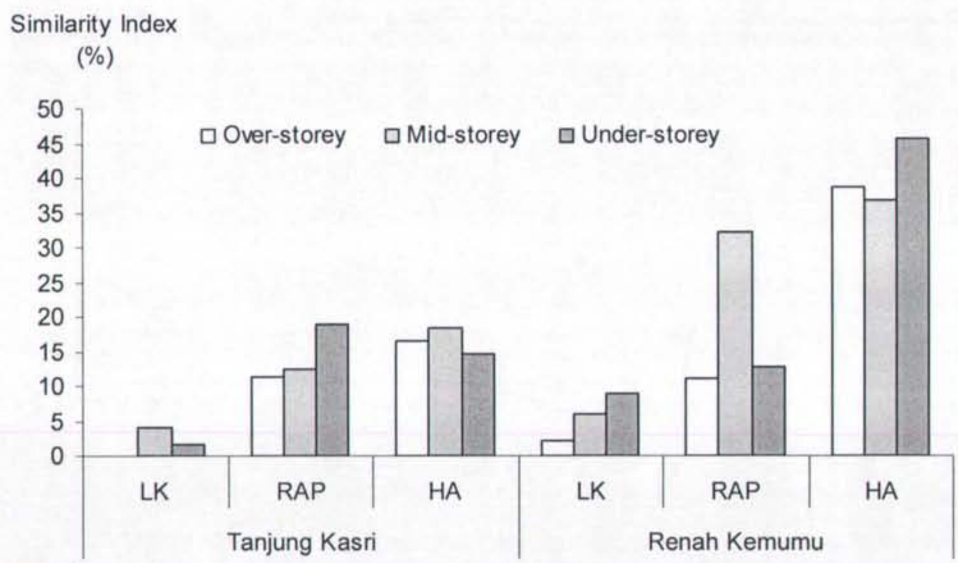


Fig. 9.6. Chao-Jaccard-Raw Abundance-based Similarity Index of *Rimbo Gano* (Old-growth Forest) to other Forest Types*)

*) LK= *Ladang Kulit* (Cinnamon Agroforest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest).

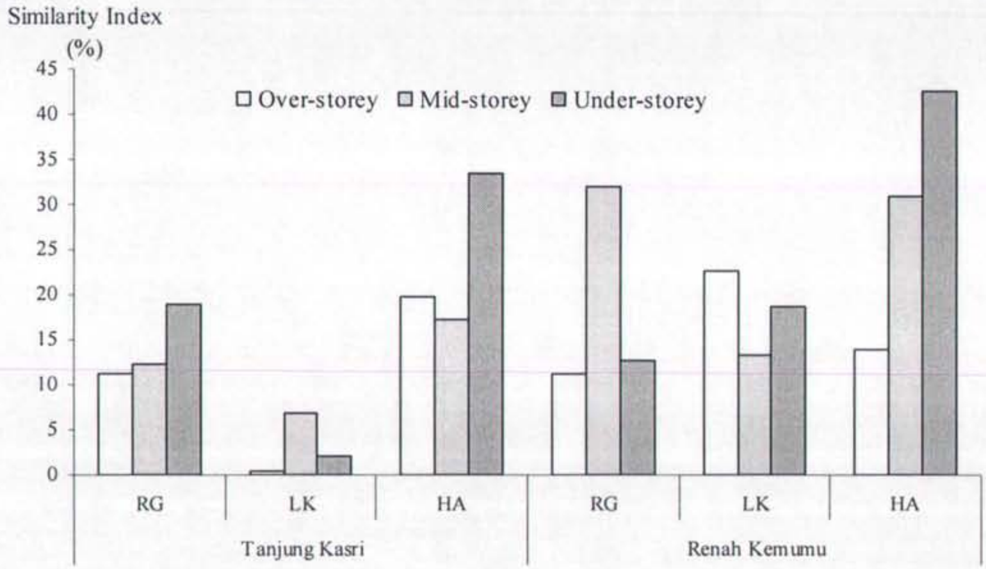


Fig. 9.7. Chao-Jaccard-Raw Abundance-based Similarity Index of *Rapohen* to Agroforest and other Forest Types in Associated Village*)

*) RG = *Rimbo Gano* (Old-growth Forest), LK= *Ladang Kulit* (Cinnamon Agroforest), HA = *Hutan Adat* (Customary Forest).

For overstory taxa, *rapohen* and *hutan adat* share between 14 and 20 percent of their flora. Some species that are commonly shared by these forests include *kelat* (*Helicia rostrata* D. B. Foreman Proteaceae), *biung* (*Turpinia sphaerocarpa* Haask. Sapindaceae) and *letung* (*Dysoxilum parasiticum* [Osbeck] Kosterm., Meliaceae). Understory taxa among these forests have a more similar flora than those in overstory class (from 35% to 45%). Some understory taxa that are commonly shared by these forest types include *kandung aye* (*Elatostema rostratum*, [Bl.] Hassk. & H.Schroet., Urticaceae), *puar* (*Alpinia* sp., Zingiberaceae) and *nalan nasi* (*Zingiber* sp.).

Overall, plant species that make up the forests of Tanjung Kasri are also quite different from those of Renah Kemumu. *Hutan adat* in those two villages are more similar than *rapohen* in term of midstory and understory taxa, yet they share less than 30 percent of their flora (Fig. 9.8). Some midstory species that commonly occur in both villages include *Meliosma ferruginea* Sieb. & Zucc. ex Hook. f. (Meliosmaceae), *Daemonorops angustifolius* Mart. (Arecaceae) and *D. parasiticum* (Osbeck) Kosterm. (Meliaceae). *D. parasiticum* is also commonly occurred as overstory stands.

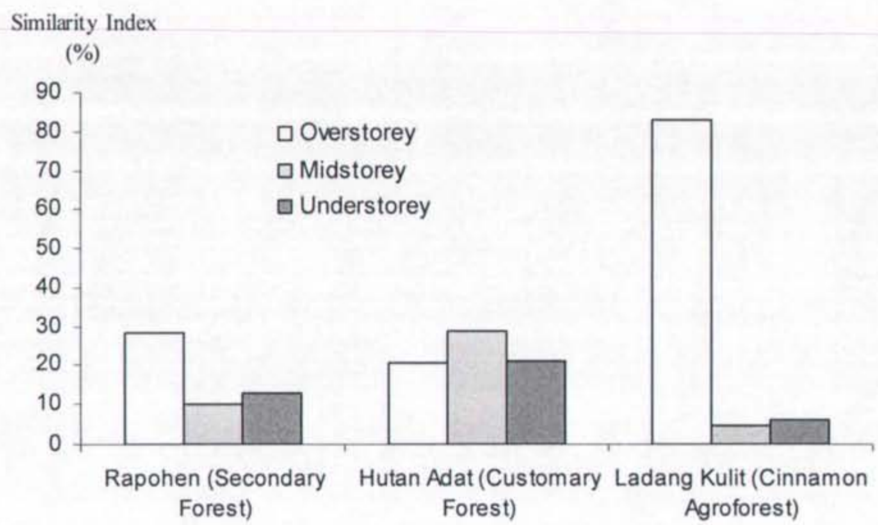


Fig. 9.8. Chao-Jaccard-Raw Abundance-based Similarity Index between Tanjung Kasri and Renah Kemumu by Forest (Agroforest) Type.

For *rapohen*, Tanjung Kasri and Renah Kemumu share slightly more overstory taxa than they do with the *hutan adat*, but only about 27 versus 20 percent of plants in this category. Besides *sapat* (*Macaranga tanarius* Muell. Arg., Euphorbiaceae), the other overstory taxa that commonly occur in *rapohen* in both villages are *sambada* (*Saurauja nudiflora* DC. Ternstroemiaceae), *narung* (*Trema orientalis* Bl. Ulmaceae) and *spok'eng* (*Vernonia arborea* Buch.-Ham., Asteraceae).

9.3.4.4. Species Diversity

The Shannon-Wiener plant biodiversity indices (H`) in the forests of Serampas ranges from 2.29 to 3.49. Conspicuously, the diversity of cinnamon agroforest is much lower than that of the other forest types. The Shannon-Wiener biodiversity index of the agroforest is only 0.2 to 0.6 (also see Chapter 8). The *hutan adat* in both Tanjung Kasri (H`= 2.61 - 3.13) and Renah Kemumu (H`= 2.32 – 3.30) represent almost the same biodiversity level as the *rimbo gano.* Plant diversity of *hutan adat* in those two village is not significantly different from that of the *rimbo gano* ((H`= 2.82 – 3.49) (Fig. 9.9).

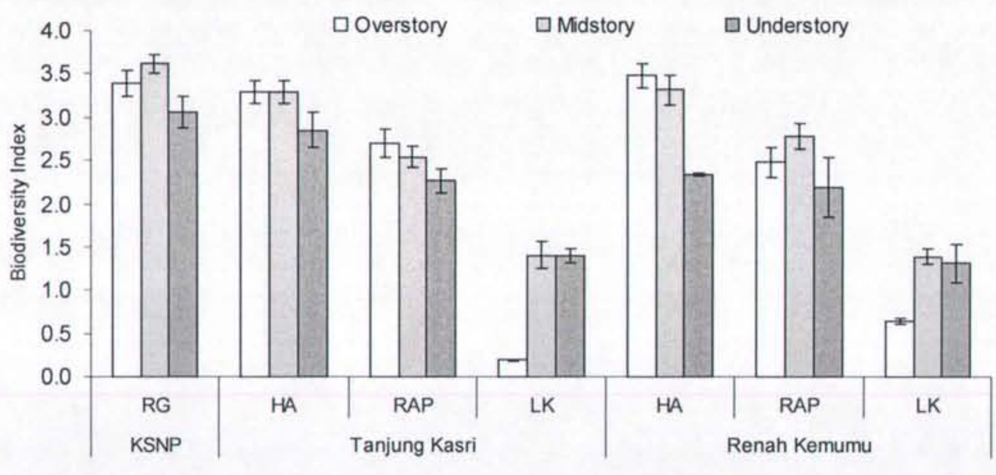


Fig. 9.9. Shannon-Wiener Biodiversity Index over Different Plant Habits, Forest Categories and Villages*)

*) RG = *Rimbo Gano* (Old-growth Forest), LK= *Ladang Kulit* (Cinnamon Agroforest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest), KSNP = Kerinci Seblat National Park). Each value is mean of bootstrap with 1000 time sampling with replacement ± confidence interval

In general, *rapohen* has the lowest plant diversity as compared to the other forest types. The *rapohen* of Tanjung Kasri has significantly lower biodiversity than does the *hutan adat* and *rimbo gano* for all plant habit categories. The *rapohen* in the Renah Kemumu also indicates a similar tendency. However, the great variability in the *rapohen* of this village masks any significant difference.

9.4. Discussion

9.4.1. Forest Management and Socio-Economic-Cultural Aspects

Most of Serampas is still covered by forest, however it seems that the rate of deforestation throughout Serampas as well as in other sites of the KSNP will increase in the near future. The well accessed forests such as those near the village of Renah Alai and Rantau Kermas will likely suffer the most deforestation. As observed by Linkie *et al.* (2004) the KSNP forests closest to roads are most susceptible to deforestation. The soil and microclimate of Serampas are generally quite suitable for a number of horticultural products, especially potato and chili, and they have attracted people to migrate to some of the more accessible Serampas villages. The expansion of potato farming together with local high local human population growth threatens sustainability of the surrounding forests.

Outside Serampas, the KSNP forests are severely threatened by a great number of pioneer farmers who migrate to "empty" land, converting old-growth forest into agricultural fields. Although traditional customary systems land use systems in the sites still exist, they are unable to combat the immigration of a large number of pioneer farmers. The long term centralistic government policy has marginalized traditional customary systems and disempowered the local institutions from protecting local forests and lands (also Chapter 4) from encroachment by immigrants. On other hand, the KSNP does not have the enough capacity to address this kind of conflict. Sadly, the park lacks support from the government, especially at the local level, to protect the entire area of KSNP including conservation of its biodiversity resources (see Chapter 11 for a further discussion of this). Poffenberger (2006) suggests that the forest encroachment by monoculture farmers is common throughout Southeast Asia, especially due to unclear land tenure status.

The indigenous Serampas forest categorization into the types referred to as *hutan adat*, *rimbo gano* and *rapohen* (consisted of *sangkan*, *sesap jerami, blukar mudo* and *blukar tuo*; see Chapter 7) has likely evolved along with the implementation of the traditional forest management system. Uma' Jalan, a shifting cultivator community in Borneo also has traditionally managed their forest (Colfer *et al.*, 1997). Similar to Serampas, the Bornean categorize the forest into *bekan* (new fallow), *jekau bu'et* (young secondary forest), *jekau dadu'* (old secondary forest) and *mpa'* (old-growth forest). Another Dayak group in Borneo, who also practice shifting cultivation, recognizes more diverse land use categories. They distinguish at least six types of forest including old-growth forest, hunting forest, timber forest, farming reserved forest, plantation reserved forest and fruit forest (Roedy, 1998). Serampas' fewer categorizes of local forests indicates their lesser dependency on forests for hunting, timber and commercial products such as NTFP.

Most of the Serampas traditional forest management practices are no longer implemented as a result of the weakening of local traditional institutions. An example of this is the collection of a levy for every extraction of a forest resource. Poffenberger

(2006) observes that the decline in traditional forest management systems has led to forest degradation in many regions in Asia. This is unfortunate since some traditional forest practices such as the designation of customary forests as *hutan adat* not only benefit the local people but also appear to promote biodiversity conservation. Nanang and Inoue (2000) support the idea of employing local traditions to enable local management of the forests on a sustainable basis.

Although forest boundaries were demarcated between the KSNP forests and traditional forests in Tanjung Kasri, their effectiveness is still questionable since the markers are not permanent and the border concept is weakly supported by local people. Most Serampas interpret the zonation initiative as an effort to distance people from their traditional rights over the local forests. Moreover, the rights and responsibilities of local people, as well as the KSNP associated with the zonation, are not well understood by the local people. Neidel (2006) pointed out that the local political interests of people in Tanjung Kasri to strengthen their bargaining position over another village on some disputed agricultural lands has encouraged people in this village to support the zonation.

The park initiatives to delineate forested areas such as the zonation are essential in order to conserve biodiversity in the long run. However, conservation programs that do not gain consent of the local people may discourage local conservation initiatives. For example, in Nepal, community forestry programs are widely implemented in many regions of the country (e.g., Fisher 1991; Nepal 2002, Nagendra *et al.* 2005). However, in some cases, government-oriented forestry programs in the country have hindered local people from protecting their local forests (Shrestha, 1994). Poffenberger (2006) also concurs with this point of view and pointed out that state sponsored forest management programs frequently fails to implement forest resource use on a sustainable basis. Most of the states lack the capacity to keep the implementation of on the ground forest management policies on track.

9.4.2. Structure, Composition, Richness and Diversity of Serampas Forests

9.4.2.1. Comparison of Serampas Forests with Forests Elsewhere

Overall, Serampas' forests are not exceptionally rich in flora compared to that of other forests in Sumatra and other tropical regions; the Shannon biodiversity index in total plots of 1.5 ha of Serampas' forests ranges from between 2.29 and 3.49. However, more samples across different landscape gradients would likely better portray the ecological properties of the Serampas forests, especially for species richness and diversity.

In another part of Sumatra, Laumonier (1987) observed plant vegetation in 10-ha plots over different altitudes and revealed a Shannon biodiversity index of trees and lianas (>10 cm dbh) between 4.7 and 5.3. Gillison *et al.* (1996) observed vascular plants in logged and un-logged forests around KSNP. They identified 169 species of vascular plants in the richest plot of 400 m^2 of un-logged forest at 650 m altitude. This result is not quite comparable to the flora of Serampas due to some differences in the methodology of plant inventory being used and elevation of the research sites. However, the result may indicate that this forest is richer in species than the Serampas' *rimbo gano*. Excluding epiphytes, the Serampas old-growth forest has only 168 plants species. Langenberger *et al.* (2006) inventoried at least 685 vascular plant taxa in the Leyte

Cordillera lowland forest (Philippines). They employed total plots of 4900 m^2 in elevation between 55 and 520 m a.s.l. The fact that the elevation of the above two forest sites is much lower than Serampas may contribute to their higher species richness.

Rennolls and Laumonier (2000) identified 504 species of trees (>10 cm dbh) in a total of three hectares in *Batang Ule* forest. Employing the same tree category and plot size, they also recorded 340 species in another forest (*Pasir Mayang*). Both forests are tropical lowland rainforest (50 – 150 m a.s.l.) in Eastern Jambi, Sumatra. These forests are richer in species than that of Serampas forest.

Species of Meliaceae, Lauraceae and Myrtaceae are well represented in the forests of Serampas. However, species of Dipterocarpaceae which are common in lowland forest of Sumatra and Borneo (e.g., Laumonier 1987, Rennolls and Laumonier 2000 and Wilie *et. al.* 2004), are totally absent from the Serampas' forests. Laumonier (1987) also noted that family of the Dipterocarpaceae still constitutes dominant families in medium-elevation hill forests of Sumatra (450 m – 800 m a.s.l.). Some high mountains that encircle Serampas such as *Masurai* (2935 m) and *Sumbing* (2507 m) may hamper distribution of the Dipterocarpaceae into the region.

9.4.2.2. Differences in Species Composition, Richness and Diversity among Serampas Forests Types

Each type of Serampas forest is mostly composed of flora belonging to different taxa. The different forest types share less than half of their flora in common. Flora of *hutan adat* represents a transition between *rimbo gano* and secondary forest. Euphorbiaceae, which is less represented in old-growth forest, becomes better represented in the *hutan adat*. Moreover, species of Meliaceae which are the most dominant overstory family in *rimbo gano*, are taken over by Rubiaceae (in the *hutan adat* of Tanjung Kasri) and Lauraceae (in the *hutan adat* of Renah Kemumu). Overall, the *hutan adat* has significantly higher species diversity and richness than *rapohen*. Importantly, the flora (species richness) of the *hutan adat* is not different significantly from that of *rimbo gano*.

Hutan adat is the local version of a protected area; people are not allowed to clear and cultivate this forest. Therefore, some of the *hutan adat* may emerge from a pristine forest that has never been cleared by earlier settlers. One thing that distinguishes the *hutan adat* from *rimbo gano* and *rapohen* is their location on landscape that mostly stretches on steep lands. Most *rapohen* and *hutan adat* are proximate to the villages whereas *rimbo gano* occupy more remote sites. The Serampas customary system that protects the *hutan adat* not only assures the ecological functions of the forest, mainly to prevent landslides and drought, but also conserves flora and other living beings associated with the forest.

Although *hutan adat* and *rimbo gano* have the same level of biodiversity, these two forest types are mostly composed of species belonging to different taxa. Among the 257 species identified in the two forests, 80 species were limited to *hutan adat* and 46 species occurred in the *rimbo gano* exclusively. *Ficus* species commonly grow in those forests; a small number of those figs reach a diameter up to 4 m. Among 12 species of *Ficus* in the forests, four species are limited to *rimbo gano* including *Ficus geocarpa* Teijsm., *F. parientalis* Bl., *F. ribes* Reinw and *F. sinuate* Thunb. In contrast, three *Ficus* species occur exclusively in *hutan adat* including *F. lasiocarpa* Miq., *F. stupenda* Thunb and *F. subulata* Bl.

Hutan adat in both Tanjung Kasri and Renah Kemumu have similar properties especially in terms of socio-hydrologic functions. Some individuals of cultivated species such as *Caffea spp., Lansium domesticum* Jack and *Archidendron pauclorum* (Benth.) I.C. Nielsen have escaped to the *hutan adat* in both villages. However, in terms of diversity; *hutan adat* of Renah Kemumu harbor more species and have higher species similarity to *rimbo gano* than those of Tanjung Kasri *hutan adat*.

Hutan adat geographically is the closest natural forest to the community settlements. Without protection from the adat, the forests would have been converted to other land uses. Poffenberger (2006) argued that local people in Southeast Asia have an essential role in maintaining the hydrological functions and at the same time preserving the biodiversity of local forests. In Nepal, traditional forest management has been able to significantly reduce deforestation and forest fragmentation, even to rehabilitate some degraded forests (Nagendra *et al.*, 2005). Traditional forest management in Borneo was confirmed to be more effective in conserving the ironwood (*Eusideroxylon zwageri*) than government forest management regimes (Peluso, 1992). However, traditional forestry systems do not always mean preserving the local forests. In Malawi, for example, customary forests have significantly lower dbh classes than forest reserves and leasehold land (Mwase *et al.*, 2007). The customary forest is fragile and very susceptible to human disturbance due to the high dependence of local communities on the forest resources.

Rapohen has significantly lower plant diversity than the *rimbo gano* and the *hutan adat*. The cyclical practice of shifting cultivation has greatly reduced species recruitment in this secondary forest. However, in the village of Tanjung Kasri the extensive practices of shifting cultivation over long time periods has driven secondary forest formation in this village toward higher representation of human-preferred species (see Chapter 10). The "managed species" provide additional *rapohen* plant diversity; although it is not significant, overstory species diversity of *rapohen* in this village is higher than that of Renah Kemumu.

Martin *et al.* (2004) compared the vegetation structure and floristic composition of old-growth and 40-year-old secondary riparian forests in the Cordillera Central, Dominican Republic. Using plots of 2.4 ha, they identified 213 plant species in the old-growth forest and 157 species in the secondary forest. Among the taxa, woody species comprised 39 percent of vascular species in the secondary forests, in contrast to 32 percent in old-growth forests. Obviously, introduced species contribute 12 percent of woody taxa in the secondary forest. Guariguata and Ostertag (2001) observed that the regeneration rate of secondary forest in the Neotropics is high as long as the forest is close to planting material sources mainly natural forest and if the secondary forest did not experience severe land use prior to fallowing.

9.4.2.3. Differences in Species Composition, Richness and Diversity between Forests of Renah Kemumu and Tanjung Kasri

Rapohen in the village of Renah Kemumu is more variable, especially in terms of species richness and diversity (Fig 9.4 and Fig. 9.9) than that of Tanjung Kasri. The less expansive farming system in Renah Kemumu puts less pressure on the secondary forest. In this village, secondary forests are not automatically converted to cinnamon agroforests. Some people still allow the abandoned shifting cultivation fields to develop into secondary forests. Even some parcels of *sangkan*; pieces of cleared land originating from old-growth forest (*rimbo gano*) that has been cleared but allowed to fallow without ever cultivating any single crop on the land (see Chapter 7), are still found in this village. Taking into account that species in the secondary forest of Renah Kemumu are more similar to *rimbo gano*, especially for midstory taxa, than that of Tanjung Kasri (Fig. 9.6), secondary forest succession in Renah Kemumu seems to lead to forests that mimic the *rimbo gano*.

In general, the forests of Renah Kemumu appear to have higher biodiversity and species richness than that of Tanjung Kasri (Fig 9.4 and Fig. 9.9). The closer proximity to old-growth forest in the prior village may shape forests in this village in a different direction from that of Tanjung Kasri. Moreover, a closer proximity of Renah Kemumu to old-growth forests also facilitates the dispersion of more old-growth-forest-origin species to the *hutan adat* and *rapohen* in that village. Martin (2004) found rapid forest recovery in terms of tree diversity and structure in Dominican secondary forests that were close to old-growth forest.

In another part of the KSNP border, Murniati *et al.* (2001) found that people that have mixed livelihoods from agroforestry and wetland rice farming system threaten the forest less than those who rely on either agroforestry or wetland rice farming alone. The extensive practice of shifting cultivation in Tanjung Kasri may induce forest fragmentation and hamper connections between local forests with other forests, especially the old-growth forest. This human influenced landscape may disrupt mammal seed dispersers that ultimately reduce seedling recruitment of old-growth-forest-origin species (e.g., Wright and Duber, 2001). Honnay *et al.* (2002) observed that most plant species show low rates of colonization in forest habitat that has been separated from other forest after about 40 years. Moreover, sites that are better connected to forest show higher rates of species colonization. In Southern Brazil, Tabarelli *et al.* (1999) found that fragmentation mainly disrupts species that are shade-intolerant, occupy forest canopy and depend on abiotic agents for seed dispersal.

Overall, the forested areas of Serampas as well as other areas in the adjacent sites of the KSNP have decreased over time. Well-accessed areas in particular suffer more severe and more rampant forest degradation (also see Linkie *et al.* 2004). The weakening of the local customary system together with the weak park law enforcement make them powerless to stop the KSNP forest encroachment by land-hungry farmer migrants who come from other regions.

Traditional forests including *hutan adat* and *rapohen* harbor a great number of species belonging to different taxa. Moreover, this research also reveals that *hutan adat* harbor species diversity as high as the old-growth forest. Therefore, it is essential to keep those kinds of forests in order to conserve overall diversity in the landscape. The loss of *rapohen* as a result of cinnamon agroforest expansion seems to have significant ecological implications, especially in reducing local diversity.

Besides conserving biodiversity resources, traditional forests such as *hutan adat* also have an essential role in conserving fragile lands and protecting watershed. In fact, local practices to conserve the *hutan adat* have been incorporated in local customary system not only in Serampas but also in other cultures especially in Sumatra. Revitalization of such traditional forests and the associated values and practices most likely benefits the local people as well as the long-term conservation of biodiversity.

9.4.3. The Future of Serampas Forests

Serampas have inhabited their current sites and practiced shifting agriculture over generations. Despite the growing debate about the environmental consequences of shifting agriculture, the Serampas traditional farming does not seem to lead to loss of biodiversity. The forests are mainly composed of mosaics of old-growth forests and secondary forests from various ages. In the secondary forests, basal area, canopy height and species diversity of the overstory individuals increases with forest age. Overstory species density and diversity are the lowest in the early stage, but the understory has the highest diversity. This forest dynamic is common in secondary forests elsewhere in the tropics (e.g., Toledo and Salick 2006).

The fertile soil and the closeness to old-growth forests likely facilitate the growth and the recovery of Serampas secondary forests. Soil fertility plays a significant role in supporting the recruitment of old-growth forest taxa, especially woody species. Brearleya *et al.* (2004) observed succession rates in the forest in Barito Ulu, Borneo. They argue that low soil nutrient concentration is responsible for the slow regeneration of the forest, regardless of the proximity to seed sources. In another part of the tropics, Martin *et al.* (2004) observed quick recovery of woody plant structure and diversity in fertile secondary forests of Dominican Republic that are close to mature forests.

The future of Serampas forests is challenged by the rapid expansion of cinnamon agroforests, especially in the last three decades (Chapter 8). The cinnamon agroforest impedes the recovery of Serampas forests, since fallow lands that used to regenerate into secondary forest are converted to cinnamon agroforest. More importantly, seedlings of cinnamon trees may escape and invade the local forests as well as the KSNP forests.

Similar invasion of forests by plantation species has been seen with *Leucaena leucocephala* and some species of *Acacia* (Parrotta *et al.*, 1997).

Elsewhere in the tropics, some species of cinnamon show a high invasiveness and a potential to change the local forest, especially in terms of forest structure and nutrient cycling (e.g., Horcher 2000 and Kueffer *et al.* 2008). Furthermore, Kueffer *et al.* (2007) observed that another species of cinnamon (*Cinnamomum verum*) develops a layer of dense topsoil roots that increases its competitiveness to absorb scarce nutrients, especially in poor soils. Schumacher *et al.* (in press) showed that water stress in shaded habitat in Mahe (Seychelles) is able to reduce the invasiveness of cinnamon. In that habitat, native species grow better than the invasive species. Throughout Serampas, high precipitation takes place almost all year, creating a microenvironment that eases distribution and development of cinnamon in the local forests.

However, despite the potential factors that may enable cinnamon to invade the local forests, very few cinnamon individuals to date have escaped from agroforest fields. Within the total plots of 3,000 m^2 I established in each forest type (secondary forest, customary forest, old-growth forest) in the villages of Tanjung Kasri and Renah Kemumu, I only recorded one single individual cinnamon seedling in a plot of secondary forest of Tanjung Kasri. Neither midstory nor overstory cinnamon individuals were recorded in the customary forest and old-growth forest plots. *Cinnamon burmanii* (Nees & T. Nees) Bl., which is native to Sumatra and Southeast Asia (e.g., Smith 1986, Aumeerudy and Sansonnens 1994), may have natural enemies in its native habitat that control the species from being invasive. Further research is essential to observe the possibility of cinnamon to invade the local forests, including the KSNP forests, especially in sites adjacent to the abandoned cinnamon agroforests. Understanding the impact of cinnamon on the vegetation of the local forests is also essential in order to develop policies that better address people and park issues. For example, totally removing people from the park would greatly increase the area of the abandoned cinnamon agroforests, which would then have the potential to greatly change the structure of the local forests over time.

The fate of the Serampas forests in the future will also be significantly influenced by the socio-economic and cultural changes of Serampas, and the presence or absence of a power that administers the forest effectively. The waning of Serampas customary system unavoidably diminishes the role of Serampas in managing the local forests. Elsewhere, there is a common tendency with respect to the declining of local people's attachment to their forests. Bromley and Cernea (1989) argue that in many developing countries, the waning traditional institutions have not been directly replaced by the formation of more effective organizations. Moreover, government institutions also have not satisfactorily taken over the earlier resource management systems. In addition, some existing traditional institutions have guided resource management that threaten sustainability (e.g., Watts, 2003). He suggests not generalizing that local people are the guardian of the forests. Traditional resource management systems are not always or necessarily ecologically sound (e.g., Campbell 1999, see Chapter 4). For example, sometimes local leaders manipulate the local customary system for personal interests in ways that are not ecologically sustainable (also Chapter 11). Serampas share a common experience in the implementation of local customary system (adat).

Nanang and Inoue (2000) argue that local people have the capability to manage forests on a sustainable basis by empowering their traditions. To do so, Watts (2003) suggests developing a partnership between the state and community/private institutions. The state serves as a consultative body and undertakes the highest level of forest management through law enforcement; whereas the community and/or the private institutions undertake forest management and law enforcement on a daily basis. However, Nanang and Inou (2000) warn that it is necessary to consider specific socio-economic and cultural properties associated with each community and discourage the standardization of forest development model across different communities. Charnley and Poe (2007) conclude that there are still some gaps in term of state-community forest partnerships. The delegation of power to the local people to govern the forest has been incomplete and poorly implemented. Moreover, local participation in forest management may provide ecologically, but not necessarily socio-economic benefits. The future of Serampas forest depends on both the local resource management practices and traditions associated with the forest and the government policies that addressing the forest development and conservation, either in the regional or central level.

9.5. Summary

Total forest area in Serampas and in the adjacent sites on the border of the KSNP has decreased over time, especially in the well-accessed areas. Serampas recognize at least three main categories of forests including *rimbo gano* (old-growth forest), *hutan adat* (customary forest) and *rapohen* (secondary forest). The *rimbo gano* covers old-growth forests that mostly belong to the KSNP. Although *hutan adat* and *rapohen* are also within the territory of the park; these forests are traditionally perceived as common property of the local communities.

The Serampas natural resource management practices, especially the cinnamon agroforest may have significant impact on the local forests. Therefore, it is important to examine the impact of the cinnamon to the forests. The future of Serampas forests is also shaped by the local tradition and government policies associated with the forests.

Rapohen has the lowest biodiversity index and species richness as compared to the other forest types. However, in terms of horizontal structure, the *rapohen* is not different from that of *hutan adat* and *rimbo gano* significantly. Moreover, the species diversity in the *hutan adat* is also statistically similar to that of the *rimbo gano*.

Each forest type, including *rapohen*, *hutan adat* and *rimbo gano* harbors species that are quite different from one another. Unfortunately, the expansive development of cinnamon agroforest has considerably reduced the secondary forest. Therefore, perpetuating the existing traditional forest including the *rapohen* and the *hutan adat* is essential since each of the forest type has significant number of unique taxa.

Overall, the forests of Renah Kemumu are richer in species and have higher plant diversity than those of Tanjung Kasri. The closer distance of this village to the vast area of KSNP old-growth forest seems to ease species recruitment that enriches the local forest. Moreover, the livelihood strategy in Renah Kemumu which is more rely on wetland rice farming, instead of shifting agriculture, less threaten the local forests.

Regardless that *hutan adat* has the high species diversity value, this forest has prominent role in preserving local watershed and fragile landscapes. Some values and practices associated with the *hutan adat* have been directed by adat (local customary system). To some degree, adat still control the forests; however, adat's control over the forest has gradually weakened over time with the rising domination of village institutions supported by the government. Re-empowering traditional forest management systems such as the *hutan adat* and putting them in the current context of biodiversity conservation seems to have positive implications in conserving the Serampas forests as well as the KSNP.

CHAPTER 10

SERAMPAS NATURAL RESOURCES: THE FACTS AND THE PEOPLE'S PERCEPTIONS

"Berjalan kincir kareno aek, bergoyang dahan kareno angin"

"Waterwheel is running because of water flow, and branches are weaving due to wind". The proverb implies that an effective leader is able to activate and empower his community to achieve a common goal.

10.1. Introduction

Efforts to conserve biodiversity have a greater chance of being well implemented if they include recognition of local people's relationships to their natural resources. Lynam *et al.* (2007) underline the importance of incorporating local knowledge into developing effective conservation initiatives, although doing so may involve great challenges in tropical forest-dependent communities due to some barriers of poverty, literacy, language, culture and accessibility. Moreover, Lawrence *et al.* (2005) emphasize the importance of integrating local values about some taxa in order to develop forest management policies. To date, researchers, development workers and policy-makers have tended to concentrate only on a number of species that are marketable. In fact, the most marketable species are not always be perceived by local communities as the most valued species.

There is a growing body of literature on the valuation of natural resources. Tuxill and Nabhan (2001) quantified people's valuation of local resources by asking people to allocate a number of grains or other material to an associated resource being valued.

Prance *et al.* (1987) assessed the importance value of plants by categorizing the plants into 'major' and 'minor' uses. Phillips *et al.* (1994) measured the use value of a plant as perceived by a community. They defined "use value" for each species that was estimated based on the degree of consistency of repeated interview with an informant and between different informants. Quinlan (2005) used freelists and quantitatively analyzed ethnobotanical data collected by the freelists to develop "salience value index". .

However, Lawrence *et al.* (2005) warn that a use value is not absolute; it may vary over different times and environments. Lynam *et al.* (2007) suggest that valuation methods should not be used alone; they are usually complemented with other methods and procedures. For example, Sheil *et al.* (2004) adopted and incorporated Tuxill and Nabhan's method on valuation as a part of a more comprehensive landscape assessment (also see Boissiere *et al.*, 2004).

People who live in and around a protected area such as Serampas are at the forefront of efforts to conserve biodiversity resources. Understanding the importance value of resources as perceived by the local people is crucial to develop conservation strategies that meet not only the local people needs, but also the scientific idea of biodiversity conservation (e.g., Lawrence *et al.*, 2000). Specifically, revealing the most important species may drive conservation agenda to also focus on some taxa that are locally perceived to be in critical condition.

This chapter provides a further analysis of the ethnobotanical inventory of Serampas' forests and agroforests by investigating the distribution of ethnobotanical resources and by assessing local people's valuation of their natural resources. Specifically, it addresses three main questions: (1) How do Serampas value their different vegetation/landuse types?; (2) How is the richness, density, basal area and total proportion of useful plant species distributed across different landuses and vegetation types? and (3) What are the most important plants as perceived by Serampas in each landuse/vegetation type?.

10.2. Methods

This chapter describes my research which employs a combination of field ecological assessments and ethnographic methods including in-depth interviews and focus group discussions. The overall fieldwork was carried out with people of Serampas in Central Sumatra, Indonesia over the course of July 2005 to March 2006.

I inventoried useful plants across different vegetation types including *ladang kulit* (cinnamon agroforest), *rapohen* (secondary forest), *hutan adat* (customary forest) and *rimbo gano* (old-growth forest). This inventory was done as part of the vegetation analysis carried out in each land use category (Chapter 8 and 9); specifically I recorded the uses of all the species documented in each transect. I used and modified methods developed by Gentry (1982) and Murali *et al.* (1996) for the vegetation analysis.

Following the above ethnobotanical inventory, I conducted in-depth interviews with local experts using an open-ended questionnaire (Appendix D) mainly to gather more information about plants that are commonly used by the local people. In addition to etnobotanical knowledge collected during the vegetation analysis, I employed this interview to cross check the knowledge. The experts included customary leaders, shamans, midwives, farmers and others who hold knowledge associated with forests and plant uses. The snowball method was applied to select the respondents (Bernard, 2002), starting with the *kepala desa* (village leader). The in-depth interviews were performed with 51 respondents, consisting of 15 people from Tanjung Kasri, 21 people from Renah Kemumu and the other 15 people were respondents who live outside both villages. They are Serampas' scholars, government officers, non-government organization staffs and park officers.

In addition to the above in-depth interview, structured interview explored local knowledge about plants over different vegetation types. I also asked respondents to list plants that occurred in each of the vegetation type. These interviews were part of a more complex interview to reveal practices associated with Serampas' traditional natural resource management presented in earlier chapters. I randomly selected 29 households out of total households' population in both Tanjung Kasri and Renah Kemumu. This number represented 18-20% of the population of households in both villages. Respondents interviewed were either the husband or wife from selected households. They consisted of 13 people from Tanjung Kasri (7 men and 6 women) and 16 people from Renah Kemumu (7 men and 9 women). Although I intended to interview just a husband or wife from a particular household, in some cases I could not avoid additional response (intervention) from one's couple, relative and neighbor who visited a respondent's house or field during the interview.

I also conducted focus group discussions (FGD) to get general ideas about people's perceptions of their natural resources. Two FGDs were performed in each village, one with women and one with men. This FGD was also included a discussion dedicated to explore Serampas cosmologies, myth, stories, local customs, beliefs and values related to local natural resources (as presented in Chapter 3 and 4). The FGDs were enriched by including the pebble distribution method (e.g., Tuxill and Nabhan 2001 and Sheil *et al.* 2004) to illustrate the relative value of local natural resources. Participants demonstrated their relative values of different natural resources by allocating a number of pebbles to each resource. I explained the "rules of the game" before the participants valued each resource. The participants tried out this method to value a series of other objects before doing the real assessment. I used locally available materials, mostly whole blackened coffee beans, to perform the pebble method. I also provided photos of each category of resources to help participants recognize each of the natural resource categories.

This method demonstrated the importance of six resource categories that are closely associated with Serampas' farming system including (1) *rimbo* (old-growth forest and customary forest), (2) *rapohen* (secondary forest), (3) *umo* (shifting agriculture), (4) cinnamon agroforest, (5) coffee agroforest and (6) *sawah* (wetland rice field). This categorization is slightly different from that of vegetation analysis (Chapter 8) and of ethnobotanical inventory (the following section of this chapter). Serampas frequently consider *rimbo gano* (old-growth forest) to overlap with *hutan adat* (customary forest) in that some of the *hutan adat* are also considered as *rimbo gano*; in this section those two forest types are therefore categorized as *rimbo,* a term to refer to the old-growth forest and/or the customary forest.

All plants from the aforementioned vegetation analysis as well as elicited from the above-mentioned ethnographic methods were collected. Vouchers were identified by plant taxonomists at the Herbarium Bogoriense, Bogor Indonesia. The vouchers are stored in the Biology Laboratory, the University of Jambi. Taxonomic grouping and scientific naming of the vouchers was consulted with Index Kewensis under the International Plant Name Index available online at www.ipni.org/.

The quantitative ethnobotanical data collected by the ecological assessment described in Chapters 8 and 9 were categorized according to the use categories and then processed to compute ethnobotanical indicators including family and species richness of useful plants and percentage of useful species from the total collected taxa. Data on useful species collected from the survey were calculated to obtain salience values following Quinlan (2005). For the FGD data, I used cross tabulation of some variables to reveal relationship between them, including any associations between ethnographic data and botanical and/or ecological assessments. I employed two way ANOVAs to analyze resource values by village and gender.

10.3. Results

10.3.1. Local Land Use: Socio-economic and Cultural Importance

The findings of FGDs indicated that in general, Serampas place equal value on most of land use types, except for *umo* and *sawah*. People in the village of Tanjung Kasri, who are highly dependent on shifting agriculture, perceive *umo* as the most importance resource (Fig 10.1**Error! Reference source not found.**). Moreover, people in this village value the *umo* significantly higher than that of Renah Kemumu ($p=0.02$). On the other hand, people in the latter village who more dependent on *sawah*, perceive this wetland significantly higher than that of Tanjung Kasri ($p=0.07$). *Sawah* is the most important natural resource in Renah Kemumu.

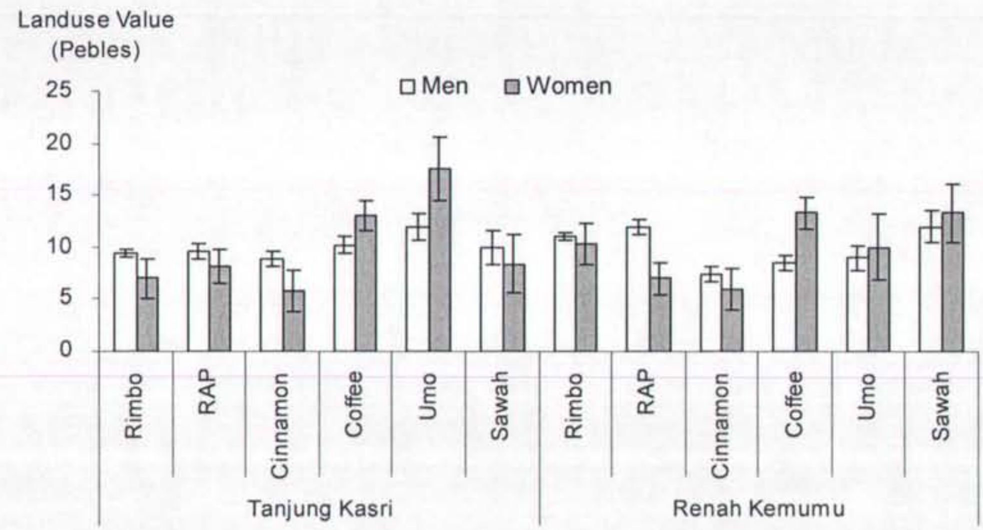


Fig. 10.1. The Importance Value of Land-Use Types for Tanjung Kasri and Renah Kemumu as Determined Using the Pebble Method *)

*) Total value for six landuse types is 60, *Rimbo* = old-growth forest and/or customary forest, RAP = *Rapohen* (secondary forest), *Umo* = Shifting Cultivation, *Sawah* = Wetland rice field.

In both Tanjung Kasri and Renah Kemumu, people perceive their coffee agroforests to be their second most important natural resource after rice-producing fields. Conversely, cinnamon, which used to be the backbone of Serampas economy, at least for several years, is ranked in the lowest level. Coffee agroforests have gradually taken over the economic role of the cinnamon agroforest. Surprisingly, women in both village consistently place coffee agroforests in a significantly higher value than that of men ($p=0.01$).

Serampas give a middle value to forests, both old-growth forest and secondary forest. People of Renah Kemumu value *rimbo* (old-growth and/or customary forest) higher than that of Tanjung Kasri; however the value is not different significantly. For secondary forest, men in both villages ranked the forest significantly higher than did women (p=0.01).

10.3.2. Distribution of Useful Plants across Different Forest Types Land Uses

Out of 360 species of plant recorded in Serampas from the vegetation transects (Chapters 8 and 9), 201 species (56%) are commonly used by local people for various uses including food (76 species), construction (65 species), tools and fibers (31 species), medicines (18 species), ritual (16 species) and 45 species for other uses. Some of the species are used for more than one use category (see Table A.17 to A.21). The other species are crops that are commonly cultivated in a small patchy garden around *pondok* and *pelak* (Chapter 8 and Table A.1). Incorporating the crops increase the overall percentage of useful plants from the existing taxa from 56% to a level of 59%.

Rimbo gano has the highest number of useful species, followed by *hutan adat*, *rapohen* and cinnamon agroforest, in the lowest position [Fig. 10.2(a)]. Overall, land use types of Renah Kemumu support a much higher number of useful plant species than those of Tanjung Kasri (p=0.0003, Fig 10.3).

However, in terms of the proportion of useful species in each landuse category, the Tanjung Kasri has higher percentage of useful plants than does Renah Kemumu [p=0.05, Fig 10.2(b)]. Edible plants and construction plants are well represented in all forest types (Fig. 10.3). In contrast, medicinal plants and ritual plants are more represented in farming fields than in those forests. Across all land-use types, the average proportion of useful plants was similar, and ranged from 58-85% [Fig. 10.2(b)].

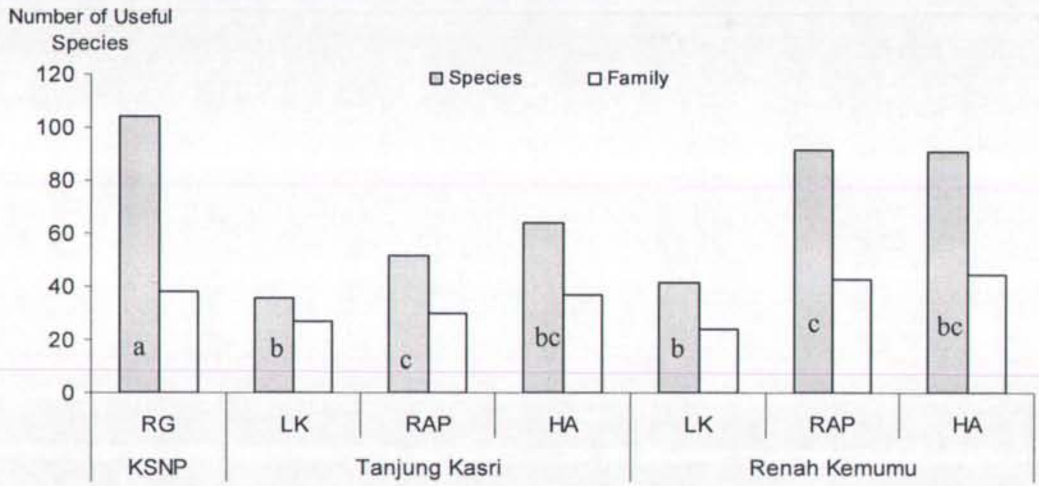


Fig. 10.2(a). The Number of Useful Species and Families in Each Landuse Category and Village*)

*) RG = *Rimbo Gano* (Old-growth Forest), LK= *Ladang Kulit* (Cinnamon Agroforest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest), KSNP = Kerinci Seblat National Park)
The bars with the same letter are not significantly different at α=0.05

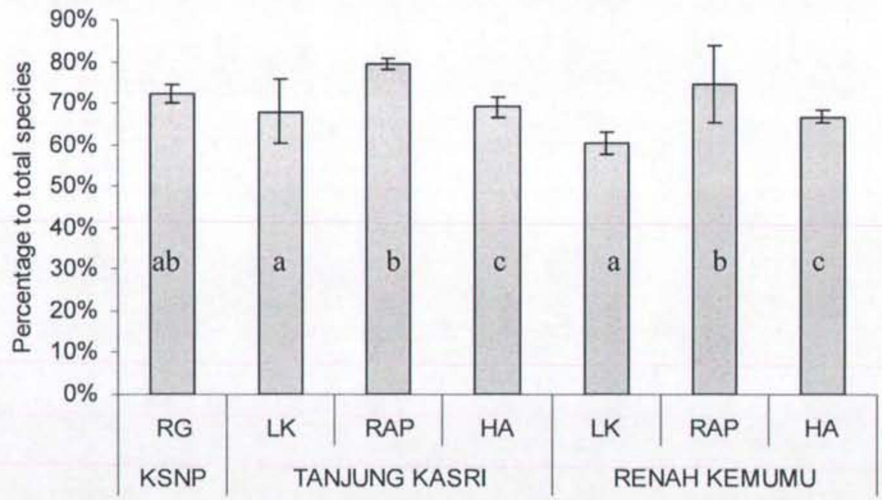


Fig. 10.2(b). Percentage of Useful Plant Species in Each Landuse Category and Village*)

*) RG = *Rimbo Gano* (Old-growth Forest), LK= *Ladang Kulit* (Cinnamon Agroforest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest), KSNP = Kerinci Seblat National Park)
The bars with the same letter are not significantly different at α=0.05

In *rimbo gano* (old-growth forest), out of 175 species recorded in this forest, about 72 percent are useful species. They include species for construction (37 species), food (47 species), medicine (12 species), tool and fiber (18 species), ritual (8 species) and 22 species for other uses. Obviously, the *rimbo gano* has the highest number of edible plant species compare to the other forest types (Fig 10.3).

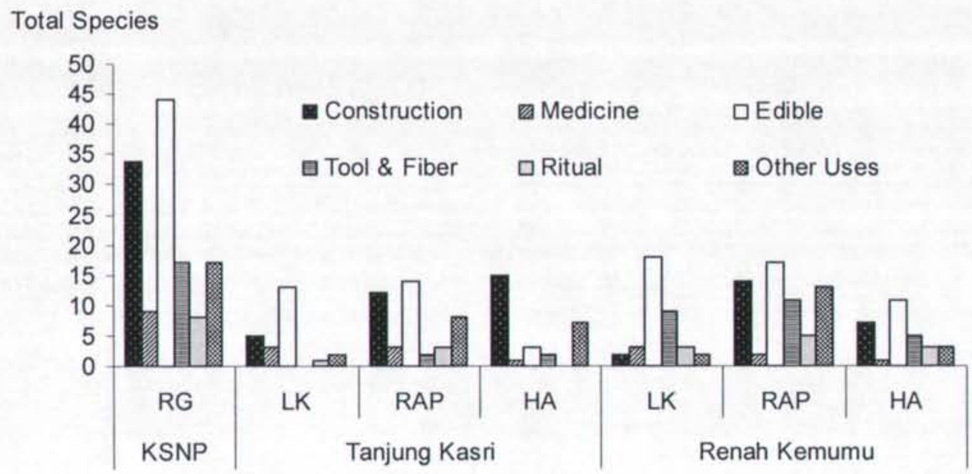


Fig. 10.3. Serampas Useful Species Richness by Use Category and Village*)

*) RG = *Rimbo Gano* (Old-growth Forest), LK= *Ladang Kulit* (Cinnamon Agroforest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest), KSNP = Kerinci Seblat National Park)

In addition to the *rimbo gano*, *hutan adat* (customary forest) also harbors a large number of useful plants. In the plots established in the *hutan adat* of Tanjung Kasri and Renah Kemumu occur at least 137 useful species including edible plants (50 species), construction plants (45 species), tool and fiber plant (23 species), medicinal plant (11 species), ritual plants (11 species) and 22 species for other uses. The most represented families of useful plants in the forest are Lauraceae, Arecaceae and Euphorbiaceae (Table 10.1).

In *rapohen* (secondary forest), at least 125 species out of 204 species that occur in this forest are recognized as useful species; the average useful plants in the *rapohen* plots is 78%. The percentage of useful plants in this secondary forest is not significantly different from *rimbo gano* and is higher than that in other forest types. The useful plants in the *rapohen* consisted of 50 species for food, 31 species for construction, 16 species for tools and fibers, 14 species for medicines, 12 species for ritual and 30 species for others uses. As mentioned in Chapter 5, the *rapohen* together with *umo* constitute the most important source of Serampas' pharmacopeias. The complete list of the medicinal plants as well as the other useful plants on this *rapohen* is presented in Table A.17 and A.18. The main families that mostly constitute useful plants in the *rapohen* are Zingiberaceae, Euphorbiaceae, Lauraceae, Rubiaceae, Arecaceae and Moraceae (Table 10.1).

The main edible taxa in the rapohen are mostly dominated by Zingiberaceae species such as *puar* (Alpinia sp.), *lolo (Hornstedtia* sp.), *kelu* (*Etlingera elatior* (Jack) R. M. Sm.) and *nalam nasi* (*Zingiber* sp.). *Bauk'eng (Baccaurea* lanceolata Muell. Arg., Euphorbiaceae) that produces sour-taste fruit is also abundant in this *rapohen.* This forest is also rich of some cultivated fruit such as durian *(Durio zibethinus* Murr.), *cempedak (Artocarpus integra* Merrill) and *payang (Pangium edulis* Reinw).

Table 10.1. Top Ten Families of Useful Plants in Each Serampas Landuse Category

No.	*Rimbo Gano* (Old-growth Forest)		*Hutan Adat* (Customary Forest)		*Rapohen* (Secondary Forest)		Ladang Kulit (Cinnamon Agroforest)	
	Family*)	**Total Species**	**Family*)**	**Total Species**	**Family*)**	**Total Species**	**Family*)**	**Total Species**
1	Laur	11	Laur	14	Zingi	9	Euph	6
2	Arec	10	Arec	12	Euph	8	Meli	5
3	Mora	10	Euph	12	Laur	8	Poa	5
4	Rubi	8	Mora	7	Rubi	8	Urti	5
5	Meli	5	Zingi	7	Arec	8	Faba	4
6	Myrt	5	Meli	6	Mora	7	Rubi	4
7	Urti	5	Rubi	6	Myrt	5	Mora	3
8	Zingi	5	Faga	4	Faba	4	Zingi	3
9	Euph	4	Urti	4	Urti	4	Arec	2
10	Faga	3	Clusi	3	Meli	3	Aster	2

*) Arec = Arecaceae; Aste = Asteraceae; Clusi = Clusiaceae; Euph = Euphorbiaceae; Faba = Fabaceae; Faga = Fagaceae; Laur = Lauraceae; Meli = Meliaceae; Mora = Moraceae; Myrt = Myrtaceae; Poa = Poaceae; Rubi = Rubiaceae; Urti = Urticaceae; Zingi = Zingiberaceae.

In cinnamon agroforests the number of useful species ranges between 36 and 42 species. In average, useful plants constitute 66% of flora in the cinnamon agroforest plots [Fig. 10.2(b)]. Although agroforest have the least number of useful species, the percentage of useful species in the agroforest is not significantly different from that of *rimbo gano.* The useful plants in the cinnamon agroforest consists of 31 edible species, 7 construction species, 9 species for tools and fibers, 15 medicinal species, 7 ritual species and 3 species for others uses.

In terms of density, Renah Kemumu significantly has the higher density of useful plants than those of Tanjung Kasri [p=0.01, Fig. 10.4(a)]. *Rimbo gano* has higher number of useful species than agroforest and hutan adat (p=0.04); however the density of useful plant in the *rimbo gano* is not significantly different form that of *rapohen* (p=0.07). The useful plant density in *rapohen* is also not different significantly from *hutan adat*, although the *rapohen* has higher useful plant density. Useful plants in the *rapohen* are mostly dominated by midstory individuals. The forests of Tanjung Kasri tend to have more overstory individuals of useful plants than those of Renah Kemumu [Fig. 10.4(b)].

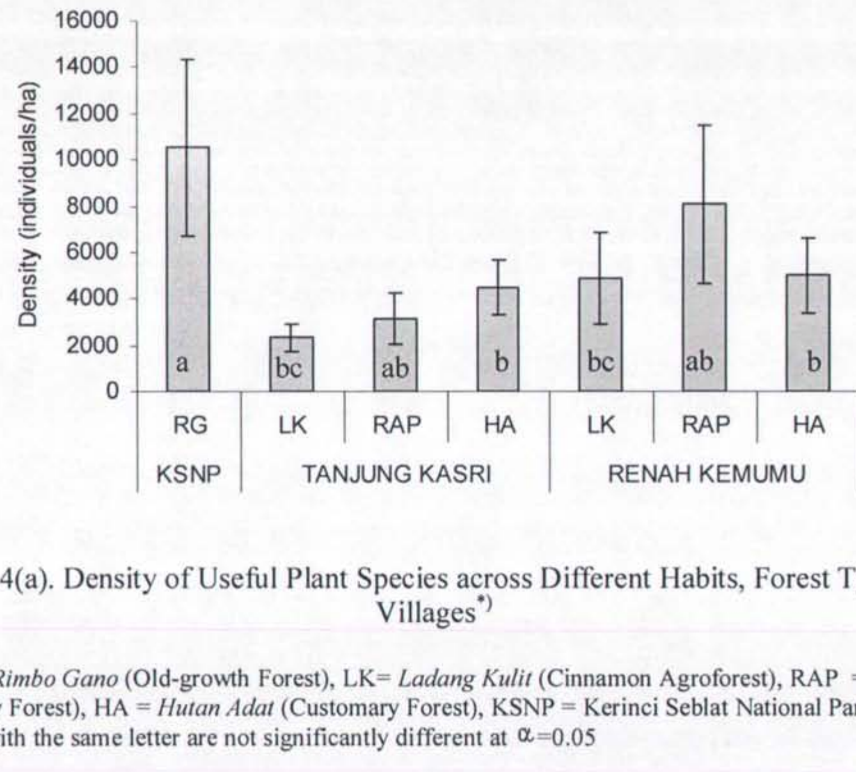


Fig. 10.4(a). Density of Useful Plant Species across Different Habits, Forest Types and Villages*)

*) RG = *Rimbo Gano* (Old-growth Forest), LK= *Ladang Kulit* (Cinnamon Agroforest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest), KSNP = Kerinci Seblat National Park)
The bars with the same letter are not significantly different at $\alpha=0.05$

Corresponding to the density of useful species, the forests and agroforest of Renah Kemumu also support greater basal area of useful plants (p = 0.03), especially for construction materials [Fig 10.4(c)]. However, the useful plant basal area is not different across different forest/agroforest types in both village (p=0.14).

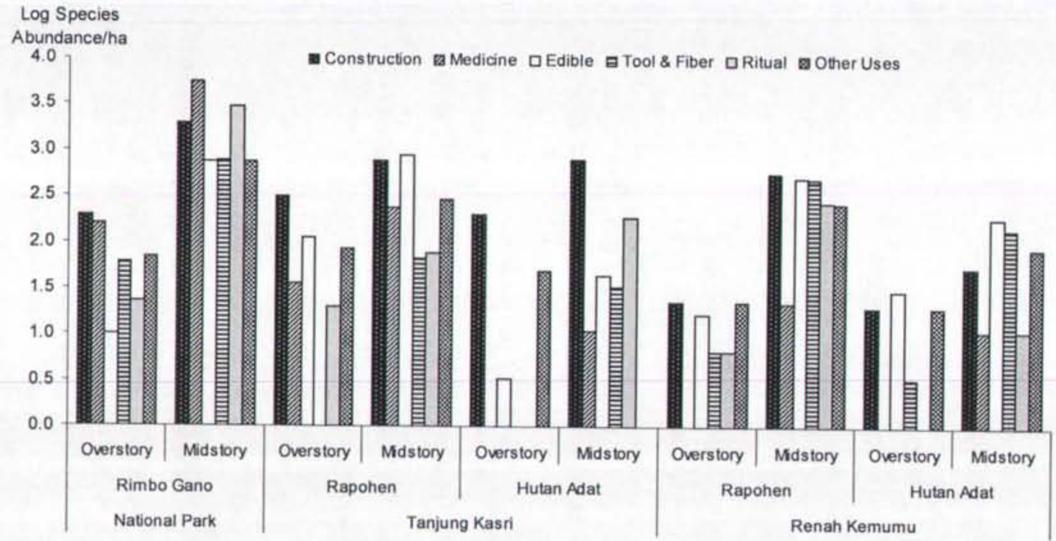


Fig. 10.4(b). Abundance of Useful Plant across Different Habits, Forest Types and Villages*)

*) RG = *Rimbo Gano* (Old-growth Forest), RAP = *Rapohen* (Secondary Forest), HA = *Hutan Adat* (Customary Forest).

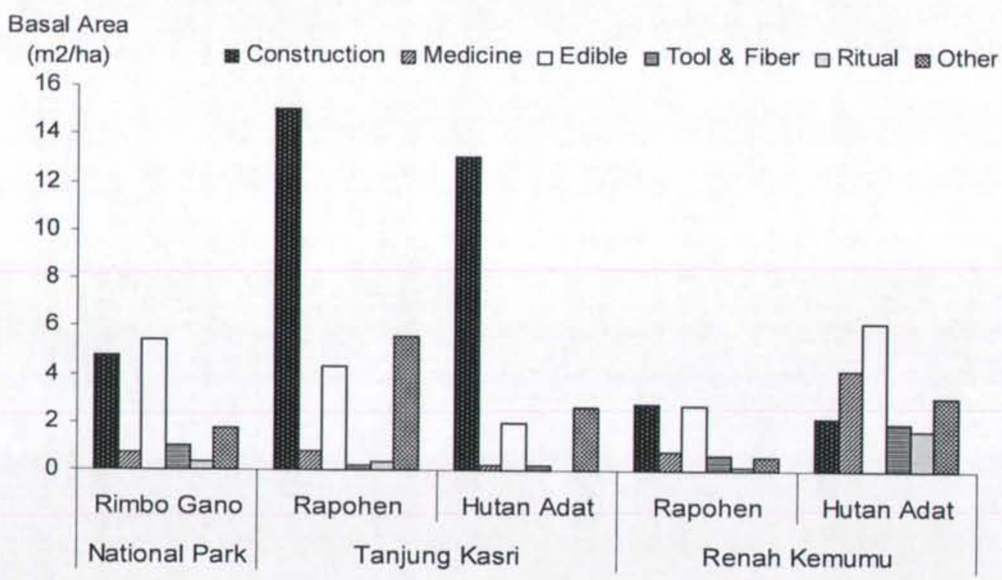


Fig. 10.4(c). Total Basal Area of Useful Plants across Different Habits, Forest Types and Villages*)

*) *Rimbo Gano*: Old-growth Forest, *Rapohen*: Secondary Forest, *Hutan Adat* : Customary Forest.

10.3.3. The Most Important Plants: People's Perceptions

In this section I use the term *rimbo* to refer to the *rimbo gano* (old-growth forest) and/or the *hutan adat* (customary forest). In the eyes of Serampas, an important species of plant does not necessarily mean a useful plant. Some "distracting plants", are also recognized as important plants. They include a number of species that most people feel inconvenience to interact with, regardless the fact that some of the species are useful plants. For example, some people recognize *jelatang* (*Laportea* spp.) as important species in the *rapohen* because of their fruit edibility. However, other people perceive that these species are important due to their notorious itchy hairy leaves. People have to keep opening their eyes to the distracting plants that mostly belonging to Urticaceae when they work either in the forest or in the agricultural fields. People also perceive the importance of *jerambing* (*Bidens pilosa* Linn., Asteraceae) and *rumput terbung* (*Setaria plicata* T.Cooke, Poaceae) for different reasons. Some argue that these species are common weeds in their *ladang kulit*. The others recognize those species as important sources of fodder for their cattle especially horses and cows.

The most important plants was revived by looking at respondents' free-lists and the top five important ethnospecies in each land-use category. In this dissertation, the importance of plant was defined based on the order cited by respondents. The plant that firstly cited was categorized as the most important plant. Following Quinlan (2005), the free-list method assumes that people tend to list items in order of (i) familiarity, (ii) knowledge and (iii) prominence. Thus a species that is first mentioned by a respondent is perceived as the most important species. Importance level of a species is represented by a salience value. This value was calculated based on frequency of citation for each taxon and weighted according to the position of the taxon in the list. The higher the value the more important is the species. The salience value for each species is presented in Table A.22 to A.27.

In the list of important plants, each species may not be equally weighted because some ethnotaxa include several botanical species. For example, people put various species of bamboo (which belong to several genera) into *buluh*, an ethnogenus. They also put some species of rattans into single ethnogenera (*rotan*) that mainly include some species of *Calamus* and *Khortalasia*.

People had the longest list of useful species from *rapohen* (secondary forests) (36-48 species), followed by those growing in *rimbo* (old-growth/customarry forest) (30-38 species) and in *ladang kulit* (cinnamon agroforests) (24-26 species). Ten of the most important species are presented in Table 10.2. Overall, people in the village of Renah Kemumu listed 85 different species; whereas people in Tanjung Kasri had a slightly shorter list (66 species). There was a high overlap of listed species between the two villages; between 49% and 64%, depending on the land-use type. However, the relative values of each species are quite different in each village. For example, the species that was perceived as the most important species in the forests of Renah Kemumu (e.g., *Elaeocarpus stipularis* Bl.) was considered as a less important species in forests of Tanjung Kasri.

The list of important species differed across landuse categories. Important species in *rimbo* were dominated by rattan, *manau* and some timber species, especially *surian rimbo* (*Toona sureni* Merr.), *asal* (*E. stipularis*) and *medang giring* (*Persea cf rimosa* Zoll. ex Meisn.). Conversely, other than cinnamon; the important species that occurred in *ladang kulit* (cinnamon agroforest) were dominated by more cultivated edible species such as *durian* (*Durio zibethinus* Murr.), *petai* (*Parkia speciosa* Haask.) and coffee. Some species of weeds such as *rumput gedang* (*Erechtites valerianaefolia* D.C.) and *rumput angit* (*Ageratum conyzoides* L.) were also important species in the *ladang kulit*. *Rapohen* held some useful species that also occur in both *rimbo* and *ladang kulit;* people asserted that the *rapohen* harbors both timber species and cultivated edible plants. In this forest type, timber species are mostly dominated by some pioneer species such as *narung* (*Trema orientalis* Bl., Ulmaceae) and *sapat* (*Macaranga tanarius* Muell. Arg., Euphorbiaceae).

Table 10.2. Ten Most Important Species across Different Land-Use Categories

	Tanjung Kasri			**Renah Kemumu**		
	Local Name	**Scientific Name**	**Family*)**	**Local Name**	**Scientific Name**	**Family*)**
	A. *Rimbo* (Old-growth Forest and Customary Forest)					
1	*Surian rimbo*	*Toona sureni* Merr.	Meli	*Buluh*	*Several genera*	Poac
2	*Medang Giring*	*Persea cf. rimosa* Zoll. ex Meisn.	Laur	*Asal*	*Elaeocarpus stipularis* Bl.	Elae
3	*Asal*	*Elaeocarpus stipularis* Bl.	Elae	*Surian rimbo*	*Toona sureni* Merr.	Meli
4	*Rotan*	*Calamus spp & Khortalasia spp.*	Arec	*Manau*	*Calamus manna* Miq.	Arec
5	*Buluh*	*Several genera*	Poac	*Rotan*	*Calamus spp & Khortalasia spp.*	Arec
6	*Batang Bintang*	*Bischofia javanica* Bl.	Euph	*Telap*	*Morus sp.*	Mora
7	*Manau*	*Calamus manna* Miq.	Arec	*Medang Giring*	*Persea cf. rimosa* Zoll. ex Meisn.	Laur
8	*Seri*	*Ficus tinctoria* G. Forst. f.	Mora	*Medang Jambu*	*Nothaphoebe umbelliflora* Bl.	Laur
9	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubi	*Mentang Keladi*	*Syzygium acutangulum* Nied.	Myrt
10	*Medang Jambu*	*Nothaphoebe umbelliflora* Bl.	Laur	*Medang Simpai*	*Litsea grandis* Hook.f.	Laur
	B. *Rapohen* (Secondary Forest)					
1	*Narung*	*Trema orientalis* Bl.	Ulma	*Petai*	*Parkia speciosa* Haask	Faba
2	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Aste	*Durian*	*Durio zibethinus* Murr.	Bomb

Table 10.2. (Continued) Ten Most Important Species across Different Land-Use Categories

	Tanjung Kasri			Renah Kemumu		
	Local Name	**Scientific Name**	**Family*)**	**Local Name**	**Scientific Name**	**Family*)**
3	*Sapat*	*Macaranga tanarius* Muell. Arg.	Euph	*Narung*	*Trema orientalis* Bl.	Ulma
4	*Surian*	*Toona spp.*	Meli	*Jengkol*	*Archidendron pauclorum* (Benth.) I.C. Nielsen	Faba
5	*Semlo'en*	*Homalanthus giganteus* Zoll. & Mor.	Euph	*Surian*	*Toona spp.*	Meli
6	*Buluh*	*Several genus*	Poac	*Kepayang*	*Pangium edule* Reinw.	Flac
7	*Duri Peringat*	*Rubus moluccanus* Linn.	Rosa	*Molesaten*	*Villebrunea rubescens* Bl.	Urti
8	*Durian*	*Durio zibethinus* Murr.	Bomb	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Aste
9	*Nulang*	*Glochidion obscurum* Bl.	Euph	*Sapat*	*Macaranga tanarius* Muell. Arg.	Euph
10	*Petai*	*Parkia speciosa* Haask.	Faba	*Buluh*	Several genus	Poac
	C. *Ladang Kulit* (Cinnamon Agroforest)					
1	*Kulit manis*	*Cinnamomum burmannii* (Nees & T. Nees) Bl.	Laur	*Kulit manis*	*Cinnamomum burmannii* (Nees & T. Nees) Bl.	Laur
2	*Petai*	*Parkia speciosa* Haask.	Faba	*Kopi*	*Coffea spp.*	Rubi
3	*Kopi*	*Coffea spp.*	Rubi	*Durian*	*Durio zibethinus* Murr.	Bomb
4	*Durian*	*Durio zibethinus* Murr.	Bomb	*Petai*	*Parkia speciosa* Haask.	Faba
5	*Surian*	*Toona spp.*	Meli	*Jering*	*Archidendron pauclorum* (Benth.) I.C. Nielsen	Faba
6	*Jering*	*Archidendron pauclorum* (Benth.) I.C. Nielsen	Faba	*Surian*	*Toona spp.*	Meli
7	*Jelatang*	*Laportea spp.*	Urti	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Aste
8	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Aste	*Rumput Gedang*	*Erechtites valerianaefolia* DC.	Aste
9	*Rumput Angit*	*Ageratum conyzoides* Linn.	Aste	*Pinang*	*Areca catechu* Linn.	Arec
10	*Narung*	*Trema orientalis* Bl.	Ulma	*Jerambing*	*Bidens pilosa* Linn.	Aste

*) Arec = Arecaceae; Aste = Asteraceae; Bomb = Bombaceae; Elae = Elaeocarpaceae; Euph = Euphorbiaceae; Faba = Fabaceae; Flac = Flacourtiaceae; Laur = Lauraceae; Meli = Meliaceae; Mora = Moraceae; Myrt = Myrtaceae; Poac = Poaceae; Rosa = Rosaceae; Rubi = Rubiaceae; Ulma = Ulmaceae; Urti = Urticaceae.

The Arecaceae family is the most important family in *rimbo* followed by Lauraceae, Meliaceae and Poaceae (Table 10.3), whereas in *rapohen*, Euphorbiaceae is the most important family. Other important families in this *rapohen* include the Asteraceae, Ulmaceae and Fabaceae. Similar to the *rimbo*, Lauraceae is also the most important family in the *ladang kulit*. The other important families in this agroforest include Fabaceae, Asteraceae and Rubiaceae.

Surian, which consisted of *surian bungkal* (the cultivated *surian, Toona sinensis* M. Roem) and *surian rimbo* (the wild *surian, T. sureni* Merr.) is consistently perceived as one of the most important taxa for people in both Tanjung Kasri and Renah Kemumu (Table A.22 to A.27). *Surian* is well represented in all landuse categories. The wild *surian* that commonly grows in old-growth forest and secondary forest very occasionally grows in the *ladang kulit*, whereas the *surian bungkal* is restricted mostly in the *rapohen* and *ladang kulit*.

Table 10.3. The Five Most Important Families in Different Types of Land-Use

Village/ Land-Use Category	**Tanjung Kasri**		**Renah Kemumu**	
	Family	**CSV*)**	**Family**	**CSV*)**
A. *Rimbo* (Old-growth Forest and Customary Forest)	Lauraceae	0.930	Arecaceae	0.802
	Meliaceae	0.748	Poaceae	0.628
	Arecaceae	0.509	Elaeocarpaceae	0.559
	Moraceae	0.379	Meliaceae	0.513
	Elaeocarpaceae	0.364	Moraceae	0.368
B. *Rapohen* (Secondary Forest)	Euphorbiaceae	0.688	Fabaceae	0.589
	Asteraceae	0.494	Bombacaceae	0.321
	Ulmaceae	0.488	Ulmaceae	0.321
	Poaceae	0.288	Asteraceae	0.289
	Meliaceae	0.246	Euphorbiaceae	0.268
C. *Ladang Kulit* (Cinnamon Agroforest)	Lauraceae	0.746	Lauraceae	0.716
	Asteraceae	0.537	Rubiaceae	0.542
	Fabaceae	0.531	Fabaceae	0.521
	Rubiaceae	0.341	Asteraceae	0.391
	Bombacaceae	0.340	Bombacaceae	0.347

*) CSV: Complex Salient Value

10.4. Discussion

10.4.1. Local Land Use: Socio-economic and Cultural Importance

Serampas categorize their natural resources mainly into *rimbo gano* (old-growth forest) *hutan adat* (customary forest), *rapohen* (secondary forest), *ladang kulit* (cinnamon agroforest), *umo* (shifting agriculture) and *sawah* (wetland rice field). The *rapohen* is further divided into *belukar mudo* (young secondary forest) and *belukar tuo* (old secondary forest). However, people's perception of the relative importance value of the *hutan adat* and of its species were frequently ambiguous with respect to those of *rimbo gano*. The weakening of Serampas customary system that used to totally control the *hutan adat* (Chapter 4) may contribute to this growing ambiguity. The KSNP initiative to revive the *hutan adat* while introducing park zonation (Chapter 7) does not seem to have significantly reduced the ambiguity.

Serampas do not perceive of their forest, either *rimbo* or *rapohen,* as more important than their *umo* or *sawah.* This implies that Serampas are closer to an agricultural community and are less dependent on the forest. The fact that Serampas' categorization of forests is also less complex than other forest communities (Chapter 9), also corroborate the notion that they are more an agricultural society.

In terms of the importance value across different land uses, people of Serampas value the land uses differently. The shifting agricultural field is the most important landuse for the people of the village of Tanjung Kasri. The relative value of the shifting agricultural field is significantly higher than that of Renah Kemumu. In fact, people in Tanjung Kasri also prefer to practice sedentary farming on wet irrigated land. However, the lack of arable wetland in this village forces people to depend on shifting agriculture to fulfill their needs for rice.

On the other hand, for the people of Renah Kemumu, *sawah* (wetland rice field) is the most important natural resource. People in this village value the *sawah* significantly higher than those of Tanjung Kasri. This village has vast arable land for wetland rice farming and makes this village the rice basket of Serampas (Chapter 7).

The *sawah* stretches in a plain near the village's settlement. In addition, people also develop some small parcels of *sawah*, employing wet-swampy land scattered around the village. They even employ wetlands in forest interior to develop their *sawah*. However, some parcels of the *sawah* are being abandoned, especially those located in remote and isolated areas. The high risk involved in cultivating the sawah alone, especially due to challenges from pests (e.g., sparrow and boar), hampers people from growing rice in such isolated areas.

Although Serampas do not perceive forest resource as their most important natural resources, to some extent they still depend on the forest. The finding that men place significantly higher value on secondary forests than do women can be explained by the fact that most forest-related activities such as hunting, fishing, logging, timber harvesting and forest clearing in Serampas are still men's domain. Similar to Serampas, men of Memberamo Watershed in West Papua also value forest higher than do women (Boissiere *et al.*, 2004).

In term of agroforests, women in both villages of Tanjung Kasri and Renah Kemumu consistently valued coffee agroforest significantly higher than men. Women seem to be more aware of the importance of the contribution of coffee agroforest to family income. Women are mainly involved in harvesting and processing the coffee beans. Similar to Serampas, women of Papua also value sago garden higher than do men (Boissiere *et al.*, 2004). The sago, which is mostly cultivated by the women, supplies most staple food for people in the region. In Peru, Lawrence *et al.* (2005) also revealed that women value fruit taxa more than do men.

Villagers who grow coffee enjoy gradual increase in price of the bean. At the end of my field work, the price of sun-dried coffee bean in close-by markets was almost double from the previous years and reached a level of Rp 8,000 (USD 0.88) per kg. As a comparison, the price of cinnamon which used to be the main source of cash for Serampas, remained stable at Rp 4,000 (USD 0.44) per kg. Moreover, harvesting the cinnamon also requires more labor costs than that of coffee. Today villagers treat the cinnamon as a safety net (also Neidel, 2006), they will harvest the cinnamon only if they have no other alternative sources of cash.

10.4.2. Distribution of Useful Plants over Different Land Uses

At least 56 % (201 species) of the plant taxa sampled in Serampas' forests (including old-growth forest, customary forest and secondary forest) are recognized as useful plants. The percentage is similar to that found in various studies elsewhere. For example, it is the same as that observed by Bussmann (2006) in the Mountain of Nyiru, South Turkana, Kenya. He recorded 249 (56%) useful plants out of a 448 plant collection. The percentage of plants that are useful for Serampas is higher than that of some other culture such as the Panare (34 species, 49%) (Prance *et al.*, 1987) and Los

Gwarayo (44% out of 123 species) (Toledo & Salick, 2006). However, the percentage of Serampas useful flora is lower than that of indigenous groups elsewhere including the Tembé (73 species, 61%), Ka'apor (76 species, 77%), Chácobo (74 species, 79%) (Prance *et al.*, 1987), an aboriginal group in northern Peru (131 species, 60.1%) (Pinedo-Vasquez *et al.*, 1990).

The forests and agroforest of Tanjung Kasri Significantly have higher percentage of useful plant species than Renah Kemumu. This finding is contradictory with the overall of species richness which is higher in Renah Kemumu than that in Tanjung Kasri (Chapter 9). However, overall the forests and agroforest in Renah Kemumu significantly hold a greater number of useful species. Some species such as *bungkul* (*Stelechocarpus burahol* Hook. f. & Thoms) and *tajam tumpul* (*Castanopsis javanica* A.DC.) are found only in the forests of Renah Kemumu. The *bungkul* is an Annonaceae species that produces edible sweet fruits with conspicuous cauliflowers. The less extensive practice of shifting agriculture as well as their close connection to vast old-growth forest of the park may facilitate higher species recruitment in the forests of the village.

Corresponding to total species richness and diversity in each forest type (Chapter 9), old-growth forests also provide the highest richness of useful plant species [Fig. 10.2(a)]. Parallel to its biodiversity index (Chapter 9), cinnamon agroforest consistently has the lowest species richness of useful plants, whereas, secondary forest and customary forest are in between agroforest and old-growth forest.

Medicinal plants as well as ritual plants in Serampas are less represented than the other plant use categories, representing only 5% (18 species) from the total plant taxa. The proportion of medicinal plant species in the Serampas forests (1-9%) is lower than that reported elsewhere. Pinedo-Vasquez *et al.* (1990) recorded 9.9% species of medicinal plant out of 218 species identified in the Northeastern Peru. In Mt. Nyiru, South Turkana, Kenya, Bussmann (2006) found 18% medicinal plant out of 448 plant species occurred in the mountain. In northeastern Costa Rica, medicinal plants are highly represented, contributing 167 species (36%) out of 459 woody species collected from the local forests (Chazdon and Coe, 1999).

However, basal area of the medicinal plants is moderately represented in the *rimbo gano* and in the *hutan adat* of Renah Kemumu [Fig 10.4(c)]. The total basal area of medicinal plant in the latter forest is the highest among the other forest types. This is because the medicinal plants include tree and liana such as *lenzat hutan* (*Aglaia odoratissima* Lour., Meliaceae), *kiro munting* (*Nauclea calycina* Bartl.ex DC., Rubiaceae) and *akar rundang* (*Poikilospermum suaveolens,* [Blume] Merrill, Moraceae) (a list of possible illnesses and/or ailments the plants are used to remedy is provided in Table A.5).

The high basal area of medicinal plants in the Serampas' forest is due to the fact that many are trees, and differs from studies elsewhere. Ingram *et al.* (2005) observed a very limited basal area of medicinal plants in the littoral forests of Madagascar, as individual medicinal plants that reach more than 15 cm dbh are very rare. In Eastern Nicaragua, about half out of 153 medicinal plants that positively contain alkaloid are herbaceous (Coe & Anderson 1996), trees only constitute 28% of the medicinal plants.

Although useful species richness in secondary forest is not different from *hutan adat*, the secondary forest significantly provides the greatest percentage of useful species. For example, in the village of Tanjung Kasri, about 79% of species occurred in secondary forest are recognized as useful plants [Fig. 10.2(b)]. Moreover, the secondary forests in this village contain high basal area of useful plants, especially for construction and other uses [Fig. 10.4(c)].

Most secondary forests have resulted from the fallowing state of shifting agriculture. This state is required in order to recover land fertility that is greatly reduced after two consecutive years of farming. The practice of the shifting cultivation over generations has driven people to accumulate TEK associated with the shifting agriculture, including knowledge about useful plants. This may be why people recognize a greater proportion of useful plants in secondary forests, especially those that occur abundantly.

In analyzing the families of useful plants, the most dominant families of useful plants differ across the land-uses. In *rimbo gano*, useful plants are dominated by old-growth forest families such as Lauraceae and Meliaceae (Table 10.1). In agroforests and secondary forests, on the other hand, species of useful plants are mostly represented by species belonging to pioneer families such as Euphorbiaceae and Zingiberaceae. Species of Fabaceae also becomes better represented in the secondary forests. Importantly, in the agroforests, species belonging to Poaceae and Asteraceae conspicuously are better represented than those in other land use categories.

Corresponding to customary forest species richness which is in between old-growth forest and secondary forest [Fig 10.2(a)], families of useful plant in the customary forest are also in a level between old-growth forest and secondary forest. Both mature-forest families and pioneer families such as Lauraceae and Euphorbiaceae are fairly represented in the customary forest (Table 10.1).

Overall, edible plants and construction plants are quite well represented in all land use categories. Unsurprisingly, *rimbo gano* has the highest richness of useful species for all plant use categories. Plants for food, construction, tool and fiber and for other uses are well represented in this forest [Fig 10.4(b)]. Obviously, the *rimbo gano* harbors the highest number of edible species than other land use types; edible plants constitute 47 species (27%) in this forest. However, the number and percentage of the edible plant is not exceptional compared to other cultures. In Northeastern Peru, Pin˜edo-Vasquez *et al.* (1990) recorded 28.2% edible plant out of 131 identified useful tree species. In other parts of Neo Tropics, Prance *et al.* (1987) identified edible tree species with some indigenous groups in the region that ranges from 22% to 40%.

Among the existing forest types in Serampas, *rapohen* of Tanjung Kasri has the lowest number of species and families of useful plant [Fig. 10.2(a)]. This is a reflection of the lower overall species richness in the *rapohen* (Chapter 9). However, this forest has great volume (dbh) of plants for construction, food and for other uses as well as higher percentage of useful species. Even for the construction, *rapohen* in this village bears a higher volume (basal area) of useful plants than that of the other landuse categories [Fig 10.4(c)].

As mentioned in Chapter 7, people of Tanjung Kasri have been more dependent on shifting cultivation and have developed vast secondary forests. The extensive and continual practice of the shifting cultivation over long time may gradually have directed the succession of secondary forests in this village towards forests dominated by more human-preferred species. A number of processes including experimentation, evaluation, development, sharing and transmission of knowledge about a particular taxon in the secondary forest ultimately influence people perceptions and drive them to develop cultural consensus about the use and value of the taxon. On the other hand, people use their knowledge and perception about useful taxa to manage the forest toward a condition dominated by preferred taxa. The practice of partially managing some locally important timber species; such as *surian rimbo* (*Toona sureni* Merr., Meliaceae) in the secondary forests clearly illustrates this. Such practice facilitates recruitment of some preferred species in the secondary forest and over long run, contributes in shaping species composition of the secondary forest. Forest people frequently develop human-managed forests containing both native species and introduced species (Posey 1984, Balée & G´ely 1987, Balée 1989, Irvine 1989, G´omez-Pompa & Kaus 1990, Alcorn 1995, Toledo & Salick 2006).

Other than the *surian rimbo*, some other timber species that commonly occur in the *rapohen* are *kayu kelat* (*Helicia rostrata* D. B. Foreman, Proteaceae) and *sapat* (*Macaranga tanarius* Muell. Arg., Euphorbiaceae). Serampas likely value the most abundant and the most accessible and available species such those species above. Murali *et al.* (1996) corroborate the idea that people tend to harvest the most abundant species rather than the less common species.

The customary forests of Tanjung Kasri have more species and families of useful plant than those of secondary forests; whereas in Renah Kemumu, the number of useful plants in customary forest and secondary forest are similar [Fig 10.2(a)]. The finding that customary forest have lower percentage of useful species than other forest types [Fig 10.2(b)] is likely due to the fact that most of the customary forests stretch mainly along steep lands of watershed forests. Cutting timber in such forest will severely degrade the land, the water, as well as the flora in the forest. People used to obtain permits from local leaders prior to cutting timber from the forest. A similar practice is also recognized by Dayak Iban in Western Borneo (Wadley and Colfer, 2004). Although customary rules dealing with the forest are weakened and barely publicized, people are still reluctant to cut timber from customary forests. Instead, they prefer to obtain timber in other forests. Recognition of the customary forests over generations might have influenced peoples knowledge of useful plants in this forest type; shifting and accumulating more knowledge about plants to that occurred in other forest types such as secondary forests. Another possibility is that ethnobotanical knowledge associated with flora in the customary forest may have declined since people now use the plants less intensively as the case in eastern Amazon where local knowledge about plant declined since people have engaged in logging industry (Shanley and Rosa, 2004).

Compared to other landuse categories, cinnamon agroforests bear the lowest richness of useful plant. Cinnamon trees that dominate agroforest provide less space for wild overstory taxa to grow in between the cinnamon (Chapter 8). For example, the cinnamon agroforest of Tanjung Kasri has only six overstory species including cinnamon (*Cinnamomum burmannii* [Nees & T. Nees] Bl.) Most of useful species in this landuse category are midstory and understory taxa. However, even though many stands of midstory and understory taxa are useful species, they do not necessarily reach maturity thus may not be harvested.

In general, cinnamon agroforests in Renah Kemumu support more useful plants than the similar agroforests of Tanjung Kasri. Moreover, the useful plants that occurred in the agroforests in both villages mostly belong to different taxa (Fig 8.7). Cinnamon agroforests in the village of Tanjung Kasri tend to be dominated by more domesticated useful species such as *surian bungkal* (*Toona sinensis* M.Roem, Meliaceae), *petai* (*Parkia speciosa* Haask., Fabaceae) and *durian* (*Durio zibethinus* Murr., Bombacaceae). Some giant durian trees of about 130-140 cm in dbh stand in between the cinnamon trees. Conversely, the agroforests of Renah Kemumu tend to be more dominated by (semi) wild useful species such as *surian rimbo* (*Toona sureni* Merr., Meliaceae), *masam-masam* (*Ardisia sumatrana* Miq., Myrsinaceae) and *batang bintang* (*Bischofia javanica* Bl., Euphorbiaceae).

10.4.3. The Most Important Plants: People's Perceptions

People perception about the local plants across different land use types indicates a gradual shift of important plants between those occurs in the natural forest and those grow in anthropogenic landscape. People tend to cite more obvious plants in the forest such as big woody timber species; whereas in the human-made landscape including secondary forest and agroforest, they quite often cited some species of herb and grasses.

The *rimbo* of Serampas not only stores the most plant diversity (Fig 9.4 and Fig 10.3), but also holds the greatest number of useful species. This finding is supported by Salick *et al.* (1999) who suggest that total useful species is a function of overall biodiversity. However, in the eyes of Serampas, *rapohen* has more locally important plants than has the *rimbo*. In the free listing exercise, people listed more important species from the *rapohen* than they did from the *rimbo*.

The importance of secondary forests as sources of useful plants for indigenous people were also reported in some other cultures (e.g., Unruh & Alcorn 1987, Unruh &

Flores-Pait'an 1987, Grenand 1992, Salick 1992, Toledo & Salick 2006). The landuse with the highest richness of useful plant is not necessary the one that people perceive as the most important. Serampas intentionally collect a species from the old-growth forest only if they cannot find it or a substitute species in other vegetation. However, for top quality timbers such as *medang giring (Persea cf. rimosa* Zoll. ex Meisn.) and *asal* (*Elaeocarpus stipularis* Bl.), Serampas still rely most on the old-growth forest.

Taking into account that Serampas do not trade most of their forest and agroforest products (except cinnamon and coffee), the importance value of a plant taxon is mostly based on its subsistence value, such as direct use and cultural/ritual values. A community that experiences intensive exposure to markets may develop a relative valuation system different from that of subsistence community. In rural areas of South Africa, for example, people's valuation on a particular forest plant is influenced by price of the associated forest product in local market (Shackleton *et al.*, 2002).

Secondary forests as well as customary forests geographically are the closest forests to people's settlement. People easily go back and forth to the forest to take the plants they need. They regularly visit secondary forests, especially their former shifting farming patches, to check some trees that may bear fruits, especially *durian* (*D. zibethinus* Murr.), *petai* (*P. speciosa* Haask.) and *jering* (*A. pauclorum* [Benth.] I.C. Nielsen). Ladio *et al.* (2006) corroborate that utilization of useful plants is defined by their geographical closeness, in addition to the properties of the plants. Secondary forests of Serampas are recognized as common property thus making the forest accessible to all people. In addition, in contrast to the mature forest, most useful species in secondary forest, especially edible plants such as *kelu* (*Etlingera elatior* (Jack) R. M. Sm.), *pucuk* *lumai* (*Solanum nigrum* Leschen ex Dunal), *rebung* (bamboo shoot) and mushrooms are reachable by most people, including women and children. Serampas perceive Arecaceae to be the most important family in *rimbo* (old-growth forest and customary forest, Table 10.3). They employ some species of Arecaceae, especially *manau* (*Calamus mannan* Miq.) and several species of rattans to produce *kiding* and other utilities (Chapter 6). Arecaceae is also one of the most useful families perceived by some indigenous groups in South America (e.g., Prance *et al.* 1987; Pin˜edo-Vasquez *et al.* 1990, Galeano 2000, Lawrence *et al.* 2005).

The high valuation of Arecaceae might be driven by properties of Arecaceae species that mostly have multiple uses. Moreover, the high importance value of the family may also be induced by high density of species in this family, as indicated by the ethnobotanical inventory. There are at least six stands of *manau* (*D. mannan* Miq.) in old-growth forest plots. The other smaller rattan species such as *rotan sendahan* (*Korthalsia laciniosa* Mart.), *rotan getah* (*Daemonorops angustifolius* Mart.) and *rotan seni* (*Calamus sp.*) are much more abundant in both old-growth forests and customary forests. Lawrence *et al.* (2005) confirm that the importance value of a taxon is influenced by degree of abundance of the taxon.

In contrast to *rimbo*, the most important family in *rapohen* (secondary forest) is Euphorbiaceae (Table 10.3). Serampas employ some common species belonging to the family include *sapat* (*Macaranga tanarius* Muell. Arg.), *buah kereh* (*Aleurites moluccana* Wild.) and *semlo'en* (*Homalanthus giganteus* Zoll. & Mor.) for some purposes. Wood of the *sapat* is commonly used as construction material for *pondok* (hut) in agroforest and in shifting cultivation fields. Broad leaves of this species are also important food wrapper for daily basis use as well as for a festival. *Sapat* is quite abundant in *rapohen*, at least 35 overstory individuals and 8 midstory individuals occur in each hectare of the *rapohen* plots. Other than *rapohen*, this species is also common in open area of old-growth and/or customary forest.

Similar to the *rimbo*, the most recognized important family in cinnamon agroforest is Lauraceae (Table 10.3). However, species of Lauraceae that constitute the cinnamon agroforest are extremely different from those of the *rimbo*. The agroforest is dominated by dense stands of cinnamon and coffee. It is not a surprise that complex salient index of the Lauraceae in the agroforest is much higher than the other families due to over-representation of the cinnamon (*C. burmanii* [Nees & T. Nees] Bl.) Taking out both cinnamon and coffee consistently places Fabaceae and Asteraceae as the most important families in cinnamon agroforest in both Tanjung Kasri and Renah Kemumu.

The species of Fabaceae and Asteraceae that occur in the agroforest are similar to those in the secondary forest. The perceived important species of Fabaceae mainly consisted of *petai* (*Parkia speciosa* Haask.) and *jering* (*Archidendron pauclorum* [Benth.] I.C. Nielsen). In fact, population of these species is low in the cinnamon agroforest. I recorded only five individuals per hectare of the *petai* and two individuals per hectare of the *jering* in the cinnamon agroforests. However, beans of these legume species are highly desirable by people in the entire Serampas community. *Petai* and *jering* are important food stuffs to develop one's appetite (Chapter 5). These species is also protected by Serampas customary law (Chapter 4).

Overall, people in the village of Renah Kemumu produced a longer list of important species than those of Tanjung Kasri. The location of the prior village which is more isolated may encourage people in this village to use more species from local flora. This finding is supported by Shackleton *et al.* (2002) who reveal that among three indigenous groups in rural area of South Africa, the group who lives in the least developed region use more diverse woodland products.

Most people in the village of Renah Kemumu perceive *asal* (*E. stipularis* Bl.) as the highest quality timber. Contradictory to the above argument of Lawrence *et al.* that an important taxon is influenced by its abundance, population of *asal* in local forest is actually very low. I recorded only one stand in old-growth forest plots. People have to explore deeper interior of old-growth forests to find this species. However, the high durability of this timber drives people to value the species more highly than the other species. Over exploitation of this slow growing species may have greatly reduced population of this species.

People in the village of Tanjung Kasri who live in a more deforested area than that of Renah Kemumu also used to perceive *asal* as the best quality of timber. However, they witnessed the disappearance of this species from local forest much earlier than did Renah Kemumu. Therefore, regular monitoring of a highly desired slow growing useful species is crucial to assure sustainability of this kind of species. Although *asal* is still in the list of locally important plant, people of Tanjung Kasri no longer value the species as the most important timber; instead they set *medang giring (P. cf. rimosa* Zoll. ex Meisn.) to substitute the *asal*. The species is quite abundant in the local forest; I recorded 120 individuals of *medang giring* in one hectare customary forest of Tanjung Kasri.

Serampas perceive species of *surian* (*T. sureni* Merr. and *T. sinensis* M. Roem) as middle class timbers. However, since those species quite abundant in secondary forest and agroforests, people rely more on these species to supply their need of timber. The latter species is also easily cultivated, especially in cinnamon agroforest field. In addition to timber and roofing, Serampas employ young leaves of the cultivated *surian* for vegetable (Chapter 5). *Surian* is one of the most important species in *rimbo, rapohen and ladang kulit.*

The fact that the number of useful plant species is high in *rimbo gano* should mean that there is an obvious link for local people to be interested in forest conservation. However, the fact that people are more dependent on shifting agriculture and rice fields than forest resources is important in terms of their desire for forest conservation. This conditions need to be considered in terms of looking for common ground in conservation initiatives. Moreover the fact that people in different villages value different things emphasizes heterogeneity of groups and importance of including multiple stake holders in any efforts to identify local relationships to the forests. Understanding the importance of resources as perceived by local people is crucial in order to develop forest management model that meets the local people needs and at the same time promoting biodiversity conservation.

10.5. Summary

People of Serampas perceive that forests, either secondary forest or old growth forest are not more important than other landuse categories. They rank rice-producing fields: *umo* and sawah, as the most important landuse as these remain the main producers of Serampas food. People in Tanjung Kasri who are dependent on shifting cultivation value the *umo* significantly higher than do people in Renah Kemumu. In contrast, People of Renah Kemumu who are more dependent on wetland rice farming values the sawah significantly higher than do people of Tanjung Kasri. Agroforests are an important resource for generating cash income. Although cinnamon no longer provides significant contribution for the Serampas livelihoods, cinnamon agroforest is still dominant throughout Serampas. The rising price of coffee has placed this cash crop to temporarily substitute the economic role of cinnamon. Women in both Tanjung Kasri and Renah Kemumu value the coffee agroforest significantly higher than do men.

The number of useful species occur in the Serampas forests resemble the plant species richness and biodiversity. *Rimbo gano* has highest number of useful species than the other forest types. This forest also has the highest basal area of useful plants. Overall, the village of Renah Kemumu has the higher number of useful species than that of Tanjung Kasri. However, in term of proportion of useful plant to total taxa; the forests of Tanjung Kasri harbor higher percentage of useful plant.

Secondary forests together with old-growth forest have the higher percentage of useful plant. In contrast, customary forests obviously have the lowest percentage of useful plant. The persistent practice of shifting cultivation over generations seems to have generated vast knowledge associated with the farming system and driven secondary forest succession toward more anthropogenic species. In contrast, the enforcement of the traditional law associated with the customary forest may have reduced people's access to the forest. This persistent barrier to forest access over long time has likely driven the development of knowledge about local plants toward that associated with plants that occurred in more accessible landscape.

Species of Areacae, mainly including some species of rattan and Meliaceae, mostly consisted of top class timber, are perceived as the most important species/family in the Serampas forests. The most important plants usually are closely associated with the most abundant useful plants. However, in a case of slow growing highly desired species, such as *asal* (*E. stipularis* Bl.) there is a gap between the perceived most important plants and the real abundance of the species in field. People start to devaluate an important taxon after recognizing severe decreasing population of the taxon. Locally perceived important plants, especially the slow growing woody species tend to be overexploited. Conservation programs should monitor and highlight such species before individuals of the species totally extinct from the local forests.

Although people of Tanjung Kasri and Renah Kemumu attach to the same culture, they value local natural resources differently. Moreover, men and women also have different interests related to local land uses. Conservation initiatives should incorporate the associated local stakeholders in order to develop conservation programs that fully supported by the local people.

CHAPTER 11

LIVING WITH IN A PARK: DISCORDANCE BETWEEN NATURAL AND CULTURAL CONSERVATION AND ECONOMIC DEVELOPMENT

"...lalu ke hulu Sungai Kuku perbatasan dengan orang Pulau Sangkar lalu ke Bukit Atap Ijuk perbatasan dengan orang Lempur hingga Tabat Cematang Batu dalam Manjuto ...."

"*... then on to the upper stream of Sungai Kuku bordering the people of Pulau Sangkar, then on to Bukit Atap Ijuk, bordering the people of Lempur, up to Tabat Cematang Batu in Manjuto ......"* The above phrase is quoted from one of Serampas' *piagam* (royal edict) issued in 1173 H (AD 1759). The quotation describes the border of land territory claimed by the early Serampas. Overlaying the border with current map results in great overlapping between the territory of Kerinci Seblat National Park and the traditional area of Serampas.

11.1. Introduction

The growing awareness of the importance of environmental sustainability has triggered the creation of protected areas throughout the planet. A large number and various types of protected areas have been established, although some of the areas are still considered as "paper protected areas". In 1978, the IUCN (International Union for Conservation on nature and Natural resources) classified protected areas into ten categories, including scientific reserves, national parks, natural monuments, managed nature reserves, protected landscapes, resource reserves, natural biotic areas, multiple-use management areas, biosphere reserve and world heritage sites (McNeely *et al.*, 1990).

Most protected areas are located in rural regions and frequently overlap with areas that are being claimed by indigenous people as part of their territories. Moreover, Grayson (2004) observes that most of the areas with the highest biodiversity in the world have been settled by indigenous people. He estimates that the population of the indigenous people throughout this planet is between 200 and 600 million. However, there is ongoing debate as to whether indigenous people are nurturing or destroying nature (e.g., Redford, 1991).

Some researchers have investigated the interactions between Kerinci Seblat National Park (KSNP) and people in the adjacent areas. Suminar *et al.* (2001) indicate the very poor appreciation of local people around KSNP of park conservation programs. Werner (2001) observes that the main challenge of nature conservation in this region is a lack of understanding among associated stakeholders, including the park and the local people. Moreover, she observes that a complex set of powerful factors outside KSNP seriously threaten the park as a consequence of political, administrative and law enforcement problems.

Harijanto *et al.* (2001) argue that the growing conflict between KSNP and local people has emerged as a result of overlapping land between the territory of KSNP and the customary land of local people. By law, the establishment of KSNP has eliminated traditional rights of Serampas to their customary land. Neidel (2006) concludes that conservationists' allegation of people who reside in the park as forest encroachers is a directed effort to erase local history and abolish Serampas' right over their traditional natural resources.

This chapter examines the protected area system in Indonesia and the relationships between protected area and people who live in or on the adjacent to protected area. Specifically, it addresses local knowledge, practices and values that agree with biodiversity conservation; the things that were not covered by the previous studies. This chapter draws on the literature and links it to the findings reported in the previous chapters of this dissertation to address three main questions: (1) What is history of the protected area system in Indonesia and what have been its challenges and changes over time?, (2) What is the nature of the interactions between KSNP and Serampas and are there any commonalities with similar cases elsewhere? and (3) What implications or insight does Serampas have for resource conservation in KSNP and elsewhere? Understanding the practices and values associated with local conservation is essential in order to link local initiatives with the broader context of conservation.

11.2. Protected Areas in Indonesia

Some initiatives in nature conservation in Indonesia emerged as a manifestation of the emergent worldview of human-nature relationships in western culture. Stamford Raffles who was the British Governor for Java did a lot of natural history work during the short British rule in the island from 1811 to 1814 (Jepson and Whittaker, 2002). The Dutch, who took over controlling Indonesia, were inspired by the work of Raffles and continued sending natural historians to the country. Carl Reinwardt who was the Royal Cabinet of Natural History was sent to Java, then he established Bogor Botanical Garden in 1818 (2002)

The Netherlands Indies government first introduced *Ordonnantie tot bescherming van sommige in het wild levende zoogdieren en vogels, Staatsblad* No. 497/1909; a legislation that regulated species hunting and protection and was issued in 1909 (Jepson and Whittaker, 2002). Addressing the growing concern of nature conservation promoted by *Nederlandsh Indische Vereeniging tot Natuurbescherming* (Netherlands Indian

Association for Nature Protection), the government issued *Staatsblad* No. 278 in March 1916 which proclaimed that all nature reserves were under control of and managed by the Dutch colonial regime (Departemen Kehutanan, 1986). Following this regulation, the regime assigned the establishment of at least 55 nature reserves, including the establishment of Kerinci nature reserve in 1929, which later developed into KSNP.

The ordinance 278/1916 was mainly focused on preserving nature reserve. In order to protect wildlife, the colonial government issued a *Natuurmonumentenen Wildreservaten Ordonnantie* (Ordinance on Nature reserves and Wildlife Sanctuary, *Staatsblad* No.17/1932) (Jepson and Whittaker, 2002). Later on, this ordinance was invalidated and replaced by *Natuurbeschermings Ordonnantie Staatsblad* No.167/1941, an ordinance for nature reserves and wildlife sanctuaries (Departemen Kehutanan 1986). The last ordinance became the basic law of protected area establishment in the following years of Dutch occupation in Indonesia. The ordinance was still in effect for more than a decade after the end of the Dutch colonization period.

No longer after the independence, the government of Indonesia issued the Basic Agrarian Law in 1960. This law strived to eliminate the Dutch colonial influence by incorporating adat into the European laws (e.g., McWilliam, 2006). This law recognizes some property rights including private property, temporary use rights and adat rights. Following the Agrarian Law, the government passed the first Basic Forestry Law (UU No.5/1967). From the nature conservation perspective, there are two important points addressed by the latter law. First, the law reinforced the existence of nature reserve and sanctuary reserves as they were pointed by the Dutch Ordinance No.167/1941 (also Adiwibowo, 2005). Second, the law took into consideration the presence of local people as well as the customary systems that had traditional rights over some forests. However, the law emphasized that the needs of local people should not contradict the main objective of the law. For example, a traditional right could not hamper government initiatives to exploit a particular forested area for the benefit of the country.

In addition to nature reserves, Indonesia has adopted other models of nature preservation including national parks, grand forest parks and nature recreation parks through the UU No.5/1990 (Law concerning conservation of biological resources and its ecosystems). In addition to the above models of conservation, this law also recognizes biosphere reserves and adopts a concept of national park zonation that divides a park into core zones, use zones and other zones. However, the biosphere reserve in this case is mainly dedicated for research and education, it does not address the needs of local people as well as regional development. The law No.5/1990 abolishes some colonial ordinances associated with nature conservation including the hunting ordinance (*Staatsblad* 133/1931), the wildlife protection ordinance (*Staatsblad* 134/1931), the hunting in Java and Madura ordinance (*Staatsblad* 133/1939) and the nature reserve ordinance (*Staasblad* 167/1941). The colonial laws were no longer relevant in modern Indonesia. For example, the *Staatsblad* 133/1939 was only to regulate wildlife hunting on the islands of Java and Madura, instead of including the entire territory of the country. Following the law No.5/1990, the Government of Indonesia has also ratified UN convention on biodiversity in 1994 (UU No.5/1994).

The most recent regulation associated with nature conservation in Indonesia is the law No. 41/1999, concerning the Basic Forestry Law. This law abolishes the previous Basic Forest Law (law No. 5/1967). In contrast to the previous laws, this law conspicuously recognizes the rights of traditional communities and their customary systems to access forest resources. The law acknowledges the rights of indigenous people to collect NTFPs and to customarily manage their traditional forests. Still, the access must not contradict state interests (e.g., Pradja 1999 and McCarthy 2000). McWilliam (2006) argues that Indonesian government regulations represent a common trajectory of recognizing the existence and practice of traditional people (adat). However, the implementation of policy denies recognition of the people; recognition to adats only to a level that they do not conflict with the government development agendas.

The Basic Forestry Law classifies forests into three main groups: production forests, conservation forests and protection forests. The law 5/1990 defines protected areas into two main groups: nature reserves and preservation areas. Nature reserves are further divided into strict nature reserves and wildlife sanctuaries. The preservation areas consist of national parks, grand forest parks and natural recreation parks. Throughout the country, 28.26 million hectares of land have been formally protected, consisting of terrestrial conservation areas (22.7 million hectares) and marine/coastal conservation areas (5.6 million hectare) (DGOFPNC, 2006). The protected areas cover about 12 percent of terrestrial and one percent of marine ecoregion of Indonesia.

11.3. Some Initiatives and Challenges of Conservation Development in Indonesia

The number and area of protected areas is growing throughout the country (Fig 11.1). Some of the neglected production forests on the border of protected areas, mostly due to overharvesting of timber (bad forest management), are being converted and incorporated into the closest protected area. For example, KSNP acquired an additional area of 14,160 ha in 2004 from the abandoned forest in the district of Merangin. In other cases, former production forests and/or important biodiversity spots are being consolidated to establish a new separated conservation area. Some national parks have been quite recently established (in the period of 2004) such as Batang Gadis and Tesso Nilo in Sumatra, Sebangau in Borneo, Bantimurung-Bulusarang and Kepulauan Togean in Sulawesi and Aketajawe-Lolobata in Mollucas. The expansion of current parks as well as the establishment of new national parks has added to the total acreage of protected areas in Indonesia, at least on paper. In 2005 there were 534 conservation areas area throughout the country, covering an area of 28.3 million hectares.

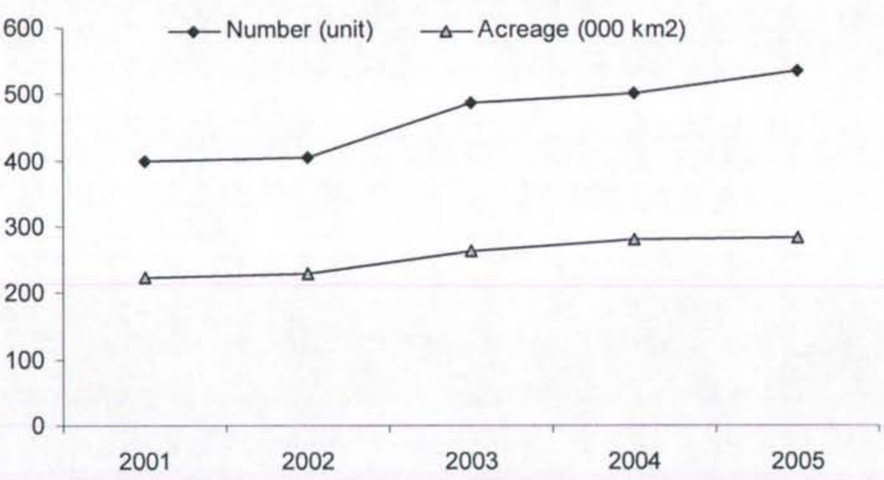


Fig. 11.1. The Development of Conservation Area in Indonesia (2001-2005)
(Source: DGOFPNC, several years)

National parks are the backbone of nature conservation in Indonesia. The law 5/1990 defines a national park as a nature preservation area that has a natural ecosystem, managed with a zone system that is aimed for some activities associated with research, education, science and recreation. The parks contribute roughly 58% of the total area under conservation. Most national parks are quite young, mostly less than ten years old. Some of them actually are enhancement and/or consolidation of some smaller protected areas such as wildlife sanctuaries animal and nature reserves that existed since the Dutch colonial era. Moreover, some of the national parks are dedicated to conserve some prominent species such as Komodo National Park which focuses on conserving the giant lizard (*Varamus comodoensis*) and Ujung Kulon National Park which focuses on protecting the Javanese rhinoceros (*Rhinoceros sundaicus*). A list of the national parks in Indonesia is presented in Table A.30.

A number of development initiatives, including the Integrated Conservation Development Project, have been implemented to conserve biodiversity as well as to improve the life of people who live in and around conservation areas. Six national parks including Cibodas, Lore Lindu, Pulau Siberut, Gunung Lesuser and Tanjung Puting joined the UNESCO's Man and Biosphere Program and are recognized as Biosphere Reserves (Soedjito, 2004). Three national parks become the site of Ramsar, including Komodo NP, Danau Sentarum NP and Berbak NP (Departmen Kehutanan, 2007). Six national parks, including KSNP are acknowledged as the World Heritage Sites (Unesco, 2007).

Management of conservation areas in Indonesia is administered by the central government through the Directorate General of Forest Protection and Nature

Conservation under the Ministry of Forestry. The directorate general employs park managers and other supporting personnel including park rangers to administer the conservation areas. Observing Indonesian laws associated with nature conservation, Adiwibowo (2005) indicates that nature conservation politics in the country has gradually shifted from "nature preservation" to "biodiversity conservation". The politics of "nature preservation" dominated the era of 1880s up to the end of 1970s. "Conservation of nature" dominated the conservation policy between 1980 and early 1990s. Finally, between 1992 and 2002, the evolving discourse has been on promoting "the sustainable use of biodiversity resources".

Currently, the government is still in a process of formulating a policy that promotes *Kesatuan Pemangkuan Hutan* (forest management unit), an integrated forest management (Kusumawardhani[14], 2006, pers. comm.). Instead of separating exploitation from preservation, this system promotes forest resources management based on geographical closeness (ecoregion) and involves the associated stakeholders. Thus, a national park may manage not only conservation areas but also production forests.

Although the number and total area of Indonesian protected area has increased over time, most of the areas are under serious threat of forest degradation. The policy of decentralization (Law No.22/1999) together with the growing movement of reformation following the collapse of the New Order era contested the sustainability and intactness of the areas. This is because the policy delegates considerable power and responsibility to district government to implement a number of important governance affairs (Barr *et al.*, 2006).

[14] Kusumawardhani is a former park manager of KNSP, currently she holds the position of Director of Natural Forest Development, Indonesian Ministry of Forestry.

Most local governments, especially at the district level, interpret and employ the decentralization policy to generate as much regional income as they can to run their government as well as to promote local development. They tend to employ the policy as a justification to exploit natural resources in their jurisdiction, especially natural forests, to generate income for regional development. They tend to depreciate the existence of conservation areas because of their low (or no) contribution to local economic development. This condition severely threats protected areas in Indonesia, both physically and socially (Jepson and Whittaker, 2002). As a consequence, logging, poaching and encroaching in protected areas is expanding throughout the country (e.g., EIA/Telapak 1999, Jepson *et al.* 2001 and Resosudarmo 2002).

11.4. Kerinci Seblat National Park: between the Park and the People

11.4.1. The Nature and its Challenges

Kerinci Seblat National Park (KSNP) is one of the most prominent protected areas in Indonesia. The park covers 14,847 km^2 and is the largest region of pristine forest in Sumatra, Indonesia (e.g., Aumeeruddy, 1994). The park was designated as a national park in October 4, 1982 in the third World National Parks Congress in Bali, Indonesia (World Bank 1993, Departemen Kehutanan 2007a). However, the park was not officially established until the issuance of the Minister of Forestry Decree in 1999 (Decree No.901/kpts-II/99). The KSNP involved unification of some nature reserves and wildlife sanctuaries in the Midwest of Sumatra including Inderapura and Bukit Tapan Nature Reserves, Rawas Hulu Lakitan-Bukit Kayu Embun and Gedang Seblat Wildlife

Sanctuaries, and more recently, some protected forests and production forests in the region were added (Departemen Kehutanan 2007a).

KSNP stretches along the southern Barisan Mountains in the western part of the island of Sumatra. The park spreads out over four provinces, including Jambi, West Sumatra, Bengkulu and South Sumatra, borders nine districts, 43 sub districts and 468 villages. The population in the districts bordering to the park is about 1.75 million people (World Bank, 1996). This population consists of diverse ethnic groups including Minang, Kerinci, Rejang, Malay, Kubu, Serampas, Batak, Javanese and Sundanese.

The massive forest coverage of the KSNP provides essential shelter for many endangered animals, especially the Sumatran rhino, Sumatran tiger, wild Sumatran goat, tapir and elephant. The park is a home to wild mammals (37 spp), birds (139 spp), reptiles (10 spp), amphibians (6 spp) and primates (8 spp) (Departemen Kehutanan, 2007a). A number of endangered plants species are also present in the area such as *raflesia* (*Raflesia arnoldi* and *R. hasseltii*), *kayu pacet* (*Harpulia alborea*) and *Pinus merkusii* strain Kerinci.

The park represents diverse habitats including lakes and riverine ecosystems, low and medium altitude forests, sub montane and montane forests and flooded forests. The park has a significant number of mountains including Kerinci, an active volcano of 3,805 m, Ratam, Baleng, Pantai Cermin, Terembung, Tujuh, Raya, Masurai, Gergah and Sumbing (Aumeeruddy 1994 and Arifin 2002). Last but not least, the park is the main source of springs for the largest rivers in Southern Sumatra, primarily the *Batang Hari*, *Musi* and *Merangin* (FAO, 1982). Therefore, the fate of million hectares of rice fields as well as people in the region highly depends on the park's sustainability.

In the 2004 World Heritage Committee meeting, the institution inaugurated the KSNP together with Leuser NP and Bukit Barisan Selatan NP as the Cluster World Natural Heritage of Sumatra. UNESCO has emphasized the importance of conserving the KSNP due to its pivotal biological and economic values and recognized the park as one of the World Heritages Sites in 2004 (Departemen Kehutanan, 2007b). Three main characteristics allow the park to meet the criteria as a World Heritage Site, including the significant on-going evolution of biological and ecological processes, the exceptional natural beauty and aesthetic importance and the significant natural habitat for *in situ* biological conservation. The park, which spans from lowland to mountainous ecosystems serves as the most prominent tropical rainforest in the island of Sumatra and an important spot for biodiversity conservation. The park that stretches along the Bukit Barisan Mountains, known as the "Andes of Sumatra", has some spectacularly beautiful sites including *Danau Gunung Tujuh* (the highest lake in Southeast Asia) and *Gunung Kerinci* (the highest mountain in Sumatra). The park harbors more than 50% of total flora of Sumatra including *Raflesia arnoldii* (the world's largest flower) and *Amorphophallus titanum*, the world's tallest flower (Unesco, 2007).

However, the elongated area of KSNP that borders with a great number of villages makes it very vulnerable to park-people conflicts. There are at least four main activities that threaten the KSNP, including illegal logging, poaching, encroachment for agriculture and road construction (Wells *et al.* 1999, Hitchcock and Meyers 2006, IUCN-UNESCO 2007). The rampant park and people conflicts that lead to park-related violations have become common news in national and local newspapers[15]. In terms of road construction, KSNP is under serious threat due to 34 proposals to develop roads across the core zone of the park (Hitchcock and Meyers, 2006), endorsed by local governments. In most cases, the local governments have different points of view from the central government in terms of road construction across the park. Local people also propose and initiate developing new roads as well as upgrading the current roads. When I was undertaking fieldwork for this dissertation, an illegal road across the park was still under construction, as also mentioned by Hitchcock and Meyers. It was initiated by local people and employed heavy equipment such as bulldozers. Some local capitalists interested in exploiting the park resources were most likely involved in the illegal road construction.

11.4.2. Interactions between KSNP and Local People

Local People: between Participation and Conflict

Most people who live on the border of the KSNP are traditional communities who have resided in the region over generations and have strong ties with their land. There is a great overlapping of land entitlement between the traditional rights of local community and the territory of KSNP. For example, an indigenous group of Rejang Lebong perceive that part of the KSNP forests belong to their adat (Harijanto *et al.*, 2001). People of

[15] Here are some example of park-related violations reported by local and national news. 119 illegal sawmill keep running in KSNP (Kompas, 5/12/2001), What difficult to keep KSNP from illegal logger (Kompas, 6/14/2004), KSNP is kept being encroached (Sriwijaya Post, 1/12/2006), Thousands KSNP flora and fauna are under threat of extinction (Antara, 2/2/2007), People keep encroaching the KSNP, bordering poles disappear (Kompas, 9/2/2006), Road construction projects keep nibbling KSNP (Kompas, 11/10/2006), KSNP is getting more devastated: Lack of park rangers to control illegal logging (Kompas 7/3/2007).

Serampas also share a similar perception. This is a common people-park conflict in most Asian countries where indigenous people have inhabited lands long before they were declared as protected areas (Lasimbang, 2004).

Local people employ the resources of KSNP for various purposes including harvesting timber and NTFPs and practicing agriculture. People in the village of Sungai Lisai and Sungai Tutung for example, have collected some species of rattan (*Calamus* sp.) from KSNP over generations to produce *jalik* (rattan mats), baskets and general binding (Siebert 1989, Giripurwo *et al.* 2001). In the case of Serampas, the entire area of Tanjung Kasri and Renah Kemumu is within the territory of KSNP (Chapter 3). Serampas use the KSNP not only for gathering some forest products and practicing agriculture, but rather they spend most of their entire life times within the territory of the KSNP, a practice that violates national laws.

The establishment of the KSNP has disrupted traditional social and cultural arrangements of some local communities, especially those who live with in the KSNP. Neidel (2006) argues that the process of park establishment has been a way of erasing adats. Local people who used to have access to the park forests became labeled as forest encroachers (*perambah hutan*) soon after the park establishment (2006). The process of establishing the KSNP follows Gómez-Pompa and Kaus' argument (1999), where park land is treated as an empty site, thus leaving out the existing land tenure (also McCarthy, 2000).

Conservation Policy in the Ground

As described above, nature conservation in Indonesia is regulated by a number of laws including the law 41/1999 relating to forestry, law 5/1990 relating to conservation of biological resources and their ecosystems and the government regulation (PP68/1998) relating to nature reserve areas. According to these regulations, people are not allowed to do any activities that may disrupt biological resources in a conservation area. The regulation 68/1998 explicitly prohibits people from hunting and exploiting other resources from the conservation areas. The law 5/1990 prescribes park managers to employ the zonation system in their jurisdiction. However, because the zonation system is not fully adopted by the KSNP, people who live within a conservation area including Serampas, have been accused as poachers and/or encroachers. The zonation has been delineated on paper, but it is not genuinely implemented in the ground.

The establishment of KSNP included little involvement of people along the border of the park, who have traditional rights of access to the park. Since the forests have now been formalized as the property of the KSNP, the people, especially who live in urbanized regions, are no longer responsive or take responsibility to prevent other people's activities, either insiders or outsiders that may destroy the KNSP forests. This attitude is an expression of local people's resistance to the KSNP. They blame the KSNP for seizing their ancestors' lands (e.g., Suminar *et al.*, 2001). In a southern border of the park, people of Rejang Lebong condemned KSNP from removing the current border poles, shrinkage the border into the ancient *Boschwezen* (the nature reserves during the Dutch colonial era) border positions (Harijanto *et al.*, 2001). This is a common phenomenon in other KSNP bordering villages (pers. obs.).

The majority respondents I interviewed in Serampas are not well informed about the KSNP or of the importance of the national park for biodiversity conservation. In contrast, most of them proposed improving road access to their villages. The other few respondents proposed that KSNP allow them to cultivate forested areas along inter-villages footpaths in order to maintain and to ease access to and from Serampas. Due to isolation from other communities, some Serampas feel as if they were *belum merdeka* (still living in a colonial era); a common phrase to express a backward situation.

The KSNP claim over Serampas lands has induced feelings of insecurity and uncertainty about the future of the community. Park zonation that is mandated by the law 5/1990 is not fully adopted and implemented by the KSNP. As a consequence, people who live within the park do not benefit from the people-oriented policy outlined by the central government. This reality corroborates the McWilliam's (2006) thesis about the ambiguity of the government to recognize the rights of indigenous people. Most Serampas do not know about the law and therefore neither Serampas individuals nor institutions are striving to gain recognition over their right to legally inhabit their lands.

Serampas villagers, however, are starting to recognize and become concerned about the status of their villages within the territory of the KSNP. They are also aware of outsiders' stereotyped views, especially of their traditional practice of hunting and swidden agriculture. Commonly outsiders consider the farming system as *peladang berpindah* (slash and burnt and nomadic agriculture) rather than shifting agriculture, which is considered destructive. As a consequence, villagers are always suspicious of outsiders who visit to their villages. They worry whether the visitor may have an association with KSNP, such as park ranger. For example, a villager must ascertain that he will not meet "a stranger" when bringing home venison from his hunting. Otherwise, he has to wait or use another alternative pathway in order to avoid the stranger.

The Integrated Conservation Development Project (ICDP)

To address the growing disagreement with the local people as well as to promote conservation of biological resources, the Indonesian government has initiated some conservation and development programs. The most conspicuous program is Integrated Conservation Development Project (ICDP). The program was tested in eight national parks in Indonesia including Gunung Leuser, Kerinci Seblat, Gede-Pangrango, Halimun, Bromo-Tengger Semeru, Kutai, Dumoga-Bone and Lore Lindu. The ICDP integrates conservation of biological resource with local socioeconomic development initiatives (Wells *et al.*, 1999).

The total budget for the first six year period (1996-2002) of ICDP for KSNP alone was 46 million US$ (Wells *et al.*, 1999). This initiative covered 134 (29%) villages out of 468 villages bordering the park. The fund was contributed by the World Bank, the Global Environmental Facilities and the Government of Indonesia. The enormous budget for the project has placed the KSNP ICDP as the largest project in the history of nature conservation in Indonesia (Wells *et al.* 1999, Kusumawardhani 2001). The project consisted of four components including park management, village/area development, biodiversity conservation and monitoring and evaluation (2001).

The main objective of village development was to come out with a village conservation agreement (VCA) between local people and the park. The VCA mandated community participation in park protection and biodiversity conservation on village lands. As compensation, the VCA legalized people's access to the park including access to NTFPs and intensification of agricultural system. Moreover, ICDP was granted a conservation fund of about 50,000 USD per village to promote rural development such as marketing and village infrastructure improvements (World Bank, 2003).

The VCA was approved by village leaders, the KSNP Manager and the head of local government (district and sub-district), and consisted of several agreed upon articles about rights and responsibilities of villagers dealing with development and conservation program in a particular village. For example, the document describes the definition and boundary of traditional use zones and specific use zones, land ownership of the zones and some activities that are permitted or prohibited within the zones. The VCA also mentions sanctions and settlements of disputes in case there is violation(s) to the agreement. Neidel (2006) provides more detail on this agreement.

Overall however, the achievements of the KSNP ICDP in terms of both biological conservation as well as rural development were unsatisfactory. The project achievements did not confirm improvement of biodiversity conservation, the major goal of the project (e.g., Wells *et al.* 1999, World Bank 2003, Mackinnon 2005). Deforestation still takes place around the KSNP boundaries. Indeed, the highest rate of deforestation during the project period was taking place in districts that had received the largest grant for village/area development.

The ICDP was not fully supported by the government, especially at the provincial and district level. The lack of law enforcement in the region hindered local people from implementing the village conservation agreements (e.g., Wells *et al.* 1999, Kusumawardhani 2001, Helmi 2007). The fact that a number of larger-scale park-related violators were not prosecuted discouraged local people from sticking to the VCA. Most of the violations were for poaching and encroaching organized by outsiders.

The number of villages involved in the KSNP ICDP was revised from 134 to 74 villages about two years before the closure of the project in 2002. A long process to achieve a VCA hampered the project from achieving the earlier number of targeted villages. Moreover, the Indonesian economic crisis that drove the devaluation of the local currency from Rp 2,300 to Rp 9,000 for each USD led to cancelation of a number of loan for the ICDP. With the reduction in village number, the ICDP now covered only 16% of the total villages that were physically bordering the park. The other 394 villages were not involved in the ICDP, including some villages located within the territory of the park such as Renah Kemumu and Tanjung Kasri.

The ICDP ended in 2002, after six years of contract. Since that year, KSNP has been "a paper park" (at least according to categorization of Gómez-Pompa and Kaus, 1999); it has legal recognition but does not have enough resources to properly operate as a conservation area. Park encroachment, illegal logging and poaching have become chronic problems and threaten most area of the KSNP. The economic crisis that hit Indonesia in the end of 1990s followed by reformation era (decentralization policy) have complicated efforts of biodiversity conservation in the KSNP. On one hand, people urged to seek land for farming; on the other hand, government control over the park lands tends to weaken.

11.4.3. Integrating Traditional Ecological Knowledge and Culture into Conservation Initiatives

Serampas as well the other indigenous groups who inhabit areas around KSNP bear traditional knowledge and practices that may be consistent with nature conservation (e.g., Table 11.1). However, the presence of traditional ecological knowledge is subtle; it is strongly attached to local traditions and values including rituals, *saluko adat* (local adages), stories, *pantangan dan larangan* (taboos) and worldview. Unfortunately, some pieces of the knowledge disappear concomitantly with the weakening of customary system (Chapter 4) and the persistent influence of dominant cultures.

Traditionally, Serampas prohibited people from planting tree cash crops in secondary forest in order to assure the sustainable practice of the shifting agriculture (Chapter 7). This practice was an adaptive farming technology that fit with the local socioedaphic factors, including low population density, undulated and steep land and shallow top soils. A number of rituals and worldviews are also strongly attached with the practice. The tradition of *melambeh* before initiating a cycle of shifting agriculture drives a farmer to select a parcel of forested land deliberately, by considering socio-cultural and natural aspects.

Similar to concept of modern conservation, Serampas developed some forms of protecting landscapes, including *hutan adat* and sacred sites. The *hutan adat* (customary forest) is mainly dedicated to the protection watershed in the region (Chapter 9). Sacred sites are commonly associated with Serampas ancestor relics, such as graveyards and former settlement sites. The protection of customary areas is a common land arrangement practiced by some indigenous groups around the KSNP. For example,

Table 11.1. Potential Social and Environmental Implications of Serampas Adat Rules and Traditions

Adat Rule/TraditionsC	onservation Implications
Protection of locally important fruit trees (*jambu kalko*)	• Promotes regeneration of locally important fruits • Conserves some wildlife associated with the fruits • Assures food sufficiency
Banning of picking unripe durian (*D. zibethinus* Murr.)	• Promotes the recruitment and regeneration of the durian • Conserves some wildlife associated with the durian • Promotes an equal distribution of the durian among the local people
Protection of *Hutan Adat* (customary forest)	• Conserves fragile landscapes • Provides ecological services, especially water • Conserves local biodiversity • Promotes food self-sufficiency
Banning of planting tree cash crops in shifting cultivation fields	• Promotes sustainable cycle of shifting cultivation • Reduce pressure on old-growth forest • Promotes equal access to the land
Some taboos on wood cutting	• Conserves fragile land and streams • Conserves plant biodiversity
Banning of destructive fishing methods	• Promotes sustainable fishing • Conserves local fishing resources • Promotes equal access to the fish
Banning of bringing in fowl from outside	• Minimizes disease transmission from outside • Conserves wild avian fauna • Encourages local fowl growth
Kenduri Psko	• Transfer of knowledge associated with local traditions • Reinforcement of customary law articles, including those associated with conservation

people of Baru Pelepat who inhabit eastern border of KSNP protect local rivers, usually the deep parts where fishes breed and congregate (Permatasari, 2007). Fishing is prohibited for certain period of times, thus assuring the sustainability of fish stock in the village. In the northwestern border of KSNP, people of Pesisir Selatan have a customary law that controls the local customary forest and prohibits people from cutting timber along river basins (Warman *et al.*, 2001). The latter traditional law effectively preserved local natural resources during the colonial era; however, it disappeared gradually as colonial reign vanished.

The Serampas customary forest not only benefits preservation of watersheds and landscapes prone to landslide and erosion but also contributes to conserving of local biodiversity. Indeed, the plant biodiversity index in customary forest is lower than that of old-growth forest. However, importantly, biodiversity indexes for ovestory and understory plants in those two forest types are not different significantly (Chapter 9).

Although secondary forests have lower species richness then other forest types, they have the highest number of useful plant species. Given that the secondary forest is a stage of a shifting agriculture cycle, performing the shifting agriculture on sustainable basis will maintain local sources of useful plants. Ultimately, this practice can reduce tension to encroach on old-growth forests for resources.

The expansive development of cinnamon agroforests has drastically changed the Serampas traditional farming system. More importantly, the consistent expansion of the cinnamon severely threatens the core forest zone of the KSNP. Nonetheless, the less densely cinnamon plantings practiced by the people of Renah Kemumu results in a cinnamon agroforest horizontal structure that closely represents to that of old-growth forest. Such a cinnamon agroforest system may still bear at least some of the conservation value of local biodiversity. Adapting the current practice of cinnamon agroforestry, for example by incorporating native woody cash crops species may not only improve its ecological resiliencies, but also increase local economic gains.

To some degree, Serampas have applied some restrictions in harvesting forest resources, although these are not all obvious. For example, Serampas prescribe *pantangan dan larangan* (taboos) for cutting some trees that have special growth forms (Chapter 6). This practice might be interpreted as a traditional way of conserving a particular timber species including a number of living creatures associated with the tree. Taboos are also applied to keep people performing good behavior, especially while they are in the forests. Serampas also prohibit people from harvesting *jambu kalko* (common property fruits) that are not fully ripened (Chapter 5). This practice not only promotes a fair distribution of the fruits among villagers but also allows other living creatures to enjoy the fruits and disperse their seeds. People of Sungai Lisai on the southern border of KSNP developed an agreement among themselves to harvest only the matured rattan sego (*Calamus* sp.) in a quantity of no more than 50% of total individual in each clump. Besides sustainability considerations, the rule also to eases the work of basket weaving, because working with matured rattan is much easier than working with the young (Giripurwo *et al.*, 2001).

In terms of fishing, Serampas employ natural poison of *tubo* (*Derris* spp.) that pollutes water resources and may kill most of fish and the other aquatic animals, including the small ones. However, they are aware about ecological consequence of the poison. Still, they use the natural poison, but they modify the fishing techniques to reduce the negative effects of the poison (Chapter 6). Noticeably, this Serampas traditional fishing technique also promotes a more equal distribution of fish within the community. The above restrictions on practices of natural resource exploitation may hold values that benefit biodiversity conservation.

Conservation Values of Traditional Systems

Gadgil *et al.* (1993) suggest that local people who have used resources over long periods of time often hold detailed ecological knowledge obtained from observing and adapting to the local complex behavior of the ecological system in which they live. The knowledge is learned and handed down over generations through parent, relatives and neighbors as part of childhood and later experiences. In many cases, indigenous people have practiced and held the traditional ecological knowledge over time without explicitly naming the knowledge. Local people in the highland of New Guinea, for example, follow some effective agricultural practices done by their ancestors, but they have neither any theoretical background nor word explanations for the practices (Sillitoe, 1998). Alcorn (1989) discusses how in Mexico and elsewhere, traditional agricultural knowledge is often in the form of "scripts" followed by farmers. For instance, local farmers grow of a Fabaceae species without knowing the reason for the practice. Local ecological knowledge is frequently embedded in the local language and art such as song and stories. Serampas interactions with the local resources over long periods also have developed knowledge, practices and values that embedded subtly on local traditions.

Barsh (1999) proposes four aspects that make indigenous people essential to conserving biodiversity: (1) Indigenous people employ high species diversity and practice restraint in exploiting local resources. As a result, their traditional resource management practice has less impact on biological diversity; (2) Indigenous people always attempt to improve biodiversity in their fields in order to increase their consumption variety and to minimize production risks; (3) In order to anticipate uncertainties of harvestable plant and animal, indigenous people underestimate the maximum amount of the harvestable species; and (4) Indigenous people have strong ties to, and take care of, their land in order to maintain and hand down their knowledge and practices to their subsequent generations.

However, local ecological knowledge and practice are not always in harmony with nature conservation principles (e.g., Redford and Stearman, 1993). A more intensive exposure to market and the need or desire to maximize economic benefits in fairly short time periods tend to lead indigenous people to adopt natural resource management practice that less or not sustainable. For example, Serampas practice of cinnamon agroforest is very expansive and puts pressure on the local forests as well as the KSNP (Chapter 8). Moreover, the marginalization of customary system had lead local leaders to twist customary law for the benefit of their own families (Chapter 4). People of Baru Pelepat recognize a similar case of what they called, *limbago*, a customary law violator is not prosecuted because h/she is close family to local leaders (Helmi, 2007).

Whether sustainable or not, there is ample evidence that traditional resource systems clearly alter nature. Human have modified tropical forests since prehistoric periods. For instance, indigenous people such as Yucatan, Huastec and Kayapo have distributed edible plant seeds throughout their forests. As Denevan, 1992, notes, "There are no virgin forests today nor were there in 1492". Most existing landmarks that used to be considered as "natural" or "pristine" by ecologists and botanists have been effectively influenced by human existence within a historical period (Posey 1997, Ghimire and Pimbert 2000). Redford (1991) concurs that there is evidence that local people have changed most tropical forests even before the European arrival, maintaining that precontact Indians were not "ecosystem men", but they enormously altered the environment.

KSNP: Conserving Nature in the Complex Socio-cultural-political Setting

The elongated shape of 1.3 million hectare area of KSNP makes it have a particularly long boundary. The park overlaps with four provincial and nine district governments that have different policies and interests in nature conservation, especially since the promotion of decentralization policy in the late 1990s. Moreover, more than 400 villages with myriad socio-cultural diversities and different levels of interest and attachment to nature and traditional culture, physically interact with the border of the park. Outside the park boundaries, more powerful stakeholders including illegal loggers, illegal sawmill syndicates and land-rich farmers seriously and directly threathen the park (Jepson *et al.*, 2001).

Given the complicated setting faced by the KNSP, I argue that the success of the biodiversity conservation program in the park requires at least three main elements, 1) the political commitment from government both at the central and the local level, 2) a qualified and professional park management team and 3) participatory support from local stakeholders, especially people who live within and along the boundary of the park. Social, political and economic conditions at the macro level influence the long-term survival and services of biological conservation initiatives (Brandon 1997, MacKinnon, 1997, Brandon *et al.* 1998, MacKinnon 2005). Employing appropriate technology such as geo-spatial technology can assist in monitoring the entire area of the park and defining priority agendas that have to be addressed by the KSNP. Based on forest cover change between 1985 and 1992, Linkie *et al.* (2004) identified and suggested that the park pay more attention to some points of forests that are prone to encroachment, mainly those located at lower elevation and close to roads.

Establishing park boundaries and employing qualified park officers and rangers are essential steps to managing a conservation area, but they are unlikely to accomplish conservation objectives if they do not recognize and incorporate the knowledge, culture and land tenure arrangements of the local people. Incorporating these values into park management system can reduce tension and resistance between people and the park and in doing so, also promote biodiversity conservation in the park. However, there is no single standardized conservation model that properly addresses the socio-cultural diversity of the communities. Given the complexity of KSNP, a number of small, long-term conservation initiatives that fit with local socio-cultural and environmental setting would likely be more successful than a gigantic conservation project such as the ICDP.

Revitalizing Traditional Systems for Conservation

Worldwide there is a growing number of models for nature conservation initiatives that involve local communities. Lawrence *et al.* (2000) suggest that the most essential aspect to incorporate local participation is to understand how the values of resources in local perspective correspond to scientific idea of nature conservation. People and park collaborations should also consider socio cultural and ecological dynamics taking place in the community. Moreover, Gómez-Pompa and Kaus (1999) emphasize that conservation does not imply maintaining the status quo; instead it should accommodate management and preparation of changes. Local people's participation is a "continuous problem-solving process", rather than a steady state (Carlsson and Berkes, 2005). Park and people conservation arrangements may change over time to adjust the dynamic of both the park and the people.

Lasimbang (2004) argues that having indigenous peoples within or on the border of a park, especially those who hold conservation values, can improve management natural resources management for the area. Therefore, it is more important and more beneficial to keep those communities close to a park rather than force them out. Moreover, indigenous systems that evolved based on in-situ sustainable existence over centuries often offer more appropriate and less expensive techniques of conservation (Plotkin and Forsyth, 2006). Nepstad *et al.* (2006) confirm that deforestation rate and forest fire in Amazonian forest reserves is significantly lower in locations inhabited by indigenous people than those of uninhabited sites.

In Asia there are a growing number of examples of initiatives to foster cooperation between local and indigenous peoples and protected areas. For example, the people of Ngata Toro on the border of Lore Lindu NP in Central Sulawesi Indonesia recognize a traditional zoning system in their traditional customary forest (Golar, 2006). They also employ customary forest rangers to control the forest. The Ngata Toro forest management system has been smoothly integrated as part of the park system, benefiting both the park and the people. A similar model has been implemented much earlier in Sagarmatha National Parks in Nepal (Nepal, 2002). India developed Joint Forest Management System (JFMS) to accommodate the needs and interests of local people in managing the forests (Prasad and Kant, 2003). This system, which has been adopted by most states in India, apparently has led to improvements not only the ecology of the forests but also the prosperity of the people.

In KSNP, the people of *Baru Pelepat* on the mid-eastern border of the park, revived their customary law associated with their customary forests (Helmi, 2007). They approached the local district government and the house of representatives to promote recognition of the customary law and to formalize it as a district government law (*Peraturan Daerah*). This is a strategy for conserving traditional knowledge and practice mainly in more urbanized areas where environment changes and marginalization of customary systems are taking place at a higher pace.

As this dissertation illustrates, Serampas still hold some traditional knowledge, values and practices that may benefit nature conservation. Revitalization of that knowledge has the potential to benefit not only the people but also the KSNP. However, the revitalization does not necessarily mean romanticizing of traditional knowledge, or the perception that traditional knowledge is a closed system that in harmony with nature, as warned by Dyson-Hudson and Dyson-Hudson (1980). Instead revitalization should strives to revive traditional knowledge and practices and to adapt them to the current socio-economic and environment setting.

Since Serampas has been left behind the surrounding communities in terms of socio-economic development and the lack of knowledge about current government configuration associated with their cultural revival, it essential to facilitate the revitalization of Serampas traditional system. A non-partisan institution may mediate and convey effective, equal and fruitful communication between local people, KSNP, local government and the other associated stake holders. Since KSNP borders with a great number of people with diverse ethnic and cultural background, it is important to undertake research to reveal the different kinds of knowledge, values and practices in each community that may be in harmony and/or discordance with nature conservation objectives.

Some cases of traditional system revitalization associated with nature conservation indicate the essential role of a facilitation agency to successfully revitalize traditional systems (e.g., Fay *et al.* 1998, Chapman 2003, Golar 2006, Helmi 2007, Permatasari 2007, Kusters *et al.* 2007). For example, *damar* (*Shorea* spp.) agroforests in Southern Sumatra used to be considered as a backward and low benefit farming system. Government and private companies proposed to convert the *damar* agroforests to other landuse categories mainly palm oil plantation (e.g., Michon *et al.*, 2000). However, after intensive and enduring research involving some national and international institutions, the ecological soundness of the *damar* agroforests was confirmed and the central government ultimately issued a decree to recognize and legitimate the agroforests on state forested land. This is a breakthrough policy in the history of community forestry in Indonesia (Fay, 1998).

Gómez-Pompa and Kaus (1999) argue that neither national policy nor traditional knowledge is enough to conserve the nature. National policies have been unable to control natural resource depletion. On the other hand, traditional knowledge and practices are very site specific and powerless in addressing external pressure and internal challenges such as population growth. Mutual collaboration between national protected area system and indigenous knowledge and practices may enhance nature conservation efforts, especially in developing countries where overlapping between park and indigenous land is common.

Serampas as well as the other indigenous groups who live in and around national parks and have close interaction with local natural resources over long period commonly bear traditional ecological knowledge and values that valuable for nature conservation. Revitalization of the traditional knowledge and values may help promote nature conservation, at least in the local landscape. However, given the current Serampas socio-economic conditions as well as socio-political system in Indonesian, Serampas themselves most likely would never succeed in reviving and perpetuating their traditional systems. Serampas essentially require a facilitating agency that able to encourage the use of local system at the same time bridging the needs of local people and the outsiders' interests. Small conservation actions in isolated areas such as in Serampas may seem insignificant in addressing global-scale challenges, however, the sum of such local action, as suggested by Gómez-Pompa and Kaus (1999), may result in developing "conservation building block" for the entire area of KSNP as well as in the broader of scale.

11.5. Summary

The development of protected area in Indonesia was initiated in the Dutch era. The number as well as the area of the protected area is still growing. Some protected areas are quite recently established. In 2005 the protected areas covers about 15% of the Indonesian lands. National park is the back bone of protected area in the country; however, most of the parks still represent paper parks.

Parallel to the global trend of changes in the nature conservation paradigm, policies of nature conservation in Indonesia are also in the process of shifting from a nature preservation approach towards one that emphasizes the sustainable use of biological resources. Local people who were totally excluded in the earlier models of conservation are gradually being integrated into nature conservation initiatives. However, since most stakeholders, mainly local people, park management, local and central government have not yet fully implemented the new government policies, the current policies do not significantly enhance biodiversity conservation throughout the country.

Kerinci Seblat National Park (KSNP) is the largest national park in the island of Sumatra. The park physically contacts with millions of people with various socio-cultural background who live in almost 500 villages around the park. Typical to most national parks in the country, the establishment of the KSNP less involved the local people. A number of conflicts between the park and the people still persist, especially those related to poaching and encroachment. KSNP adopted Integrated Conservation and Development Project (ICDP) in order to conserve biodiversity as well as to promote local development and to resolve the conflicts. However, the conservation project that spends the largest amount of money in the history of conservation in the country was fail to achieve its main conservation goals.

Given the complexity of the nature-culture-socioeconomic-local governmental setting along the border of the KSNP, there is no one, perfect conservation model that can properly addresses the needs and interests of stakeholders associated with biodiversity conservation in the park (e.g., Sayer, 1995). Therefore many integrated small community-based conservation initiatives that are adapted to local settings would likely be more effective than a huge and rigid conservation program. However, the continuity and effectiveness of any conservation programs will not be assured without the strong support and commitment from both local and central governments. Therefore, improving relationships between local people, protected areas and governments may improve biodiversity conservation programs, especially in developing countries where protected areas greatly overlap with indigenous lands and there is a lack of resources to properly protect and conserve biodiversity.

Serampas as well as the other indigenous groups who live in and around national parks have traditional ecological knowledge and values that are often valuable for nature conservation. However, many aspects of the traditions are on the way to extinction with the weakening of local customary systems and the growing pressures of other dominant cultures. Revitalization of traditional knowledge and values may help promote nature conservation, at least in the local landscape. Small conservation action in isolated areas such as in Serampas may seem insignificant in addressing global-scale challenges, however, the sum of such local action, as suggested by Gómez-Pompa and Kaus (1999), may result in developing "conservation building block" for the entire area of KSNP as well as in the broader of scale.

CHAPTER 12

CONCLUSIONS

"Ayik hening ikanyo jinak, rumput mudo kerbaonyo gepuk"

"In the limpid water, the fish are tame, whereas in the green grassland, the buffaloes are bony"

12.1. Introduction

In the eyes of the Serampas, the tame fish, the green grassland and the bony buffalo represent prosperity. Figuratively, the above proverb depicts an expected era whereby nature is well maintained and has affluent resources to be enjoyed by humans forever. In this view, natural resources are utilized in specific ways to ensure long-term and reciprocal benefits for both the community and nature. The proverb is just one of many known throughout the Serampas community and commonly cited by elders and local leaders in ceremonial events. It is thought that the use of these proverbs might persuade the greater community to adopt specific behaviors in relationship to nature that best support the goal of long-term prosperity.

This research aimed to produce a holistic analysis of Serampas traditional ecological knowledge and practices relating to natural resource management in and around Kerinci Seblat National Park (KSNP). Seven primary questions were addressed: (1) What are the traditional management practices associated with forest and agroforest resources?; (2) How have these traditional resource management practices changed over time? (3) What effects do traditional resource management practices have on forest/agroforest plant structure, composition, & diversity?; (4) What ethnobotanical knowledge do Serampas have and how has this changed over time? (5) How are useful plants distributed across land-use type?; (6) How do Serampas value their natural resources, especially forest and agroforest resources?; and (7) What are the current interactions between Serampas Communities and the KSNP?

12.2. Research Conclusions

12.2.1. Serampas Customary System

Serampas is an ethnic group who inhabit a plateau region in the mid-southwest of Sumatra. Archeological artifacts indicate that they have lived in the region since the eleventh century AD (Bonatz *et al.*, 2006). Historically, the population size of the group has remained relatively low, but there has been a significant increase in recent decades. The culture of Serampas evolved as an interaction between natural conditions and the dynamics of social and cultural trends. The culture of Serampas is influenced and enriched by a few dominant cultures living close-by, primarily the Kerinci, Minang and Jambinese Malay peoples

As commonly recognized by most indigenous people throughout Indonesia, Serampas adhere to adat, a traditional customary system (law) that governs most aspects of people's lives including natural resource management. To some degree, Serampas share a similar adat with other aforementioned surrounding cultures. The presence of adat is subtle however; most dictums of adat are encoded and handed down over generations through oral transmission. Proverbs, as cited in the beginning of every chapter of this dissertation, are the most common form of Serampas oral tradition. The proverbs as well as the other forms of oral tradition not only hold and transmit the adat over generations, but importantly they encode the Serampas local knowledge.

Adat employs some strategies that are quite different from conventional laws. For example, adat promotes the enforcement of laws by striving to maintain unity of the entire community. Importantly, adat extends a moral sanction of "*malu*" (being ashamed) rather than depending upon monetary fines against lawbreakers. The close and intense relationships among villagers creates a social network and people simultaneously watch and encourage each other to adhere to adat. As a result, the customary law can be more effective and more appropriate in governing small and isolated communities such as Serampas than conventional law.

Today a number of changes, both inside and outside Serampas, challenge the existence of adat. Better market access inevitably fosters villagers' exposure to global culture and has gradually changed Serampas socio-cultural structure. Moreover, the centralistic policy of the Indonesian Government, especially the Government Act No. 5/1979, has greatly weakened adat and gradually marginalized the Serampas customary system.

The entwined tree, as the title of this dissertation, symbolizes the condition of Serampas today; they are neither enforcing nor ignoring their traditional practices and values. They are being "entwined" by a number of social, economic and environmental pressures that are gradually changing their community. On the one hand, they strive to maintain their traditional cultures and traditions. On the other hand, they cannot avoid implementing the introduced systems imposed by the government and are also responding to adapt and make the most of changing conditions to meet their socioeconomic conditions. As "an entwined tree", the fate of Serampas is not only defined by their own community but also significantly driven by "vines and lianas", a number of socio-cultural, politic and economic factors outside Serampas.

12.2.2. Plants of Economic and Cultural Importance

This research documented 318 plant species belonging to 89 families that are commonly used by Serampas. By the number of species used, edible and medicinal plants together constitute the most useful species for the Serampas. Fewer plant species are used for construction and fiber, although many of these species are still essential for local needs, especially timber. Some plant species used as medicines are also important in rituals; one third of the 28 ritual plant species are commonly used for medicines. More importantly, about two fifths of the medicinal plants that are commonly consumed by Serampas are edible. Overall, the constellation of plant species used by the Serampas has changed over time, mostly towards lower diversity, with the occasional addition of new cash crops.

Local ethnobotanical knowledge about edible plants is relatively well preserved, while knowledge about dye plants has almost disappeared. Most edibles species recorded by Marsden in the late 17th century are still common edible plants today. On the contrary, most dye plants that were used at the time are no longer used today. Ethnobotanical knowledge about other use categories, including medicine, fiber and construction, is being lost at a moderate rate.

Ethnobotanical knowledge of a particular plant is most likely well preserved over generations in communities who keep using product(s) associated with the plant (e.g., Pfeiffer and Uril, 2003). The Serampas resource management practices that maintain high species diversity in the managed landscape as well as in the natural forest allow Serampas to maintain a greater diversity of plant-based products. The practices also help Serampas in conserving the knowledge associated with the diverse species. In terms of edible plants for example, Serampas use a variety of wild and semi-wild species to diversify the taste of local dishes. These species commonly bear unusual flavors such as bitter and sour that are quite different from their cultivated cohorts. Traditional food processing such as fermentation also broadens the horizon of food flavors and frequently involves the use of many associated plant species.

A change in community livelihoods is likely to change plant uses of taxa toward those have multiple uses and are more accessible in the new environment. For example, although *enau* (*Arenga pinnata* Merr.) was widely used by the ancient generation of Serampas, its role has gradually been replaced by *pinang* (*Areca catechu* L.), as Serampas shifted toward a more sedentary agricultural livelihoods. The prior species mostly grows in secondary forest, whereas the latter species is mostly planted in farming fields and around settlements. The transition is also reflected in local oral traditions; stories associated with *enau* most likely refer to ancient times. In contrast, the *pinang* is better represented in the modern context. Ethnobotanical knowledge associated with secondary forest (*rapohen* and *sangkan*) will most likely be lost more quickly with the decline of shifting agriculture.

In a traditional society such as Serampas, the utilization of a large number of useful plants are strongly attached to local traditions driven by adat (customary systems). *Dukun berempat jantan dan berempat betino* (the four shaman men and four shaman women), a customary institution that provides health service for the community, indirectly conserves knowledge related to medicinal plants. Moreover, adat protection over a number of edibles fruit producing-trees not only promotes more equal access to such species, but also helps conserve plant and animals associated with the trees. In short, empowering such customary systems appears to contribute to conserving locally important plants and ethnobotanical knowledge associated with the plants and has implications for promoting social equitability.

12.2.3. From Shifting Cultivation to Cinnamon Agroforestry

The Serampas are one of the few tropical rainforest peoples remaining in Sumatra. Since time immemorial, they have practiced shifting agriculture to fulfill most of their basic needs. The farming system is not simply a means of filling bellies, however, it has become an integral part of Serampas socio-cultural life and contributes to shaping and maintaining the local landscape. Local traditions, ritual and worldview associated with shifting cultivation articulate a complex relationship between humanity, nature and the creator.

Serampas' traditional practices of shifting cultivation appear to have various components that promote ecological sustainability and social equality. Shifting cultivation creates secondary forests, a stage that, if left long enough without further use, eventually replenishes degraded land, thus maintaining a long-term sustainable farming system cycle. The adat of Serampas that governs the local lands sustains shifting agriculture by providing equal access to arable land, especially for local people. The sustainability of the swidden agriculture is also supported by population of Serampas, which is quite low.

In terms of forest succession, and development and perpetuation of local knowledge, the persistent practice of shifting cultivation drives two processes simultaneously: on the one hand it directs succession of secondary forest toward vegetation dominated by human-preferred species. On the other hand, intensive and recurrent interactions of people with the secondary forest improve people's ethnobotanical knowledge and capacity to manage and utilize forest resources.

The practice of shifting cultivation over generations has maintained a mosaic of old-growth forests, secondary forests and shifting cultivation fields. However, this has changed with the recent incorporation of agroforestry practices. Although in many cases in the tropics, long-term shifting cultivation practices lead to the development of complex multilayer agroforests with a diversity of greenish canopy hues, the adaptation of shifting cultivation in Serampas has led to an expansive and almost mono-dominant cinnamon agroforest with a monotone reddish-purple canopy.

The Serampas expansive cinnamon agroforests reflect a logical local strategy to secure land tenure given that the land is within the area of KSNP. Unfortunately, the agroforest breaks down the sustainable practice of shifting cultivation by replacing the normal fallow period with permanent cinnamon agroforest stands. Placing the cinnamon agroforest in the biodiversity and productivity diagram of Van Noordwijk *et al.* (1987) and Belcher *et al.* (2005), Serampas agroforest resembles a plantation more than a forest garden or extractive reserve.

A complex agroforest is the product of multiple interactions taking place in a particular region over long periods. For a particular community, cultures often develop their own idiosyncratic, indigenous agroforestry through recurrent trial and error processes over generations. They may also adopt agroforest systems from other cultures and adapt them to suit local conditions and preferences. The cinnamon agroforests have been quite recently introduced to Serampas as an imitation of a similar system practiced around the region, especially in Kerinci. Serampas may be in the early phases of a long process to develop a more complex agroforest.

Comparing agroforest characteristics between the Serampas villages of Tanjung Kasri and Renah Kemumu, a community that has more diverse livelihoods most likely has more economic "space" to undertake "farming experiments", allowing some natural processes such as spontaneous species recruitment and vegetation dynamics to take place. At the same time, they also gradually manipulate the farming system towards preferred conditions. The current cinnamon based agroforest will not likely be the final system; the Serampas are always working to develop agroforest models that best fit with the local socio-cultural-economic and environmental setting.

Although cinnamon (*Cinnamomum burmannii* [Nees & T. Nees] Bl.) dominates most of the Serampas agroforests, in fact there is a growing diversity of cinnamon-based agroforest in terms of the species that are being incorporated into the management of the agroforests. The further promotion of diversity within cinnamon agroforests should be considered in formulating a policy that addressing the park and people issues. Moreover, understanding trade-offs between biodiversity and productivity (e.g., Belcher *et al.*, 2005) may help to improve and develop the Serampas cinnamon agroforests. Decreasing the cinnamon planting density concomitantly with enriching local agroforests with more diverse and valuable species (economically and culturally) may benefit not only the local economy but also the local culture and local biodiversity as well.

12.2.4. The Forest of Serampas

One way that the Serampas manage their forests is by controlling access following the direction of adat. However, most adat regulations are not documented in written format but are saved within the databanks of local memory, particularly among the elders. People usually cite relevant proverbs (*saluko adat*); a derivation piece of adat regulation, in local discourses associated with adat's rules, rather than referring to the original dictum of the regulation. As a result, it is not uncommon that people have different opinions and attitudes in interpreting an adat rule.

Serampas recognize at least three main categories of forests, including *rimbo gano* (old-growth forest), *hutan adat* (customary forest) and *rapohen* (secondary forest). The *rimbo gano* category includes old growth forest that belongs largely to the KSNP. The *hutan adat* and *rapohen* are traditionally claimed as common property of the local people, although these forest types are within the territory of the park. The Serampas protect the *hutan adat* mainly to preserve watershed and fragile landscapes. Traditional protected forests in the form of *hutan adat* are widely recognized not only by the Serampas but also by other cultures throughout Sumatra. In conserving fragile land and watersheds, such *hutan adats* are also compatible with conservation of biodiversity resources. Importantly, the plant species diversity and plant species richness of the *hutan adat* are similar to those of *rimbo gano*.

Comparing the forest properties between the villages of Tanjung Kasri and Renah Kemumu, the forests in the latter village are richer in species and have higher plant diversity than those of the prior village. This suggests that communities such as Renah Kemumu that have multiple livelihood sources not only tend to develop more species-rich- agroforests (Chapter 8), but also maintain forests of higher diversity. A relatively closer connection to vast areas of mature forests in the Renah Kemumu facilitates recruitment of more mature-forest-origin species.

Overall, the area of forestlands of the Serampas, as well as forests in areas adjacent to the KSNP, has decreased over time. Easily accessible areas, in particular, suffer more severe and more rampant forest degradation (e.g., Linkie *et al.* 2004). The future of Serampas forests are also challenged by rampant practice of low diversity cinnamon agroforest and the expansion growing of horticultural cash farming especially potato. Therefore, it is important to examine the impact of the practices to the local forests. Moreover, the weakening of local customary systems together with a lack of law enforcement near the KSNP also encourages farmer migrants from other regions to encroach upon the KSNP lands.

12.2.5. Natural Resource Perceptions and Distribution of Ethnobotanical Resources

Although the Serampas live within a forested region, they do not place a higher value on forests as compared to rice-producing fields (including *umo* and *sawah*). In general, people rank food security resources more highly than the miscellaneous products of the forest. I observed some differences among gender; men tended to value land use zones and resources that hold long-term benefits, such as securing secondary forest land for farming. In contrast, women tended to value resources that provide short-term benefits for households such as coffee agroforest. The coffee is easily converted to cash to fulfill urgent family needs.

Traditional protected forests such as *hutan adat* are crucial in providing both ecological services for the local people while maintaining biodiversity. Nonetheless, these forests have the lowest proportion of useful species (number of useful species/number of total species) as compared to other vegetation types for the Serampas. The enforcement of traditional laws associated with the customary forest has likely reduced people's access and interest in the forest. Importantly, the persistent barrier access to the *hutan adat* forest over long time seems to drive the development of knowledge about local plants toward knowledge associated with plants that occurred in more accessible lands. The preservation of biodiversity that hampers people from using forest resources over the long term may also be associated with decreased local knowledge related to the resources.

An inventory of Serampas useful plants indicated that mature forest have the highest species richness of useful taxa, followed by customary forest, secondary forest and, finally, cinnamon agroforests. However, forest zones with high densities of useful plants area not necessarily perceived locally as the most important. The Serampas rely upon and harvest a great proportion of useful plants from secondary forests than from mature forest. Secondary forests had the highest proportion of useful species, followed by mature forests and agroforests (with similar levels), then *hutan adat*. The mature forest–secondary forest is a continuum of useful species sources that to some degree represents an interactive, "source-sink dynamic"; people harvest species primarily from secondary forests and simultaneously, secondary forest keeps enriching and recruiting other species mainly from the mature forest.

People who have close contact with their environment over long periods develop not only knowledge but also perception of particular resources associated with specific socio-economic and cultural settings (e.g., Gadgil *et al.* 1993 and Meffe *et al.* 2006). Moreover, some indigenous groups have adopted conservation of some endangered resources into their traditional natural resource management practices. Understanding the existing traditional resource management practices as well as the relative value of important resources as perceived by the people is crucial to developing conservation programs that address both biological and cultural conservation objectives.

12.2.6. Linking Local Socio-economic and Cultural Interests with Conservation

This dissertation illustrates that Serampas have traditional ecological knowledge and values that are valuable for nature conservation. This is also the case with many other indigenous groups who live in and around a national park. However, the knowledge and values are subtle and attached to adat customary law and local traditions, especially oral traditions. Unfortunately, many Serampas traditions are on the way to extinction due to the weakening of local customary system and the increasing pressure from other local dominant cultures, global culture and changing socio-economic conditions.

Documenting such traditions during current rapid socio-cultural changes is critical to conserve traditional knowledge.

However, Campbell (1999) warns that employing a traditional system such as adat does not always mean living in harmony with nature or providing benefits to most people. There are some examples in which local leaders twist the customary system, benefiting only their close families. Revitalization and adaptation of Serampas traditional systems to the current context can be one important way to promote biodiversity and nature conservation in KSNP. Small conservation actions in isolated area such as in Serampas may seem insignificant in addressing global-scale challenges. However, the sum of such local actions, as suggested by Gómez-Pompa and Kaus (1999), may result in the development of "conservation building blocks" for the entire area of KSNP as well as broader scales.

Given the complex nature-culture-socioeconomic-local governmental context of the KSNP, there is no conservation model that could possibly address the needs and interests of all stakeholders associated with biodiversity conservation in the park (e.g., Sayer, 1995). Involving local people in conservation initiatives is essential to maintain the achievement of conservation goals over the long run. However, efforts to fully involve the local people may take some time, especially in communities who have been left out of the process of the establishment of the conservation area, as is the case of Serampas. Currently in Serampas there is a lack of understanding of the intention and goals of the KSNP and it may take a long time for people to deeply consider and shift their position from "observer" to "participant" in a conservation program. Such changes deal not only with individual interest but also have implications for local socio-cultural contexts. In this case, many small integrated community-based conservation initiatives would likely be more effective than a large, top-down and rigid conservation program.

However, regardless of the local involvement and funding of conservation initiatives, long-term success in conservation requires strong support and commitment from both local and central government. Therefore, symbiotic associations between local people, protected areas and government agencies may improve biodiversity conservation programs. This is true especially in developing countries where protected areas greatly overlap with indigenous lands and there is a lack of resources to properly protect and conserve biodiversity.

12.3. Research Implications, Limitations and Further Studies

This research covers general aspects of Serampas Traditional Ecological Knowledge (TEK) including customary systems, ethnobotanical knowledge, farming systems and forestry. However, given the nature of this research, more intensive research that focuses on more specific aspects of TEK over a longer field period may reveal a deeper and more comprehensive TEK, as suggested by Christensen (2002). Although this dissertation does cover many parts of Serampas knowledge and wisdom; there is much more knowledge held within the community that could not be covered here. Information about Serampas TEK and resource management practices in the past is very limited; therefore it is impossible to clearly and comprehensively identify the changes in knowledge and practice over time.

Taking into account that most of the knowledge and wisdom are saved in the heads of the elders and conveyed by means of mouth, it is crucial to focus upon documenting the various forms of Serampas oral tradition that encode the knowledge. In addition, this research mainly focused on people and natural resources in the villages of Tanjung Kasri and Renah Kemumu over the course of nine months field work. Expanding the research to all Serampas villages would lead to more comprehensive findings.

The knowledge of useful plants in this study was accumulated from pieces of knowledge collected from respondents in both Tanjung Kasri and Renah Kemumu. The knowledge was not analyzed by village domain, considering that people in both villages are attached to the same culture. Regarding to medicinal plants, knowledge associated with the plants was more extensively collected in the village of Renah Kemumu than Tanjung Kasri. Further research could assess any differences among these villages, especially since I found differences between villages in terms of agroforest practices and in terms of richness and diversity of useful forest/agroforest species and overall forest/agroforest plant species.

In terms of the vegetation analysis, this research relied on samples of a total of 3000 m^2 in each land use type including cinnamon agroforest, secondary forest, customary forest and old-growth forest. The total area sampled may not have been big enough to represent the total flora of Serampas, but logistically it was not possible to sample over a larger area. Future studies on specialized aspects of the forest should sample larger areas. In addition, plant specimens collected from the vegetation analysis often lacked reproductive structures, which could have led to some misidentification within the level of genus.

Ethnobotanical knowledge about plants that are no longer or rarely used seems the most susceptible to disappear, such as ethnobotanical knowledge related to dye plants for the Serampas. To conserve the knowledge, conservation programs should promote the use of local products for example by linking and developing markets. The use of local plant materials on a sustainable basis can help conserve both ethnobotanical knowledge and the forest, because it maintains local people's interests in preserving forest habitat instead of converting it to other uses, such as horticultural crops.

Populations of some woody species that are locally perceived as the most important timber, such as *asal* (*Elaeocarpus* sp.), are declining. Moreover, some non-timber forest products such as *bayeh* (*Oncosperma* sp.) are also harvested in unsustainable manners. Since the population of the Serampas is growing, it is essential to investigate the biology and potential for sustainable harvest of such threatened species before they are lost.

The Serampas utilize a number of non-timber forest products such as the sap *damar* (*Canarium pilosum* A. W. Benn.) and the seed of *payang* (*Pangium edule* Reinw.) that have potential for helping support the local economy. However, obscure arrangements about the rights and responsibilities between the people and the park discourage people from developing and selling those kinds of products; it is not clear what kind of forest products people are allowed to harvest and which they are not. Linking the Serampas with other indigenous groups who have developed advanced agroforest systems may enlighten the Serampas about agroforestry that best fits with the local socio-ecological conditions. Some examples include *damar* agroforest in southern Sumatra and benzoic agroforest in northern Sumatra.

In terms of medicinal plants, besides generalist knowledge, a large body of ethnobotanical knowledge is possessed by local shamans and is strongly associated with the Serampas traditional health care service system. Incorporating this system with the modern government health care system can help conserving local knowledge related to the medicinal plants and at the same time assure the sustainability of providing local healthcare system at a more affordable price.

This research was not designed solely to investigate Serampas' knowledge of plant use; rather it forms a part of a larger research endeavor attempting to reveal a broader perspective of Serampas traditional ecological knowledge and its relationships to forest conservation. In Chapter 5 and Chapter 6, I trace the change of Serampas ethnobotanical knowledge by comparing the current Serampas ethnobotanical knowledge with that of Marsden era in addition to information collected from respondents. Although this comparison is clearly not nearly as strong as a diachronic study, it was not possible to resolve this issue as it is not possible to find more in-depth evidence of the earlier Serampas ethnobotanical knowledge.

Kenduri Psko is one of the remaining prominent traditions that is still well maintained by the Serampas. Importantly, the *Kenduri Psko* is an essential medium and has held and conveyed some pieces of traditional knowledge and values associated with Serampas culture over generations. Promoting, employing and re-empowering local traditions such as the *kenduri psko* can help to spread conservation messages as well as facilitate the goals of biodiversity conservation.

Given that cinnamon agroforests in Serampas cover huge areas, a clear demarcation between "community land" and "park land" is crucial to reduce further penetration into the park forests. However, the implementation of park boundaries should go along with a facilitation to develop more sustainable alternatives sources of income. A number of studies need to be done in order to identify agroforestry systems that best fit with Serampas conditions. Enriching the existing cinnamon agroforests with native economic valued trees appears to benefit not only the local livelihood but also biodiversity conservation.

Overall, Serampas traditional systems contain values and approach that may complement and enrich the modern systems. However, there is currently a lack of understanding between Serampas and the KSNP. Therefore, in terms of natural resource management, empowering local people together with revitalization and adaptation of traditional resource management to link it to the current conservation context will most likely enhance the conservation of biodiversity resources. Taking into account some cases of traditional system revitalization in Indonesia, Serampas would require a facilitator that would help local people revealing, honoring and reviving their knowledge, practices and traditions. The role of the facilitator is also essential in order to facilitate Serampas in placing the traditional systems in to the current conservation context, and more importantly to link and facilitate the Serampas in dealing with outside world, especially the government and the KSNP.

Serampas are in some ways representative of other indigenous groups along the border of the KSNP. In terms of people and park interactions, both Serampas and the other indigenous groups had little involvement or participation in the establishment of the park or in developing and implementing programs associated with biodiversity conservation. To some degree, Serampas also share common adat, traditional ecological knowledge and traditional resource management with the other groups. Although most of the groups recognize and implement adat, the rules and organization of the adat are quite diverse across the groups. Importantly, most of the groups adhere less to their adat than Serampas do, and have become more materialistic as they become urbanized and integrated with more people (migrants) from different ethnic groups. For example, in many communities the adat is used to govern only affairs such as marriage, divorce and dispute, instead of for govern most aspects of human lives including natural resource management.

A few groups of migrants from particular ethnicities also inhabit some areas on the border of the park. Although the populations of the latter groups are quite small compared to the total indigenous population along the park's border, the population is growing sharply and the groups seriously challenge the sustainability of the park. They encroach on the park for growing some cash crops.

The results of this study may not applicable to addressing people and park issues in some urbanized villages where the people are no longer attached to their traditions. However, in those more remote and isolated forested areas such as Serampas, local people are the real observers and keepers of the forest. Therefore, a close and strong collaboration between local people, KSNP and local and central governments, by reviving and revitalizing the local adat and traditional ecological knowledge may help address conflict between people and parks.

Appendix A. Approval from Committee on Human Studies, University of Hawaii

UNIVERSITY OF HAWAI'I

Committee on Human Studies

MEMORANDUM

March 3, 2005

TO: Bambang Hariyadi
Principal Investigator
Department of Botony

FROM: William H. Dendle
Executive Secretary

SUBJECT: CHS #13563- "Encountering the Change: Traditional Forests and Agroforests in the Jangkat Community, Jambi Indonesia"

Your project identified above was reviewed and has been determined to be exempt from Department of Health and Human Services (DHHS) regulations, 45 CFR Part 46. Specifically, the authority for this exemption is section 46.101(b)(2). Your certificate of exemption (Optional Form 310) is enclosed. This certificate is your record of CHS review of this study and will be effective as of the date shown on the certificate.

An exempt status signifies that you will not be required to submit renewal applications for full Committee review as long as that portion of your project involving human subjects remains unchanged. If, during the course of your project, you intend to make changes which may significantly affect the human subjects involved, you should contact this office for guidance prior to implementing these changes.

Any unanticipated problems related to your use of human subjects in this project must be promptly reported to the CHS through this office. This is required so that the CHS can institute or update protective measures for human subjects as may be necessary. In addition, under the University's Assurance with the U.S. Department of Health and Human Services, the University must report certain situations to the federal government. Examples of these reportable situations include deaths, injuries, adverse reactions or unforeseen risks to human subjects. These reports must be made regardless of the source funding or exempt status of your project.

University policy requires you to maintain as an essential part of your project records, any documents pertaining to the use of humans as subjects in your research. This includes any information or materials conveyed to, and received from, the subjects, as well as any executed consent forms, data and analysis results. These records must be maintained for at least three years after project completion or termination. If this is a funded project, you should be aware that these records are subject to inspection and review by authorized representatives of the University, State and Federal governments.

Please notify this office when your project is completed. We may ask that you provide information regarding your experiences with human subjects and with the CHS review process. Upon notification, we will close our files pertaining to your project. Any subsequent reactivation of the project will require a new CHS application.

Please do not hesitate to contact me if you have any questions or require assistance. I will be happy to assist you in any way I can.

Thank you for your cooperation and efforts throughout this review process. I wish you success in this endeavor.

Enclosure

2540 Maile Way, Spalding 252, Honolulu, Hawai'i 96822-2303
Telephone: (808) 539-3955/(808) 956-5007, Facsimile: (808) 539-3954, Web site: www.hawaii.edu/irb
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Appendix A. (Continued) Approval from Committee on Human Studies, University of Hawaii

OMB No. 0990-0263
Approved for use through 07/31/2005

Protection of Human Subjects
Assurance Identification/IRB Certification/Declaration of Exemption
(Common Rule)

Policy: Research activities involving human subjects may not be conducted or supported by the Departments and Agencies adopting the Common Rule (56FR28003, June 18, 1991) unless the activities are exempt from or approved in accordance with the Common Rule. See section 101(b) of the Common Rule for exemptions. Institutions submitting applications or proposals for support must submit certification of appropriate Institutional Review Board (IRB) review and approval to the Department or Agency in accordance with the Common Rule.

Institutions must have an assurance of compliance that applies to the research to be conducted and should submit certification of IRB review and approval with each application or proposal unless otherwise advised by the Department or Agency.

1. Request Type	2. Type of Mechanism	3. Name of Federal Department or Agency and, if known, Application or Proposal Identification No.
[] ORIGINAL [] CONTINUATION [X] EXEMPTION	[] GRANT [] CONTRACT [] FELLOWSHIP [] COOPERATIVE AGREEMENT [] OTHER:________	

4. Title of Application or Activity	5. Name of Principal Investigator, Program Director, Fellow, or Other
"Encountering the Change: Traditional Forests and Agroforests in the Jangkat Community, Jambi Indonesia"	Bambang Hariyadi

6. Assurance Status of this Project *(Respond to one of the following)*

[X] This Assurance, on file with Department of Health and Human Services, covers this activity:
Assurance Identification No. F-3526, the expiration date October 15, 2005 IRB Registration No. IORG0000169

[ ] This Assurance, on file with *(agency/dept)* ________________, covers this activity.
Assurance No. ________, the expiration date ________ IRB Registration/Identification No. ________ *(if applicable)*

[ ] No assurance has been filed for this institution. This institution declares that it will provide an Assurance and Certification of IRB review and approval upon request.

[X] Exemption Status: Human subjects are involved, but this activity qualifies for exemption under Section 101(b), paragraph 2.

7. Certification of IRB Review (Respond to one of the following IF you have an Assurance on file)

[ ] This activity has been reviewed and approved by the IRB in accordance with the Common Rule and any other governing regulations.
by: [ ] Full IRB Review on (date of IRB meeting) ______ or [ ] Expedited Review on (date) ________
[ ] If less than one year approval, provide expiration date ________

[ ] This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by the Common Rule will be reviewed and approved before they are initiated and that appropriate further certification will be submitted.

8. Comments

CHS #13563

9. The official signing below certifies that the information provided above is correct and that, as required, future reviews will be performed until study closure and certification will be provided.		10. Name and Address of Institution
11. Phone No. *(with area code)*	(808) 956-5007	University of Hawaii at Manoa Office of the Chancellor 2444 Dole Street, Bachman Hall Honolulu, HI 96822
12. Fax No. *(with area code)*	(808) 539-3954	
13. Email:	dendle@hawaii.edu	
14. Name of Official William H. Dendle		15. Title Compliance Officer
16. Signature		17. Date 3/1/05

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Appendix B. Informed Consent (English Version)

Bambang Hariyadi
Primary Investigator

Statement:

This research project is being conducted as a component of a dissertation for a doctoral degree. The purpose of the project is to learn traditional resource management system in Serampas. You are being asked to participate, because you were observed practicing agroforest and stay close to customary forest areas.

Participation in the project will be asked about background information about yourself, and a short interview with the investigator. Interview questions will focus on what knowledge and practice you hold associated with forest and agroforest. Data from the interview will be summarized into broad categories. No personal identifying information will be included with the research results. Each interview will last no longer than two hours. Interviews will be audio recorded for the purpose of transcription.

Participating in this research may be of no direct benefit to you. It is believed, however, the results from this project will help to conserve the local ecological knowledge for the benefit of future generation.

Participation in this research project is completely voluntary. You are free to withdraw from participation at any time during the duration of the project with no penalty, or loss of benefit to which you would otherwise be entitled.

Question:

Would you be interested to participate in this research?

If you have any questions regarding this research project, please contact the researcher, Bambang Hariyadi, at 944-7093.

If you have any questions regarding your rights as a research participant, please contact the UH Committee on Human Studies at (808)956-5007.

Appendix C. Informed Consent Hand (Indonesian Version)

Bambang Hariyadi
Peneliti

Pernyataan:

Sebagai salah satu kelengkapan untuk menyelesaikan studi S-3, saya bemaksud untuk melakukan penelitian di daerah ini. Adapun tujuan dari penelitian ini adalah untuk mempelajari praktek-praktek pengelolaan sumberdaya alam yang dilakukan oleh masyarakat Marga Serampas. Saya memeohon kesediaan Bapak/Ibu untuk bisa ikut serta dalam penelitian ini.

Saya akan melakukan wawancara kepada Bapak/Ibu untuk mendapatkan informasi terutama terkait dengan ladang, kebun, dan hutan. Data yang diperoleh selanjutnya akan diolah untuk mendapatakan gambaran yang menyeluruh mengenai pengelolaan sumberdaya alam yang dilakukan oleh masyarakat Serampas. Meskipun demikian infromasi yang bersifat pribadi tidak akan ditampilkan dalam hasil akhir penlitian ini. Pelaksanan wawancara akan direkam untuk memudahkan pencatatan . Setiap wawancara membutuhkan waktu sekitar dua jam.

Penelitian ini mungkin tidak akan memberikan dampak secara langsung bagi Bapak/Ibu. Akan tetapi, hasil penelitian ini diharapkan akan membantu upaya untuk melestarikan pengetahuan local yang dimiliki masyarakat Srampas untuk keperluan generasi yang akan datang.

Keikut-sertaan Bapak/Ibu dalam penelitian bersifat suka rela. Sewaktu-waktu, Bapak/Ibu bisa mengundurkan diri dengan tidak ada sanksinya.

Pertanyaan:

Apakah Bapak/Ibu tertarik untuk ikut serta dalam penelitian ini?

Jika Bapak/Ibu masih ragu-ragu ataupun memiliki pertanyaan, silahkan menghubungi penelitinya yaitu Bambang Hariyadi, dengan alamat FKIP Universitas Jambi, Telfon 0815-86319870.

Jika Bapak/Ibu ingin mengbetahui hak-hak-nya sebagai peserta penelitian, silahkan menghubungi Committee on Human Studies di Universitas Hawaii, telfon 1-808-956-5007.

Appendix D. Guideline for in-Depth Interview

1. Respondent No: #___
2. Age:
3. Village #_____
4. Sex:
5. Education (how many year):
6. Ethnicity:
7. Occupation:

I. Socio-economic Aspects and Settlement History

1. When was the community first time established? Who were the original settlers? Who came after? [time line]
2. Describe the main sources of villagers' income, how has the income change over time.
3. Which groups are currently control most of the agricultural land, and which group are landless?
4. Describe the distribution of local land holding & landuse size [TABLE OF LAND OWNERSHIP AND LAND USE BY HOUSEHOLDS]. How have the land ownership and landuse changed over time, why and what are the consequences?
5. Describe the villagers' occupation [TABLES OF VILLAGERS OCCUPATION]. How has the occupation changed over time, why and what are the consequences? Identify any household members that migrate annually, how many months?
6. Describe the current villagers' education level. How has the education changed over time, why, what are the consequences?
7. Describe access to local markets [TABLE OF LOCAL MARKET NAME VS OPERATIONAL DAY VS DISTANCE]. Which is the main market for villagers; how have the markets changed over time, why, what are the consequences? Identify any traders and buyers that temporarily visit the village.
8. Describe any institution (school, bank, cooperative, etc.) that provide service to the community [TABLE INSTITUTION NAME, FUNCTION, DISTANCE] how have the institutions changed over time, why, what are the consequences?

II. Forest/Agroforest and Other Local Resources

1. Describe the existing local resources, how have the resources changed over time, why, what are the consequences?
2. Describe the current landuse, how has the landuse change over time, why, what are the consequences? Identify any particular event that significantly affected the local landscape (natural disasters, development projects, etc.) [TRENDLINES)

3. Describe the main products (fuel wood, fodder, and NTFPs) their availability of each landuse. How have the product changed over time, why, what are the consequences? Indicator might include changes in the number and type of products, trends in volume and utilization. Identify any product that growing scarce [TRENDLINES]
4. Describe the availability/harvesting pattern of the product within a year [Tables of forest/agroforest products by month]. How have the pattern changed over time, why, what are the consequences?
5. Describe which villagers who utilize each local resource (forest, agroforest, paddy field, settlement, lagoon, river etc.). Are there any special groups who are more dependent on those particular resources? [typology]
6. What rights do the community, other community, or specific user groups have to those resources? How have these rights changed over time? Are there any formal or informal agreements among user groups regarding to products? What effect have these changes had on (a) access to those resources, especially forest/agroforest; (b) product availability, and (c) relationship between communities or sub groups within the communities and the Park [probes: gender-related issues, increased collection burdened]
7. Describe the landuse (rice field/forest/agroforest) history, including the process of forest clearing for agriculture, logging, and settlement encroachment?
8. Were there any disturbances to local forest, which one, when? What impact has forest disturbance had on a) soil (loss, agricultural productivity, stream sedimentation); b) water (flooding, drought, crops, surface and ground water tables); c) species diversity.
9. What socio economic impacts has forest disturbance had on community demographics, employment, and migration patterns (poverty and income, family cohesion, role of women as head of household, child education etc.). [TRENDLINES]

III. *Institutional and Cultural Issues*

10. What are the functioned institutions exist in the village, how have the institutions hanged over time (formal and informal), why, what are the consequences? [TIME LIME] How do/did the institutional work?
11. Describe any <u>government laws</u> deals with forest. Which laws and how do they affect people interaction to forests? Is there any punishment for disobeying the law, which one and how? If there were any villagers who disobey the laws, what was the real punishment? When did the last time the laws take into effect? How have the laws changed over time, why, what are the consequences?
12. Describe any rituals, traditions, ceremony that currently practiced by community, how have the rituals changed over time, why, what are the consequences?
13. Describe any particular sites that consider as special/sacred place. Identify any particular rituals deal with this sacred site. How have the sites and rituals changed over time, why, what are the consequences?

14. Describe any local folk taxonomy deals with local resources (esp. forests/agroforest), how do the resources be classified according to the folk taxonomy. How have the taxonomy changed over time, why and what are the consequences.
15. Describe the current customary laws deals with resources? Which laws and how do they affect people interaction to forests? Is there any punishment for disobeying the law, which one and how? If there were any villagers who disobey the laws, what was the real punishment? When did the last time the laws take into effect? How have the laws changed over time, why, what are the consequences?
16. Describe any cultural rituals dealing with resources, which one, how , and when and where the rituals usually take place? How have the rituals changed over time, why and what are the consequences?
17. Describe any taboos dealing with resources, which one, what are the consequences of the taboos both to the resources and the people, how have the taboos changed over time, why, what are the consequences?
18. Describe any myths related to resources, which one, what are the consequences of the myths both to the resources and the people, how have the myths changed over time, why, what are the consequences?
19. Describe any stories related to forests, which one, what are the consequences of the stories both to the resources and the people, how have the stories changed over time, why, what are the consequences?

IV. The Park – People Interactions

20. How are the historical interaction between The Park/forest department to villagers, how has the interaction changed over time, why, what are the consequences?
21. Did the Park conduct development program for local people, which programs, when, how did the programme be initiated and implemented, what are the benefits? Identify people participation on those development programs.
22. Does the Park manage the local forest, how do the Park manage the forest?
23. Who manage the forest prior to that? What institutional arrangements existed (formal and informal), and how have the arrangements changed over time, why, what are the consequences?
24. Are the any records of conflicts between people and the Park, which one, when, why, what are the consequences?
25. Were there logging histories in that area, who did that, what are the consequences?
26. Are there any prominent period that significantly change the life of villagers (what event, when, what were the consequences)?

Appendix E. Questionnaire for Respondent Survey

1. Respondent No: #___
2. Age:____ year
3. Village #_____
4. Sex: Male / Female
5. Education: ______year
6. Ethnicity:
7. Are you born in this village? No / Yes
   Yes; have you ever lived outside this village? No / Yes, what for.........
   No; how long have you been living in this village? ____ year
   Why did you move into this village? ....

I. Farming System

8. What kind of farming system do you practice? How many parcels do you occupy for each of the farming system and who owns the lands; how far are the lands from your house?

Farming Systems	Total land parcel	Land Size	Ownership (Rent/share cropping/ self-owned etc.)	Distance from house		Since what year
				Min	Km	

9. Are there any farming systems that you don't practice anymore, which one and why?

10. Is there any local name for different stage and/or different farming system, what are the descriptions of each name/type? (Explore the possibility that people might categorize a single agroforest system into some sub-classes)

For this and the following questions, if respondent has more than one agroforestry systems/parcel, explore each of the parcel/system.

11. What kind plants species that grow in your agroforest?

Local name	Cultivated/Wild	Uses[16]
Plants:		

12. Besides the harvested products, is there any other benefit from your agroforest (this question means to explore non-tangible value of agroforests)

13. How do you manage your agroforests?

Agroforest Activity	Method	The ones involve (husband, wife, sons, neighbor etc.)	Any paid labor (%)
Land preparation			
Nursery (source of seed etc.)			
Planting (lay-out, density, composition, etc.)			
Weeding			
Fertilizing			
Pest/disease control			
Harvesting			
Post harvest & processing			
Marketing			
Others			

14. Were there any cases of labor supply deficiency; how did you cope the lack of labor supply?

15. Are there any laws (either customary or government) deal with agroforest? Which laws and how do they affect your agroforests?

The law	What are the consequences	How does it work	Were there any punishment	How did you learn the law

[16] (a) cash/barter, (b) food, (c) fuel, (d) housing, (e) tool and equipment, (f) medicinal, (g) cultural, (h) others ....

16. Are there any cultural rituals dealing with agroforest, which one, how, and when?

Cultural rituals	How does it work	The ones involve	The objectives/consequences	How did you learn the rituals

17. Are there any taboos dealing with agroforest; which one, are there any consequences of the taboos (either to the agroforest or local people)?

Which Taboos	The objectives/consequences	How did you learn the taboos

18. Do you recognize any myths or stories related to the agroforest, which one, are there any consequences of the taboos, what (If not, try to explore whether respondent has another myths by using list of myths obtained from FGD, if applicable).

List of stories/myth dealing with agroforests	How did you learn the stories/myth

19. Is there any rule that control the conversion of agroforest to another systems, which ones and what the rules about?

20. Do you have any problem with your agroforests?

Agroforest problem	The reason	The consequences	How do you address the problem

II. Agroforest Change Overtime

21. When and how did you start your agroforest? Year _____

Agroforest System/parcel	When	How did you start the agroforest	Why do you prefer choose the site	What was interested you to do agroforest

22. Are/were there any local values being used to assess land suitability for your agroforest (probes: local signs, plant indicators, etc)?

23. How did you learn about agroforest?

Agroforest system	When	Where	With whom	How

24. Do you recognize any change in the local agroforest over time (to explore the main agroforest change and to get idea of any particular period that significantly changes the local agroforests[17])?

Aspect of change	What/Degree of change	Reason of change	Consequences	Local people response
Agroforest type				
Total agroforest area				
Agroforest Products				
Others ……..				

[17] It could be based on year (5, 10, 15 years etc.); local prominent events such as earthquake, flood, drought, volcano eruption etc.; or generations (comparing the current respondents generation with their parent or grand parent generation). Different respondent might perceive the different prominent events.

25. If respondent recognizes local naming for agroforest (look Section #I, Q #11), was there any change of the agroforest naming over time, what was the naming, what were the descriptions of each type?

26. Are there any microclimate changes within your agroforest over time?

Microclimate	What the change	What the effects	How do you cope the change
Rainfall			
Wind (direction, velocity)			
Soil (fertility etc.)			
Pest & disease			
Plant (productivity, resistance, etc)			
Others			

27. Change of agroforest products over time.

Products that no longer available			Products that become rarer		
List of Products	Why	The consequences	List of Products	Why	The consequences

28. How do you deal with external changes that affect your agroforest?

External changes	Agroforest products	What are the changes	What are the consequences	Ho do you cope the changes
Price				
Production costs				
Land availability				
Land status				
In-migration/ out-migration				
Others ...				

29. Are there any different in your agroforest compare to your first agroforest (this repetitive question means to magnificently observe the agroforest change over time)? Are there any changes, which ones and how are the changes over time?

In the following questions, I intentionally replicate (some time partially) the questions to reveal any values that might be no more in effect, and/or to verify respondent's response to the similar question in Section #I).

30. Were there any change in laws (either customary or government) deal with agroforest?

Which law	Why	When	The one who modify/change	The consequences

31. Were there any change of cultural rituals dealing with agroforest?

Which rituals	Why	When	The one who modify/change	The consequences

32. Were there any taboos dealing with agroforest; which one; were there any consequences of the taboos (both to the agroforest and local people)? Do people still perceive the taboos, if no, then why, and are there any consequences (and what)?

Taboos that change or no longer exist	Why	The one who modify/change	The consequences

33. Did you recognize any myths and stories related to the agroforest, which one? Do people still recognize the myths and stories; are there any changes, what are the changes; are there any consequences of the myths, what?

Myth/Story that change/ no longer exist	Why	The consequences

34. Do you plan to change your current agroforest system (either <u>improve or change to another agroforest system or non-agroforest system</u>), to which system and why, if no then why)?

Yes, to which system . . . .
The reason . . . .

No, the reason . . . .

III. Current Forest Properties

35. Is there any local name for different stage and/or different forest type, what are the descriptions of each name/type? (Explore the possibility that people might categorize a forest type into some sub-classes. Show the sketch map to refer location of each forest category?)

Forest Type	Location in map	Characteristics	Distance from house Min./KM	Benefits

36. Are there forest type that no longer exist, which one and why?

37. What kind of animals/plants species live in each forest type (ask respondent to make as long list of species as s/he can)?

Forest Type 1:	Forest Type 2:

This question is very sensitive; interviewer should consider interview environment and respondent willingness before asking this question.

38. What kind of forest products that can be used from each forest type?

Forest Type 1: ____________

Products	Part of body	Uses[18]

Besides the harvested products, is there any other benefit from the above forest type (this repetitive means to explore non-tangible values of local forests)

Forest Type 2: ____________

Products	Part of body	Uses[19]

Besides the harvested products, is there any other benefit from the above forest type (this repetitive means to explore non-tangible values of local forests)

39. Are there any law (either national law or customary laws) deals with forest? Which laws and how do they affect your interaction to forests? Is there any punishment for disobeying the law, which one and how? If there were any villagers who disobey the laws, what was the real punishment? When did the last time the laws take into effect?

The law	What are the consequences	How does it work	Were there any punishment	When was the last punishment take place

[18] (a) cash/barter, (b) food, (c) fuel, (d) housing, (e) tool and equipment, (f) medicinal, (g) cultural, (h) others ....

[19] (a) cash/barter, (b) food, (c) fuel, (d) housing, (e) tool and equipment, (f) medicinal, (g) cultural, (h) others ....

40. Are there any cultural rituals dealing with forests, which one, how, and when?

Cultural rituals	How does it work	When & where is it performed	The ones involve	The objectives/consequences

41. Are there any taboos dealing with forest; which one, are there any consequences of the taboos (both to the forest and the people), what?

Which Taboos	The objectives/consequences

42. Do you recognize any myths and stories related to the forests, which one?

IV. Forest Change Overtime

43. Do you recognize any change in the local forest over time (to explore the main forest change and to get idea of any particular period that significantly changes the local forests[20])?

Forest Type 1. _____________

Aspect of change	What/Degree of change	Reason of change	Consequen-ces	Local people response
Forest cover				
Forest services				
Others ……..				

[20] It could be based on year (5, 10, 15 years etc.); local prominent events such as earthquake, flood, drought, volcano eruption etc.; or generations (comparing the current respondents generation with their parent or grand parent generation). Different respondent might perceive the different prominent events.

Forest Type 2. ______________

Aspect of change	What/Degree of change	Reason of change	Consequences	Local people response
Forest cover				
Forest services				
Forest status				
Others ……..				

44. How do the forest products change over time?

Products that no longer available			Products that become rarer		
List Products	Why	How do you cope the change	List Products	Why	How do you cope the change

45. Is there any modification/change of the traditional laws dealing with local forest over time?

Which law	Why	When	The one who modify/change	The consequences

46. Are there any changes on cultural rituals associated with forests over time (which one, when, why was it change)?

Which rituals	Why	When	The one who modify/change	The consequences

47. Are there any change of taboos dealing with forests (which ones, why, when, what are consequences of the changes)?

Taboos that change or no longer exist	Why	The one who modify/change	The consequences

48. Are there any change of myths and stories related to forests, which ones, when, why, what are the consequences?

Myth/Story that no longer exist	Why	The consequences

V. Local People and Parks

49. Are there rural development projects promoted by the parks, what projects, how was the process, what are the results/consequences?

Project	Year	Initiator	How was the process, is there any villager participation?	What are the result	Consequence to local people, forest, & agroforest

50. Are there any other park initiatives deals with local people/forest/agroforest (ask respondent to list the initiatives), are there any impact to local people, what?

Other park initiative	Year	The impact to local people

51. How do you perceive the park and park programs?

Following the interview, be sure to:

- Thank them for their time and sharing their knowledge
- Ask respondent whether s/he has important and relevant issues that were not discussed in the above questions.
- Tell him/her if s/he to meet the interviewer in case s/he wants to change his/her answers or want to provide additional information.

Table A.1. List of Cultivated Edible Plant

No.	Vernacular Name	Scientific Name	Family	Part
1	*Ubi Dewa*	*Abelmoschus manihot* Medic.	Malvaceae	Tuber
2	*Buah Kereh*	*Aleurites moluccana* Willd.	Euphorbiaceae	Seed
3	*Bawang Merah*	*Allium cepa* L.	Alliaceae	Tuber, Leaf
4	*Daun Bawang*	*Allium fistulosum* L.	Alliaceae	Leaf
5	*Bawang Gando*	*Allium porrum* L.	Alliaceae	Tuber
6	*Bawang Putih*	*Allium sativum* L.	Alliaceae	Tuber
7	*Lengkuas*	*Alpinia galangal* Wild.	Zingiberaceae	Rhizome
8	*Bayam*	*Amaranthus sp*	Amaranthaceae	Leaf
9	*Nenas Putih*	*Ananas sp*	Bromeliaceae	Fruit
10	*Serai*	*Andropogon nardus* L.	Poaceae	Pith
11	*Nangko Belando*	*Annona muricata* L.	Annonaceae	Fruit
12	*Seladari*	*Apium graveolens* L.	Apiaceae	Leaf
13	*Kacang Gorek*	*Arachis hypogaea* L.	Fabaceae	Seed
14	*Jengkol*	*Archidendron pauclorum* (Benth.) I.C. Nielsen	Fabaceae	Seed
15	*Pinang*	*Areca catechu* L.	Arecaceae	Seed
16	*Cempedak*	*Artocarpus champeden* Spreng.	Moraceae	Fruit
17	*Nangko*	*Artocarpus iheterophyllus* Lam.	Moraceae	Fruit, Seed
18	*Gelimbing*	*Averrhoa carambola* L.	Oxalidaceae	Fruit
19	*Cabe Besar*	*Capsicum annuum* L.	Solanaceae	Fruit
20	*Cabe Rawit*	*Capsicum frutescens* Rodsch.	Solanaceae	Fruit
21	*Terung Pilo*	*Carica papaya* L.	Caricaceae	Fruit
22	*Limau Kapas*	*Citrus aurantifolia* Swingle	Rutaceae	Fruit
23	*Limau Purut*	*Citrus hystrix* DC.	Rutaceae	Fruit
24	*Limau Padang*	*Citrus limon* (L.) Burm. f.	Rutaceae	Fruit
25	*Limau Manis*	*Citrus reticulate* Blanco	Rutaceae	Fruit
26	*Limau Kunci*	*Citrus sp*	Rutaceae	Fruit
27	*Kelapa Hijau*	*Cocos nucifera* L.	Arecaceae	Young Shoot, Seed
28	*Kopi*	*Coffea Arabica* L.	Rubiaceae	Seed
29	*Kambang*	*Colocasia esculenta* Schott	Araceae	Tuber
30	*Timun*	*Cucumis sativus* L.	Cucurbitaceae	Fruit
31	*Prenggi*	*Cucurbita moschata* Duchesne ex Poir.	Cucurbitaceae	Fruit, Leaf
32	*Kunyit*	*Curcuma domestica* Valeton	Zingiberaceae	Rhizome
33	*Terong Pirus*	*Cyphomandra betacea* Cav.	Solanaceae	Fruit

Table A.1. (Continued) List of Cultivated Edible Plant

No.	Vernacular Name	Scientific Name	Family	Part
34	*Ubi Arang*	*Dioscorea alata* L.	Dioscoreaceae	Tuber
35	*Durian*	*Durio zibethinus* Murr.	Bombacaceae	Fuit
36	*Ubi Manis*	*Ipomoea batatas* (L.)Poir.	Convolvulceae	Tuber
37	*Sicekur*	*Kaempferia galangal* L.	Zingiberaceae	Rhizom
38	*Gambas*	*Luffa acutangula* Roxb.	Cucurbitaceae	Fruit
39	*Pauh*	*Mangifera applanata* Kosterm.	Anacardiaceae	Tuber
40	*Ubi kayu*	*Manihot utilissima* Pohl.	Euphorbiaceae	Fruit
41	*Mengkudu*	*Morinda citrifolia* Hunter	Rubiaceae	Fruit
42	*Pisang Dingin*	*Musa sp*	Musaceae	Fruit
	Pisang Itam	*Musa sp*	Musaceae	Fruit
	Pisang Kabu	*Musa sp*	Musaceae	Fruit
	Pisang Lidi	*Musa sp*	Musaceae	Fruit
43	*Pisang Sembatu*	*Musa sp2.*	Musaceae	Fruit
44	*Rambutan*	*Nephelium lappaceum* L.	Sapindaceae	Leaf
45	*Tembakau*	*Nicotiana tobacum* L.	Solanaceae	Grain
46	*Padi*	*Oryza sativa* L.	Poaceae	Grain
47	*Ketan Hitam*	*Oryza sp*	Poaceae	Leaf
48	*Pandan*	*Pandanus sp.*	Pandanaceae	Seed
49	*Kepayang*	*Pangium edule* Reinw.	Flacortiaceae	Seed
50	*Petai*	*Parkia speciosa* Haask.	Fabaceae	Seed
51	*Buncis*	*Phaseolus vulgaris* L.	Fabaceae	Leaf
52	*Sirih*	*Piper betle* L.	Piperaceae	Seed
53	*Merica*	*Piper nigrum* Lam. Ex Link.	Piperaceae	Fruit
54	*Jambu Kreh*	*Psidium guajava* L.	Myrtaceae	Pith
55	*Tebu Hitam*	*Saccharum officinarum* L.	Poaceae	Fruit
56	*Salak*	*Salacca edulis* Bl.	Arecaceae	Leaf
57	*Tarakatu*	*Sauropsus sp.*	Euphorbiaceae	Fruit, Leaf
58	*Labu Siam*	*Sechium edule* (Jacq.) Sw.	Cucurbitaceae	Fruit
59	*Jambu Aye*	*Sizygium sp.*	Myrtaceae	Fruit
60	*Terung Rimbang*	*Solanum indicum* L.	Solanaceae	Fruit
61	*Tomat*	*Solanum licopersicum* Blanco	Solanaceae	Fruit
62	*Terung Pandan*	*Solanum melongena* L.	Solanaceae	Fruit
63	*Terung akar*	*Solanum sp*	Solanacea	Fruit
64	*Terong Kelapo*	*Solanum sp.*	Solanaceae	Fruit

Table A.1. (Continued) List of Cultivated Edible Plant

No.	Vernacular Name	Scientific Name	Family	Part
65	*Terung*	*Solanum sp.*	Solanacea	Fruit
66	*Tomat Pipit*	*Solanum sp.*	Solanaceae	Tuber
67	*Kentang*	*Solanum tuberosum* L.	Solanaceae	Leaf
68	*Surian Tanam*	*Toona sinensis* M.Roem	Meliaceae	Leaf
69	*Gambir*	*Uncaria gambier* Roxb.	Rubiaceae	Seed
70	*Kacang Panjang*	*Vigna sinensis* Endl. Ex Haask.	Fabaceae	Grain
71	*Jagung*	*Zea mays* L.	Poaceae	Rhizome
72	*Jahe*	*Zingiber officinale* Roscoe	Zingiberaceae	Rhizome
73	*Pare*	*Momordica charantia* L.	Cucurbitaceae	Fruit

Table A.2. List of Wild Edible Plant

No	Vernacular Name	Scientific Name	Family	Part
1	*Kayu arang*	*Acmena acuminatissima*	Myrtaceae	Fruit
2	*Gitan*	*Adenia macrophylla*	Passifloraceae	Fruit
3	*Lenzat hutan*	*Aglaia odoratissima*	Meliaceae	Fruit
4	*Puar*	*Alpinia sp.*	Zingiberaceae	Tuber
5	*Gelambai*	*Anthocephalus cadamba*	Rubiaceae	Fruit
6	*Tiruk*	*Antidesma cuspidatum*	Euphorbiaceae	Fruit
7	*Merenai*	*Antiesma neurocarpum*	Euphorbiaceae	Fruit
8	*Jering tupai*	*Archidendron fagifolium*	Fabaceae	Fruit
9	*Kayu Asam*	*Ardisia lanceolata*	Myrsinaceae	Young leaf
10	*Masam-masam*	*Ardisia sumatrana*	Myrsinaceae	Young leaf
11	*Enau*	*Arenga pinnata*	Arecaceae	Stem
12	*Terap*	*Artocarpus elasticus*	Moraceae	Fruit
13	*Cempedak hutan*	*Artocarpus integra*	Moraceae	Fruit
14	*Tapang*	*Artocarpus rigida*	Moraceae	Fruit
15	*Paku pukut*	*Athyrium esculentum*	Woodsiaceae	Leaf
16	*Mbauk'eng*	*Baccaurea lanceolata*	Euphorbiaceae	Fruit
17	*Aur cino*	*Bambusa multiflex*	Poaceae	Shoot
18	*Mentang kirai*	*Beilschmiaedia madang*	Lauraceae	Bark
19	*Jerambing*	*Bidens pilosa*	Asteraceae	Leaf
20	*Batang bintang*	*Bischofia javanica*	Euphorbiaceae	Young leaf
21	*Manau*	*Calamus manna*	Arecaceae	Fruit
22	*Rotan tunas*	*Calamus sp. 1*	Arecaceae	Fruit
23	*Rotan tunas*	*Calamus sp. 2*	Arecaceae	Fruit
24	*Rotan jukut*	*Calamus sp. 4*	Arecaceae	Fruit
25	*Rotan jerat*	*Calamus sp. 5*	Arecaceae	Fruit
26	*Rotan seni*	*Calamus sp. 6*	Arecaceae	Fruit
27	*Rotan sikai*	*Calamus sp. 7*	Arecaceae	Fruit
28	*Sampul*	*Caryota rumphiana*	Arecaceae	Shoot
29	*Tajam tumpul*	*Castanopsis javanica*	Fagaceae	Fruit
30	*Kitab*	*Cephalomappa maloticarpa*	Euphorbiaceae	Fruit
31	*Keladi air*	*Colocasia esculenta*	Araceae	Tuber, Stem, Leaf
32	*Kayu palik*	*Cryptocarya ferrea*	Lauraceae	Fruit

Table A.2. (Continued) List of Wild Edible Plant

No	Vernacular Name	Scientific Name	Family	Part
33	*Sekedek'en*	*Cyrtandra sandei*	Gesneriaceae	Fruit
34	*Rotan getah*	*Daemonorops angustifolius*	Arecaceae	Fruit
35	*Paku ikan*	*Diplazium asperum*	Woodsiaceae	Leaf
36	*Jemban*	*Donax grandis*	Marantaceae	Fruit
37	*Dadap duri*	*Erythrina subumbrans*	Fabaceae	Fruit
38	*Sekuduk'en/ Semantung*	*Ficus fistulosa*	Moraceae	Fruit
39	*Sawang*	*Ficus obscura*	Moraceae	Fruit
40	*Kiro nasi*	*Ficus stupenda*	Moraceae	Fruit
41	*Kiro kesik*	*Ficus tinctoria*	Moraceae	Fruit
42	*Rukam bubur*	*Flacourtia rukam*	Flacourtiaceae	Fruit
43	*Manggus hutan*	*Garcinia celebica*	Clusiaceae	Fruit
44	*Manggus hutan*	*Garcinia lateriflora*	Clusiaceae	Fruit
45	*Kenis*	*Garcinia parvifolia*	Clusiaceae	Fruit
46	*Puar angit*	*Hornstedtia sp. 2*	Zingiberaceae	Tuber
47	*Lolo*	*Hornstedtia* sp.*1*	Zingiberaceae	Tuber
48	*Rotan sendahan*	*Korthalsia laciniosa*	Arecaceae	Fruit
49	*Jelatang nyiru*	*Laportea sinuate*	Urticaceae	Fruit
50	*Jelatang ruso*	*Laportea stimulans*	Urticaceae	Fruit
51	*Sekentuten*	*Lasianthus pseudo-stipularis*	Rubiaceae	Young leaf
52	*Sekentut'en*	*Lasianthus rigidus*	Rubiaceae	Young leaf
53	*Limau keli*	*Luvunga eleutherandra*	Rutaceae	Fruit
54	*Pauh*	*Mangifera applanata*	Anacardiaceae	Fruit
55	*Pisang ungko*	*Musa acuminate*	Musaceae	Flower
56	*Pisang karok*	*Musa salaccensis*	Musaceae	Flower
57	*Kelu*	*Etlingera elatior*	Zingiberaceae	Pith
58	*Bayeh*	*Oncosperma* sp.	Arecaceae	Stem
59	*Gelam*	*Planchonella nitida*	Sapotaceae	Fruit
60	*Respang*	*Pleomele elliptica*	Liliaceae	Young leaf
61	*Rukam air*	*Prunus javanica*	Rcsaceae	Fruit
62	*Pringga'en*	*Rubus moluccanus*	Rosaceae	Fruit
63	*Sentul*	*Sandoricum koetjape*	Meliaceae	Fruit
64	*Sa'em*	*Saurauia javanica*	Actinidiaceae	Fruit
65	*Sambada/Sampadi*	*Saurauja nudiflora*	Actinidaceae	Fruit
66	*Pucuk lumai*	*Solanum nigrum*	Solanaceae	Young leaf
67	*Semat baju*	*Stauranthera caerulea*	Gesneriaceae	Fruit

Table A.2. (Continued) List of Wild Edible Plant

No	Vernacular Name	Scientific Name	Family	Part
68	*Bungkul*	*Stelechocarpus burahol*	Annonaceae	Fruit
69	*Jambu kelawar*	*Syzygium leptostemon*	Myrtaceae	Fruit
70	*Ubo serai*	*Syzygium polyanthum*	Myrtaceae	Fruit
71	*Gambir*	*Uncaria gambier*	Rubiaceae	Leaf
72	*Molesaten*	*Villebrunea rubescens*	Urticaceae	Fruit
73	*Nalam nasi*	*Zingiber sp.*	Zingiberaceae	Pith, Flower

Table A.3. List of Common Species for Construction

No	Vernacular Name	Scientific Name	Family
1	*Medang Kayu Bukit*	*Actinodaphne sesquipedalis* Hook. f.	Lauraceae
2	*Beko*	*Aglaia crassinervia* Kurz. ex Hiern.	Meliaceae
3	*Letung Anye*	*Aglaia* sp.	Meliaceae
4	*Kayu burung, puleh*	*Alangium javanicum* (Blume) Wangerin	Alangiaceae
5	*Kayu Bawang*	*Aporusa lucida* (Miq.) Airy Shaw	Euphorbiaceae
6	*Menzi*	*Ardisia crispa* Roxb.	Oleaceae
7	*Medang Cempaka*	*Ardisia sumtrana* Miq.	Myrsinaceae
8	*Tapang*	*Artocarpus nitida* Trec.	Moraceae
9	*Tapang*	*Artocarpus rigida* Blume	Moraceae
10	*Medang Kulit*	*Belischmiedia madang* Blume	Lauraceae
11	*Kanidai*	*Bridelia insulana* Hance	Euphorbiaceae
12	*Menzi (2)*	*Chionanthus ramiflorus* Roxb.	Oleaceae
13	*Kayu Usang*	*Cinnamomum javanicum* Blume	Lauraceae
14	*Kayu Moton*	*Cratoxylum sumatranum* Blume	Clusiaceae
15	*Medang Kurus*	*Cryptocarya ferrea* Blume	Lauraceae
16	*Medang Telur*	*Dehaasia incrassate* (Jack) Kosterm.	Lauraceae
17	*Medang Kawah*	*Dichapetalum gelonioides* Engl.	Dichapetalaceae
18	*Kayu Kacang*	*Dysoxylum alliaceum* Blume	Meliaceae
19	*Letung Padi*	*Dysoxylum parasiticum*(Osbeck) Kosterm.	Meliaceae
20	*Asal*	*Elaeocarpus stipularis* Blume	Elaeocarpaceae
21	*Medang Sunting*	*Ficus callosa* Willd.	Moraceae
22	*Buluh Serik*	*Giganthocloa cf serik*	
23	*Buluh Kapal*	*Giganthocloa sp1*	
24	*Nulang*	*Glochidion obscurum* Blume	Euphorbiaceae
25	*Kelat*	*Helicia rostrata* D. B. Foreman	Proteaceae
26	*Medang Jambu*	*Knema cinerea* Warb.	Myristicaceae
27	*Medang Pelanau*	*Knema mandarahan* Warb.	Myristicaceae
28	*Mening Putih*	*Lithocarpus gracilis* (Korth.) Soepadmo	Fagaceae
29	*Mening*	*Lithocarpus pseudo-molucca* Rehder	Fagaceae
30	*Medang Gambung*	*Litsea garciae* Vidal	Lauraceae
31	*Medang Simpai*	*Litsea grandis* Hook. f.	Lauraceae
32	*Antoy*	*Litsea* sp..	Lauraceae
33	*Medang Serumput*	*Litsea mappacea* Boerl.	Lauraceae
34	*Medang Telampung Kuning*	*Litsea robusta* Blume	Lauraceae
35	*Medang Burung*	*Litsea sp.*	Lauraceae
36	*Sapat*	*Macaranga tanarius* Muell. Arg.	Euphorbiaceae
37	*Temeras*	*Memecylon* sp.	Melastomatac

Table A.3. (Continued) List of Common Species for Construction

No	Vernacular Name	Scientific Name	Family
38	*Telap*	*Morus* sp.	Moraceae
39	*Medang Giring*	*Persea cf. rimosa* (Bl.) Kosterm.	Lauraceae
40	*Kayu Kapuk*	*Pterocymbium tubulatum* Pierre	Sterculiaceae
41	*Mentang Cabai*	*Quercus subsericea* A. Camus	Fagaceae
42	*Kayu Terentang*	*Santiria laevigata* Blume	Burseraceae
44	*Kayu Bukit*	*Semecarpus heterophylla* Blume	Anacardiaceae
45	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae
46	*Ubo Serai*	*Syzigium polyanthum* Miq.	Myrtaceae
47	*Surian Tanam*	*Toona sinensis* (A.Juss.) M.Roem	Meliaceae
48	*Surian Rimbo*	*Toona sureni* (Blume) Merr.	Meliaceae
49	*Narung*	*Trema orientalis* (L.) Bl.	Ulmaceae
50	*Kayu Panjut*	*Urophyllum corymbosum* Korth.	Rubiaceae
51	*Kayu Kunyit*	*Xanthophyllum affine* Korth.	Polygalaceae

Table A.4. List of Useful Plant for Tool Materials

No.	Vernacular Name	Scientific Name	Family	Part	Tool/Product
1	*Merenai*	*Antidesma cuspidatum* Muell. Arg.	Euphorbiaceae	Twig	Bush shrub hooker
2	*Merenai*	*Antiesma neurocarpum* Miq.	Euphorbiaceae	Twig	Bush shrub hooker
3	*Mndap'en*	*Aralia dasyphylla* Miq.	Aralliaceae	Trunk	Hatchet holder
4	*Enau*	*Arenga pinnata* Merr.	Arecaceae	Fiber	Broom
5	*Terap*	*Artocarpus elasticus* Reinw.	Moraceae	Bark	Kiding (bamboo basket)
6	*Mangli*	*Arytera xerocarpa* (Blume) Adelb.	Sapindaceae	Trunk	To snare hunted animal
7	*Batang bintang*	*Bischofia javanica* Blume	Euphorbiaceae	Sap	Dye
8	*Manau*	*Calamus manna* Miq.	Arecaceae	Trunk	Kiding (bamboo basket)
9	*Rotan jerat*	*Calamus* sp. *5*	Arecaceae	Trunk	Puller, facilitate establishing house
10	*Rotan seni*	*Calamus* sp.6	Arecaceae	Trunk	Kiding (bamboo basket) and multi purpose rope
11	*Rotan sikai*	*Calamus* sp. *7*	Arecaceae	Trunk	Kiding (bamboo basket) and lukah (fish trap)
12	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae	Fiber	Broom
13	*Kayu manau*	*Celtis philippinensis* Blanco	Ulmaceae	Twig	To snare hunted animal
14	*Akar ulun*	*Cissus cf. nodosa* Blume	Vitaceae	Trunk	To bond cinnamon and other stuffs
15	*Rotan getah*	*Daemonorops angustifolius* Mart.	Arecaceae	Trunk	Kiding (bamboo basket)
16	*Buluh betung*	*Dendrocalamus asper* (Schult. & Schult. f.) Backer ex K. Heyne	Poaceae	Trunk	Kiding (bamboo basket)
17	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae	Trunk	Fish basket
18	*Bemban*	*Donax grandis* (Miq.) Ridley	Marantaceae	Trunk	Fish basket

Table A.4. (Continued) List of Useful Plant for Tool Materials

No.	Vernacular Name	Scientific Name	Family	Part	Tool/Product
19	*Rukam bubur*	*Flacourtia rukam* Zoll. & Mor.	Flacourtiaceae	Trunk	Pestle
20	*Manggus hutan*	*Garcinia celebica* L.	Clusiaceae	Trunk	Hatchet holder
21	*Manggus hutan*	*Garcinia lateriflora* Blume	Clusiaceae	Trunk	Hatchet holder
22	*Buluh Serik*	*Giganthocloa cf serik*	Poaceae	Trunk	Kiding (bamboo basket)
23	*Buluh kapal*	*Giganthocloa hasskarliana* (Kurz) Backer ex Heyne	Poaceae	Trunk	Lukah (fishing)
24	*Buluh mayan*	*Giganthocloa robusta* Kurz	Poaceae	Trunk	Buyang
25	*Rotan sendahan*	*Korthalsia laciniosa* Mart.	Arecaceae	Sucker, trunk	Machete holder, fish hooker, puller in cutting coconut tree
26	*Labu guci*	*Lagenaria siceraria* Standley	Cucurbitaceae	Fruit	Ancient glass; magical associated stuff
27	*Bigau*	*Lepironia articulate* (Retz.) Domin	Cypaeraceae	Trunk	Mat
28	*Limau keli*	*Luvunga eleutherandra* Dalz.	Rutaceae	Trunk	Chisel
29	*Temeras*	*Memecylon sp.*	Melastomatac	Trunk	Pestle
30	*Meni'en udang*	*Mitrephora maingayi* Hook. f. & Thoms.	Annonaceae	Trunk	Fish hooker and hatchet holder
31	*Meni'en saluang*	*Orophea cf. hexandra* Blume	Annonaceae	Trunk	Hatchet holder
32	*Tiruk*	*Palaqium hexandrum* Engl.	Sapotaceae	Twig	Bush shrub hooker
33	*Pandan singkil*	*Pandanus cf. furcatus* Roxb.	Pandanaceae	Leaf	Mat
34	*Jegeh*	*Pandanus sp.1*	Pandanaceae	Leaf	Mat
35	*Mengkuang*	*Pandanus sp.2*	Pandanaceae	Trunk	Mat
36	*Nyeman*	*Pandanus sp.3*	Pandanaceae	Leaf	Mat

Table A.4. (Continued) List of Useful Plant for Tool Materials

No.	Vernacular Name	Scientific Name	Family	Part	Tool/Product
37	*Pandan*	*Pandanus sp.4*	Pandanaceae	Leaf	Mat
38	*Batang sedam*	*Schefflera polybotrya* Koord.	Aralliaceae	Trunk	Hatchet holder
39	*Buluh tangkal*	*Schizostachyum latifolium* Gamble	Poaceae	Trunk	Stick of sap to trap bird; weaving (sandang)
40	*Buluh umpo*	*Schizostachyum sp.1*	Poaceae	Trunk	To trap boar and macaque
41	*Buluh uwi*	*Schizostachyum sp.2*	Poaceae	Trunk	Flute and basket
42	*Menjiang*	*Scirpus grossus* L. f.	Cyperaceae	Trunk	Mat.
43	*Buku*	*Scirpus mucronatus* Linn.	Cyperaceae	Trunk	Mat
44	*Akar kait*	*Uncaria glabrata* DC.	Rubiaceae	Trunk	Arch part of cow's cart
45	*Umbai*	*Unidentified*		Trunk	Mat

Table A.5. List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
1	*Ubi dewa*	*Abelmoschus manihot* Medic.	Malvaceae	C	Umo	Sakit pinggang, Sakit perut	Back pain, stomach
2	*Jerangau*	*Acorus calamus* Linn.	Acoraceae	C	Umo	Demam, Tangkal iblis, rematik, sakit perut	Fever, Anti bad spirit, rheumatic, stomach
3	*Dain Inggap*	*Aeschynanthus albida* A. DC.	Gesneriaceae	W	Forest/ Umo/SF	Luko	Injury
4	*Rumput Angi'*	*Ageratum conyzoides Linn.*	Asteraceae	SW	Ladang/SF	Luko	Injury
5	*Lenzat Hutan*	*Aglaia odoratissima* Benth.	Meliaceae	W	F/SF	Malaria	Malaria
6	*Buah Kereh*	*Aleurites moluccana* Willd.	Euphorbiaceae	C	Umo/SF	Memar, bengkak	Contusion, swelling
7	*Bawang Merah*	*Allium cepa* Linn.	Alliaceae	C	Umo	Masuk angin, sakit kepala	Headeach
8	*Bawang Gando*	*Allium porrum* Linn.	Alliaceae	C	Umo	Sakit perut	Stomach
9	*Bawang putih*	*Allium sativum* Linn.	Alliaceae	C	Umo	Sakit kepala, rematik	Headeach, rheumatic
10	*Lengkuas*	*Alpinia galanga* Willd.	Zingiberaceae	C	Umo	Panu, kurap, sesak napas	Inhalation problem, ringworm
11	*Puar*	*Alpinia sp.*	Zingiberaceae	W	Umo/SF	Gatal-gatal	Itchy
12	*Pulai*	*Alstonia scholaris* R.Br.	Apocynaceae	W	Umo/SF	Malaria	Malaria
13	*Bayam*	*Amaranthus sp*	Amaranthaceae	C	Umo	Kurang darah	Anemia
14	*Nenas Putih*	*Ananas sp*	Bromeliaceae	C	Umo	Berak darah, ginjal	Blody Diarrhea, kidney problems
15	*Rumput Mempedu*	*Andrographis paniculata* Nees	Acanthaceae	SW	Umo	Sariawan	Scurvy

Table A.5. (Continued) List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
16	*Serai*	*Andropogon nardus* Linn.	Poaceae	C	Umo	Ginjal, malaria, sakit pinggang, panas dalam	Kidney problems, back pain, malaria, scurvy
17	*Rumput Patah Budi*	*Aneilema vaginatum* (L.) R. Br.	Commelinaceae	C	Sawah	Patah tulang	Broken bones
18	*Daun Sako*	*Aphelandra sp.*	Acanthaceae	C	Umo	Memar	Contusion
19	*Seladari*	*Apium graveolens* Linn.	Apiaceae	C	Umo	Darah tinggi	High blood presure
20	*Pinang*	*Areca catechu* Linn.	Arecaceae	C	Umo	Luko	Injury
21	*Nangko*	*Artocarpus iheterophyllus* Lam.	Moraceae	C	Umo	Sakit gigi	Teeth problem
22	*Gelimbing*	*Averrhoa carambola* Linn.	Oxalidaceae	C	Umo	Sakit pinggang	Back pain
23	*Mpaung*	*Baccaurea lanceolata* Mull. Arg.	Euphorbiaceae	W	Forests/SF	Kutu air	
24	*Jerambing*	*Bidens pilosa* Linn.	Asteraceae	SW	Umo	Luko	Injury
25	*Batang Bintang*	*Bischofia javanica* Bl.	Euphorbiaceae	SW	Forests/SF	Luko, sakit perut	Injury, stomach
26	*Kecubung*	*Brugmansia candida* Pers.	Solanaceae	C	Umo/SF	Sakit mata	Eye problems
27	*Manau*	*Calamus manna* Miq.	Arecaceae	W	F	Sariawan	Ulcer
28	*Sebih Putih*	*Canna indica* Ruiz & Pav.	Cannaceae	C	Umo	Demam	Fever
29	*Cabe*	*Capsicum frutescens* Rodsch.	Solanaceae	C	Umo	Sakit pinggang	Back pain
30	*Terung Pilo*	*Carica papaya* Linn.	Caricaceae	C	Umo	Darah tinggi	High blood presure
31	*Gelinggang*	*Cassia alata* Linn.	Fabaceae	C	Umo/SF	Panu/Kurap	Ringworm
32	*Kapuk*	*Ceiba pentandra* Gaertn	Bombacaceae	C	Umo/SF	Sakit kepala	Headeach
33	*Rumbu abang/kuning*	*Celosia argentea* Linn.	Amaranthaceae	C	Umo	Sakit kepala	Headeach

Table A.5. (Continued) List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
34	*Kulit manis*	*Cinnamomum burmannii* (Nees & T. Nees) Bl.	Lauraceae	C	Umo/SF	Sakit perut	Stomach
35	*Limau kapas*	*Citrus aurantifolia* Swingle	Rutaceae	C	Umo	Batuk	Cough
36	*Limau Padang*	*Citrus limon* (L.) Burm. f.	Rutaceae	C	Umo	Demam	Fever
37	*Limau manis*	*Citrus reticulate* Blanco	Rutaceae	C	Umo	Beri-beri	Beri-beri
38	*Limau Kunci*	*Citrus sp*	Rutaceae	C	Umo	Demam	Fever
39	*Cerek*	*Clausena excavate* Burm. f.	Rutaceae	SW	Forests/SF	Beri-beri	Beri-beri
40	*Sekambing*	*Clerodendron fragrans* Vent.	Verbenaceae	SW	Umo	Malaria	Malaria
41	*Bungo Panggil*	*Clerodendrum buchanani* (Roxb.) W. G. Walpers	Lamiaceae	C	Umo	Gangguan iblis	Bad spirit
42	*Kelapa hijau*	*Cocos nucifera* Linn.	Arecaceae	C	Umo	Sakit Pinggang	Back pain
43	*Kopi*	*Coffea Arabica* Linn.	Rubiaceae	C	Umo/SF	Sakit Pinggang	Back pain
44	*Peladang Angi'*	*Coleus amboinicus* Lour	Lamiaceae	C	Forests/SF	Beri	Beri-beri
45	*Kambang*	*Colocasia esculenta* Schott	Araceae	C	Sawah/ Umo	Beri	Beri-beri
46	*Jeluangan*	*Cordyline terminalis* Kunth.	Liliaceae	C	Umo/SF	Demam	Fever
47	*Petawar*	*Costus speciosus* Sm.	Costaceae	C	Umo/SF	Stres	Stress
48	*Jelipuk*	*Crinum cf. asiaticum* DC.	Amaryllidaceae	W	Umo/SF	Sakit pinggang	Back pain
49	*Timun*	*Cucumis sativus* Linn.	Cucurbitaceae	C	Umo	Darah tinggi	High blood presure
50	*Prenggi*	*Cucurbita moschata* Duchesne ex Poir.	Cucurbitaceae	C	Umo	Sakit gigi	Teeth
51	*Daun Matahari*	*Curculigo latifolia* Dryand.	Hypoxidaceae	W	Umo/SF	Penelap tidur	Sleeping stimulant for kids

Table A.5. (Continued) List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
52	*Kunyit*	*Curcuma domestica* Valeton	Zingiberaceae	C	Umo	Bisul	Abscess
53	*Bunga Cubung*	*Datura fastuosa* Linn.	Solanaceae	C	Umo/SF	Sakit mata	Eye problems
54	*Buluh Betung*	*Dendrocalamus asper* Backer ex K. Heyne	Poaceae	SW	Umo/SF	Beri-beri	Beri-beri
55	*Rumput Sapu*	*Dicrhocephala bicolor* Schllldl.	Asteraceae	SW	Umo	Mempercepat melahirkan	Inducer to give birth
56	*Ubi Arang*	*Dioscorea alata* Linn.	Dioscoreaceae	C	Umo	Membersihkan darah, obat kuat laki-laki	Cleaning the blood after giving birth, improve men stamina
57	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae	W	Forest/ Umo/SF	Bisul	Abscess
58	*Jemban*	*Donax grandis* (Miq.) Ridley	Marantaceae	W	F	Bisul	Abscess
59	*Rumput Sasi*	*Drymaria cordata* Willdt. ex Schult.	Caryophyllaceae	SW	Umo	Penghilang noda	Acne and fleck
60	*Rumput Sembuang*	*Eleusine indica* Steud.	Poaceae	SW	Umo/SF	Mengusir iblis	Exorcise of Bad spirit
61	*Rumput Gedung*	*Erechtites valerianaefolia* DC.	Asteraceae	SW	Umo/SF	Luko	Injury
62	*Dadap Duri*	*Erythrina subumbrans* Merr.	Fabaceae	C	Forests/SF		Diabetes
63	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Asteraceae	SW	Umo/SF	Luko	Injury
64	*Bekung*	*Ficus geocarpa* Teijsm.	Moraceae	W	F/SF	Sariawan	Ulcer
65	*Buluh Kupal*	*Gigantochloa hasskarliana* Backer ex K.Heyne	Poaceae	SW	F/SF	Melahirkan bayi	Birth delivery
66	*Akar Tunggal*	*Goniothalamus macrophylus* Miq.	Annonaceae	W	Forests/SF	Gigitan ular	Snake beat
67	*Puding*	*Graptophyllum pictum* Griff.	Acanthaceae	C	Umo	Sakit Pinngang	Back pain

Table A.5. (Continued) List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
68	*Bungo Rayo Putih*	*Hibiscus sp*	Malvaceae	C	Umo	Paru-paru	Lungs
69	*Kanulau Merah*	*Homalomena cordata* Schott	Araceae	C	Umo/SF	Luko	Injury
70	*Sekumpai*	*Hymenachne amplexicaulis* Ness	Poaceae	C	Umo	Stres	Stress
71	*Inai*	*Impatiens balsamina* Linn.	Balsaminaceae	C	Umo	Gigitan ular	Snake beat
72	*Lalang*	*Imperata cylindrical* P. Beauv	Poaceae	SW	Umo/SF	Malaria	Malaria
73	*Ranjau Ruso*	*Justicia gendarusa* Blanco	Acanthaceae	C	Umo/SF	Sakit Kepala	Headeach
74	*Sicekur*	*Kaempferia galangal* Linn.	Zingiberaceae	C	Umo	Demam, rematik, sakit perut	Fever, rheumatic, stomach
75	*Sedingin*	*Kalanchoe pinnata* Pers.	Crassulaceae	C	Umo	Bisul, demam	Abscess, fever
76	*Labu guci*	*Lagenaria siceraria* Standl.	Cucurbitaceae	C	Umo	Ambeien	Hemorrhoids
77	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae	W	Forests/SF	Sakit Mata	Eye
78	*Batang Bali*	*Leea indica* Merr.	Vitaceae	W	SF	Bisul	Abscess
79	*Rumput Bento*	*Leersia hexandra* Sw.	Poaceae	SW	Umo/SF	Cido	Fatigue
80	*Kulit Angin*	*Mallotus paniculatus* Mull. Arg.	Euphorbiaceae	W	Umo	Sakit mata	Eye
81	*Ubi kayu*	*Manihot utilissima* Pohl	Euphorbiaceae	C	Umo	Kurang darah	Anemia
82	*Tarum*	*Marsdenia tinctoria* R. Br.	Asclepiadaceae	C	Umo	Memar, demam	Contusion, fever
83	*Seduruk*	*Melastoma candidum* D.Don	Melastomataceae	SW	Umo/SF	Luko	Hurt
84	*Seduruk Hitam*	*Melastoma malabathricum* Jack	Melastomataceae	SW	Umo	Batuk	Cough
85	*Segerem*	*Melastoma sp.*	Melastomataceae	SW	Umo/SF	Batuk	Cough
86	*Akar Kembung*	*Merremia peltata* Merr.	Convolvulaceae	SW	Forests/SF	Batuk	Cough

Table A.5. (Continued) List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
87	*Rumput Unggul*	*Mikania cordata* (Burm. f.) B. L. Rob.	Asteraceae	SW	Umo	Batuk, sakit kepala	Cough, headeache
88	*Akar Serampai*	*Milletia sericea* Wight & Arn.	Fabaceae	W	Forests/SF	*Luko, infeksi*	Infected hurt, injury
89	*Mengkudu*	*Morinda citrifolia* Hunter	Rubiaceae	C	Umo	Sakit pinggang, darah tinggi	Back pain, high blood pressure
90	*Telap*	*Morus sp.*	Moraceae	W	Forests/SF	Luko, Gatal-gatal	Hurt, icthy
91	*Pisang Dingin*	*Musa sp*	Musaceae	C	Umo	Sakit Perut	Stomach
92	*Pisang Itam*	*Musa sp*	Musaceae	C	Umo	Demam	Fever
93	*Pisang Kabu*	*Musa sp*	Musaceae	C	Umo	Sakit Perut	Stomach
94	*Pisang Lidi*	*Musa sp*	Musaceae	C	Umo	Demam, demam berdarah, sakit perut	Fever, dengue, stomach
95	*Pisang Sembatu*	*Musa sp*	Musaceae	C	Umo	Cido	Fatigue
96	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae	W	Forests/SF	Luko	Injury
97	*Rambutan*	*Nephelium lappaceum* Linn.	Sapindaceae	C	Umo	Sakit kepala	Headeach
98	*Tembakau*	*Nicotiana tobacum* Linn.	Solanaceae	C	Umo	Masuk angina, sakit gigi	Catching a cold, teeth problems
99	*Telasih Hijau*	*Ocimum basilicum* Linn.	Lamiaceae	C	Umo	Demam, mempercepat melahirkan	Fever, Inducer to give birth
100	*Sungui Kucing*	*Orthosiphon spicatus* Benth.	Lamiaceae	C	Umo	Sakit pinggang	Back pain
101	*Ketan Hitam*	*Oryza sp*	Poaceae	C	Sawah	Gigitan lebah	Bees beat

Table A.5. (Continued) List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
102	*Pandan Singkil*	*Pandanus cf. furcatus* Roxb.	Pandanaceae	C	Umo/SF	Tangkal iblis	Protecting from bad spirit
103	*Pandan*	*Pandanus sp.*	Pandanaceae	C	Umo	Diare	Diarhea
104	*Kepayang*	*Pangium edule* Reinw	Flacortiaceae	SW	Umo/SF	Sakit ggi	Teeth problems
105	*Rumput Kinat*	*Paspalum conjugatum* C. Cordem ex J. Cordem	Poaceae	SW	Umo/SF	Luko	Injury
106	*Sedukung Anak*	*Phyllanthus urinaria* Wall.	Euphorbiaceae	C	Umo/SF/sawah	Sakit pinngang	Back pain
107	*Medang Garu*	*Picrasma javanica* Bl.	Simaroubaceae	W	Umo/sawah	Sakit pinggang	Back pain
108	*To'em*	*Physallis angulata* Linn	Solanaceae	SM	Umo/sawah	Sakit pinggang, darah tinggi	Back pain, high blood presure
109	*Sirih*	*Piper betle* Linn.	Piperaceae	C	Umo/SF	Sakit mata	Eye problems
110	*Merica*	*Piper nigrum* Lam. ex Link	Piperaceae	C	Umo	Sakit kepala	Headeach
111	*Sirih hantu*	*Piper sp.*	Piperaceae	W	SF	Gatal-gatal	Itchy
112	*Gumbo*	*Piper umbellatum* Linn.	Piperaceae	W	Umo/SF	Sakit perut	Stomach
113	*Ngelo*	*Plectronia horrida* K. Schum.	Rubiaceae	W	SF/F	Demam	Fever
114	*Nilam*	*Pogostemon cablin* Benth.	Lamiaceae	C	Umo	Luko	Injury
115	*Peladang Abang*	*Pogostemon menthoides* Bl.	Lamiaceae	C	Forests/SF	Beri-beri	Beri-beri
116	*Peladang Hutan*	*Pogostemon villosus* Benth.	Lamiaceae	C	Forests/SF	Demam	Fever
117	*Akar Rundang*	*Poikilospermum suaveolens* (Bl.) Merr.	Cecropiaceae	W	Forests/SF	Beri-beru	Beri-beri
118	*Jambu Kreh*	*Psidium guajava* Linn.	Myrtaceae	C	Umo	Luko	Injury
119	*Inggu*	*Ruta angustifolia* Pers.	Rutaceae	W	Umo	Rematik	Rheumatic

Table A.5. *(Continued)* List of Serampas Medicinal Plants

No.	Vernacular Name	Scientific Name	Family	Sources *)	Habitat	Serampas Disease Term	Possible Biomedical Correlate/English Translation
120	*Tebu Hitam*	*Saccharum officinarum* Linn.	Poaceae	C	Umo	Demam	Fever
121	*Spenehen*	*Schefflera sp.*	Araliaceae	W	Umo/SF	Demam	Fever
122	*Jirak*	*Simplocos fasciculate* Roxb ex.A.DC	Symplocaceae	W	Umo	Demam	Fever
123	*Terung Rimbang*	*Solanum indicum* Linn.	Solanaceae	C	Umo	Sakit mata	Eye
124	*Terung Pundan*	*Solanum melongena* Linn.	Solanaceae	C	Umo	Sakit perut	Stomach
125	*Terung*	*Solanum sp*	Solanacea	C	Umo	Sakit pinggang	Back pain
126	*Terung akar*	*Solanum sp*	Solanacea	C	Umo	Sakit perut	Stomach
127	*Surian Tanam*	*Toona sinensis* M.Roem	Meliaceae	C	Umo/SF	Sakit gigi	Teeth problems
128	*Kacang Panjang*	*Vigna sinensis* Endl. ex Hassk.	Fabaceae	C	Umo	Kurang darah	Anemia
129	*Kayu Timah*	*Vitex trifolia* Linn.	Lamiaceae	W	Umo/sawah	Malaria	Malaria
130	*Sepede*	*Zingiber officinale* Rosc.	Zingiberaceae	C	Umo	Gangguan pernafasan	Inhalation problem
131	*Kunyit Melai*	*Zingiber purpureum* Rosc.	Zingiberaceae	C	Umo	Demam	Fever

*) C: Cultivated, W: Wild, SW: Semi Wild

Table A.6. List of Useful Plant for *Uras*

No.	Vernacular Name	Scientific Name	Family	Purpose
1	*Kayu Hijau*	*Lepionurus sylvestris* Blume	Opiliaceae	To initiate rice harvesting
2	*Ngelo*	*Plectronia horrida* Benth. & Hook. f. ex Kurz.	Rubiaceae	To initiate rice harvesting
3	*Rumput Rabun*	*Centhotheca lappacea* Desv.	Poaceae	To initiate rice harvesting
4	*Sepiding*	*Scleria purpurascens* Benth.	Cyperaceae	To initiate rice harvesting
5	*Respang*	*Pleomele elliptica* N. E. Brown	Liliaceae	To initiate rice harvesting
6	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae	To initiate rice harvesting
7	*Patawa*	*Costus speciosus* Sm.	Zingiberaceae	To initiate rice harvesting
8	*Pinang Hutan*	*Pinanga latisecta* Blume	Arecaceae	To protect the rice
9	*Papit*	Indentification in progress		To cure the sick rice
10	*Sekumpai*	*Hymenachne amplexicaulis* Nees.	Poaceae	To cure the sick rice
11	*Tundu'en*	*Disporum chinensis* D. Don	Liliaceae	To cure the sick rice
12	*Aur Gajah*	*Bambusa sp.*		To cure the sick rice
13	*Ngelo*	*Plectronia horrida* Benth. & Hook. f. ex Kurz.	Rubiaceae	To cure the sick rice
14	*Risi*	*Caryota mitis* Lour.	Arecaceae	To cure the sick rice
15	*Paku Liman*	*Angiopteris evecta* (Forst.) Hoffm.	Marratiaceae	To cure the sick rice
16	*Sa'em*	*Saurauia javanica* (Nees) R. D. Hoogland	Actinidiaceae	To initiate slashing, expel the 'forest keeper'
17	*Ranjau Ruso*	*Justicia gendarusa* Blanco	Acanthaceae	To cure the sick rice
18	*Terap*	*Artocarpus elasticus* Reinw.	Moraceae	To cure the sick rice
19	*Peladang Abang*	*Pogostemon menthoides* Blume	Labiatae	To cure the sick rice

Table A.6. (Continued) List of Useful Plant for *Uras*

No.	Vernacular Name	Scientific Name	Family	Purpose
20	*Peladang Anyik*	*Coleus amboinicus* Lour.	Labiatae	To cure the sick rice
21	*Kayu Usang*	*Cinnamomum javanicum* Blume	Lauraceae	To cure the sick rice
22	*Sakrau*	*Eunydra fluctuans*	Asteraceae	To initiate slashing, expel the 'forest keeper'
23	*Daun Cerek*	*Clausena exavata* Burm. f.	Rutaceae	To expel the rice seed's pests
24	*Jerangau*	*Acorus calamus* Linn.	Araceae	To cure a sick cattle.
25	*Daun Tarum*	*Marsdenia tinctoria* R. Br.	Asclepiadaceae	To expel bad spirit
26	*Puding Hutan*	*Psychotria rostrata* Blume	Rubiaceae	To initiate slashing, expel the 'forest keeper'
27	*Limbang Hantu*	*Lepidagathis sp.*	Acanthaceae	To expel the inhabited "orang gunung".
28	*Peladang Hutan*	*Plectranthus galeatus* Vahl.	Labiatae	To expel bad spirit

Table A.7. List of Useful Plant for Other Uses

No	Vernacular Name	Scientific Name	Family	Uses
1	*Petehen*	*Actinodaphne* sp.	Lauraceae	fire cracker
2	*Kayu Mutah*	*Aglaia argentea* Bl.	Meliaceae	firewood
3	*Terap*	*Artocarpus elasticus* Reinw.	Moraceae	clothing
4	*Damar*	*Canarium pilosum* A. W. Benn.	Burseraceae	lighting
5	*Kayu Serabut*	*Chionanthus nitens* Koord. & Valet.	Oleaceae	wet firewood
6	*Serabut*	*Chionanthus oliganthus* (Merr.) R. Kiew	Oleaceae	wet firewood
7	*Limau Purut*	Citrus hystrix D.C	Rutaceae	shampoo
8	*Sekambing*	*Clerodendron fragrans* Vent.	Verbenaceae	traditional soccer ball.
9	*Peladang*	*Coleus* sp.	Lamiaceae	traditional ink
10	*Jeluangan*	*Cordyline terminalis* Kunth	Liliaceae	Fencing
11	*Kunyit*	*Curcuma domestica* Valeton	Zingiberaceae	Dye
12	*Kayu Kacang*	*Dysoxylum alliaceum* Seem.	Meliaceae	firewood
13	*Kiro Bayan*	*Ficus cf. ribes* Reinw. ex Bl.	Moraceae	Bird feed
14	*Loloy*	*Ficus ribes* Reinw.	Moraceae	firewood
15	*Seri*	*Ficus tinctoria* G. Forst. f.	Moraceae	firewood, bird feed
16	*Nulang*	*Glochidion obscurum* Bl.	Euphorbiaceae	bird feed
17	*Akar Tunggal*	*Goniothalamus macrophylus* Miq.	Annonaceae	to cure and avoid a snake bite
18	*Daun Puding*	*Graptophyllum pictum* Griff.	Acanthaceae	fencing
19	*Antoy*	*Litsea* sp.	Lauraceae	wet firewood
20	*Limau Keli*	*Luvunga eleutherandra* Dalz.	Rutaceae	shampoo
21	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae	wet firewood
22	*Seduruk Hitam*	*Melastoma malabathricum* Jack	Melastomataceae	traditional ink

Table A.7. (Continued) List of Useful Plant for Other Uses

No	Vernacular Name	Scientific Name	Family	Uses
23	*Kayu Kapeh*	*Meliosma ferruginea* Sieb. & Zucc. ex Hook. f.	Meliosmaceae	traditional necklaces.
24	*Kayu Lilin*	*Microdesmis caseariaefolia* Planch. ex Hook.	Pandanaceae	firewood
25	*Akar Serampal*	*Millettia sericea* Wight & Arn.	Fabaceae	absorbent in producing brown sugar from areca
26	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae	firewood, bird feed
27	*Pandan*	*Pandanus* sp.	Pandanaceae	Talcum powder
28	*Duri Ngelo*	*Plectronia horrida* K. Schum.	Rubiaceae	soap
29	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae	firewood
30	*Bungo Cempako*	*Talauma candollii* Bl.	Magnoliaceae	Talcum powder
31	*Narung*	*Trema orientalis Bl.*	Ulmaceae	firewood
32	*Peladas*	Unidentified	Unident.	Talcum powder
33	*Molesaten*	*Villebrunea rubescens* Bl.	Urticaceae	firewood
34	*Kayu Timah*	*Vitex trifolia* Linn.	Lamiaceae	preventing rice from deterioration and sprouting.

Table A.8. List of Plant in Tanjung Kasri Agroforest

No.	Vernacular Name	Scientific Name	Family
1	Anonim	*Acer niveum* Blume	Aceraceae
2	*Paku Regis*	*Angiopteris evecta* (Fortst.) Hoffm.	Marratiaceae
3	*Jengkol*	Archidendron pauclorum *(Benth.) I.C. Nielsen*	Fabaceae
4	*Menzi*	*Ardisia crispa* A.DC.	Myrsinaceae
5	*Sesam*	*Ardisia lanceolata* C.F. Gaertn.	Epacridaceae
6	*Pinang*	*Areca catechu* Linn.	Arecaceae
7	*Cempedak*	*Artocarpus integra* Merrill	Moraceae
8	*Pulai*	*Alstonia angustifolia* Miq.	Apocynaceae
9	*Paku Pukut*	*Athyrium esculentum* Copel.	Woodsiaceae
10	Anonim	*Baccaurea racemosa* Muell. Arg.	Euphorbiaceae
11	*Kawah*	*Caffea* sp.	Rubiaceae
12	*Rumput Rabun*	*Centhotheca lappacea* Desv.	Poaceae
13	*Kulit Manis*	*Cinnamomum* burmannii (Nees & T. Nees) Bl.	Lauraceae
14	Anonim	*Clidemia hirta* D. Don	Melastomataceae
15	*Patawa*	*Costus speciosus* Sm.	Costaceae
16	*Daun Matahari*	*Curculigo latifolia* Dryand.	Hypoxidaceae
17	*Jelapak*	*Cyrtandra pendula* Bl.	Gesneriaceae
18	*Paku Ikan*	*Diplazium asperum* Bl.	Woodsiaceae
19	*Durian*	*Durio zibethinus* Murr.	Bombacaceae
20	*Letung*	*Dysoxylum parasiticum* (Osbeck) Kosterm.	Meliaceae
21	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Asteraceae
22	*Bambu Kapal*	*Giganthocloa* sp.	Poaceae
23	*Nulam*	*Glochidion obscurum* Bl.	Euphorbiaceae
24	*Batang Nurun*	*Glochidion* sp.	Euphorbiaceae
25	Anonim	*Goodyera* sp.	Orchidaceae
26	Anonim	*Hedyothis verticilata* Lam	Rubiaceae
27	*Akar Kadam*	*Hogdosonia macrocarpa* Cogn.	Cucurbitaceae
28	Anonim	*Hydrocatyle javanica* Thunb.	Apiaceae
29	*Lalang*	*Imperata cyindrica* P. Beauv	Poaceae
30	*Sedingin*	*Kalanchoe pinnata* Pers.	Crassulaceae
31	*Jelatang Api*	*Laportea* sp.	Urticaceae
32	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae

Table A.8. (Continued) List of Plant in Tanjung Kasri Agroforest

No.	Vernacular Name	Scientific Name	Family
33	Anonim	*Maesa perlarius* (Lour.) Merrill	Myrsinaceae
34	*Akar Kembung*	*Merremia peltata* Merrill	Convolvulaceae
35	*Akar Serumpal*	*Millettia sericea* Wight. & Arn.	Fabaceae
36	*Paku Larat*	*Nephrolepis bisserata* (Sw.) Schott)	Davalliaceae
37	*Rumput Serteh*	*Ottochloa nodosa* (Kunth.) Dandy	Poaceae
38	*Petai*	*Parkia speciosa* Haask.	Fabaceae
39	*Rumput Kinat*	*Paspalum conjugatum* Berg.	Poaceae
40	Anonim	*Peliosanthes tetta* Andrews	Liliaceae
41	Anonim	*Poulzolzia zeylanica* (L.) Benn.	Urticaceae
42	*Jambu Kreh*	*Psidium guajava* Linn.	Myrtaceae
43	*Bayu*	*Pterospermum javanicum Jungh.*	Sterculiaceae
44	Anonim	*Ranunculus sundaicus* (Baker) Hj. Eichl.	Ranunculaceae
45	*Duri Peringat*	*Rubus moluccanus* Linn.	Rosaceae
46	*Sampadi*	*Saurauja nudiflora* DC.	Ternstroemiaceae
47	*Sepiding*	*Scleria purpurascens* Benth.	Cyperaceae
48	*Rumput Kudo*	*Selaginela wildenowii* (Desv.) Baker.	Selaginellaceae
49	*Rengas*	*Semecarpus heterophylla* Hook. f.	Anacardiaceae
50	*Rumput Terbung*	*Setaria plicata* T.Cooke	Poaceae
51	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae
52	Anonim	*Tetrastigma leucostaphylum* (Dennst.) A.Alston	Vitaceae
53	*Surian Bungkal*	*Toona sinensis* (A.Juss.) M.Roem	Meliaceae
54	*Spok'eng*	*Vernonia arborea* Buch- Hams.	Asteraceae
55	*Molaseten*	*Villebrunea rubescens* Bl.	Urticaceae
56	Anonim	Unidentified B 08	
57	Anonim	Unidentified B 09	
58	Anonim	Unidentified B 13	
59	Anonim	Unidentified B03	

Table A.9. List of Plant in Renah Kemumu Agroforest

No.	Vernacular Name	Scientific Name	Family
1	*Rumput Angit*	*Ageratum conyzoides* Linn.	Asteraceae
2	*Mutah*	*Aglaia argentea* Bl.	Meliaceae
3	*Bureh*	*Aleurites mollucana* Willd.	Euphorbiaceae
4	*Mumu Liar*	*Alocasia* sp.	Araceae
5	*Puar*	*Alpinia* sp.	Zingiberaceae
6	*Kerubut*	*Amorphophallus titanum* Becc.	Araceae
7	*Paku Regis*	*Angiopteris evecta* (Fortst.) Hoffm.	Marratiaceae
8	*Menzi*	*Ardisia crispa* A.DC.	Myrsinaceae
9	*Asam-asam*	*Ardisia sumatrana* Miq.	Myrsinaceae
10	*Nangko*	Artocarpus heterophyllus *Lam.*	Moraceae
11	*Mengkli*	*Arytera xerocarpa* (Bl.) Adelb.	Sapindaceae
12	*Pulai*	*Alstonia angustifolia* Miq.	Apocynaceae
13	*Paku Pukut*	*Athyrium esculentum* Copel.	Woodsiaceae
14	*Mbok'eng*	*Baccaurea lanceolata* Muell. Arg.	Euphorbiaceae
15	*Aur Minyak*	*Bambusa vulgaris* Nees	Poaceae
16	*Asam Gunung*	*Begonia longifolia* Blume	Begoniaceae
17	*Mndek'eng (bintang)*	*Bischofia javanica* Blume	Euphorbiaceae
18	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae
19	*Morosat*	*Celtis nigrecens* (Miq.) Planch.	Ulmaceae
20	*Kitab Kacang*	*Cephalomappa maloticarpa* J. J. Smith	Euphorbiaceae
21	*Letung Enggang*	*Chisocheton ceramicus* (Mig.) C. DC.	Meliaceae
22	*Kulit Manis*	*Cinnamomum* burmannii (Nees & T. Nees) Bl.	Lauraceae
23	*Kawah*	*Coffea* sp.	Rubiaceae
24	*Jeluang Merah*	*Cordyline terminalis* Kunth.	Liliaceae
25	*Patawa*	*Costus speciosus* Sm.	Costaceae
26	*Penjarang Sungsang*	*Cyathula prostrata* Blume	Amaranthaceae
27	*Sekedek'eng*	*Cyrtandra sandei* De Vriese	Gesneriaceae
28	*Tubo Akar*	*Derris scandens* Benth.	Fabaceae
29	*Paku Ikan*	*Diplazium asperum* Bl.	Woodsiaceae
30	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae
31	*Bemban*	*Donax grandis* (Miq.) Ridley	Marantaceae
32	*Sekawak'eng*	*Ficus obscura* Blume	Moraceae
33	*Aro*	*Ficus variegata* Blume	Moraceae

Table A.9. (Continued) List of Plant in Renah Kemumu Agroforest

No.	Vernacular Name	Scientific Name	Family
34	*Sekukuk*	*Forrestia mollissima* Koord.	Commelinaceae
35	*Lalan Besi*	*Globa* sp.	Zingiberaceae
36	*Rumput Sugi*	*Hyptis capitata* Jack.	Labiatae
37	*Jelatang Nyiru*	*Laportea sinuata* Bl. ex Wedd.	Urticaceae
38	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae
39	*Kayu Bali*	*Leea indica* Merr.	Vitaceae
40	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae
41	*Kayu Kapeh*	*Meliosma ferruginea* Blume	Sabiaceae
42	*Kayu Lilin*	*Microdesmis caseariaefolia* Planch. ex Hook.	Euphorbiaceae
43	*Pisang Ungko*	*Musa acuminata* Colla	Musaceae
44	*Sepanehen*	*Mycetia fasciculata* (Bl.) Bl. ex Korth.	Rubiaceae
45	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae
46	*Paku Larat*	*Nephrolepis biserrata* (Sw.) Schott)	Davalliaceae
47	*Kelu*	*Etlingera elatior* (Jack) R.M. Sm.	Zingiberaceae
48	*Kapung*	*Oroxylum indicum* (L.) Kurz	Bignoniaceae
49	*Rumput Serteh*	*Ottochloa nodosa* (Kunth.) Dandy	Poaceae
50	*Rumput Kinat*	*Paspalum conjugatum* Berg.	Poaceae
51	*Sirih*	*Piper betle* DC.	Piperaceae
52	*Senglo*	*Plectronia borrida* K. Schum.	Rubiaceae
53	*Akar Rundang*	*Poikilospermum suaveolens* (Bl.) Merr.	Cecropiaceae
54	*Akar Kanis*	*Poulzolzia viminea* Wedd.	Urticaceae
55	*Mpisang*	*Rhaphidophora oblongifolia* Schott.	Ternstroemiaceae
56	*Sampadi*	*Saurauja nudiflora* DC.	Actinidaceae
57	*Sergau*	*Selaginella plana* Hieron	Selaginellaceae
58	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae
59	*Ubo Serai*	*Syzygium polyanthum* Miq.	Myrtaceae
60	*Surian Rimbo*	*Toona sureni* (Blume) Merr.	Meliaceae
61	*Nilau*	*Trichospermum javanicum* Blume	Tiliaceae
62	*Kayu Beliung/Biung*	*Turpinia sphaerocarpa* Hassk.	Staphyllaceae
63	*Spok'eng*	*Vernonia arborea* Buch- Hams.	Asteraceae
64	*Molaseten*	*Villebrunea rubescens* Bl.	Urticaceae
65	*Elang*	Unidentified	
66	*Kayu Salak*	Unidentified	

Table A.10. List of Useful Plants in Tanjung Kasri Agroforest

No.	Vernacular Name	Scientific Name	Family	Uses*)
1	*Paku Liman*	*Angiopteris evecta* (Fortst.) Hoffm.	Marratiaceae	U
2	*Jengkol*	Archidendron pauclorum (Benth.) I.C. Nielsen	Fabaceae	E
3	*Menzi*	Ardisia crispa A.DC.	Myrsinaceae	C, O
4	*Sasam*	*Ardisia lanceolata* C.F. Gaertn.	Epacridaceae	E
5	*Pinang*	*Areca catechu* Linn.	Arecaceae	E, O
6	*Cempedak Hutan*	*Artocarpus integra* Merrill	Moraceae	E
7	*Paku Pukut*	*Athyrium esculentum* Copel.	Woodciaceae	E
8	*Kawa*	*Caffea* sp.	Rubiaceae	E, O
9	*Rumput Rabun*	*Centhotheca lappacea* Desv.	Poaceae	U
10	*Kulit manis*	*Cinnamomum burmannii* (Nees & T. Nees) Bl.	Lauraceae	O, M
11	*Petawar*	*Costus speciosus* Sm.	Costaceae	U
12	*Daun Matahari*	*Curculigo latifolia* Dryand.	Amarilidaceae	E, M
13	*Paku Ikan*	*Diplazium asperum* Bl.	Woodciaceae	E
14	*Durian*	*Durio zibethinus* Murr.	Bombacaceae	E
15	*Letung Padi*	*Dysoxylum parasiticum* (Osbeck) Kosterm.	Meliaceae	C
16	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Asteraceae	M
17	*Buluh Kapal*	*Giganthocloa* sp.	Poaceae	T
18	*Nulang*	*Glochidion obscurum* Bl.	Euphorbiaceae	C
19	*Akar Kadam*	*Hogdosonia macrocarpa* Cogn.	Cucurbitaceae	M
20	*Sedingin*	*Kalanchoe pinnata* Pers.	Crassulaceae	U
21	*Jelatang Ruso*	*Laportea* sp.	Urticaceae	E
22	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae	E
23	*Akar Kembung*	*Merremia peltata* Merrill	Convolvulaceae	M
24	*Akar Sekumpal*	*Millettia sericea* Wight. & Arn.	Fabaceae	M, O
25	*Petai*	*Parkia speciosa* Haask.	Fabaceae	E
26	*Jambu Kreh*	*Psidium guajava* Linn.	Myrtaceae	E
27	*Bayu*	*Pterospermum javanicum* Jungh.	Sterculiaceae	C
28	*Pringga'en*	*Rubus moluccanus* Linn.	Rosaceae	E
29	*Sambada*	*Saurauja nudiflora* DC.	Ternstroemiaceae	E

Table A.10. (Continued) List of Useful Plants in Tanjung Kasri Agroforest

No.	Vernacular Name	Scientific Name	Family	Uses*)
30	*Sepiding*	*Scleria purpurascens* Benth.	Cyperaceae	U
31	*Kayu Bukit*	*Semecarpus heterophylla* Hook. f.	Anacardiaceae	C
32	*Rumput Terbung*	*Setaria plicata* T.Cooke	Poaceae	M
33	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae	O
34	*Surian Tanam*	*Toona sinensis* (A.Juss.) M.Roem	Meliaceae	C, E
35	*Molesaten*	*Villebrunea rubescens* Bl.	Urticaceae	E

*) C: Construction, E: Edible, M: Medicine, U: Uras, T: Tool and Fiber, O: Other uses

Table A.11. List of Useful Plants in Renah Kemumu Agroforest

No.	Vernacular Name	Scientific Name	Family	Uses*)
1	*Rumput Angit*	*Ageratum conyzoides* Linn.	Asteraceae	M
2	*Kayu Mutah*	*Aglaia argentea* Bl.	Meliaceae	O
3	*Buah Kereh*	*Aleurites mollucana* Willd.	Euphorbiaceae	E
4	*Puar*	*Alpinia* sp.	Zingiberaceae	E
5	*Paku Liman*	*Angiopteris evecta* (Fortst.) Hoffm.	Marratiaceae	U
6	*Menzi*	*Ardisia crispa* A.DC.	Myrsinaceae	C, O
7	*Masam-Masam*	*Ardisia sumatrana* Miq.	Myrsinaceae	E
8	*Nangko*	Artocarpus heterophyllus Lam.	Moraceae	E
9	*Paku Pukut*	*Athyrium esculentum* Copel.	Woodciaceae	E
10	*Mbauk'eng*	*Baccaurea lanceolata* Muell. Arg.	Euphorbiaceae	E
11	*Aur Gajah*	*Bambusa vulgaris* Nees	Poaceae	T
12	*Batang Bintang*	*Bischofia javanica* Blume	Euphorbiaceae	E, M, O
13	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae	E, T
14	*Kitab*	*Cephalomappa maloticarpa* J. J. Smith	Euphorbiaceae	E, O
15	*Letung Enggang*	*Chisocheton ceramicus* (Mig.) C. DC.	Meliaceae	C
16	*Kulit manis*	*Cinnamomum burmannii* (Nees & T. Nees) Bl.	Lauraceae	O, M
17	*Kopi*	*Coffea* sp.	Rubiaceae	E, O
18	*Jeluangan*	*Cordyline terminalis* Kunth.	Liliaceae	U
19	*Petawar*	*Costus speciosus* Sm.	Costaceae	U
20	*Sekedek'en*	*Cyrtandra sandei* de Vriese	Gesneriaceae	E
21	*Tubo Akar (Kapuk)*	*Derris scandens* Benth.	Fabaceae	T
22	*Paku Ikan*	*Diplazium asperum* Bl.	Woodsiaceae	E
23	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae	M, T
24	*Jemban*	*Donax grandis* (Miq.) Ridley	Marantaceae	M, T
25	*Sawang*	*Ficus obscura* Blume	Moraceae	E
26	*Aro*	*Ficus variegata* Blume	Moraceae	E
27	*Lalan Besi*	*Globa* sp.	Zingiberaceae	E
28	*Jelatang Nyiru*	*Laportea sinuata* Bl. ex Wedd.	Urticaceae	E
29	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae	E

Table A.11. (Continued) List of Useful Plants in Renah Kemumu Agroforest

No.	Vernacular Name	Scientific Name	Family	Uses*)
30	*Batang Bali*	*Leea indica* Merr.	Vitaceae	M
31	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae	O
32	*Pisang Ungko*	*Musa acuminata* Colla	Musaceae	E
33	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae	M
34	*Kelu*	*Etlingera elatior* (Jack) R. M. Sm.	Zingiberaceae	E
35	*Rumput Kinat*	*Paspalum conjugatum* Berg.	Poaceae	O
36	*Sirih*	*Piper betle* DC.	Piperaceae	M
37	*Ngelo*	*Plectronia borrida* K. Schum.	Rubiaceae	U
38	*Akar Rundang*	*Poikilospermum* suaveolens (Bl.) Merr.	Cecropiaceae	M
39	*Akar Kenis*	*Poulzolzia viminea* Wedd.	Urticaceae	E
40	*Sambada*	*Rhaphidophora oblongifolia* Schott.	Ternstroemiaceae	E
41	*Ubo Serai*	*Syzygium polyanthum* Miq.	Myrtaceae	E, C, O
42	*Surian Rimbo*	*Toona sureni* (Blume) Merr.	Meliaceae	C
43	*Molesaten*	*Villebrunea rubescens* Bl.	Urticaceae	E

*) C: Construction, E: Edible, M: Medicine, U: Uras, T: Tool and Fiber, O: Other uses

Table A.12. List of Plants in *Rimbo Gano* (Old-Growth Forest)

No.	Local Name	Latin Name	Family
1	*Akar Sepo*	*Acacia pennata* Wild.	Fabaceae
2	*Menien Simpai*	*Actinodaphne glomerata* Nees.	Lauraceae
3	*Kayu Mutah*	*Aglaia argentea* Bl.	Meliaceae
4	*Beko*	*Aglaia crassinervia* Kurz. ex Hiern.	Meliaceae
5	*Lenzat Hutan*	*Aglaia odoratissima* Benth.	Meliaceae
6	*Kayu Burung*	*Alangium javanicum* Wangerin	Alangiaceae
7	*Melaku*	*Alangium rotundifolium* (Hassk.) Bloemb.	Alangiaceae
8	*Puar*	*Alpinia* sp.	Zingiberaceae
9	*Paku Regis*	*Angiopteris evecta* (Fortst.) Hoffm.	Marratiaceae
10	*Cawat*	*Aporosa symplocoides* Gage	Euphorbiaceae
11	*Mendapen*	*Aralia dasyphylla* Miq.	Aralliaceae
12	*Kitab Kacang*	*Archidendron fagifolium* (Bl. ex Miq.) I.C. Nielsen	Fabaceae
13	*Asam-asam*	*Ardisia lanceolata* C.F. Gaertn.	Myrsinaceae
14	*Inai*	*Argostema borragineum* Bl.	Rubiaceae
15	*Ubo Serai*	*Argostema* sp.	Rubiaceae
16	*Merat*	*Artocarpus elasticus* Reinw.	Moraceae
17	*Cempedak Hutan*	*Artocarpus integra* Merr.	Moraceae
18	*Tapang*	*Artocarpus nitida* Trec.	Moraceae
19	*Tapang*	*Artocarpus rigida* Bl.	Moraceae
20	*Mengkli*	*Arytera xerocarpa* (Bl.) Adelb.	Sapindaceae
21	*Sempaung*	*Baccaurea lanceolata* Mull. Arg.	Euphorbiaceae
22	*Medang Batu*	*Beilschmiedia lucidula* (Miq.) Kosterm.	Lauraceae
23	*Medang Batu*	*Beilschmiedia maingayi* Hook. f.	Lauraceae
24	*Medang Kunyit*	*Belischmiedia madang* Bl.	Lauraceae
25	*Kayu Pinggan*	*Blumeodendron tokbrai* Kurz.	Euphorbiaceae
27	*Manau*	*Calamus manan* Miq.	Arecaceae
28	*Rotan Tunas*	*Calamus* sp.	Arecaceae
29	*Rotan Tikus*	*Calamus* sp.	Arecaceae
30	*Rotan Jukut*	*Calamus* sp.	Arecaceae
31	*Rotan Seni*	*Calamus* sp.	Arecaceae
32	*Rotan Sikai*	*Calamus* sp.	Arecaceae
33	*Damar*	*Canarium pilosum* A. W. Benn.	Burseraceae
34	Anonim	*Carallia brachiata* Merr.	Rhizophoracaee

Table A.12. (Continued) List of Plants in *Rimbo Gano* (Old-Growth Forest)

No.	Local Name	Latin Name	Family
35	*Risi*	*Caryota mitis* Lour.	Arecaceae
36	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae
37	*Kayu Manau*	*Celtis philippinensis* Blanco	Ulmaceae
38	*Kitab*	*Cephalomappa maloticarpa* J.J. Smith	Euphorbiaceae
39	*Kayu Sabut*	*Chionanthus nitens* Koord. & Valet.	Oleaceae
40	*Kayu Sabut*	*Chionanthus oliganthus* (Merr.) R. Kiew	Oleaceae
41	Anonim	*Chloranthus officinalis* Bl.	Chloranthaceae
42	*Kayu Usa*	*Cinnamomum javanicum* Bl.	Lauraceae
43	Anonim	*Claoxylon cf. longifolium* Baill.	Euphorbiaceae
44	*Patawa*	*Costus speciosus* Sm.	Zingiberaceae
45	*Palik*	*Cryptocarya ferrea* Kurz.	Lauraceae
46	*Paku Tiang*	*Cyanthea cf. squamulata* Copel	Cyatheaceae
47	*Sekedek'en*	*Cyrtandra sandei* de Vrise	Gesneriaceae
48	*Inai*	*Cyrtandra* sp.	Gesneriaceae
49	*Inai*	*Cyrtandra wallichii* (C. B. Cl.) B. L. Burtt	Gesneriaceae
50	*Rotan Getah*	*Daemonorops angustifolius* Mart.	Arecaceae
51	*Medang Telur*	*Dehaasia incrassata* (Jack) Kosterm.	Lauraceae
52	*Buluh Betung*	*Dendrocalamus asper* Backer ex K. Heyne	Poaceae
53	*Medang Kawah*	*Dichapetalum gelonioides* (Roxb.) Engl.	Dichapetalaceae
54	Anonim	*Diospyros cauliflora* Mart. ex Mix.	Ebenaceae
55	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae
56	*Mutah*	*Dysoxylum parasiticum* (Osbeck) Kosterm.	Meliaceae
57	*Asal Kunyit*	*Elaeocarpus stipularis* Bl.	Elaeocarpaceae
58	*Kandung Aye*	*Elatostema rostratum* (Bl.) Hassk. & H.Schroet.	Urticaceae
59	*Sisik Trenggiling*	*Euonymus javanicus* Bl.	Celastraceae
60	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Asteraceae
61	*Bekung*	*Ficus albipila* (Miq.) King	Moraceae
62	*Sekuduk'en*	*Ficus fistulosa* Reinw. ex Bl.	Moraceae
63	*Bekung*	*Ficus geocarpa* Teijsm.	Moraceae
64	*Sekawak'eng*	*Ficus obscura* Bl.	Moraceae
65	*Kiro Pulut*	*Ficus parientalis* Bl.	Moraceae

Table A.12. (Continued) List of Plants in *Rimbo Gano* (Old-Growth Forest)

No.	Local Name	Latin Name	Family
66	*Loloi*	*Ficus ribes* Reinw.	Moraceae
67	*Kayu Taji*	*Ficus sinuata* Thunb.	Moraceae
68	*Rukam*	*Flacourtia rukam* Zoll. & Mor.	Flacourtiaceae
69	*Manggus Hutan*	*Garcinia lateriflora* Bl.	Clusiaceae
70	*Buluh Serik*	*Giganthocloa cf serik* E.A.Widjaja	Poaceae
71	*Lalan Tupai*	*Globa pendula* Roxb.	Zingiberaceae
72	*Lalan Besi*	*Globa* sp.	Zingiberaceae
73	*Akar Tunggal*	*Goniothalamus macrophylus* Miq.	Annonaceae
74	Anonim	*Gordonia excelsa* Bl.	Theaceae
75	*Medang Cempako*	*Gordonia oblongifolia* (Miq.) Steenis	Theaceae
76	*Puar Rincung*	*Hornstedtia* sp.	Zingiberaceae
77	*Puar Angit*	*Hornstedtia* sp.	Zingiberaceae
78	*Kayu Sumpah*	*Horsfieldia glabra* Warb.	Myristiceae
79	*Setebal*	*Ixora grandifolia* Mull.Arg.	Rubiaceae
80	*Medang Rengas*	*Knema latericia* Elmer	Myristiceae
81	*Rotan Sendahan*	*Korthalsia* sp.	Arecaceae
82	*Jelatang Nyiru*	*Laportea sinuata* Bl. ex Wedd.	Urticaceae
83	*Jelatang Ruso*	*Laportea* sp.	Urticaceae
84	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae
85	*Sekentuten*	*Lasianthus pseudo-stipularis* Amsof. ex Bakh. f.	Rubiaceae
86	*Sekring*	*Lasianthus reticulatus* Bl.	Rubiaceae
87	*Sekentuten*	*Lasianthus rigidus* Miq.	Rubiaceae
88	*Kayu Bali*	*Leea indica* Merr.	Leeaceae
89	*Kayu Hijau*	*Lepionurus sylvestris* Bl.	Opiliaceae
90	*Mening Putih*	*Lithocarpus gracilis* (Korth.) Soepadmo	Fagaceae
91	*Mening*	*Lithocarpus pseudo-molucca* Rehder	Fagaceae
92	*Mening Hitam*	*Lithocarpus* sp.	Fagaceae
93	*Medang Gambung*	*Litsea garciae* Vidal	Lauraceae
94	*Medang Simpai*	*Litsea grandis* Hook. f.	Lauraceae
95	*Saluang*	*Litsea lanceolata* (Bl.) Kosterm.	Lauraceae
96	*Antoi*	*Litsea mappacea* Boerl.	Lauraceae

Table A.12. (Continued) List of Plants in *Rimbo Gano* (Old-Growth Forest)

No.	Local Name	Latin Name	Family
97	*Medang Telampung Kuning*	*Litsea robusta* Bl.	Lauraceae
98	*Sekunyit*	*Litsea* sp.	Lauraceae
99	*Medang Burung*	*Litsea umbellata* Merr.	Lauraceae
100	*Medang Cabe*	*Lophopetalum sessilifolium* Ridl.	Celastraceae
101	*Akar Nulang*	*Luvunga eleutherandra* Dalz.	Rubiaceae
102	*Mang*	*Macaranga triloba Muell.* Arg.	Euphorbiaceae
103	*Balam Merah*	*Madhuca sericea* H. J. Lam	Sapotaceae
104	*Medang Pauh*	*Mangifera quadrifida* Jack	Anacardiaceae
105	*Munuk'eng*	*Mastixia trichotoma* Bl.	Cunnoniaceae
106	*Balam Mencit*	*Melanochyla caesia* (Bl.) Ding Hou	Anacardiaceae
107	*Kayu Kapuk*	*Meliosma ferruginea* Sieb. & Zucc. ex Hook. f.	Sabiaceae
108	*Bayu*	*Meliosma nitida* Bl.	Sabiaceae
109	*Temereh Padi*	*Memecylon* sp.	Melastomatac
110	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae
111	*Kayu Lilin*	*Microdesmis* caseariaefolia Planch. ex Hook.	Euphorbiaceae
112	*Akar Serumpal*	*Millettia sericea* Wight. & Arn.	Fabaceae
113	*Damar*	*Mischocarpus pentapetalus* Radlk.	Sapindaceae
114	*Menien Udang*	*Mitrephora maingayi* Hook. f. & Thoms.	Annonaceae
115	*Sepanehen*	*Mycetia fasciculata* (Bl.) Bl. ex Korth.	Rubiaceae
116	*Kiro Muting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae
117	*Cengang*	*Neesia altisima* Bl.	Bombacaceae
118	*Paku Larat*	*Nephrolepis bisserata* (Sw.) Schott)	Nephrolepis Gr.
119	*Medang Jambu*	*Nothaphoebe umbelliflora* Bl.	Lauraceae
120	*Medang Sawo*	*Nyssa javanica* Wangerin	Cunnoniaceae
121	*Meni'en Saluang*	*Orophea cf. hexandra* Bl.	Annaceae
122	Anonim	*Paraphlomis javanica* Prain	Labiatae
123	*Daun Lirik*	*Phrynium pubinerve* Bl.	Marantaceae
124	*Rumput Serupo*	*Phyllagathis rotundifolia* (Jack) Bl.	Melastomataceae
125	*Medang Garu*	*Picrasma javanica* Bl.	Simarubaceae
126	*Mpinang*	*Pinanga* sp.	Arecaceae
127	*Mpinang*	*Pinanga* sp.	Arecaceae
128	Anonim	*Piper mollissimum* Bl.	Piperaceae

Table A.12. (Continued) List of Plants in *Rimbo Gano* (Old-Growth Forest)

No.	Local Name	Latin Name	Family
129	*Sirih Hantu*	*Piper* sp.	Piperaceae
130	*Gelam*	*Planchonella nitida* Dubard	Sapotaceae
131	*Senglo*	*Plectronia horrida* K. Schum.	Rubiaceae
132	*Akar Rundang*	*Poikilospermum suaveolens* (Bl.) Merr.	Moraceae
133	*Lengkat*	*Pometia tomentosa* Kurz.	Sapindaceae
134	*Semat Baju*	*Procris cf. pedunculata* Wedd.	Urticaceae
135	*Kayu Seruput*	*Prunus arborea* (Bl.) Kalkm.	Rosaceae
136	*Rukam Air*	*Prunus javanica* Miq.	Rosaceae
137	*Cakrau Rimbo*	*Psychotria montana* Bl.	Rubiaceae
138	*Puding Hutan*	*Psychotria rostrata* Bl.	Rubiaceae
139	*Akar Gitan*	*Psychotria* sp.	Rubiaceae
140	*Bentang Mloro*	*Pterocymbium tubulatum* Pierre	Sterculiaceae
141	*Senarahen*	*Pyrrenaria serrata* Bl.	Theaceae
142	*Mpisang*	*Rhaphidophora oblongifolia* Schott.	Araceae
143	*Sentul*	*Sandoricum koetjape* Schott.	Meliaceae
144	Anonim	*Saurauia cf. cuspictella* Miq.	Actinidiaceae
145	*Sap'em*	*Saurauia javanica* (Nees) Hooglan	Actinidiaceae
146	*Sergau*	*Selaginella plana* Hieron	Selaginellaceae
147	*Rengas*	*Semecarpus heterophylla* Hook. f.	Anacardiaceae
148	*Mentilin*	*Stauranthera caerulea* Merr.	Gesneriaceae
149	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae
150	*Medang Timun*	*Symplocos cf. cochinchinensis* S. Moore	Symplocaceae
151	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae
152	*Kelat*	*Syzigium lineatum* (DC.) Merr. & L.M.Perry	Myrtaceae
153	*Mentang Keladi*	*Syzygium acutangulum* Nied.	Myrtaceae
154	*Jambu Kelawar*	*Syzygium leptostemon* (Korth.) Merr. & L.M.Perry	Myrtaceae
155	*Ubo Serai*	*Syzygium polyanthum* Miq.	Myrtaceae
156	*Kelat Senduk*	*Syzygium* sp.	Myrtaceae
157	*Kayu Bawang*	*Syzygium zeylanicum* DC.	Myrtaceae
158	Anonim	*Talauma candollii* Bl.	Magnoliaceae
159	*Cupak*	*Ternstroemia coriacea* Wall.	Theaceae
160	*Jelapak*	*Trevesia sundaica* Miq.	Aralliaceae
161	*Moloro*	*Turpinia sphaerocarpa* Hassk.	Staphyllaceae
162	*Akar Kait*	*Uncaria glabrata* DC.	Rubiaceae

Table A.12. (Continued) List of Plants in *Rimbo Gano* (Old-Growth Forest)

No.	Local Name	Latin Name	Family
163	*Kayu Panjut*	*Urophyllum corymbosum* Korth.	Rubiaceae
164	*Melambung*	*Vernonia arborea* Buch.-Ham.	Asteraceae
165	Anonim	*Viburnum lutescens* Bl.	Urticaceae
166	*Molesaten*	*Villebrunea rubescens* Bl.	Urticaceae
167	*Kayu Tirih*	*Vitex quinata* F. N. Will.	Verbenaceae
168	*Kayu Sekunyit*	*Xanthophyllum affine* Korth. ex Miq.	Polygalaceae
169	*Nalam Nasi*	*Zingiber* sp.	Zingiberaceae

Table A.13. List of Plant in *Rapohen* (Secondary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientific Name	Family
1	*Menien Simpai*	*Actinodaphne glomerata* Nees.	Lauraceae
2	*Medang Kayu Bukit*	*Actinodaphne sesquipedalis* Hook.f. & Thoms. ex Hook.f.	Lauraceae
3	*Mutah*	*Aglaia argentea* Bl.	Meliaceae
4	*Puar*	*Alpinia* sp.	Zingiberaceae
5	*Puar Merah*	*Alpinia* sp.	Zingiberaceae
6	*Kerubut*	*Amorpophalus titanium* Becc.	Araceae
7	*Paku Liman*	*Angiopteris evecta* (Fortst.) Hoffm.	Marratiaceae
8	*Gelambai*	*Anthocephalus cadamba* Miq.	Rubiaceae
9	*Jering Tupai*	*Archidendron elipticum* (Bl.) I.C. Nielsen	Fabaceae
10	*Menzi*	*Ardisia crispa* A.DC.	Oleaceae
11	*Kayu Asam*	*Ardisia lanceolata* C.F. Gaertn.	Myrsinaceae
12	*Paku Pukut*	*Athyrium esculentum* Copel.	Athyrium Gr.
13	*Mauk'eng*	*Baccaurea lanceolata* Mull. Arg.	Euphorbiaceae
14	*Daun Serteh*	*Beilschmiedia gemmiflora* (Bl.) Kosterm.	Lauraceae
15	*Ndek'eng*	*Bischofia javanica* Bl.	Euphorbiaceae
16	*Bentang Jelapak*	*Calanthe* sp.	Orchidaceae
17	*Rumput Rabun*	*Centhotheca lappacea* Desv.	Poaceae
18	*Daun Kitab*	*Cephalomappa maloticarpa* J. J. Smith	Euphorbiaceae
19	*Kayu Manis*	*Cinnamomum burmanii* (Nees & T. Nees) Bl.	Lauraceae
20	*Keladi Air*	*Colocasia esculenta* Schott	Araceae
21	*Patawa*	*Costus speciosus* Sm.	Zingiberaceae
22	*Jelapak*	*Cyrtandra pendula* Bl.	Gesneriaceae
23	*Buluh Betung*	*Dendrocalamus asper* Backer ex K. Heyne	Poaceae
24	*Rumput Resam*	*Dicranopteris linearis* J.Underw.	Gleicheniaceae
25	*Peleh Tupai*	*Diflugossa filiformis* (Bl.) Bremek	Acanthaceae
26	*Jemban*	*Donax grandis* (Miq.) Ridley	Marantaceae
27	*Kayu Kacang*	*Dysoxylum alliaceum* Seem.	Meliaceae
28	*Kandung Aye*	*Elatostema* rostratum (Bl.) Hassk. & H.Schroe	Urticaceae
29	*Sakrau*	*Enhydra fluctuans* Lour.	Asteraceae
30	*Dadap Duri*	*Erythrina subumbrans* Merr.	Fabaceae
31	*Sekuduken*	*Ficus hispida* Roxb. ex Wall.	Moraceae

Table A.13. (Continued) List of Plant in *Rapohen* (Secondary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientific Name	Family
32	*Loloy*	*Ficus ribes* Reinw. ex Bl	Moraceae
33	*Seri*	*Ficus tinctoria* G. Forst. f.	Moraceae
34	*Buluh Kapal*	*Giganthocloa hasskarliana* Backer ex K.Heyne	Poaceae
35	*Nulang*	*Glochidion obscurum* Bl.	Euphorbiaceae
36	*Kayu Kelat*	*Helicia rostrata* Foreman	Proteaceae
37	*Sakrekeng*	*Helicia* sp.	Proteaceae
38	*Semlo'en*	*Homalanthus giganteus* Zoll. & Mor.	Euphorbiaceae
39	*Jelatang Api*	*Laportea* sp.	Urticaceae
40	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae
41	*Batang Antoy*	*Litsea mappacea* Boerl.	Lauraceae
42	*Limau Keli*	*Luvunga eleutherandra* Dalz.	Rutaceae
43	*Sapat*	*Macaranga tanarius* Muell. Arg.	Euphorbiaceae
44	*Kapeh*	*Meliosma ferruginea* Sieb. & Zucc. ex Hook. f.	Sabiaceae
45	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae
46	*Akar Serempal*	*Millettia sericea* Wight. & Arn.	Fabaceae
47	*Sapanehen*	*Mycetia fasciculata* (Bl.) Bl. ex Korth.	Rubiaceae
48	*Kirau Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae
49	*Paku Larat*	*Nephrolepis biserrata* (Sw.) Schott*)*	Davaliaceae
50	*Meni'en Kijang*	*Orophea cf. hexandra* Bl.	Annonaceae
51	*Kelekap*	*Phymatodes nigrescens* J. Sm.	Polypodiaceae
52	*Betang Sirih*	*Piper nigrecens* Miq.	Piperaceae
53	*Sirih Hantu*	*Piper* sp.	Pierpaceae
54	*Peladang Hutan*	*Plectranthus galeatus* Vahl.	Labiatae
55	*Batang Ngelo*	*Plectronia horrida* K. Schum.	Rubiaceae
56	*Paku Kerkap*	*Polypodium* sp.	Polypodiaceae
57	*Semat Baju*	*Procris cf. pedunculata* Wedd.	Urticaceae
58	*Rukam Air*	*Prunus javanica* Miq.	Rosaceae
59	*Mloro*	*Pterocymbium tubulatum* Pierre	Sapotaceae
60	*Bayu*	*Pterospermum javanicum* Jungh.	Sterculiaceae
61	*Sampadi*	*Saurauja nudiflora* DC.	Actinidaceae
62	*Batang Gelam*	*Schefflera elliptica* Harms.	Araliaceae
63	*Senehen*	*Schefflera* sp.	Araliaceae
64	*Akar Meresakeng*	*Scindapsus hederaceus* Schott.	Araceae
65	*Rumput Kudo*	*Selaginela wildenowii* (Desv.) Baker.	Selaginellaceae

Table A.13. (Continued) List of Plant in *Rapohen* (Secondary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientific Name	Family
66	*Kayu Bukit*	*Semecarpus heterophylla* Hook. f.	Anacardiaceae
67	*Kopi Rimbo*	*Syzigium leptostemon* (Korth.) Merr. & L.M.Perry	Myrtaceae
68	*Surian Rimbo*	*Toona sureni* Merr.	Meliaceae
69	*Narung*	*Trema orientalis* Bl.	Ulmaceae
70	*Melambung*	*Vernonia arborea* Buch.-Ham.	Asteraceae
71	*Molesaten*	*Villebrunea rubescens* Bl.	Urticaceae
72	*Nalam Nasi*	*Zingiber* sp.	Zingiberaceae
73	*Kalon*	Unidentified	

Table A.14. List of Plant in *Hutan Adat* (Customary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientific Name	Family
1	*Menien Simpai*	*Actinodaphne glomerata* Nees.	Lauraceae
2	*Mertin*	*Actinodaphne procera* Nees.	Lauraceae
3	*Mutah*	*Aglaia argentea* Bl.	Meliaceae
4	*Melaku*	*Alangium* rotundifolium (Hassk.) Bloemb.	Alangiaceae
5	*Puar*	*Alpinia* sp.	Zingiberaceae
6	*Kerubut*	*Amorpophalus titanum* Becc.	Araceae
7	*Merenai*	*Antidesma neurocarpum* Miq.	Euphorbiaceae
8	*Kayu Bawang*	*Aporusa lucida* (Miq.) Airy Shaw	Euphorbiaceae
9	*Petai Beluru*	*Archidendron* clypearia (Jack) I.C. Nielsen	Fabaceae
10	*Jering Tupai*	*Archidendron elipticum* (Bl.) I.C. Nielsen	Fabaceae
11	*Jering*	Archidendron pauclorum (Benth.) I.C. Nielsen	Fabaceae
12	*Menzi*	*Ardisia crispa* A.DC.	Myrsinaceae
13	*Sesam*	*Ardisia lanceolata* C.F. Gaertn.	Myrsinaceae
14	*Mbaukeng*	*Baccaurea lanceolata* Mull. Arg.	Euphorbiaceae
15	*Bentang Kunyit*	*Beilschmiaedia madang* Bl.	Lauraceae
16	*Mentang Kerai*	*Beilschmiaedia* sp.	Lauraceae
17	*Kalumpang*	*Beilsmiedia maingayi* Hook.f.	Lauraceae
18	*Serangkah*	*Botryophora geniculata* (Miq.) Beumee ex Airy Shaw	Euphorbiaceae
19	*Kanidai*	*Bridelia insulana* Hance	Euphorbiaceae
20	*Manau*	*Calamus manan* Miq.	Arecaceae
21	*Rotan Seni*	*Calamus* sp.	Arecaceae
22	*Kayu Manau*	*Celtis philippinensis* Blanco	Ulmaceae
23	*Petehen*	*Cinnamomum iners* Reinw. ex Bl.	Lauraceae
24	*Lingkat*	*Clausena exavata* Burm. f.	Rutaceae
25	*Batang Petawar*	*Costus speciosus* Sm.	Zingiberaceae
26	*Moton*	*Cratoxylum sumatranum* Bl.	Clusiaceae
27	*Kayu Palih*	*Cryptocarya ferrea* Kurz.	Lauraceae
28	*Daun Matahari*	*Curculigo latifolia* Dryand.	Amarilidaceae
29	*Paku Tiang*	*Cyanthea cf. squamulata* Copel.	Cyatheaceae
30	*Jelapak*	*Cyrtandra pendula* Bl.	Gesneriaceae

Table A.14. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientific Name	Family
31	*Rotan Getah*	*Daemonorops angustifolius* Mart.	Arecaceae
32	*Medang Kawah*	*Dichapetalum gelonioides* (Roxb.) Engl.	Dichapetalaceae
33	*Kayu Kacang*	*Dysoxylum alliaceum* Seem.	Meliaceae
34	*Letung*	*Dysoxylum* parasiticum (Osbeck) Kosterm.	Meliaceae
35	*Asal*	*Elaeocarpus* sp.	Elaeocarpaceae
36	*Kandung Air*	*Elatostema rostratum* (Bl.) Hassk. & H.Schroet.	Elaeocarpaceae
37	*Rumput Gedang*	*Erechtites valerianaefolia* DC.	Asteraceae
38	*Medang Sunting*	*Ficus callosa* Willd.	Moraceae
39	*Kayu Aro*	*Ficus* sp.	Moraceae
40	*Malau*	*Ficus stupenda* Thunb.	Moraceae
41	*Akar Kunyal*	*Ficus subulata* Bl.	Moraceae
42	*Rukam Bubur*	*Flacourtia rukam* Zoll. & Mor.	Flacourtiaceae
43	*Misang Hantu*	*Freycinetia javanica* Bl.	Pandanaceae
44	*Manggus Hutan*	*Garcinia celebica* Linn	Clusiaceae
45	*Kenis*	*Garcinia parvifolia* Hort. ex Boerl.	Clusiaceae
46	*Kenis Hutan*	*Garcinia* sp.	Clusiaceae
47	*Medang Kelumpang*	*Gardenia tubifera* Wall.	Clusiaceae
48	*Buluh Serik*	*Giganthocloa cf serik* E.A.Widjaja	Poaceae
49	*Medang Payo*	*Glochidion microcarpum* Bl.	Euphorbiaceae
50	*Nulam*	*Glochidion obscurum* Bl.	Euphorbiaceae
51	*Kelat*	*Helicia rostrata* Foreman	Proteaceae
52	*Sekrekeng*	*Helicia* sp.	Proteaceae
53	*Medang Jambu*	*Nothaphoebe umbelliflora* Bl.	Lauraceae
54	*Duku Hutan*	*Lansium domesticum* Jack.	Meliaceae
55	*Jelatang Api*	*Laportea* sp.	Urticaceae
56	*Kayu Miang*	*Lasianthus densifolius* Miq.	Rubiaceae
57	*Mening Putih*	*Lithocarpus gracilis* (Korth.) Soepadm	Fagaceae
58	*Mening*	*Lithocarpus pseudo-molucca* Rehder	Fagaceae
59	*Medang Labu*	*Litsea grandis* Hook.f.	Lauraceae
60	*Menien Saluang*	*Litsea lanceolata* (Bl.) Kosterm.	Lauraceae
61	*Antoy*	*Litsea mappacea* Boerl.	Lauraceae

Table A.14. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientific Name	Family
62	*Medang Cabai*	*Lophopetalum sessilifolium* Ridl.	Celastraceae
63	*Limau Keli*	*Luvunga eleutherandra* Dalz.	Rutaceae
64	*Sapat*	*Macaranga tanarius* Muell. Arg.	Euphorbiaceae
65	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae
66	*Kulit Angin*	*Mallotus paniculatus* Mull. Arg.	Euphorbiaceae
67	*Panco*	*Mallotus phlippinensis* Mull. Arg.	Euphorbiaceae
68	*Pauh*	*Mangifera quadrifida* Jack	Anacardiaceae
69	*Kayu Katak*	*Mastixia parvifolia* Hallier f.	Cornaceae
70	*Kapeh*	*Meliosma ferruginea* Sieb. & Zucc. ex Hook. f.	Sabiaceae
71	*Kayu Babi*	*Memecylon myrsinoides* Bl.	Melastomaceae
72	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae
73	*Damar*	*Mischocarpus pentapetalus* Radlk.	Sapindaceae
74	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae
75	*Medang Kulit*	*Neolitsea cassiaefolia* Merr.	Lauraceae
76	*Rambutan Rimbo*	*Nephelium lappaceum* Linn.	Sapindaceae
77	*Paku Larat*	*Nephrolepis biserrata* (Sw.) Schott)	Davaliaceae
78	*Paku Regis*	*Nephrolepis falcata* C. Chr.	Davaliaceae
79	*Menien Kijang*	*Orophea cf. hexandra* Bl.	Annonaceae
80	*Medang Giring*	*Persea cf. rimosa* Zoll. ex Meisn.	Lauraceae
81	*Pinang Hutan*	*Pinanga latisecta* Bl.	Arecaceae
82	*Sirih Hantu*	*Piper* sp.	Piperaceae
83	*Kayu Jelatang*	*Polyosma ilicifolia* Bl.	Saxifragaceae
84	*Malaru*	*Pterocymbium tubulatum* Pierre	Sapotaceae
85	*Narahen*	*Pyrrenaria serrata* Bl.	Theaceae
86	*Mentang Cabai*	*Quercus subsericea* A. Camus	Fagaceae
87	*Duri Peringat*	*Rubus moluccanus* Linn.	Rosaceae
88	*Terentang*	*Santiria laevigata* Bl.	Burseraceae
89	*Kentut*	*Saprosma arboreum* Bl.	Rubiaceae
90	*Medang Kentut*	*Saurauia javanica* (Nees) Hooglan	Actinidiaceae
91	*Batang Sedam*	*Schefflera polybotrya* R.Vig.	Aralliaceae
92	*Sepiding*	*Scleria purpurascens* Benth.	Cyperaceae
93	*Melantung*	*Sterculia subpeltata* Bl.	Sterculiaceae
94	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae
95	*Saragaten*	*Symplocos adenophylla* Wall.	Symplocaceae

Table A.14. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientific Name	Family
96	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae
97	*Kayu Simpai*	*Syzygium acutangulum* Nied.	Myrtaceae
98	*Jambu Kelawar*	*Syzygium claviflorum* (Roxb) Wall. ex Steud	Myrtaceae
99	*Sepah*	*Syzygium fastigiatum* (Bl.) Merr. & L.M.Perry.	Myrtaceae
100	*Juo*	*Syzygium leptostemon* (Korth.) Merr. & L.M.Perry	Myrtaceae
101	*Kayu Kaliki*	*Syzygium lineatum* (DC.) Merr. & L.M.Perry	Myrtaceae
102	*Tuba Serai*	*Syzygium polyanthum* Miq.	Myrtaceae
103	*Kayu Cupak*	*Ternstroemia coriacea* Wall.	Theaceae
104	*Akar Dauk*	*Tinomiscium phytocrenoides* Kurz. ex Teijsm. & Binn.	Menispermaceae
105	*Narung*	*Trema orientalis* Bl.	Ulmaceae
106	*Spong (Spok'eng)*	*Vernonia arborea* Buch.-Ham.	Asteraceae
107	*Molaseten*	*Villebrunea rubescens* Bl.	Urticaceae
108	*Kayu Tirih*	*Vitex quinata* F. N. Will.	Verbenaceae
109	*Kayu Kunyit*	*Xanthophyllum affine* Korth. ex Miq.	Polygalaceae
110	*Nalam Nasi*	*Zingiber sp.*	Zingiberaceae
111	*Kayu Lidi*	Unidentified	

Table A.15. List of Plant in *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family
1	*Akar Kepuh*	*Acacia pennata* (L.) Willd.	Fabaceae
2	*Mentaleten*	*Acalypha caturus* Blume	Euphorbiaceae
3	*Lenzat Hutan*	*Aglaia odoratissima* Lour.	Meliaceae
4	*Puar*	*Alpinia* sp.	Zingiberaceae
5	*Kerubut*	*Amorphophallus titanum* Becc.	Araceae
6	Anonim	*Aralidium pinnatifidium* Miq.	Araliaceae
7	*Jering Tupai*	*Archidendron fagifolium* (Bl. ex Miq.) I. Nielsen	Fabaceae
8	Anonim	*Ardisia cf. colorata* Roxb.	Myrsinaceae
9	*Menzi*	*Ardisia crispa* Roxb.	Myrsinaceae
10	*Medang Cempako*	*Ardisia sumtrana* Miq.	Myrsinaceae
11	*Merat*	*Artocarpus elasticus* Reinw.	Moraceae
12	*Mekli*	*Arytera xerocarpa* (Blume) Adelb.	Sapindaceae
13	*Medang Batu*	*Beilschmiedia lucidula* (Miq.) Kosterm.	Lauraceae
14	*Medang Batu*	*Beilschmiedia maingayi* Hook.f.	Lauraceae
15	*Bintang*	*Bischofia javanica* Blume	Euphorbiaceae
16	*Medang Serangkah*	*Botryophora geniculata* (Miq.) Beumee & Airy Shaw	Euphorbiaceae
17	*Kanidai*	*Bridelia insulana* Hance	Euphorbiaceae
18	*Rotan Jerat*	*Calamus* sp.	Arecaceae
19	*Rotan Kesu*	*Calamus* sp.	Arecaceae
20	*Rotan Sikai*	*Calamus* sp.	Arecaceae
21	Anonim	*Calanthe cf. triplicata* Ames	Orchidaceae
22	*Damar/kedundung*	*Canarium pilosum* A. W. Benn.	Burseraceae
23	*Menzi*	*Carallia brachiata* Merrill	Rhizophoracaee
24	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae
25	*Kayu Manau*	*Celtis philippinensis* Blanco	Ulmaceae
26	*Kitab*	*Cephalomappa maloticarpa* J. J. Smith	Euphorbiaceae
27	*Kayu Serabut*	*Chionanthus nitens* Koord. & Valet.	Oleaceae

Table A.15. (Continued) List of Plant in *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family
28	*Serabut*	*Chionanthus oliganthus* (Merrill) R. Kiew	Oleaceae
29	*Kulit Manis*	*Cinnamomum burmannii* (Nees & T. Nees) Bl.	Lauraceae
30	*Usang*	*Cinnamomum javanicum* Blume	Lauraceae
31	*Cirek*	*Clausena exavata* Burm. f.	Rutaceae
32	*Kawa*	*Coffea* sp.	
33	*Patawa*	*Costus speciosus* Sm.	Zingiberaceae
34	*Palik*	*Cryptocarya ferrea* Blume	Lauraceae
35	*Daun Tari*	*Curculigo latifolia* Dryand.	Amarilidaceae
36	*Sekedek'en*	*Cyrtandra sandei* De Vriese	Gesneriaceae
37	*Rotan Getah*	*Daemonorops angustifolius* Mart.	Arecaceae
38	*Rotan Jerenang*	*Daemonorops draco* Bl.	Arecaceae
39	*Medang Telu*	*Dehaasia incrassata* (Jack) Kosterm	Lauraceae
40	*Medang Kawah*	*Dichapetalum gelonioides* Engl.	Dichapetalaceae
41	*Setundu'en*	*Disporum chinensis* D. Don	Liliaceae
42	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae
43	*Bemban*	*Donax grandis* (Miq.) Ridley	Marantaceae
44	*Kayu Kacang*	*Dysoxylum alliaceum* Blume	Meliaceae
45	*Letung Padi*	*Dysoxylum parasiticum* (Osbeck) Kosterm.	Meliaceae
46	Anonim	*Elaeagnus latifolia* Linn.	Elaeagnaceae
47	*Cepo/Kapung Laut*	*Elaeocarpus mastersii* King	Elaeocarpaceae
48	Anonim	*Elaeocarpus sphaericus* Schum.	Elaeocarpaceae
49	*Kandung Aye*	*Elatostema rostratum* (Bl.) Hassk.	Urticaceae
50	*Sabaruten*	*Elatostema sinuatum* Hassk.	Urticaceae
51	*Rumput Gedang*	*Erechtites valerianaefolia* DC.	Asteraceae
52	*Dadap duri*	*Erythrina subumbrans* Merrill	Fabaceae
53	*Dedap*	*Erythrina subumbrans* Merrill	Fabaceae

Table A.15. (Continued) List of Plant in *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family
54	*Rumput Bungo*	*Eupatorium* inulaefolium H. B. & K.	Asteraceae
55	*Saeh Hutan*	*Ficus hirta* Vahl.	Moraceae
56	*Bakung*	*Ficus lasiocarpa* Miq.	Moraceae
57	*Loloy*	*Ficus ribes* Reinw. ex Blume	Moraceae
58	*Kayu Taji*	*Ficus sinuata* Thunb.	Moraceae
59	*Jelemu*	*Ficus* sp.	Moraceae
60	*Aro*	*Ficus* sp.	Moraceae
61	*Rukam*	*Flacourtia rukam* Zoll. & Mo	Flacourtiaceae
62	*Sekukuk Hutan*	*Forrestia mollissima* Koord.	Commelinaceae
63	*Manggus Hutan*	*Garcinia celebica* L.	Clusiaceae
64	*Kanis*	*Garcinia parvifolia* Hort. ex Boerl.	Clusiaceae
65	*Buluh Kapal*	*Giganthocloa* sp.	
66	*Lalan Besi*	*Globa* sp.	Zingiberaceae
67	*Nulang*	*Glochidion obscurum* Blume	Euphorbiaceae
68	*Akar Tunggal*	*Goniothalamus macrophylus* Hook. f. & Thoms	Annonaceae
69	*Kayu Segeneh*	*Gordonia excelsa* Blume	Theaceae
70	*Sengun*	*Gynochthodes coriacea* Blume	Rubiaceae
71	*Semlo'en*	*Homalanthus giganteus* Zoll. & Mor.	Euphorbiaceae
72	*Lolo Tanah*	*Hornstedtia* sp.	Zingiberaceae
73	*Puar Rincung*	*Hornstedtia* sp.	Zingiberaceae
74	*Sumpah*	*Horsfieldia glabra* Warb.	Myristicaceae
75	*Kayu Ruman*	*Ilex cymosa* Blume	Aquifoliaceae
76	*Setebal*	*Ixora grandifolia* J. J. Smith	Rubiaceae
77	*Medang Pelananu*	*Knema mandarahan* Warb.	Myristicaceae
78	*Sekring*	*Lasianthus reticulatus* Blume	Rubiaceae
79	*Mali*	*Leea indica Merrill*	Leeaceae
80	*Mening*	*Lithocarpus pseudo-molucca* Rehder	Fagaceae
81	*Antoy*	*Litsea mappacea* Boerl.	Lauraceae

Table A.15. (Continued) List of Plant in *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family
82	*Medang Burung*	*Litsea* umbellata (Lour.) Merrill	Lauraceae
83	*Limau Keling*	*Luvunga eleutherandra* Dalz`.	Rutaceae
84	*Tutup/Sapat*	*Macaranga tanarius* Muell. Arg.	Euphorbiaceae
85	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae
86	*Marilak'eng Hutan*	*Mallotus sphaerocarpus* Muell. Arg.	Euphorbiaceae
87	*Medang Pauh*	*Mangifera quadrifida* Jack ex Roxb.	Anacardiaceae
88	*Kayu Kapeh*	*Meliosma ferruginea* Blume	Sabiaceae
89	*Medang Surian*	*Meliosma pinnata* Maxim	Sabiaceae
90	*Temereh*	*Memecylon* sp.	Melastomataceae
91	*Akar Kembung*	*Merremia peltata* Merrill	Convolvulaceae
92	*Rumput Unggul*	*Micania cordata* (Burm. f.) B. L. Robinson	Asteraceae
93	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae
94	*Kayu Lilin*	*Microdesmis caseariaefolia* Planch. ex Hook.	Euphorbiaceae
95	*Kayu Mengkarung*	*Millettia sericea* Wight. & Arn.	Fabaceae
96	*Meni'en Udang*	*Mitrephora maingayi* Hook. f. & Thoms.	Annonaceae
97	*Telap*	*Morus* sp.	Moraceae
98	*Pisang Ungko*	*Musa acuminata* Colla	Musaceae
99	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae
100	*Cengang/Durian Hantu*	*Neesia altisima* Blume	Bombacaceae
101	*Medang Pilo*	*Neoscortechinia nicobarica* Pax & Hoffm.	Euphorbiaceae
102	*Rambutan Hutan*	*Nephelium lappaceum* L.	Sapindaceae
103	*Paku Larat*	*Nephrolepis biserrata* (Sw.) Schott)	Davaliaceae
104	*Kelu*	*Etlingera elatior* (Jack) R. M. Sm.	Zingiberaceae
105	*Medang Jambu*	*Nothaphoebe umbelliflora* Blume	Lauraceae

Table A.15. (Continued) List of Plant in *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family
106	*Medang Sawo*	*Nyssa javanica* Wangerin	Cunnoniaceae
107	*Bayeh*	*Oncosperma horridium* Scheff.	Arecaceae
108	*Menien Saluang*	*Orophea cf. hexandra* Blume	Annaceae
109	*Kapung*	*Oroxylum indicum* (L.) Kurz	Bignoniaceae
110	*Petai*	*Parkia speciosa* Haask.	Fabaceae
111	*Rumput Kinat*	*Paspalum conjugatum* Berg.	Poaceae
112	*Medang Garu*	*Picrasma javanica* Blume	Simarubaceae
113	*Pinang Hutan*	*Pinanga latisecta* Blume	Arecaceae
114	*Sirih Hantu*	*Piper* sp.	Pierpaceae
115	*Bumbo Hutan*	*Piper umbellatum* Linn.	Piperaceae
116	*Peladang Hutan*	*Plectranthus galeatus* Vahl.	Labiatae
117	*Kerkap*	*Polypodium* sp.	Polypodiaceae
118	*Akar Kanis*	*Poulzolzia viminea* Wedd.	Urticaceae
119	*Rukam Air*	*Prunus javanica* Miq.	Rosaceae
120	*Puding*	*Psychotria rostrata* Blume	Rubiaceae
121	*Akar Gitan*	*Psychotria* sp.	Rubiaceae
122	*Moloro*	*Pterocymbium* sp.	Sterculiaceae
123	*Kayu Kapuk*	*Pterocymbium tubulatum* Pierre	Sterculiaceae
124	*Bayu*	*Pterospermum javanicum* Jungh.	Sterculiaceae
125	*Senarahen*	*Pyrenaria serrata* Bl.	Theaceae
126	*Mpisang*	*Rhaphidophora oblongifolia* Schott.	Araceae
127	*Asam*	*Rhumex sagittata* Thunb.	Polygonaceae
128	*Saem*	*Saurauia javanica* (Nees) R. D. Hoogland	Actinidiaceae
129	*Sambada*	*Saurauja nudiflora* DC.	Actinidaceae
130	*Sergau*	*Selaginella plana* Hieron	Selaginellaceae
131	*Sergau*	*Selaginella wildenowii* (Desv.) Baker	Selaginellaceae
132	*Kayu Bukit*	*Semecarpus heterophylla* Blume	Anacardiaceae
133	*Langoi*	*Solanum tovum* Sw.	Solanaceae
134	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae
135	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae

Table A.15. (Continued) List of Plant in *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family
136	*Kayu Nuang*	*Symplocos rubiginosa* Wall.	Symplocaceae
137	*Kelat*	*Syzigium lineatum* (DC.) Merrill & Perry	Myrtaceae
138	*Moton*	*Syzygium incarnatum* (Elmer) Merrill & Perry	Myrtaceae
139	*Jambu Kelawar*	*Syzygium leptostemon* (Korth.) Merrill & Perry	Myrtaceae
140	*Ubo Serai*	*Syzygium polyanthum* Miq.	Myrtaceae
141	*Kayu Bawang*	*Syzygium zeylanicum* DC.	Myrtaceae
142	*Surian Rimbo*	*Toona sureni* (Blume) Merr.	Meliaceae
143	*Narung/Sapat*	*Trema orientalis* (L.) Bl.	Ulmaceae
144	*Jelapak*	*Trevesia sundaica* Miq.	Aralliaceae
145	*Nilau*	*Trichospermum javanicum* Blume	Tiliaceae
146	*Nilau Api*	*Trichospermum* sp.	Tiliaceae
147	*Nilau Kucing*	*Trichospermum* sp.	Tiliaceae
148	*Biung*	*Turpinia sphaerocarpa* Hassk.	Staphyllaceae
149	*Kayu Panjut*	*Urophyllum corymbosum* Korth.	Rubiaceae
150	*Melambok'eng/Spok'eng*	*Vernonia arborea* Buch.-Ham.	Asteraceae
151	*Molesatem*	*Villebrunea rubescens* Blume	Urticaceae
152	*Nalam Nasi*	*Zingiber* sp.	Zingiberaceae
153	*Keloyang Besi*	*Ziziphus horsfieldii* Blume	Rhamnaceae
154	Anonim	*Unidentified*	
155	*Cupak Hutan*	*Unidentified*	
156	*Meni'en Padi*	*Unidentified*	
157	*Merpau*	*Unidentified*	
158	*Nyeman Tupai*	*Unidentified*	
159	*Puar Bilu*	*Unidentified*	
160	*Kayu Salak*	*Unidentified*	

Table A.16. List of Plant in *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scinetific Name	Family
1	*Akar Sepo*	*Acacia pennata* (L.) Willd.	Fabaceae
2	*Menien Simpai*	*Actinodaphne glomerata* (Bl.) Nees.	Lauraceae
3	*Menien Padi*	*Actinodaphne* sp.	Lauraceae
4	*Gitan*	*Adenia macrophylla* Koord.	Passifloraceae
5	*Mutah*	*Aglaia argentea* Blume	Meliaceae
6	*Beko*	*Aglaia crassinervia* Kurz. ex Hiern.	Meliaceae
7	*Lenzat Hutan*	*Aglaia odoratissima* Lour.	Meliaceae
8	*Letung Aye*	*Aglaia* sp.	Meliaceae
9	*Melaku*	*Alangium rotundifolium* (Hassk.) Bloaemb.	Alangiaceae
10	*Puar Rincung*	*Alpinia* sp.	Zingiberaceae
11	*Puar*	*Alpinia* sp.	Zingiberaceae
12	*Kerubut*	*Amorphophallus titanum* Becc.	Araceae
13	*Paku Regis*	*Angiopteris evecta* (Fortst.) Hoffm.	Marratiaceae
14	*Merenai*	*Antidesma cuspidatum* Muell. Arg.	Euphorbiaceae
15	*Cawat*	*Aporosa symplocoides* Gage	Euphorbiaceae
16	*Menap'en*	*Aralia dasyphylla* Miq.	Aralliaceae
17	*Petai Belalang*	*Archidendron clipearia* (Kack) I. Nielsen	Fabaceae
18	*Kitab Kacang*	*Archidendron fagifolium* (Bl. ex Miq.) I. Nielson	Fabaceae
19	*Menzi*	*Ardisia crispa* Roxb.	Oleaceae
20	*Asam-asam*	*Ardisia sumatrana* Miq.	Myrsinaceae
21	*Enau*	*Arenga pinnata* Merr.	Arecaceae
22	*Inai*	*Argostema borragineum* Blume	Rubiaceae
23	*Terap*	*Artocarpus elasticus* Reinw.	Moraceae
24	*Cempedak Hutan*	*Artocarpus integra* Merrill	Moraceae
25	*Tapang*	*Artocarpus nitida* Trec.	Moraceae
26	*Mangkli*	*Arytera xerocarpa* (Blume) Adelb.	Sapindaceae
27	*Pulai*	*Astonia angustifolia* Miq.	Apocynaceae
28	*Paku Pukut*	*Athyrium esculentum* (Retz.) Copel.	Athyrium Gr.
29	*Mbok'eng*	*Baccaurea lanceolata* Muell. Arg.	Euphorbiaceae
30	*Medang Batu*	*Beilschmiedia maingayi* Hook.f.	Lauraceae
31	*Kelumpang*	*Beilsmiedia* sp.	Lauraceae

Table A.16. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scinetific Name	Family
32	*Mnedk'eng (bintang)*	*Bischofia javanica* Blume	Euphorbiaceae
33	*Kanidai*	*Bridelia insulana* Hance	Euphorbiaceae
34	*Manau*	*Calamus manan* Miq.	Arecaceae
35	*Rotan Kesu*	*Calamus sp.*	Arecaceae
36	*Rotan Seni*	*Calamus sp.*	Arecaceae
37	*Rotan Sikai*	*Calamus sp.*	Arecaceae
38	*Rotan Jukut*	*Calamus sp.*	Arecaceae
39	Anonim	*Calanthe sp.*	Orchidaceae
40	*Jelipuk Hutan*	*Calanthe triplicata* (Willemet) Ames	Orchidaceae
41	*Damar*	*Canarium pilosum* A. W. Benn.	Burseraceae
42	*Risi*	*Caryota mitis* Lour.	Arecaceae
43	*Merpau*	*Caryota* sp.	Arecaceae
44	*Tajam Tumpul*	*Castanopsis javanica* A. DC.	Fagaceae
45	*Kayu Manau*	*Celtis philippinensis* Blanco	Ulmaceae
46	*Kitab Kacang*	*Cephalomappa maloticarpa* J. J. Smith	Euphorbiaceae
47	*Kayu Sabut*	*Chionanthus nitens* Koord. & Valet.	Oleaceae
48	*Letung Enggang*	*Chisocheton ceramicus* (Mig.) C. DC.	Meliaceae
49	*Kayu Usang*	*Cinnamomum javanicum* Blume	Lauraceae
50	*Akar Ulun*	*Cissus cf. nodosa* Blume	Vitaceae
51	*Lingkat*	*Clausena exavata* Burm. f.	Rutaceae
52	*Kawah*	*Coffea* sp.	Rubiaceae
53	*Patawa*	*Costus speciosus* Sm.	Zingiberaceae
54	*Palik*	*Cryptocarya ferrea* Blume	Lauraceae
55	*Daun Tari*	*Curculigo latifolia Dryand.*	Amarilidaceae
56	*Paku Tiang*	*Cyanthea cf. squamulata* Copel	Cyatheaceae
57	*Sekedek'eng*	*Cyrtandra sandei* De Vriese	Gesneriaceae
58	*Rotan Getah*	*Daemonorops angustifolius* Mart.	Arecaceae
59	*Rotan Jerenang*	*Daemonorops draco* Bl.	Arecaceae
60	*Medang Telur*	*Dehaasia incrassata* (Jack) Kosterm.	Lauraceae
61	*Bambu betung*	*Dendrocalamus asper* Backer ex K. Heyne	Poaceae
62	*Medang Kawah*	*Dichapetalum gelonioides* Engl.	Dichapetalaceae

Table A.16. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scinetific Name	Family
63	*Kandung Aye Putih*	*Didimocarpus barbatus* Jack.	Scrophulariaceae
64	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae
65	*Bemban*	*Donax grandis* (Miq.) Ridley	Marantaceae
66	*Kayu Kacang*	*Dysoxylum alliaceum* Blume	Meliaceae
67	*Letung*	*Dysoxylum parasiticum* (Osbeck) Kosterm.	Meliaceae
68	*Tirau*	*Dysoxylum* sp.	Meliaceae
69	*Cepo Laut*	*Elaeocarpus mastersii* K. Schum.	Elaeocarpaceae
70	*Kayu Cawat*	*Elaeocarpus* sp.	Elaeocarpaceae
71	*Kandung Aye*	*Elatostema rostratum* (Bl.) Hassk.	Urticaceae
72	*Kayu Tulang*	*Euonymus javanicus* Blume	Celastraceae
73	*Sekuang/Bekung*	*Ficus albipila* (Miq.) King	Moraceae
74	*Sekuduk'en*	*Ficus fistulosa* Reinw. ex Bl.	Moraceae
75	*Bakung*	*Ficus lasiocarpa* Miq.	Moraceae
76	*Sekawak'eng*	*Ficus obscura* Blume	Moraceae
77	*Kiro Tampuk*	*Ficus stupenda* Miq.	Moraceae
78	*Akar Kunyal*	*Ficus subulata* Blume	Moraceae
79	*Rukam Hutan*	*Flacourtia* sp.	Flacourtiaceae
80	*Sekukuk*	*Forrestia mollissima* Koord.	Commelinaceae
81	*Kuka Bening*	*Galearia filiformis* Boerl.	Euphorbiaceae
82	*Manggus Hutan*	*Garcinia celebica* L.	Clusiaceae
83	*Bambu Kapal*	*Giganthocloa* sp.	Poaceae
84	*Lalan Besi*	*Globa* sp.	Zingiberaceae
85	*Akar Nulang*	*Glochidion obscurum* Blume	Euphorbiaceae
86	*Akar Tunggal*	*Goniothalamus macrophylus* Hook. f. & Thoms.	Annonaceae
87	*Medang Cempako*	*Gordonia oblongifolia* (Miq.) Van Steenis	Theaceae
88	*Loloy*	*Hornstedtia* sp.	Zingiberaceae
89	*Loloy Rincung*	*Hornstedtia* sp.	Zingiberaceae
90	*Setebal*	*Ixora grandifolia* J. J. Smith	Rubiaceae
91	*Kayu Seramngkah*	*Knema cinerea* Warb.	Myristicaceae
92	*Rotan Sendahan*	*Korthalsia laciniosa* Mart.	Arecaceae
93	*Jelatang Nyiru*	*Laportea sinuata* Blume ex Wedd.	Urticaceae

Table A.16. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scinetific Name	Family
94	*Jelatang Api*	*Laportea* sp.	Urticaceae
95	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae
96	*Bali*	*Leea indica* Merrill	Leeaceae
97	*Limbang Hantu*	*Lepidagathis* sp.	Acanthaceae
98	*Kayu Hijau*	*Lepionurus sylvestris* Blume	Opiliaceae
99	*Mentang Simpai*	*Litsea grandis* Hook. f.	Lauraceae
100	*Medang Seluput*	*Litsea mappacea* Boerl.	Lauraceae
101	*Medang Telampung Kuning*	*Litsea robusta* Blume	Lauraceae
102	*Medang The*	*Litsea* sp.	Lauraceae
103	*Bedang Burung*	*Litsea* sp.	Lauraceae
104	*Medang Tinggi*	*Litsea* sp.	Lauraceae
105	*Akar Sekunyit*	*Litsea* sp.	Lauraceae
106	*Antoy*	*Litsea* sp.	Lauraceae
107	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae
108	*Balam Merah*	*Madhuca sericea* H. J. Lam	Sapotaceae
109	*Pauh*	*Mangifera quadrifida* Jack ex Roxb.	Anacardiaceae
110	*Mentelam Hutan*	*Mangifera swintonioides* A.J.G.H. Kostermans	Anacardiaceae
111	*Kayu Cawat*	*Mastixia trichotoma* Blume	Cunnoniaceae
112	*Kayu Kapeh*	*Meliosma ferruginea* Blume	Sabiaceae
113	*Kayu Nggeruk*	*Meliosma nitida* Blume	Sabiaceae
114	*Tambreh*	*Memecylon* sp.	Melastomatac
115	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae
116	*Akar Serumpal*	*Millettia sericea* Wight. & Arn.	Fabaceae
117	*Sepaanehen*	*Mycetia fasciculata* (Blume) Blume ex Korth.	Rubiaceae
118	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae
119	*Durian Hantu*	*Neesia altisima* Blume	Bombacaceae
120	*Paku Larat*	*Nephrolepis biserrata* (Sw.) Schott)	Davalliaceae
121	*Medang Jambu*	*Nothaphoebe umbelliflora* Blume	Lauraceae
122	*Medangn Sawo*	*Nyssa javanica* Wangerin	Cunnoniaceae
123	*Bayeh*	*Oncosperma horridium* Scheff.	Arecaceae
124	*Meni'en Kijang*	*Orophea cf. hexandra* Blume	Annonaceae
125	*Mening Ubar*	*Orophea* sp.	Annonaceae

Table A.16. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scinetific Name	Family
126	*Kapung*	*Oroxylum indicum* (L.) Kurz	Bignoniaceae
127	*Nyeman*	*Pandanus* sp.	Pandanaceae
128	*Nyeman Tupai*	*Pandanus* sp.	Pandanaceae
129	*Petai*	*Parkia speciosa* Haask.	Fabaceae
130	*Rumput Serupo*	*Phyllagathis rotundifolia* Blume	Melastomataceae
131	*Rumput Serukuk*	*Phyllagathis* sp.	Melastomataceae
132	*Pinang Hutan*	*Pinanga latisecta* Blume	Arecaceae
133	*Pinang Muring*	*Pinanga* sp.	Arecaceae
134	*Mpinang*	*Pinanga* sp.	Arecaceae
135	*Sirih Hantu*	*Piper* sp.	Piperaceae
136	*Gelam*	*Planchonella nitida* Dubard	Sapotaceae
137	*Peladang Hutan*	*Plectranthus galeatus* Vahl.	Labiatae
138	*Senglo*	*Plectronia borrida* K. Schum.	Rubiaceae
139	*Kerkap*	*Polypodium* sp.	Polypodiaceae
140	*Seruput*	*Prunus arborea* (Blume) Kalkm	Rosaceae
141	*Akar Gitan*	*Psychotria* sp.	Rubiaceae
142	*Moloro*	*Pterocymbium* sp.	Sterculiaceae
143	*Senarahen*	*Pyrrenaria serrata* Bl.	Theaceae
144	*Mpisang*	*Rhaphidophora oblongifolia* Schott.	Araceae
145	*Sap'en*	*Saurauia javanica* (Nees) R. D. Hoogland	Actinidiaceae
146	*Sampadi*	*Saurauja nudiflora* DC.	Actinidaceae
147	*Sergau*	*Selaginella plana* Hieron	Selaginellaceae
148	*Sergau*	*Selaginella wildenowii* (Desv.) Baker	Selaginellaceae
149	*Mentilin/Semat Baju*	*Stauranthera caerulea* Merrill	Gesneriaceae
150	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae
151	*Medang Timun*	*Symplocos cf. cochinchinensis S. Moore*	Symplocaceae
152	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae
153	*Juo/Jambu Kelawar*	*Syzigium leptostemon* (Korth.) Merrill & Perry	Myrtaceae
154	*Kelat*	*Syzigium lineatum* (DC.) Merrill & Perry	Myrtaceae
155	*Ubo Serai*	*Syzygium polyanthum* Miq.	Myrtaceae

Table A.16. (Continued) List of Plant in *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scinetific Name	Family
156	*Kelat Senduk*	*Syzygium* sp.	Myrtaceae
157	*Cempako*	*Talauma candollii* Blume	Magnoliaceae
158	*Kayu Cupa*	*Ternstroemia coriacea* Willd.	Theaceae
159	*Jelapak*	*Trevesia sundaica* Miq.	Aralliaceae
160	*Kayu Beliung/Biung*	*Turpinia sphaerocarpa* Hassk.	Staphyllaceae
161	*Akar Kait*	*Uncaria glabrata* DC.	Rubiaceae
162	*Spok'eng*	*Vernonia arborea* Buch- Hams.	Asteraceae
163	*Molesaten*	*Villebrunea rubescens* Blume	Urticaceae
164	*Tirih*	*Vitex quinata* (Louis) F. N. Will.	Verbenaceae
165	*Sempedam*	Unidentified	
166	*Kayu Salak*	Unidentified	
167	*Manzurai*	Unidentified	
168	*Kayu Panjat*	Unidentified	
169	*Akar Bana*	Unidentified	
170	*Jangkang*	Unidentified	
171	*Kayu Kukuh*	Unidentified	
172	*Rebo*	Unidentified	

Table A. 17. List of Useful Plants in the *Rapohen* (Secondary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientifi Name	Family	Uses*)
1	*Medang Kayu Bukit*	*Actinodaphne sesquipedalis Hook.f. & Thoms. ex Hook.f.*	Lauraceae	C
2	*Mutah*	*Aglaia argentea Bl.*	Meliaceae	O
3	*Puar*	*Alpinia sp.*	Zingiberaceae	E
4	*Paku Liman*	*Angiopteris evecta (Fortst.) Hoffm.*	Marratiaceae	U
5	*Gelambai*	*Anthocephalus cadamba Miq.*	Rubiaceae	E
6	*Jering Tupai*	*Archidendron elipticum (Bl.) I.C. Nielsen*	Fabaceae	E
7	*Menzi*	*Ardisia crispa A.DC.*	Myrsinaceae	C, O
8	*Kayu Asam*	*Ardisia lanceolata C.F. Gaertn.*	Myrsinaceae	E
9	*Paku Pukut*	*Athyrium esculentum Copel.*	Woodciaceae	E
10	*Mauk'eng*	*Baccaurea lanceolata Mull. Arg.*	Euphorbiaceae	E
11	*Ndek'eng*	*Bischofia javanica Bl.*	Euphorbiaceae	M, E, O
12	*Bentang Jelapak*	*Calanthe sp.*	Orchidaceae	O
13	*Rumput Rabun*	*Centhotheca lappacea Desv.*	Poaceae	U
14	*Daun Kitab*	*Cephalomappa maloticarpa J. J. Smith*	Euphorbiaceae	E, O
15	*Kayu Manis*	*Cinnamomum burmanii (Nees & T. Nees) Bl.*	Lauraceae	O, M
16	*Keladi Air*	*Colocasia esculenta Schott*	Araceae	E
17	*Patawa*	*Costus speciosus Sm.*	Zingiberaceae	U
18	*Buluh Betung*	*Dendrocalamus asper Backer ex K. Heyne*	Poaceae	E, C
19	*Jemban*	*Donax grandis (Miq.) Ridley*	Marantaceae	T, M
20	*Kayu Kacang*	Dysoxylum alliaceum Seem.	Meliaceae	C
21	*Sakrau*	Enhydra fluctuans Lour.	Asteraceae	U
22	*Sekuduken*	*Ficus hispida Roxb. ex Wall.*	Moraceae	E
23	*Loloy*	*Ficus ribes Reinw. ex Bl*	Moraceae	E
24	*Seri*	*Ficus tinctoria G. Forst. f.*	Moraceae	O
25	*Nulang*	*Glochidion obscurum Bl.*	Euphorbiaceae	C
26	*Kayu Kelat*	*Helicia rostrata Foreman*	Proteaceae	C
27	*Semlo'en*	*Homalanthus giganteus Zoll. & Mor.*	Euphorbiaceae	O
28	*Jelatang Api*	*Laportea sp*	Urticaceae	E

Table A. 17. (Continued) List of Useful Plants in the *Rapohen* (Secondary Forest) of Tanjung Kasri

No.	Vernacular Name	Scientifi Name	Family	Uses*)
29	*Jelatang Bulan*	*Laportea stimulans Miq.*	Urticaceae	E
30	*Btang Antoy*	*Litsea mappacea Boerl.*	Lauraceae	O, C
31	*Limau Keli*	*Luvunga eleutherandra Dalz.*	Rutaceae	E, T
32	*Sapat*	*Macaranga tanarius Muell. Arg.*	Euphorbiaceae	C, O
33	*Kayu Pasak*	*Microcos florida Burret*	Tiliaceae	U
34	*Akar Serempal*	*Millettia sericea Wight. & Arn.*	Fabaceae	M, O
35	*Kirau Munting*	*Nauclea calycina Bartl.ex DC.*	Rubiaceae	M
36	*Kelekap*	*Phymatodes nigrescens J. Sm.*	Polypodiaceae	O
37	*Sirih Hantu*	*Piper sp.*	Pierpaceae	M
38	*Peladang Hutan*	*Plectranthus galeatus Vahl.*	Labiatae	M
39	*Batang Ngelo*	*Plectronia horrida K. Schum.*	Rubiaceae	U
40	*Semat Baju*	*Procris cf. pedunculata Wedd.*	Urticaceae	E, M
41	*Rukam Air*	*Prunus javanica Miq.*	Rosaceae	E, O
42	*Mloro*	*Pterocymbium tubulatum Pierre*	Sapotaceae	O
43	*Bayu*	*Pterospermum javanicum Jungh.*	Sterculiaceae	C
44	*Sampadi*	*Saurauja nudiflora DC.*	Actinidaceae	E
45	*Batang Gelam*	Schefflera elliptica Harms.	Araliaceae	E
46	*Kayu Bukit*	*Semecarpus heterophylla Hook. f.*	Anacardiaceae	C
47	*Ubo Serai*	Syzygium polyanthum Miq.	Myrtaceae	E, C, O
48	*Surian Rimbo*	*Toona sureni Merr.*	Meliaceae	C
49	*Narung*	*Trema orientalis Bl.*	Ulmaceae	C
50	*Molesaten*	*Villebrunea rubescens Bl.*	Urticaceae	E
51	*NalaN Nasi Merah*	Zingiber sp.	Zingiberaceae	E
52	*Nalan Nasi Putih*	Zingiber sp.	Zingiberaceae	E

*) C: Construction, E: Edible, M: Medicine, U: Uras, T: Tool and Fiber, O: Other uses

Table A.18. List of Useful Plants in the *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
1	*Lenzat Hutan*	*Aglaia odoratissima* Lour.	Meliaceae	E, M
2	*Puar*	*Alpinia* sp.	Zingiberaceae	E
3	*Jering Tupai*	*Archidendron fagifolium* (Bl. ex Miq.) I. Nielson	Fabaceae	E
4	*Menzi*	*Ardisia crispa* Roxb.	Myrsinaceae	C, O
5	*Asam-asam*	*Ardisia sumatrana* Miq.	Myrsinaceae	E
6	*Terap*	*Artocarpus elasticus* Reinw.	Moraceae	E, U, T
7	*Mangkli*	*Arytera xerocarpa* (Blume) Adelb.	Sapindaceae	T
8	*Mnedk'eng (bintang)*	*Bischofia javanica* Blume	Euphorbiaceae	M, E, O
9	*Rotan Jerat*	*Calamus* sp.	Arecaceae	T, E
10	*Rotan Kesu*	*Calamus* sp.	Arecaceae	T, E
11	*Rotan Sikai*	*Calamus* sp.	Arecaceae	T, E
12	*Jelipuk Hutan*	*Calanthe triplicata* (Willemet) Ames	Orchidaceae	O
13	*Menzi*	*Carallia brachiata* Merrill	Rhizophoracaee	C, O
14	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae	E, T
15	*Kayu Manau*	*Celtis philippinensis* Blanco	Ulmaceae	T
16	*Kitab*	*Cephalomappa maloticarpa* J. J. Smith	Euphorbiaceae	E, O
17	*Kayu Serabut*	*Chionanthus nitens* Koord. & Valet.	Oleaceae	O
18	*Serabut*	*Chionanthus oliganthus* (Merrill) R. Kiew	Oleaceae	O
19	*Usang*	*Cinnamomum javanicum* Blume	Lauraceae	C, U
20	*Cirek*	*Clausena exavata* Burm. f.	Rutaceae	U
21	*Kawa*	*Coffea* sp.	Rubiaceae	E, O
22	*Patawa*	*Costus speciosus* (Koening) Smith	Zingiberaceae	U
23	*Palik*	*Cryptocarya ferrea* Blume	Lauraceae	E
24	*Daun Tari*	*Curculigo latifolia* Dryand.	Amarilidaceae	E, M
25	*Sekedek'en*	*Cyrtandra sandei* de Vriese	Gesneriaceae	E
26	*Rotan Getah*	*Daemonorops angustifolius* Mart.	Arecaceae	T, E

Table A.18. (Continued) List of Useful Plants in the *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
27	*Medang Telu*	*Dehaasia incrassata* (Jack) Kosterm	Lauraceae	C
28	*Setundu'en*	*Disporum chinensis* D. Don	Liliaceae	U
29	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae	T, M
30	*Bemban*	*Donax grandis* (Miq.) Ridley	Marantaceae	T, M
31	*Kayu Kacang*	*Dysoxylum alliaceum* Blume	Meliaceae	C
32	*Dadap duri*	*Erythrina subumbrans* Merrill	Fabaceae	O, M
33	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Asteraceae	M
34	*Loloy*	*Ficus ribes* Reinw. ex Blume	Moraceae	E
35	*Kayu Taji*	*Ficus sinuata* Thunb.	Moraceae	O
36	*Aro*	*Ficus* sp.	Moraceae	O, E
37	*Rukam*	*Flacourtia rukam* Zoll. & Mo	Flacourtiaceae	E, T
38	*Manggus Hutan*	*Garcinia celebica* L.	Clusiaceae	E, T
39	*Kanis*	*Garcinia parvifolia* Hort. ex Boerl.	Clusiaceae	E
40	*Nulang*	*Glochidion obscurum* Blume	Euphorbiaceae	C
41	*Akar Tunggal*	*Goniothalamus macrophylus* Hook. f. & Thoms	Annonaceae	O
42	*Sengun*	*Gynochthodes coriacea* Blume	Rubiaceae	E
43	*Semlo'en*	*Homalanthus giganteus* Zoll. & Mor.	Euphorbiaceae	O
44	*Lolo Tanah*	*Hornstedtia* sp.	Zingiberaceae	E
45	*Sumpah*	*Horsfieldia glabra* Warb.	Myristiceae	O
46	*Rotan Jerenang*	*Daemonorops draco* Bl.	Arecaceae	T
47	*Medang Pelananu*	*Knema mandarahan* Warb.	Myristicaceae	C
48	*Mening*	*Lithocarpus pseudo-molucca* Rehder	Fagaceae	C
49	*Antoy*	*Litsea mappacea* Boerl.	Lauraceae	O, C
50	*Medang Burung*	*Litsea umbellata* (Lour.) Merrill	Lauraceae	C
51	*Limau Keling*	*Luvunga eleutherandra* Dalz.	Rutaceae	E, T
52	*Tutup/Sapat*	*Macaranga* tanarius Muell. Arg.	Euphorbiaceae	C, O
53	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae	O

Table A.18. (Continued) List of Useful Plants in the *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
54	*Temereh*	*Memecylon* sp.	Melastomataceae	C, T
55	*Akar Kembung*	*Merremia peltata* Merrill	Convolvulaceae	M
56	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae	U
57	*Akar Serampal*	*Millettia sericea* Wight. & Arn.	Fabaceae	M, O
58	*Meni'en Udang*	*Mitrephora maingayi* Hook. f. & Thoms.	Annonaceae	T
59	*Telap*	*Morus* sp.	Moraceae	C, M
60	*Pisang Ungko*	*Musa acuminata* Colla	Musaceae	E
61	*Kiro Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae	M
62	*Kelu*	*Etlingera elatior* (Jack) R. M. Sm.	Zingiberaceae	E
63	*Medang Jambu*	*Nothaphoebe umbelliflora* Blume	Lauraceae	C
64	*Bayeh*	*Oncosperma horridium* Scheff.	Arecaceae	E
65	*Petai*	*Parkia speciosa* Haask.	Fabaceae	E
66	*Rumput Kinat*	*Paspalum conjugatum* Berg.	Poaceae	O
67	*Pinang Hutan*	*Pinanga latisecta* Blume	Arecaceae	U
68	*Sirih Hantu*	*Piper* sp.	Piperaceae	M
69	*Rukam Air*	*Prunus javanica* Miq.	Rosaceae	E, O
70	*Puding*	*Psychotria rostrata* Blume	Rubiaceae	M, U
71	*Akar Gitan*	*Psychotria* sp.	Rubiaceae	E, O
72	*Moloro*	*Pterocymbium* sp.	Sterculiaceae	O
73	*Bayu*	*Pterospermum javanicum* Jungh.	Sterculiaceae	C
74	*Senarahen*	*Pyrenaria serrata* Bl.	Theaceae	O
75	*Sampadi (Saem)*	*Saurauia javanica* (Nees) R. D. Hoogland	Actinidiaceae	E
76	*Kayu Bukit*	*Semecarpus heterophylla* Blume	Anacardiaceae	C
77	*Langoi*	*Solanum tovum* Sw.	Solanaceae	E
78	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae	C, O
79	*Kelat*	*Syzigium lineatum* (DC.) Merrill & Perry	Myrtaceae	C
80	*Moton*	*Syzygium incarnatum* (Elmer) Merrill & Perry	Myrtaceae	C

Table A.18. (Continued) List of Useful Plants in the *Rapohen* (Secondary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
81	*Jambu Kelawar*	*Syzygium leptostemon* (Korth.) Merrill & Perry	Myrtaceae	E
82	*Ubo Serai*	*Syzygium polyanthum* Miq.	Myrtaceae	E, C, O
83	*Kayu Bawang*	*Syzygium zeylanicum* DC.	Myrtaceae	C
84	*Surian Rimbo*	*Toona sureni* (Blume) Merr.	Meliaceae	C
85	*Narung/Sapat*	*Trema orientalis* (L.) Bl.	Ulmaceae	C
86	*Biung*	*Turpinia sphaerocarpa* Hassk.	Staphyllaceae	O
87	*Cupak Hutan*	Unidentified		E
88	*Kayu Panjut*	*Urophyllum corymbosum* Korth.	Rubiaceae	C
89	*Molesatem*	*Villebrunea rubescens* Blume	Urticaceae	E
90	*Nalam Nasi*	*Zingiber* sp.	Zingiberaceae	E

*) C: Construction, E: Edible, M: Medicine, U: Uras, T: Tool and Fiber, O: Other uses

Table A.19. List of Useful Plants in the *Hutan Adat* (Customary Forest) of Tanjung Kasri

No.	Vernacular Name	*Scientific Name*	Family	Uses*)
1	*Mutah*	*Aglaia argentea Bl.*	Meliaceae	O
2	*Melaku*	*Alangium rotundifolium (Hassk.) Bloemb.*	Alangiaceae	C
3	*Puar*	*Alpinia sp.*	Zingiberaceae	E
4	*Merenai*	*Antidesma neurocarpum Miq.*	Euphorbiaceae	E, T
5	*Kayu Bawang*	*Aporusa lucida (Miq.) Airy Shaw*	Euphorbiaceae	C
6	*Menzi*	*Ardisia crispa A.DC.*	Myrsinaceae	C, O
7	*Sesam*	*Ardisia lanceolata C.F. Gaertn.*	Myrsinaceae	E
8	*Mbaukeng*	*Baccaurea lanceolata Mull. Arg.*	Euphorbiaceae	E
9	*Kalumpang*	*Beilsmiedia maingayi Hook.f.*	Lauraceae	C
10	*Kanidai*	*Bridelia insulana Hance*	Euphorbiaceae	C, O
11	*Manau*	*Calamus manan Miq.*	Arecaceae	T, E
12	*Kayu Manau*	*Celtis philippinensis Blanco*	Ulmaceae	T
13	*Petehen*	*Cinnamomum iners Reinw. ex Bl.*	Lauraceae	O
14	*Batang Petawar*	*Costus speciosus Sm.*	Zingiberaceae	U
15	*Moton*	*Cratoxylum sumatranum Bl.*	Clusiaceae	C
16	*Kayu Palih*	*Cryptocarya ferrea Kurz.*	Lauraceae	E
17	*Daun Matahari*	*Curculigo latifolia Dryand.*	Amarilidaceae	E, M
18	*Paku Tiang*	*Cyanthea cf. squamulata Copel.*	Cyatheaceae	C
19	*Rotan Getah*	*Daemonorops angustifolius Mart.*	Arecaceae	T, E
20	*Medang Kawah*	*Dichapetalum gelonioides (Roxb.) Engl.*	Dichapetalaceae	C
21	*Bemban*	*Donax cannaeformis Rolfe*	Marantaceae	M, T
22	*Asal*	*Elaeocarpus sp.*	Elaeocarpaceae	C
23	*Sekuang*	*Ficus albipila (Miq.) King*	Moraceae	M, E
24	*Kayu Aro*	*Ficus sp.*	Moraceae	E, O
25	*Rukam Bubur*	*Flacourtia rukam Zoll. & Mor.*	Flacourtiaceae	E, T
26	*Manggus Hutan*	*Garcinia celebica Linn*	Clusiaceae	E, T
27	*Kenis*	*Garcinia parvifolia Hort. ex Boerl.*	Clusiaceae	E

Table A.19. (Continued) List of Useful Plants in the *Hutan Adat* (Customary Forest) of Tanjung Kasri

No.	Vernacular Name	*Scientific Name*	Family	Uses*)
28	*Buluh Serik*	*Giganthocloa cf serik E.A.Widjaja*	Poaceae	C, T
29	*Medang Payo*	*Glochidion microcarpum Bl.*	Euphorbiaceae	O
30	*Nulam*	*Glochidion obscurum Bl.*	Euphorbiaceae	C
31	*Kelat*	*Helicia rostrata Foreman*	Proteaceae	C
32	*LOLOI*	*Hornstedtia sp.*	Zingiberaceae	E
33	*Medang Jambu*	*Knema cinerea Warb.*	Myristicaceae	C
34	*Duku Hutan*	*Lansium domesticum Jack.*	Meliaceae	E
35	*Jelatang Api*	*Laportea sp.*	Urticaceae	E
36	*Mening Putih*	*Lithocarpus gracilis (Korth.) Soepadm*	Fagaceae	C
37	*Mening*	*Lithocarpus pseudo-molucca Rehder*	Fagaceae	C
38	*Antoy*	*Litsea mappacea Boerl.*	Lauraceae	O, C
39	*Medang Cabai*	*Lophopetalum sessilifolium Ridl.*	Celastraceae	C
40	*Limau Keli*	*Luvunga eleutherandra Dalz.*	Rutaceae	T, E
41	*Sapat*	*Macaranga tanarius Muell. Arg.*	Euphorbiaceae	O, C
42	*Mang*	*Macaranga triloba Muell. Arg.*	Euphorbiaceae	O
43	*Pauh*	*Mangifera quadrifida Jack*	Anacardiaceae	E
44	*Kayu Katak*	*Mastixia parvifolia Hallier f.*	Cornaceae	U
45	*Kiro Munting*	*Nauclea calycina Bartl.ex DC.*	Rubiaceae	M
46	*Medang Kulit*	*Neolitsea cassiaefolia Merr.*	Lauraceae	C
47	*Medang Giring*	*Persea cf. rimosa Zoll. ex Meisn.*	Lauraceae	C
48	*Pinang Hutan*	*Pinanga latisecta Bl.*	Arecaceae	U
49	*Narahen*	*Pyrrenaria serrata Bl.*	Theaceae	O
50	*Mentang Cabai*	*Quercus subsericea A. Camus*	Fagaceae	C, O
51	*Duri Peringat*	*Rubus moluccanus Linn.*	Rosaceae	E
52	*Terentang*	*Santiria laevigata Bl.*	Burseraceae	C
53	*Saem*	*Saurauia javanica (Nees) Hooglan*	Actinidiaceae	E
54	*Batang Sedam*	*Schefflera polybotrya R.Vig.*	Aralliaceae	T
55	*Sepiding*	*Scleria purpurascens Benth.*	Cyperaceae	U
56	*Kayu Nasi*	*Styrax benzoin Dryand.*	Styraceae	C, O

Table A.19. (Continued) List of Useful Plants in the *Hutan Adat* (Customary Forest) of Tanjung Kasri

No.	Vernacular Name	*Scientific Name*	Family	Uses*)
57	*Saragaten*	*Symplocos adenophylla Wall.*	Symplocaceae	O
58	*Jambu Kelawar*	*Syzygium claviflorum (Roxb) Wall. ex Steud*	Myrtaceae	E
59	*Tuba Serai*	*Syzygium polyanthum Miq.*	Myrtaceae	E, C, O
60	*Kayu Cupak*	*Ternstroemia coriacea Wall.*	Theaceae	E
61	*Narung*	*Trema orientalis Bl.*	Ulmaceae	C
62	*Molaseten*	*Villebrunea rubescens Bl.*	Urticaceae	E
63	*Kayu Kunyit*	*Xanthophyllum affine Korth. ex Miq.*	Polygalaceae	C
64	*Nalam Nasi*	*Zingiber sp.*	Zingiberaceae	E

*) C: Construction, E: Edible, M: Medicine, U: Uras, T: Tool and Fiber, O: Other uses

Table A.20. List of Useful Plants in the *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
1	*Gitan*	*Adenia macrophylla Koord.*	Passifloraceae	E, T
2	*Mutah*	*Aglaia argentea Blume*	Meliaceae	O
3	*Beko*	*Aglaia crassinervia Kurz. ex Hiern.*	Meliaceae	C, O
4	*Lenzat Hutan*	*Aglaia odoratissima Lour.*	Meliaceae	E, M
5	*Letung Aye*	*Aglaia sp.*	Meliaceae	C
6	*Melaku*	*Alangium rotundifolium (Hassk.) Bloaemb.*	Alangiaceae	C
7	*Puar Merah*	*Alpinia sp.*	Zingiberaceae	E
8	*Puar Putih*	*Alpinia sp.*	Zingiberaceae	E
9	*Merenai*	*Antidesma cuspidatum Muell. Arg.*	Euphorbiaceae	E, T
10	*Cawat*	*Aporosa symplocoides Gage*	Euphorbiaceae	O
11	*Menzi*	*Ardisia crispa Roxb.*	Oleaceae	C, O
12	*Asam-asam*	*Ardisia sumatrana Miq.*	Myrsinaceae	E
13	*Enau*	*Arenga pinnata Merr.*	Arecaceae	E, T, C
14	*Terap*	*Artocarpus elasticus Reinw.*	Moraceae	T, E, U
15	*Cempedak Hutan*	*Artocarpus integra Merrill*	Moraceae	E
16	*Tapang*	*Artocarpus nitida Trec.*	Moraceae	E, C
17	*Pulai*	*Astonia angustifolia Miq.*	Apocynaceae	C
18	*Paku Pukut*	*Athyrium esculentum (Retz.) Copel.*	Woodciaceae	E
19	*Mbok'eng*	*Baccaurea lanceolata Muell. Arg.*	Euphorbiaceae	E
20	*Medang Batu*	*Beilschmiedia maingayi Hook.f.*	Lauraceae	C
21	*Mnedk'eng (bintang)*	*Bischofia javanica Blume*	Euphorbiaceae	E, M, O
22	*Kanidai*	*Bridelia insulana Hance*	Euphorbiaceae	C, O
23	*Manau*	*Calamus manan Miq.*	Arecaceae	T, E, O
24	*Rotan Seni*	*Calamus sp.*	Arecaceae	T, E
25	*Rotan Sikai*	*Calamus sp.*	Arecaceae	T,E
26	*Damar*	*Canarium pilosum A. W. Benn.*	Burseraceae	O
27	*Risi*	*Caryota mitis Lour.*	Arecaceae	U

Table A.20. (Continued) List of Useful Plants in the *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
28	*Tajam Tumpul*	*Castanopsis javanica A. DC.*	Fagaceae	E
29	*Kayu Manau*	*Celtis philippinensis Blanco*	Ulmaceae	T
30	*Kayu Sabut*	*Chionanthus nitens Koord. & Valet.*	Oleaceae	O
31	*Kayu Usang*	*Cinnamomum javanicum Blume*	Lauraceae	U, C
32	*Akar Ulun*	*Cissus cf. nodosa Blume*	Vitaceae	T
33	*Patawa*	*Costus speciosus (Koening) Smith*	Zingiberaceae	U
34	*Palik*	*Cryptocarya ferrea Blume*	Lauraceae	E
35	*Daun Tari*	*Curculigo latifolia Dryand.*	Amarilidaceae	E, O
36	*Paku Tiang*	*Cyanthea cf. squamulata Copel*	Cyatheaceae	C
37	*Sekedek'eng*	*Cyrtandra sandei De Vriese*	Gesneriaceae	E
38	*Rotan Getah*	*Daemonorops angustifolius Mart.*	Arecaceae	T, E
39	*Rotan Jerenang*	*Daemonorops draco Bl.*	Arecaceae	O
40	*Medang Telur*	*Dehaasia incrassata (Jack) Kosterm.*	Lauraceae	C
41	*Medang Kawah*	*Dichapetalum gelonioides Engl.*	Dichapetalaceae	C
42	*Bemban*	*Donax cannaeformis Rolfe*	Marantaceae	M, T
43	*Bemban*	*Donax grandis (Miq.) Ridley*	Marantaceae	M, T
44	*Kayu Kacang*	*Dysoxylum alliaceum Blume*	Meliaceae	C
45	*Sekuang/Bekung*	*Ficus albipila (Miq.) King*	Moraceae	M, E
46	*Sekuduk'en*	*Ficus fistulosa Reinw. ex Bl.*	Moraceae	E
47	*Rukam Hutan*	*Flacourtia sp.*	Flacourtiaceae	E
48	*Manggus Hutan*	*Garcinia celebica L.*	Clusiaceae	E, T
49	*Bambu Kapal*	*Giganthocloa sp.*	Poaceae	T
50	*Lalan Besi*	*Globa sp.*	Zingiberaceae	E
51	*Akar Tunggal*	*Goniothalamus macrophylus Hook. f. & Thoms.*	Annonaceae	O
52	*Medang Cempako*	*Gordonia oblongifolia (Miq.) Van Steenis*	Theaceae	C
53	*Loloy*	*Hornstedtia sp.*	Zingiberaceae	E
54	*Setebal*	*Ixora grandifolia J. J. Smith*	Rubiaceae	C

Table A.20. (Continued) List of Useful Plants in the *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
55	*Kayu Seramngkah*	*Knema cinerea Warb.*	Myristiceae	C
56	*Rotan Sendahan*	*Korthalsia laciniosa Mart.*	Arecaceae	T
57	*Jelatang Nyiru*	*Laportea sinuata Blume ex Wedd.*	Urticaceae	E
58	*Jelatang Api*	*Laportea sp.*	Urticaceae	E
59	*Jelatang Bulan*	*Laportea stimulans Miq.*	Urticaceae	E
60	*Bali*	*Leea indica Merrill*	Leeaceae	M
61	*Limbang Hantu*	*Lepidagathis sp.*	Acanthaceae	U
62	*Kayu Hijau*	*Lepionurus sylvestris Blume*	Opiliaceae	U
63	*Medang Telampung Kuning*	*Litsea robusta Blume*	Lauraceae	C
64	*Antoy*	*Litsea sp.*	Lauraceae	O, C
65	*Mang*	*Macaranga triloba Muell. Arg.*	Euphorbiaceae	O
66	*Balam Merah*	*Madhuca sericea H. J. Lam*	Sapotaceae	C
67	*Pauh*	*Mangifera quadrifida Jack ex Roxb.*	Anacardiaceae	E
68	*Tambreh*	*Memecylon sp.*	Melastomataceae	C, T
69	*Kayu Pasak*	*Microcos florida Burret*	Tiliaceae	U
70	*Kiro Munting*	*Nauclea calycina Bartl.ex DC.*	Rubiaceae	M
71	*Medang Jambu*	*Nothaphoebe umbelliflora Blume*	Lauraceae	C
72	*Bayeh*	*Oncosperma horridium Scheff.*	Arecaceae	E
73	*Nyeman*	*Pandanus sp.*	Pandanaceae	T
74	*Petai*	*Parkia speciosa Haask.*	Fabaceae	E
75	*Pinang Hutan*	*Pinanga latisecta Blume*	Arecaceae	U
76	*Pinang Muring*	*Pinanga sp.*	Arecaceae	E
77	*Gelam*	*Planchonella nitida Dubard*	Sapotaceae	E
78	*Peladang Hutan*	*Plectranthus galeatus Vahl.*	Labiatae	M
79	*Senglo*	*Plectronia borrida K. Schum.*	Rubiaceae	U
80	*Senarahen*	*Pyrrenaria serrata Bl.*	Theaceae	O

Table A.20. (Continued) List of Useful Plants in the *Hutan Adat* (Customary Forest) of Renah Kemumu

No.	Vernacular Name	Scientific Name	Family	Uses*)
81	*Sap'en*	*Saurauia javanica (Nees) R. D. Hoogland*	Actinidiaceae	E
82	*Mentilin/Semat Baju*	*Stauranthera caerulea Merrill*	Gesneriaceae	E, M
83	*Kayu Nasi*	*Styrax benzoin Dryand.*	Styraceae	C, O
84	*Saraget'en*	*Symplocos adenophylla Wall.*	Symplocaceae	O
85	*Juo/Jambu Kelawar*	*Syzigium leptostemon (Korth.) Merrill & Perry*	Myrtaceae	E
86	*Kelat*	*Syzigium lineatum (DC.) Merrill & Perry*	Myrtaceae	C
87	*Ubo Serai*	*Syzygium polyanthum Miq.*	Myrtaceae	E
88	*Kayu Cupa*	*Ternstroemia coriacea Willd.*	Theaceae	E
89	*Kayu Beliung/Biung*	*Turpinia sphaerocarpa Hassk.*	Staphyllaceae	O
90	*Akar Kait*	*Uncaria glabrata DC.*	Rubiaceae	T
91	*Molesaten*	*Villebrunea rubescens Blume*	Urticaceae	E

*) C: Construction, E: Edible, M: Medicine, U: Uras, T: Tool and Fiber, O: Other uses

Table A.21. List of Useful Plants in the *Rimbo Gano* (Old-Growth Forest)

No	Vernacular Name	Scientific Name	Family	Uses*)
1	*Kayu Mutah*	*Aglaia argentea* Bl.	Meliaceae	O
2	*Beko*	*Aglaia crassinervia* Kurz. ex Hiern.	Meliaceae	C, O
3	*Lenzat Hutan*	*Aglaia odoratissima* Benth.	Meliaceae	E, M
4	*Kayu Burung*	*Alangium javanicum* Wangerin	Alangiaceae	C, O
5	*Melaku*	*Alangium rotundifolium* (Hassk.) Bloemb.	Alangiaceae	C
6	*Puar*	*Alpinia* sp.	Zingiberaceae	E
7	*Cawat*	Aporosa symplocoides *Gage*	Euphorbiaceae	O
8	*Mendapen*	*Aralia dasyphylla* Miq.	Aralliaceae	T
9	*Asam-asam*	*Ardisia lanceolata* C.F. Gaertn.	Myrsinaceae	E
10	*Merat*	*Artocarpus elasticus* Reinw.	Moraceae	T, E, U
11	*Cempedak Hutan*	*Artocarpus integra* Merr.	Moraceae	E
12	*Tapang*	*Artocarpus nitida* Trec.	Moraceae	E, C
13	*Tapang*	*Artocarpus rigida* Bl.	Moraceae	E, C
14	*Sempaung*	*Baccaurea lanceolata* Mull. Arg.	Euphorbiaceae	E
15	*Medang Kunyit*	*Belischmiedia madang* Bl.	Lauraceae	C
16	*Manau*	Calamus manan *Miq.*	Arecaceae	T, E
17	*Rotan Seni*	*Calamus* sp.	Arecaceae	T, E
18	*Rotan Sikai*	*Calamus* sp.	Arecaceae	T, E
19	*Rotan Tunas*	*Calamus* sp.	Arecaceae	T, E
20	*Rotan Tikus*	*Calamus* sp.	Arecaceae	T, E
21	*Rotan Jukut*	*Calamus* sp.	Arecaceae	T, E
22	*Damar*	*Canarium pilosum* A. W. Benn.	Burseraceae	O
23	*Risi*	*Caryota mitis* Lour.	Arecaceae	U
24	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae	E, T
25	*Kayu Manau*	*Celtis philippinensis* Blanco	Ulmaceae	T
26	*Kitab*	*Cephalomappa maloticarpa* J.J. Smith	Euphorbiaceae	O, E
27	*Kayu Sabut*	*Chionanthus nitens* Koord. & Valet.	Oleaceae	O
28	*Kayu Sabut*	*Chionanthus oliganthus* (Merr.) R. Kiew	Oleaceae	O
29	*Kayu Usa*	*Cinnamomum javanicum* Bl.	Lauraceae	U, C
30	*Palik*	*Cryptocarya ferrea* Kurz.	Lauraceae	E
31	*Sekedek'en*	*Cyrtandra sandei* de Vrise	Gesneriaceae	E
32	*Rotan Getah*	*Daemonorops angustifolius* Mart.	Arecaceae	T, E

Table A.21. (Continued) List of Useful Plants in the *Rimbo Gano* (Old-Growth Forest)

No	Vernacular Name	Scientific Name	Family	Uses*)
33	*Medang Telur*	*Dehaasia incrassata* (Jack) Kosterm.	Lauraceae	C
34	*Buluh Betung*	*Dendrocalamus asper* Backer ex K. Heyne	Poaceae	C, E
35	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae	T, M
36	*Letung Enggang*	*Dysoxylum parasiticum* (Osbeck) Kosterm.	Meliaceae	C
37	*Asal Kunyit*	*Elaeocarpus stipularis* Bl.	Elaeocarpaceae	C
38	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Asteraceae	M
39	*Bekung*	*Ficus albipila* (Miq.) King	Moraceae	E, M
40	*Sekuduk'en*	*Ficus fistulosa* Reinw. ex Bl.	Moraceae	E
41	*Bekung*	*Ficus geocarpa* Teijsm.	Moraceae	E, M
42	*Loloi*	*Ficus ribes* Reinw.	Moraceae	E
43	*Kayu Taji*	*Ficus sinuata* Thunb.	Moraceae	O
44	*Rukam*	*Flacourtia rukam* Zoll. & Mor.	Flacourtiaceae	E, T
45	*Manggus Hutan*	*Garcinia lateriflora* Bl.	Clusiaceae	E, T
46	*Buluh Serik*	*Giganthocloa cf serik* E.A.Widjaja	Poaceae	C, T
47	*Lalan Tupai*	*Globa pendula* Roxb.	Zingiberaceae	E
48	*Lalan Besi*	*Globa* sp.	Zingiberaceae	E
49	*Akar Tunggal*	*Goniothalamus macrophylus* Miq.	Annonaceae	O
50	*Medang Cempako*	*Gordonia oblongifolia* (Miq.) Steenis	Theaceae	C
51	*Puar Angit*	*Hornstedtia* sp.	Zingiberaceae	E
52	*Rotan Sendahan*	*Korthalsia* sp.	Arecaceae	T, E
53	*Jelatang Nyiru*	*Laportea sinuata* Bl. ex Wedd.	Urticaceae	E
54	*Jelatang Ruso*	*Laportea* sp.	Urticaceae	E
55	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae	E
56	*Sekentuten*	*Lasianthus pseudo-stipularis* Amsof. ex Bakh. f.	Rubiaceae	E
57	*Sekentuten*	*Lasianthus rigidus* Miq.	Rubiaceae	E
58	*Kayu Bali*	*Leea indica* Merr.	Leeaceae	M
59	*Kayu Hijau*	*Lepionurus sylvestris* Bl.	Opiliaceae	U

Table A.21. (Continued) List of Useful Plants in the *Rimbo Gano* (Old-Growth Forest)

No	Vernacular Name	Scientific Name	Family	Uses*)
60	*Mening Putih*	*Lithocarpus gracilis* (Korth.) Soepadmo	Fagaceae	C
61	*Mening*	*Lithocarpus pseudo-molucca* Rehder	Fagaceae	C
62	*Mening Hitam*	*Lithocarpus* sp.	Fagaceae	C
63	*Medang Gambung*	*Litsea garciae* Vidal	Lauraceae	C
64	*Medang Simpai*	*Litsea grandis* Hook. f.	Lauraceae	C
65	*Medang Serumput*	*Litsea mappacea* Boerl.	Lauraceae	C, O
66	*Medang Telampung Kuning*	*Litsea robusta* Bl.	Lauraceae	C
67	*Antoi*	*Litsea* sp.	Lauraceae	C, O
68	*Medang Burung*	*Litsea umbellata* Merr.	Lauraceae	C
69	*Medang Cabe*	*Lophopetalum sessilifolium* Ridl.	Celastraceae	C
70	*Akar Nulang*	*Luvunga eleutherandra* Dalz.	Rubiaceae	E, T
71	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae	O
72	*Balam Merah*	*Madhuca sericea* H. J. Lam	Sapotaceae	C
73	*Kayu Kapuk*	*Meliosma ferruginea* Sieb. & Zucc. ex Hook. f.	Sabiaceae	C
74	*Bayu*	*Meliosma nitida* Bl.	Sabiaceae	C, O
75	*Temereh Padi*	*Memecylon* sp.	Melastomataceae	C, T
76	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae	U
77	*Akar Serumpal*	*Millettia sericea* Wight. & Arn.	Fabaceae	M, O
78	*Menien Udang*	*Mitrephora maingayi* Hook. f. & Thoms.	Annonaceae	T
79	*Kiro Muting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae	M
80	*Medang Jambu*	*Nothaphoebe umbelliflora* Bl.	Lauraceae	C
81	*Sirih Hantu*	*Piper* sp.	Piperaceae	M
82	*Gelam*	*Planchonella nitida* Dubard	Sapotaceae	E
83	*Senglo*	*Plectronia horrida* K. Schum.	Rubiaceae	U
84	*Akar Rundang*	*Poikilospermum suaveolens* (Bl.) Merr.	Moraceae	M
85	*Semat Baju*	*Procris cf. pedunculata* Wedd.	Urticaceae	E, M
86	*Rukam Air*	*Prunus javanica* Miq.	Rosaceae	E, O

Table A.21. (Continued) List of Useful Plants in the *Rimbo Gano* (Old-Growth Forest)

No	Vernacular Name	Scientific Name	Family	Uses*)
87	*Puding Hutan*	*Psychotria rostrata* Bl.	Rubiaceae	U, M
88	*Akar Gitan*	*Psychotria* sp.	Rubiaceae	E, O
89	*Bentang Mloro*	Pterocymbium tubulatum Pierre	Sterculiaceae	O
90	*Senarahen*	*Pyrrenaria serrata* Bl.	Theaceae	O
91	*Sentul*	*Sandoricum koetjape* Schott.	Meliaceae	C, E
92	*Sap'em*	*Saurauia javanica* (Nees) Hooglan	Actinidiaceae	E
93	*Rengas*	*Semecarpus heterophylla* Hook. f.	Anacardiaceae	C
94	*Kayu Nasi*	*Styrax benzoin* Dryand.	Styraceae	C, O
95	*Kelat*	*Syzigium lineatum* (DC.) Merr. & L.M.Perry	Myrtaceae	C
96	*Mentang Keladi*	Syzygium acutangulum *Nied.*	Myrtaceae	C, O
97	*Jambu Kelawar*	*Syzygium leptostemon* (Korth.) Merr. & L.M.Perry	Myrtaceae	E
98	*Ubo Serai*	*Syzygium polyanthum* Miq.	Myrtaceae	E, C, O
99	*Kayu Bawang*	*Syzygium zeylanicum* DC.	Myrtaceae	C
100	*Cupak*	*Ternstroemia coriacea* Wall.	Theaceae	E
101	*Akar Kait*	*Uncaria glabrata* DC.	Rubiaceae	T
102	*Kayu Salak*	Unidentified		C
103	*Molesaten*	*Villebrunea rubescens* Bl.	Urticaceae	E
104	*Nalam Nasi*	*Zingiber* sp.	Zingiberaceae	E

*) C: Construction, E: Edible, M: Medicine, U: Uras, T: Tool and Fiber, O: Other uses

Table A.22. Complex Salience Value of Plants in the *Rimbo* of Tanjung Kasri

No	Local Name	Scientific Name	Family	Sp Value	Comp. Salience Value
1	*Surian*	*Toona* spp.	Meliaceae	8.4	0.65
2	*Medang Giring*	*Persea cf. rimosa*	Lauraceae	6.8	0.52
3	*Asal*	*Elaeocarpus stipularis*	Elaeocarpaceae	4.8	0.37
4	*Manau*	*Calamus manan*	Arecaceae	3.4	0.26
5	*Rotan*	*Calamus* spp. & *Khortalasia* spp.	Arecaceae	2.0	0.15
6	*Seri*	*Ficus tinctoria*	Moraceae	2.0	0.15
7	*Batang Bintang*	*Bischofia javanica*	Euphorbiaceae	1.6	0.12
8	*Kiro Munting*	*Nauclea calycina*	Rubiaceae	1.6	0.12
9	*Medang Jambu*	*Nothaphoebe umbelliflora*	Lauraceae	1.2	0.09
10	*Aro*	*Ficus spp.*	Moraceae	1.0	0.08
11	*Buluh*	Several genus	Poaceae	0.8	0.06
12	*Medang*	Several genus	Lauraceae	0.8	0.06
13	*Kayu Moton*	*Cratoxylum sumatranum*	Clusiaceae	0.6	0.05
14	*Sapat*	*Macaranga tanarius*	Euphorbiaceae	0.6	0.05
15	*Telap*	*Morus sp.*	Moraceae	0.6	0.05
16	*Pulai*	*Alstonia scholaris*	Apocynaceae	0.4	0.03
17	*Enau*	Arenga pinnata	Arecaceae	0.4	0.03
18	*Medang Kunyit*	*Beilschmiedia madang*	Lauraceae	0.4	0.03
19	*Damar*	*Canarium pilosum*	Burseraceae	0.4	0.03
20	*Medang Simpai*	*Litsea grandis*	Lauraceae	0.4	0.03
21	*Meroba*	Unidentified (1)	Unidentified (1)	0.4	0.03
22	*Buha Kereh*	*Aleurites moluccana*	Euphorbiaceae	0.2	0.02
23	*Lingkat*	*Clausena sp.*	Rutaceae	0.2	0.02

Table A.23. Complex Salience Value of Plants in the *Rimbo* of Renah Kemumu

No	Local Name	Scientific Name	Family	Sp Value	Comp. Salience Value
1	*Buluh*	Several genus	Poaceae	11.8	0.62
2	*Asal*	*Elaeocarpus stipularis*	Elaeocarpaceae	9.6	0.51
3	*Surian*	*Toona* spp.	Meliaceae	7.6	0.40
4	*Manau*	*Calamus manan*	Arecaceae	7.0	0.37
5	*Rotan*	*Calamus* spp & *Khortalasia* spp.	Arecaceae	5.8	0.31
6	*Telap*	*Morus sp.*	Moraceae	4.0	0.21
7	*Medang Giring*	*Persea cf. rimosa*	Lauraceae	1.8	0.09
8	*Bayeh*	*Oncosperma sp.*	Arecaceae	1.2	0.06
9	*Akar Tunggal*	*Goniothalamus macrophylus*	Annonaceae	1.0	0.05
10	*Medang Jambu*	*Nothaphoebe umbelliflora*	Lauraceae	1.0	0.05
11	*Sampul*	*Caryota rumphiana*	Arecaceae	0.8	0.04
12	*Terap*	*Artocarpus elasticus*	Moraceae	0.8	0.04
13	*Buluh Kapal*	*Gigantochloa hasskarliana*	Poaceae	0.6	0.03
14	*Lalan Besi*	*Globba* sp.	Zingiberaceae	0.6	0.03
15	*Meroba*	Unidentified (1)	Unidentified	0.6	0.03
16	*Bungkul*	*Stelechocarpus burahol*	Annonaceae	0.4	0.02
17	*Enau*	Arenga pinnata	Arecaceae	0.4	0.02
18	*Kayu Hijau*	*Lepionurus sylvestris*	Opiliaceae	0.4	0.02
19	*Kayu Jeluang*	Unidentified (2)	Unidentified	0.4	0.02
20	*Mentang Keladi*	*Syzygium acutangulum*	Myrtaceae	0.4	0.02
21	*Damar*	*Canarium pilosum*	Burseraceae	0.2	0.01
22	*Narung*	*Trema orientalis*	Ulmaceae	0.2	0.01
23	*Puar*	*Alpinia* sp.	Zingiberaceae	0.2	0.01
24	*Sasam*	*Ardisia lanceolata*	Epacridaceae	0.2	0.01

Table A.24. Complex Salience Value of Plants in the *Rapohen* of Tanjung Kasri

No.	Local Name	Scientific Name	Family	Sp Value	Complex Salience Value
1	*Narung*	*Trema orientalis*	Ulmaceae	6.4	0.49
2	*Sapat*	*Macaranga tanarius*	Euphorbiaceae	3.2	0.25
3	*Kulit Angin*	*Mallotus paniculatus*	Euphorbiaceae	2.8	0.22
4	*Rumput Bungo*	*Eupatorium inulaefolium*	Asteraceae	2.8	0.22
5	*Semlo'en*	*Homalanthus giganteus*	Euphorbiaceae	2.8	0.22
6	*Bambu betung*	*Dendrocalamus asper*	Poaceae	1.8	0.14
7	*Duri Peringat*	*Rubus moluccanus*	Rosaceae	1.2	0.09
8	*Jelatang*	*Laportea spp.*	Urticaceae	1.2	0.09
9	*Lalang*	*Imperata cylindrica*	Poaceae	1.2	0.09
10	*Buluh Kapal*	*Gigantochloa hasskarliana*	Poaceae	1.0	0.08
11	*Jeluangan*	*Cordyline terminalis*	Liliaceae	1.0	0.08
12	*Kayu Nasi*	*Styrax benzoin*	Styraceae	1.0	0.08
13	*Molesaten*	*Villebrunea rubescens*	Urticaceae	1.0	0.08
14	*Pisang Kayak*	*Musa sp.*	Musaceae	1.0	0.08
15	*Senehen*	*Schefflera sp.*	Araliaceae	1.0	0.08
16	*Mening*	*Lithocarpus pseudo-molucca*	Fagaceae	0.8	0.06
17	*Rumput Unggul*	*Mikania cordata*	Asteraceae	0.8	0.06
18	*Surian Rimbo*	*Toona sureni*	Meliaceae	0.8	0.06
19	*Daku Arab*	Unidentified		0.6	0.05
20	*Kenis*	*Garcinia parvifolia*	Clusiaceae	0.6	0.05
21	*Nulang*	*Glochidion obscurum*	Euphorbiaceae	0.6	0.05
22	*Pucuk Lumai*	*Solanum nigrum*	Solanaceae	0.6	0.05
23	*Rumput Angit*	*Ageratum conyzoides*	Asteraceae	0.6	0.05
24	*Seduruk*	*Melastoma candidum*	Melastomataceae	0.6	0.05
25	*Dadap Duri*	*Erythrina subumbrans*	Leguminosae	0.4	0.03
26	*Dauh Serteh*	*Beilschmiedia gemmiflora*	Lauraceae	0.4	0.03
27	*Jerambing*	*Bidens pilosa*	Asteraceae	0.4	0.03
28	*Pinang*	*Areca catechu*	Arecaceae	0.4	0.03
29	*Rumput Gedang*	*Erechtites valerianaefolia*	Asteraceae	0.4	0.03
30	*Sasam*	*Ardisia lanceolata*	Epacridaceae	0.4	0.03
31	*Durian*	Durio zibethinus	Bombacaceae	0.2	0.02
32	*Kopi Rimbo*	*Urophyllum streptopodium*	Rubiaceae	0.2	0.02
33	*Rumput Sembuang*	*Eleusine indica*	Poaceae	0.2	0.02
34	*Sampadi*	*Saurauja nudiflora*	Ternstroemiaceae	0.2	0.02
35	*Seri*	*Ficus tinctoria*	Moraceae	0.2	0.02
36	*Sirih*	*Piper betle*	Piperaceae	0.2	0.02

Table A.25. Complex Salience Value of Plants in the *Rapohen* of Renah Kemumu

No.	Local Name	Scientific Name	Family	Sp Value	Complex Salience Value
1	*Narung*	*Trema orientalis*	Ulmaceae	5.6	0.29
2	*Durian*	*Durio zibethinus*	Bombacaceae	5.2	0.27
3	*Petai*	*Parkia speciosa*	Leguminosae	5.0	0.26
4	*Jengkol*	*Archidendron pauclorum*	Leguminosae	3.6	0.19
5	*KepayangP*	*angium edule*	Flacortiaceae	2.4	0.13
6	*Sapat*	*Macaranga tanarius*	Euphorbiaceae	2.4	0.13
7	*Molesaten*	*Villebrunea rubescens*	Urticaceae	2.0	0.11
8	*Bambu betung*	*Dendrocalamus asper*	Poaceae	1.8	0.09
9	*Kenis*	*Garcinia parvifolia*	Clusiaceae	1.8	0.09
10	*Surian*	*Toona sp.*	Meliaceae	1.8	0.09
11	*Pisang Hutan*	*Musa sp*	Musaceae	1.6	0.08
12	*Rumput Bungo*	*Eupatorium inulaefolium*	Asteraceae	1.4	0.07
13	*Puar*	*Alpinia sp.*	Zingiberaceae	1.2	0.06
14	*Rumput Gedang*	*Erechtites valerianaefolia*	Asteraceae	1.2	0.06
15	*Bayu*	*Pterospermum javanicum*	Sterculiaceae	1.0	0.05
16	*Daun Matahari*	*Curculigo latifolia*	Hypoxidaceae	1.0	0.05
17	*Kayu Bawang*	*Aporusa lucida*	Euphorbiaceae	1.0	0.05
18	*Mentaleten*	*Acalypha caturus*	Euphorbiaceae	1.0	0.05
19	*Sambada*	*Saurauja nudiflora*	Temstroemiaceae	1.0	0.05
20	*Seri*	*Ficus tinctoria*	Moraceae	1.0	0.05
21	*Akar Tunggal*	*Goniothalamus macrophylus*	Annonaceae	0.8	0.04
22	*Buah Kereh*	*Aleurites moluccana*	Euphorbiaceae	0.8	0.04
23	*Buluh*	*Several genus*	Poaceae	0.8	0.04
24	*Mentang Kirai*	*Beilschmiedia sp.*	Lauraceae	0.8	0.04
25	*Paku Liman*	*Angiopteris sp.*	Marratiaceae	0.8	0.04
26	*Akar akar*	*Unidentified*		0.6	0.03
27	*Akar Serampal*	*Millettia sericea*	Leguminosae	0.6	0.03
28	*Jembu Kelawar*	*Syzygium claviflorum*	Myrtaceae	0.6	0.03
29	*Medang Giring*	*Persea cf. rimosa*	Lauraceae	0.6	0.03
30	*Melammbok'eng*	*Vernonia arborea*	Asteraceae	0.6	0.03
31	*Meni'en Kijang*	*Orophea cf. hexandra*	Annonaceae	0.6	0.03
32	*Nalam Nasi*	*Zingiber sp.*	Zingiberaceae	0.6	0.03
33	*Nangko*	*Artocarpus heterophyllus*	Moraceae	0.6	0.03
34	*Rotan Getah*	*Daemonorops angustifolius*	Arecaceae	0.6	0.03
35	*Rumput Unggul*	*Mikania cordata*	Asteraceae	0.6	0.03
36	*Batang Nilau*	*Trichospermum javanicum*	Tiliaceae	0.4	0.02

Table A.25. (Continued) Complex Salience Value of Plants in the *Rapohen* of Renah Kemumu

No.	Local Name	Scientific Name	Family	Sp Value	Complex Salience Value
37	*Juo*	*Syzygium sp.*	Myrtaceae	0.4	0.02
38	*Kabau*	*Archidendron microcarpum*	Leguminosae	0.4	0.02
39	*Kelu*	*Etlingera elatior*	Zingiberaceae	0.4	0.02
40	*Kiro Malau*	*Ficus sp.*	Moraceae	0.4	0.02
41	*Kopi*	*Coffea sp.*	Rubiaceae	0.4	0.02
42	*Rumput Kinat*	*Paspalum conjugatum*	Poaceae	0.4	0.02
43	*Bentang Mloro*	*Pterocymbium tubulatum*	Sapotaceae	0.2	0.01
44	*Jelatang*	*Laportea spp.*	Urticaceae	0.2	0.01
45	*Jeluangan*	*Cordyline terminalis*	Liliaceae	0.2	0.01
46	*Kiro Munting*	*Nauclea calycina*	Rubiaceae	0.2	0.01
47	*Temeras*	*Memecylon sp.*	Melastomataceae	0.2	0.01
48	*Terap*	*Artocarpus elasticus*	Moraceae	0.2	0.01

Table A.26. Complex Salience Value of Plants in the *Ladang Kulit* of Tanjung Kasri

No.	Local Name	Scientific Name	Family	Sp Value	Complex Salience Value
1	*Kulit manis*	*Cinnamomum burmannii*	Lauraceae	8.6	0.66
2	*Durian*	Durio zibethinus	Bombacaceae	4.4	0.34
3	*Kopi*	*Coffea spp.*	Rubiaceae	4.4	0.34
4	*Petai*	Parkia speciosa	Leguminosae	4	0.31
5	*Surian*	*Toona spp.*	Meliaceae	2.6	0.20
6	*Jelatang*	*Laportea spp.*	Urticaceae	2.2	0.17
7	*Narung*	*Trema orientalis*	Ulmaceae	1.6	0.12
8	*Jering*	Archidendron pauclorum	Leguminosae	1.4	0.11
9	*Rumput Bungo*	*Eupatorium inulaefolium*	Asteraceae	1.4	0.11
10	*Rumput Angit*	*Ageratum conyzoides*	Asteraceae	1.2	0.09
11	*Nangko*	Artocarpus heterophyllus	Moraceae	1	0.08
12	*Senehen*	*Schefflera sp.*	Araliaceae	1	0.08
13	*Lalang*	*Imperata cylindrica*	Poaceae	0.8	0.06
14	*Rumput Terbung*	*Setaria plicata*	Poaceae	0.8	0.06
15	*Sapat*	*Macaranga tanarius*	Euphorbiaceae	0.8	0.06
16	*Jerambing*	*Bidens pilosa*	Asteraceae	0.6	0.05
17	*Pucuk Lumai*	*Solanum nigrum*	Solanaceae	0.6	0.05
18	*Rumput Gedang*	*Erechtites valerianaefolia*	Asteraceae	0.6	0.05
19	*Rumput Unggul*	*Mikania cordata*	Asteraceae	0.6	0.05
20	*Kulit Angin*	*Mallotus paniculatus*	Euphorbiaceae	0.2	0.02
21	*Rumput Sembuang*	*Eleusine indica*	Poaceae	0.2	0.02

Table A.27. Complex Salience Value of Plants in the *Ladang Kulit* of Renah Kemumu

No.	Local Name	Scientific Name	Family	Sp Value	Complex Salience Value
1	*Kulit manis*	*Cinnamomum burmannii*	Lauraceae	14.6	0.77
2	*Kopi*	*Coffea spp.*	Rubiaceae	10	0.53
3	*Durian*	*Durio zibethinus*	Bombacaceae	6	0.32
4	*Petai*	*Parkia speciosa*	Leguminosae	5.6	0.29
5	*Jering*	*Archidendron pauclorum*	Leguminosae	3.4	0.18
6	*Surian*	*Toona spp.*	Meliaceae	2.8	0.15
7	*Pinang*	*Areca catechu*	Arecaceae	1.6	0.08
8	*Rumput Angit*	*Ageratum conyzoides*	Asteraceae	1.6	0.08
9	*Rumput Bungo*	*Eupatorium inulaefolium*	Asteraceae	1.6	0.08
10	*Rumput Gedang*	*Erechtites valerianaefolia*	Asteraceae	1.4	0.07
11	*Pisang*	*Musa spp.*	Musaceae	1.2	0.06
12	*Jerambing*	*Bidens pilosa*	Asteraceae	1	0.05
13	*Narung*	*Trema orientalis*	Ulmaceae	1	0.05
14	*Kenis*	*Garcinia parvifolia*	Clusiaceae	0.8	0.04
15	*Rumput Kinat*	*Paspalum conjugatum*	Poaceae	0.8	0.04
16	*Keladi Air*	*Colocasia spp.*	Araceae	0.6	0.03
17	*Melambung*	*Vernonia arborea*	Asteraceae	0.6	0.03
18	*Rumput Terbung*	*Setaria plicata*	Poaceae	0.6	0.03
19	*Rumput Unggul*	*Mikania cordata*	Asteraceae	0.6	0.03
20	*Batang Bintang*	*Bischofia javanica*	Euphorbiaceae	0.4	0.02
21	*Lalang*	*Imperata cylindrica*	Poaceae	0.4	0.02
22	*Akar Kenis*	*Pouzolzia viminea*	Urticaceae	0.2	0.01
23	*Jelatang*	*Laportea spp.*	Urticaceae	0.2	0.01

Table A.28. Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
1	*Ubi dewa*	*Abelmoschus manihot* Medic.	Malvaceae	ANS 39
2	*Akar Kepuh*	*Acacia pennata* (L.) Willd.	Fabaceae	RKK 22/31
3	*Mentaleten*	*Acalypha caturus* Blume	Euphorbiaceae	RKK 01
4	Anonim	*Acer niveum* Blume	Aceraceae	BHRA-12/BB02
5	*Kayu arang*	*Acmena acuminatissima* (Bl.) Merr. & Perry	Myrtaceae	BHRK-11
6	*Jerangau*	*Acorus calamus* L.	Araceae	HH-01
7	*Menien Simpai*	*Actinodaphne glomerata* (Bl.) Nees.	Lauraceae	BHRD-52
8	*Mertin*	*Actinodaphne procera* Nees.	Lauraceae	BHRI-71
9	*Medang Kayu Bukit*	*Actinodaphne sesquipedalis Hook.f. & Thoms. ex Hook.f.*	Lauraceae	BHRE-02
10	*Petehen*	*Actinodaphne* sp.	Lauraceae	RKG 70
11	*Gitan*	*Adenia macrophylla* Koord.	Passifloraceae	FF-04
12	*Dain Inggap*	*Aeschynanthus albida* A. DC.	Gesneriaceae	ANS 34
13	*Rumput Angit*	*Ageratum conyzoides* L.	Asteraceae	BHRK-2
14	*Kayu Mutah*	*Aglaia argentea* Bl.	Meliaceae	RKC 08
15	*Beko*	*Aglaia crassinervia* Kurz. ex Hiern.	Meliaceae	RKD 38
16	*Lenzat Hutan*	*Aglaia odoratissima* Benth.	Meliaceae	BHRK5
17	*Letung Aye*	*Aglaia* sp.	Meliaceae	RKE 05
18	*Kayu Burung*	*Alangium javanicum* Wangerin	Alangiaceae	RKG 13
19	*Melaku*	*Alangium rotundifolium* (Hassk.) Bloaemb.	Alangiaceae	HH-05
20	*Bawang Gando*	*Allium porrum* L.	Alliaceae	ANS 03
21	*Puar*	*Alpinia sp.*	Zingiberaceae	BHRD-49
22	*Pulai*	*Alstonia angustifolia* Miq.	Apocynaceae	BHRA-03
23	*Pulai*	*Alstonia scholaris* R.Br.	Apocynaceae	ANS 12
24	*Rumput Mempedu*	*Andrographis paniculata* Nees	Acanthaceae	ANS 47
25	*Rumput Patah Budi*	*Aneilema vaginatum* (L.) R. Br.	Commelinaceae	ANS 73
26	*Paku Liman*	*Angiopteris evecta* (Forst.) Hoffm.	Marratiaceae	BHRA-04
27	*Gelambai*	*Anthocephalus cadamba* Miq.	Rubiaceae	BHRD-112
28	*Merenai*	*Antidesma cuspidatum* Muell. Arg.	Euphorbiaceae	BHRK 9
29	*Merenai*	*Antidesma neurocarpum* Miq.	Euphorbiaceae	HH-10
30	*Daun Sako*	*Aphelandra sp.*	Acanthaceae	ANS 05
31	*Cawat*	*Aporosa symplocoides* Gage	Euphorbiaceae	RKD 02 ?

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
32	*Kayu Bawang*	*Aporusa lucida* (Miq.) Airy Shaw	Euphorbiaceae	BHRI-42
33	*Menap'en*	*Aralia dasyphylla* Miq.	Aralliaceae	RKH 101
34	Anonim	*Aralidium pinnatifidium* Miq.	Araliaceae	RKJ 34
35	*Petai Belalang*	*Archidendron clipearia* (Kack) I. Nielsen	Fabaceae	RKD 43
36	*Jering Tupai*	*Archidendron elipticum* (Bl.) I.C. Nielsen	Fabaceae	BHRE-83
37	*Jering Tupai*	*Archidendron fagifolium* (Bl. ex Miq.) I. Nielsen	Fabaceae	RKD 37
38	Anonim	*Ardisia cf. colorata* Roxb.	Myrsinaceae	RKJ 10
39	*Menzi*	*Ardisia crispa* A.DC.	Myrsinaceae	DD02
40	*Sesam*	*Ardisia lanceolata* C.F. Gaertn.	Epacridaceae	BHRB-01/BHRD-135/BHRG-03
41	*Asam-asam*	*Ardisia sumatrana* Miq.	Myrsinaceae	RKC 02/G106
42	*Inai*	*Argostema borragineum* Bl.	Rubiaceae	RKF 10
43	*Terap*	*Artocarpus elasticus* Reinw.	Moraceae	BB-19
44	*Cempedak Hutan*	*Artocarpus integra* Merr.	Moraceae	RKD 03
45	*Tapang*	*Artocarpus nitida* Trec.	Moraceae	RKH 75
46	*Tapang*	*Artocarpus rigida* Bl.	Moraceae	RKH 77
47	*Mengkli*	*Arytera xerocarpa* (Bl.) Adelb.	Sapindaceae	RKC 06
48	*Paku Pukut*	*Athyrium esculentum* (Retz.) Copel.	Athyrium Gr.	BHRA-05
49	*Gelimbing*	*Averrhoa carambola* L.	Oxalidaceae	ANS 22
50	*Mbok'eng*	*Baccaurea lanceolata* Muell. Arg.	Euphorbiaceae	BHRH-09/RKD12
51	Anonim	*Baccaurea racemosa* Muell. Arg.	Euphorbiaceae	BHRB-11
52	*Aur cino*	*Bambusa multiflex*	Poaceae	BHRK39
53	*Aur Gajah*	*Bambusa sp.*		BHRK32
54	*Aur Gajah*	*Bambusa vulgaris* Nees	Poaceae	BHRK-31
55	*Asam Gunung*	*Begonia longifolia* Bl.	Begoniaceae	RKA 4
56	*Bentang Kunyit*	*Beilschmiaedia madang* Bl.	Lauraceae	BHRI-7
57	*Mentang Kerai*	*Beilschmiaedia* sp.	Lauraceae	BHRI-10
58	*Daun Serteh*	*Beilschmiedia gemmiflora* (Bl.) Kosterm.	Lauraceae	BHRD-144
59	*Medang Batu*	*Beilschmiedia lucidula* (Miq.) Kosterm.	Lauraceae	RKJ 11
60	*Medang Batu*	*Beilschmiedia maingayi* Hook. f.	Lauraceae	RKF 05
61	*Kelumpang*	*Beilsmiedia* sp.	Lauraceae	BHRG-145
62	*Jerambing*	*Bidens pilosa* L.	Asteraceae	ANS 24

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
63	*Mnedk'eng (bintang)*	*Bischofia javanica* Bl.	Euphorbiaceae	BHRD04/ANS28
64	*Kayu Pinggan*	*Blumeodendron tokbrai* Kurz.	Euphorbiaceae	RKG 22
65	*Medang Serangkah*	*Botryophora geniculata* (Miq.) Beumee & Airy Shaw	Euphorbiaceae	BHRG-108/RKJ33
66	*Kanidai*	*Bridelia insulana* Hance	Euphorbiaceae	BHRG-44
67	*Kecubung*	*Brugmansia candida* Pers.	Solanaceae	BHRK 64/26
68	*Manau*	*Calamus manna* Miq.	Arecaceae	BHR 27
69	*Rotan Jerat*	*Calamus* sp.	Arecaceae	RKG65
70	*Rotan Jukut*	*Calamus* sp.	Arecaceae	RKG63
71	*Rotan Kesu*	*Calamus* sp.	Arecaceae	RKJ50
72	*Rotan Seni*	*Calamus* sp.	Arecaceae	RKG50
73	*Rotan Sikai*	*Calamus* sp.	Arecaceae	RKH100
74	*Rotan Tikus*	*Calamus* sp.	Arecaceae	RKG61
75	*Rotan Tunas*	*Calamus* sp.	Arecaceae	RKG58
76	Anonim	*Calanthe sp.*	Orchidaceae	RKE13
77	*Bentang Jelapak*	*Calanthe* sp.	Orchidaceae	BHRE-5
78	*Jelipuk Hutan*	*Calanthe triplicata* (Willemet) Ames	Orchidaceae	RKJ51
79	*Damar*	*Canarium pilosum* A. W. Benn.	Burseraceae	RKD11
80	*Sebih Putih*	*Canna indica* Ruiz & Pav.	Cannaceae	ANS 02
81	Anonim	*Carallia brachiata* Merr.	Rhizophoracaee	RKH72
82	*Terung Pilo*	*Carica papaya* L.	Caricaceae	ANS 30
83	*Risi*	*Caryota mitis* Lour.	Arecaceae	BHRK46
84	*Sampul*	*Caryota rumphiana* Mart.	Arecaceae	RKG29
85	*Gelinggang*	*Cassia alata* Linn.	Fabaceae	II-05
86	*Tajam Tumpul*	*Castanopsis javanica* A. DC.	Fagaceae	RKD36
87	*Kapuk*	*Ceiba pentandra* Gaertn	Bombacaceae	ANS 32
88	*Rambu abang/kuning*	*Celosia argentea* L.	Amaranthaceae	ANS 46
89	*Morosat*	*Celtis nigrecens* (Miq.) Planch.	Ulmaceae	RKC 04
90	*Kayu manau*	*Celtis philippinensis* Blanco	Ulmaceae	RKD 33
91	*Rumput Rabun*	*Centhotheca lappacea* Desv.	Poaceae	BHRA-08
92	*Daun Kitab*	*Cephalomappa maloticarpa* J. J. Smith	Euphorbiaceae	RKG 48
93	*Kayu Sabut*	*Chionanthus nitens* Koord. & Valet.	Oleaceae	RKG 40
94	*Kayu Sabut*	*Chionanthus oliganthus* (Merr.) R. Kiew	Oleaceae	RKJ 17
95	*Letung Enggang*	*Chisocheton ceramicus* (Mig.) C. DC.	Meliaceae	RKC 01

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
96	Anonim	*Chloranthus officinalis* Bl.	Chloranthaceae	RKH 71
97	*Kayu Manis*	*Cinnamomum burmanii* (Nees & T. Nees) Bl.	Lauraceae	ANS 35
98	*Petehen*	*Cinnamomum iners* Reinw. ex Bl.	Lauraceae	BHRG-08
99	*Kayu Usang*	*Cinnamomum javanicum* Bl.	Lauraceae	RKF 14
100	*Akar ulun*	*Cissus cf. nodosa* Bl.	Vitaceae	RKD 29
101	*Limau kapas*	*Citrus aurantifolia* Swingle	Rutaceae	ANS 37
102	*Limau Padang*	*Citrus limon* (L.) Burm. f.	Rutaceae	ANS 38
103	*Limau Manis*	*Citrus reticulate* Blanco	Rutaceae	ANS 36
104	*Limau Kunci*	*Citrus sp*	Rutaceae	ANS 39
105	Anonim	*Claoxylon cf. longifolium* Baill.	Euphorbiaceae	RKG 45
106	*Daun Cerek*	*Clausena exavata* Burm. f.	Rutaceae	RKK 54
107	*Lingkat*	*Clausena sp.*	Rutaceae	BHRG-23
108	*Sekambing*	*Clerodendron fragrans* Vent.	Verbenaceae	ANS 30
109	*Bungo Panggil*	*Clerodendrum buchanani* (Roxb.) W. G. Walpers	Lamiaceae	ANS 09
110	Anonim	*Clidemia hirta* D. Don	Melastomataceae	BB-10
111	*Peladang Anyik*	*Coleus amboinicus* Lour.	Labiatae	GG-02
112	*Keladi Air*	*Colocasia esculenta Schott*	Araceae	BHRD-50
113	*Jeluangan*	*Cordyline terminalis* Kunth.	Liliaceae	BB-18
114	*Patawa*	*Costus speciosus* (Koening) Smith	Zingiberaceae	ANS 25
115	*Moton*	*Cratoxylum sumatranum* Bl.	Clusiaceae	HH-11
116	*Jelipuk*	*Crinum cf. asiaticum* DC.	Amaryllidaceae	ANS 08
117	*Palik*	*Cryptocarya ferrea* Blume	Lauraceae	BHRI-117
118	*Prenggi*	*Cucurbita moschata* Duchesne ex Poir.	Cucurbitaceae	ANS 37
119	*Daun Matahari*	*Curculigo latifolia* Dryand.	Amarilidaceae	BHRA-32
120	*Paku Tiang*	*Cyanthea cf. squamulata* Copel	Cyatheaceae	BHRG-15
121	*Penjarang Sungsang*	*Cyathula prostrata* Blume	Amaranthaceae	RKB 10
122	*Jelapak*	*Cyrtandra pendula* Bl.	Gesneriaceae	BHRA-15
123	*Sekedek'en*	*Cyrtandra sandei* de Vriese	Gesneriaceae	RKC 05
124	*Inai*	*Cyrtandra* sp.	Gesneriaceae	RKG 57
125	*Inai*	*Cyrtandra wallichii* (C. B. Cl.) B. L. Burtt	Gesneriaceae	RKG 02
126	*Rotan Getah*	*Daemonorops angustifolius* Mart.	Arecaceae	RKG 64
127	*Medang Telu*	*Dehaasia incrassata* (Jack) Kosterm	Lauraceae	RKF 04

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
128	*Tubo Akar*	*Derris scandens* Benth.	Fabaceae	RKA 3
129	*Medang Kawah*	*Dichapetalum gelonioides* (Roxb.) Engl.	Dichapetalaceae	RKD 45
130	*Rumput Sapu*	*Dicrhocephala bicolor* Schlltdl.	Asteraceae	ANS 31
131	*Kandung Aye Putih*	*Didimocarpus barbatus* Jack.	Scrophulariaceae	RKD 56
132	*Peleh Tupai*	*Diflugossa filiformis* (Bl.) Bremek	Acanthaceae	BHRD-84
133	*Ubi Arang*	*Dioscorea alata* L.	Dioscoreaceae	ANS 32
134	Anonim	*Diospyros cauliflora* Mart. ex Mix.	Ebenaceae	RKG 43
135	*Paku Ikan*	*Diplazium asperum* Bl.	Woodsiaceae	BHRK34
136	*Tundu'en*	*Disporum chinensis* D. Don	Liliaceae	RKD 39
137	*Bemban*	*Donax cannaeformis* Rolfe	Marantaceae	ANS 20
138	*Bemban*	*Donax grandis* (Miq.) Ridley	Marantaceae	BHRD-43
139	*Rumput Sasi*	*Drymaria cordata* Willdt. ex Schult.	Caryophyllaceae	ANS 49
140	*Kayu Kacang*	*Dysoxylum alliaceum* Seem.	Meliaceae	DD-10
141	*Letung Padi*	*Dysoxylum parasiticum* (Osbeck) Kosterm.	Meliaceae	RKD 21
142	*Tirau*	*Dysoxylum* sp.	Meliaceae	RKE 12
143	Anonim	*Elaeagnus latifolia* L.	Elaeagnaceae	RKK 12
144	*Cepo Laut*	*Elaeocarpus mastersii* K. Schum.	Elaeocarpaceae	RKJ 01
145	*Kayu Cawat*	*Elaeocarpus* sp.	Elaeocarpaceae	RKD 28
146	Anonim	*Elaeocarpus sphaericus* Schum.	Elaeocarpaceae	RKJ 18
147	*Asal Kunyit*	*Elaeocarpus stipularis* Bl.	Elaeocarpaceae	HH-02
148	*Kandung Aye*	*Elatostema rostratum* (Bl.) Hassk. & H.Schroet.	Urticaceae	RKF 13
149	*Sabaruten*	*Elatostema sinuatum* Hassk.	Urticaceae	RKK 03
150	*Rumput Sembuang*	*Eleusine indica* Steud.	Poaceae	ANS 40
151	*Sakrau*	*Enhydra fluctuans* Lour.	Asteraceae	II-07
152	*Rumput Gedang*	*Erechtites valerianaefolia* DC.	Asteraceae	BHRK-3
153	*Dadap Duri*	*Erythrina subumbrans* Merr.	Fabaceae	ANS 21
154	*Sisik Trenggiling*	*Euonymus javanicus* Bl.	Celastraceae	RKJ 31
155	*Rumput Bungo*	*Eupatorium inulaefolium* H. B. & K.	Asteraceae	II-08
156	*Bekung*	*Ficus albipila* (Miq.) King	Moraceae	KG 2
157	*Medang Sunting*	*Ficus callosa* Willd.	Moraceae	BHRI-60
158	*Kiro Bayan*	*Ficus cf. ribes* Reinw. ex Bl.	Moraceae	BHRG-126
159	*Sekuduk'en*	*Ficus fistulosa* Reinw. ex Bl.	Moraceae	RKH 03
160	*Bekung*	*Ficus geocarpa* Teijsm.	Moraceae	BHRK-6

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
161	*Saeh Hutan*	*Ficus hirta* Vahl.	Moraceae	RKK 25
162	*Sekuduken*	*Ficus hispida* Roxb. ex Wall.	Moraceae	BHRE-55
163	*Bakung*	*Ficus lasiocarpa* Miq.	Moraceae	RKD 08
164	*Sekawak'eng*	*Ficus obscura* Bl.	Moraceae	FF-204
165	*Kiro Pulut*	*Ficus parientalis* Bl.	Moraceae	HH-12
166	*Loloi*	*Ficus ribes* Reinw.	Moraceae	BHRD-132
167	*Kayu Taji*	*Ficus sinuata* Thunb.	Moraceae	BHRD-08
168	*Kiro Malau*	*Ficus sp.*	Moraceae	HH-13
169	*Kiro Tampuk*	*Ficus stupenda* Miq.	Moraceae	FF-02
170	*Akar Kunyal*	*Ficus subulata* Bl.	Moraceae	DD-09
171	*Seri*	*Ficus tinctoria* G. Forst. f.	Moraceae	FF-211
172	*Aro*	*Ficus variegata* Bl.	Moraceae	RKA 7
173	*Rukam*	*Flacourtia rukam* Zoll. & Mor.	Flacourtiaceae	RKK 21
174	*Sekukuk*	*Forrestia mollissima* Koord.	Commelinaceae	RKA 2
175	*Misang Hantu*	*Freycinetia javanica* Bl.	Pandanaceae	BHRI-66
176	*Kuka Bening*	*Galearia filiformis* Boerl.	Euphorbiaceae	RKD 04
177	*Manggus Hutan*	*Garcinia celebica* L.	Clusiaceae	BHRG-88
178	*Manggus Hutan*	*Garcinia lateriflora* Bl.	Clusiaceae	RKD 16
179	*Kanis*	*Garcinia parvifolia* Hort. ex Boerl.	Clusiaceae	HH-08
180	*Medang Kelumpang*	*Gardenia tubifera* Wall.	Clusiaceae	BHRI-58
181	*Buluh Serik*	*Giganthocloa cf serik* E.A.Widjaja	Poaceae	BHRK-23
182	*Buluh kapal*	*Giganthocloa hasskarliana* (Kurz) Backer ex Heyne	Poaceae	BHRK-26
183	*Buluh mayan*	*Giganthocloa robusta* Kurz	Poaceae	BHRK-22
184	*Lalan Tupai*	*Globa pendula* Roxb.	Zingiberaceae	RKG 26
185	*Lalan Besi*	*Globa* sp.	Zingiberaceae	RKB 05
186	*Medang Payo*	*Glochidion microcarpum* Bl.	Euphorbiaceae	HH-07
187	*Nulam*	*Glochidion obscurum* Bl.	Euphorbiaceae	FF-01
188	*Batang Nurun*	*Glochidion* sp.	Euphorbiaceae	BHRC-05
189	*Akar Tunggal*	*Goniothalamus macrophylus* Hook. f. & Thoms	Annonaceae	RKD 30
190	Anonim	*Goodyera* sp.	Orchidaceae	BHRA-07
191	Anonim	*Gordonia excelsa* Bl.	Theaceae	RKH 76
192	*Medang Cempako*	*Gordonia oblongifolia* (Miq.) Van Steenis	Theaceae	RKD 22
193	*Daun Puding*	*Graptophyllum pictum* Griff.	Acanthaceae	ANS 35
194	*Sengun*	*Gynochthodes coriacea* Bl.	Rubiaceae	BHRK-13

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
195	Anonim	*Hedyothis verticilata* Lam	Rubiaceae	BHRB-07
196	*Kelat*	*Helicia rostrata* D. B. Foreman	Proteaceae	BHRD-146
197	*Sakrekeng*	*Helicia* sp.	Proteaceae	BHRF-30
198	*Akar Kadam*	*Hogdosonia macrocarpa* Cogn.	Cucurbitaceae	BHRK-49
199	*Semlo'en*	*Homalanthus giganteus* Zoll. & Mor.	Euphorbiaceae	BHRK53
200	*Kanulau Merah*	*Homalomena cordata* Schott	Araceae	ANS 17
201	*Lolo Tanah*	*Hornstedtia* sp.	Zingiberaceae	BHRK-19
202	*Puar Rincung*	*Hornstedtia* sp.	Zingiberaceae	RKG 03
203	*Kayu Sumpah*	*Horsfieldia glabra* Warb.	Myristiceae	RKH 70
204	Anonim	*Hydrocatyle javanica* Thunb.	Apiaceae	BHRB-04
205	*Sekumpai*	*Hymenachne amplexicaulis* Nees.	Poaceae	II-06
206	*Rumput Sugi*	*Hyptis capitata* Jack	Labiatae	RKB 04
207	*Kayu Ruman*	*Ilex cymosa* Bl.	Aquifoliaceae	RKJ 02
208	*Inai*	*Impatiens balsamina* L.	Balsaminaceae	ANS 38
209	*Setebal*	*Ixora grandifolia* J. J. Smith	Rubiaceae	RKG 21
210	*Ranjau Ruso*	*Justicia gendarusa* Blanco	Acanthaceae	ANS 14
211	*Sedingin*	*Kalanchoe pinnata* Pers.	Crassulaceae	DD-201
212	*Kayu Seramngkah*	*Knema cinerea* Warb.	Myristicaceae	RKD 25
213	*Medang Rengas*	*Knema latericia* Elmer	Myristiceae	RKG 412
214	*Medang Pelananu*	*Knema mandarahan* Warb.	Myristicaceae	BHRG-19
215	*Rotan Sendahan*	*Korthalsia laciniosa* Mart	Arecaceae	BHRG-04
216	*Rotan Sendahan*	*Korthalsia* sp.	Arecaceae	RKG 66
217	*Labu guci*	*Lagenaria siceraria* Standl.	Cucurbitaceae	ANS 16
218	*Jelatang Nyiru*	*Laportea sinuata* Bl. Ex Wedd.	Urticaceae	BHRK-14
219	*Jelatang Ruso*	*Laportea* sp.	Urticaceae	BHRK-15
220	*Jelatang Bulan*	*Laportea stimulans* Miq.	Urticaceae	RKD 302
221	*Kayu Miang*	*Lasianthus densifolius* Miq.	Rubiaceae	II-02
222	*Sekentuten*	*Lasianthus pseudo-stipularis* Amsof. ex Bakh. f.	Rubiaceae	RKH 103
223	*Sekring*	*Lasianthus reticulatus* Bl.	Rubiaceae	RKG 30
224	*Sekentuten*	*Lasianthus rigidus* Miq.	Rubiaceae	RKG 53
225	*Kayu Bali*	*Leea indica* Merr.	Leeaceae	RKA 12
226	*Rumput Bento*	*Leersia hexandra* Sw.	Poaceae	ANS 33
227	*Limbang Hantu*	*Lepidagathis sp.*	Acanthaceae	RKD 301
228	*Kayu Hijau*	*Lepionurus sylvestris* Bl.	Opiliaceae	RKF 06

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
229	*Bigau*	*Lepironia articulate* (Retz.) Domin	Cypaeraceae	BHRK55
230	*Mening Putih*	*Lithocarpus gracilis* (Korth.) Soepadm	Fagaceae	RKF 15
231	*Mening*	*Lithocarpus pseudo-molucca* Rehder	Fagaceae	BHRH-38
232	*Mening Hitam*	*Lithocarpus* sp.	Fagaceae	RKG 05
233	*Medang Gambung*	*Litsea garciae* Vidal	Lauraceae	RKG 07
234	*Medang Simpai*	*Litsea grandis* Hook. f.	Lauraceae	RKG 19
235	*Menien Saluang*	*Litsea lanceolata* (Bl.) Kosterm.	Lauraceae	BHRH-42
236	*Medang Seluput*	*Litsea mappacea* Boerl.	Lauraceae	RKD 35
237	*Medang Telampung Kuning*	*Litsea robusta* Bl.	Lauraceae	RKD 54
238	*Sekunyit*	*Litsea* sp.	Lauraceae	RKF 02
239	*Antoy*	*Litsea* sp.	Lauraceae	BHRD-121
240	*Medang Burung*	*Litsea* umbellata (Lour.) Merrill	Lauraceae	RKK 11
241	*Medang Cabai*	*Lophopetalum sessilifolium* Ridl.	Celastraceae	RKH 73
242	*Limau Keling*	*Luvunga eleutherandra* Dalz.	Rutaceae	BHRD-102
243	*Tutup/Sapat*	*Macaranga tanarius* Muell. Arg.	Euphorbiaceae	BHRD-02
244	*Mang*	*Macaranga triloba* Muell. Arg.	Euphorbiaceae	RKA 8
245	*Balam Merah*	*Madhuca sericea* H. J. Lam	Sapotaceae	RKE 01
246	*Kulit Angin*	*Mallotus paniculatus* Mull. Arg.	Euphorbiaceae	BHRH-27
247	*Panco*	*Mallotus phlippinensis* Mull. Arg.	Euphorbiaceae	BHRA-20
248	*Marilak'eng Hutan*	*Mallotus sphaerocarpus* Muell. Arg.	Euphorbiaceae	RKK 04
249	*Medang Pauh*	*Mangifera quadrifida* Jack	Anacardiaceae	RKF 12
250	*Mentelam Hutan*	*Mangifera swintonioides* A.J.G.H. Kostermans	Anacardiaceae	RKD 32
251	*Daun Tarum*	*Marsdenia tinctoria* R. Br.	Asclepiadaceae	ANS 06
252	*Kayu Katak*	*Mastixia parvifolia* Hallier f.	Cornaceae	BHRG-27
253	*Munuk'eng*	*Mastixia trichotoma* Bl.	Cunnoniaceae	RKG 46
254	*Balam Mencit*	*Melanochyla caesia* (Bl.) Ding Hou	Anacardiaceae	RKG 33
255	*Seduruk*	*Melastoma candidum* D.Don	Melastomataceae	BHR 84
256	*Seduruk Hitam*	*Melastoma malabathricum* Jack	Melastomataceae	BHRA-42
257	*Segerem*	*Melastoma sp.*	Melastomataceae	ANS 24
258	*Kapeh*	*Meliosma ferruginea* Sieb. & Zucc. ex Hook. f.	Sabiaceae	BHRD-62
259	*Bayu*	*Meliosma nitida* Bl.	Sabiaceae	BHRA-46
260	*Medang Surian*	*Meliosma pinnata* Maxim	Sabiaceae	RKJ 04

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
261	*Kayu Babi*	*Memecylon myrsinoides* Bl.	Melastomaceae	BHRI-57
262	*Tambreh*	*Memecylon* sp.	Melastomatac	RKF 09
263	*Akar Kembung*	*Merremia peltata* Merr.	Convolvulaceae	BHRC-08
264	*Rumput Unggul*	*Micania cordata* (Burm. f.) B. L. Robinson	Asteraceae	BHRK4
265	*Kayu Pasak*	*Microcos florida* Burret	Tiliaceae	BHRD-162
266	*Kayu Lilin*	*Microdesmis caseariaefolia* Planch. ex Hook.	Pandanaceae	RKA 14
267	*Akar Serampal*	*Millettia sericea* Wight. & Arn.	Fabaceae	RKG 28
268	Anonim	*Mischocarpus pentapetalus* Radlk.	Sapindaceae	HH-04
269	*Meni'en Udang*	*Mitrephora maingayi* Hook. f. & Thoms.	Annonaceae	RKG 59
270	*Telap*	*Morus* sp.	Moraceae	ANS 27
271	*Pisang Ungko*	*Musa acuminata* Colla	Musaceae	BHRK38
272	*Pisang karok*	*Musa salaccensis*	Musaceae	BHRK37
273	*Pisang Kayak*	*Musa sp.*	Musaceae	BHRK36
274	*Sapanehen*	*Mycetia fasciculata* (Bl.) Bl. ex Korth.	Rubiaceae	RKC 03
275	*Kirau Munting*	*Nauclea calycina* Bartl.ex DC.	Rubiaceae	BHRG-56
276	*Cengang/Durian Hantu*	*Neesia altisima* Blume	Bombacaceae	RKG 06
277	*Medang Kulit*	*Neolitsea cassiaefolia* Merr.	Lauraceae	BHRI-20
278	*Medang Pilo*	*Neoscortechinia nicobarica* Pax & Hoffm.	Euphorbiaceae	RKK 55
279	*Rambutan Hutan*	*Nephelium sp.*	Sapindaceae	RKK 20
280	*Paku Larat*	*Nephrolepis biserrata* (Sw.) Schott)	Davaliaceae	BHRA-34
281	*Paku Regis*	*Nephrolepis falcata* C. Chr.	Davaliaceae	BHRI-55
282	*Kelu*	*Etlingera elatior* (Jack) R. M. Sm.	Zingiberaceae	II-60
283	*Medang Jambu*	*Nothaphoebe umbelliflora* Bl.	Lauraceae	RKD 20
284	*Medang Sawo*	*Nyssa javanica* Wangerin	Cunnoniaceae	RKJ 12
285	*Telasih Hijau*	*Ocimum basilicum* L.	Lamiaceae	ANS 13
286	*Bayeh*	*Oncosperma horridium* Scheff.	Arecaceae	RKI 52
287	*Menien Kijang*	*Orophea cf. hexandra* Bl.	Annonaceae	DD-03
288	*Kapung*	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	RKC 09
289	*Rumput Serteh*	*Ottochloa nodosa* (Kunth.) Dandy	Poaceae	BHRA-38
290	*Tiruk*	*Palaqium hexandrum* Engl.	Sapotaceae	RKD 27
291	*Pandan singkil*	*Pandanus cf. furcatus* Roxb.	Pandanaceae	BHR 104
292	*Nyeman Tupai*	*Pandanus* sp.	Pandanaceae	RKE 09

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
293	*Jegeh*	*Pandanus sp.1*	Pandanaceae	BHRK-57
294	*Nyeman*	*Pandanus sp.3*	Pandanaceae	BHRA-31
295	Anonim	*Paraphlomis javanica* Prain	Labiatae	RKH 74
296	*Rumput Kinat*	*Paspalum conjugatum* Berg.	Poaceae	BHRA-43
297	Anonim	*Peliosanthes tetta* Andrews	Liliaceae	BHRA-17
298	*Medang Giring*	*Persea cf. rimosa* Zoll. ex Meisn.	Lauraceae	BHRG-66
299	*Rumput Serupo*	*Phyllagathis rotundifolia* (Jack) Bl.	Melastomataceae	RKH 102
300	*Sedukung Anak*	*Phyllanthus urinaria* Wall.	Euphorbiaceae	ANS 48
301	*Kelekap*	*Phymatodes nigrescens* J. Sm.	Polypodiaceae	BHRE-118
302	*To'em*	*Physallis angulata* L.	Solanaceae	ANS 109
303	*Medang Garu*	*Picrasma javanica* Bl.	Simaroubaceae	RKJ 32
304	*Pinang Hutan*	*Pinanga latisecta* Bl.	Arecaceae	BHRG-02
305	*Mpinang*	*Pinanga* sp.	Arecaceae	RKD 303
306	Anonim	*Piper mollissimum* Bl.	Piperaceae	RKG 09
307	*Betang Sirih*	*Piper nigrecens* Miq.	Piperaceae	DD-07
308	*Sirih hantu*	*Piper sp.*	Piperaceae	BHRD-69
309	*Bumbo Hutan*	*Piper umbellatum* L..	Piperaceae	ANS 15
310	*Gelam*	*Planchonella nitida* Dubard	Sapotaceae	RKE 02
311	*Peladang Hutan*	*Plectranthus galeatus* Vahl.	Labiatae	DD 04
312	*Ngelo*	*Plectronia borrida* K. Schum.	Rubiaceae	BHRF-17
313	*Respang*	*Pleomele elliptica* N. E. Brown	Liliaceae	RKD 34
314	*Peladang Abang*	*Pogostemon menthoides* Bl.	Labiatae	ANS 10
315	*Peladang Hutan*	*Pogostemon villosus* Benth.	Lamiaceae	ANS 117
316	*Akar Rundang*	*Poikilospermum suaveolens* (Bl.) Merr.	Cecropiaceae	ANS 26
317	*Kayu Jelatang*	*Polyosma ilicifolia* Bl.	Saxifragaceae	JJ-51
318	*Kerkap*	*Polypodium* sp.	Polypodiaceae	RKF 03
319	*Lengkat*	*Pometia tomentosa* Kurz.	Sapindaceae	RKH 80
320	*Akar Kanis*	*Poulzolzia viminea* Wedd.	Urticaceae	RKK 02
321	Anonim	*Poulzolzia zeylanica* (L.) Benn.	Urticaceae	BHRB-06
322	*Semat Baju*	*Procris cf. pedunculata* Wedd.	Urticaceae	RKG 24
323	*Kayu Seruput*	*Prunus arborea* (Bl.) Kalkm.	Rosaceae	RKE 04
324	*Rukam Air*	*Prunus javanica* Miq.	Rosaceae	BHRD-64
325	*Cakrau Rimbo*	*Psychotria montana* Bl.	Rubiaceae	RKD 58
326	*Akar Gitan*	*Psychotria* sp.	Rubiaceae	RKE 08

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
327	*Bentang Mloro*	*Pterocymbium tubulatum* Pierre	Sterculiaceae	BHRG-111
328	*Bayu*	*Pterospermum javanicum Jungh.*	Sterculiaceae	BHRA-46
329	*Senarahen*	*Pyrenaria serrata* Bl.	Theaceae	BHRI-41
330	*Mentang Cabai*	*Quercus subsericea* A. Camus	Fagaceae	BHRI-11
331	Anonim	*Ranunculus sundaicus* (Baker) Hj. Eichl.	Ranunculaceae	BHRB-05
332	*Mpisang*	*Rhaphidophora oblongifolia* Schott.	Ternstroemiaceae	RKA 1
333	*Asam*	*Rhumex sagittata* Thunb.	Polygonaceae	GG-01
334	*Duri Peringat*	*Rubus moluccanus* L.	Rosaceae	BHRH-50
335	*Inggu*	*Ruta angustifolia* Pers.	Rutaceae	ANS 120
336	*Sentul*	*Sandoricum koetjape* Schott.	Meliaceae	BHRJ-57
337	*Terentang*	*Santiria laevigata* Bl.	Burseraceae	BHRI-9
338	*Kentut*	*Saprosma arboreum* Bl.	Rubiaceae	BHRH-26
339	Anonim	*Saurauia cf. cuspictella* Miq.	Actinidiaceae	RKG 11
340	*Sap'en*	*Saurauia javanica* (Nees) R. D. Hoogland	Actinidiaceae	RKE 11
341	*Sambada*	*Saurauja nudiflora* DC.	Ternstroemiaceae	BHRA-44
342	*Batang Gelam*	*Schefflera elliptica* Harms.	Araliaceae	BHRD-92
343	*Batang sedam*	*Schefflera polybotrya* Koord.	Aralliaceae	BHRH-46
344	*Senehen*	*Schefflera* sp.	Araliaceae	BHRD-01
345	*Buluh tangkal*	*Schizostachyum latifolium* Gamble	Poaceae	BHRK-24
346	*Buluh umpo*	*Schizostachyum sp.1*	Poaceae	BHRK-21
347	*Buluh uwi*	*Schizostachyum sp.2*	Poaceae	BHRK-25
348	*Akar Meresakeng*	*Scindapsus hederaceus* Schott.	Araceae	BHRF-35
349	*Menjiang*	*Scirpus grossus* L. f.	Cyperaceae	BHRK-54
350	*Buku*	*Scirpus mucronatus* L.	Cyperaceae	BHRK-59
351	*Sepiding*	*Scleria purpurascens* Benth.	Cyperaceae	FF-205
352	*Rumput Kudo*	*Selaginela wildenowii* (Desv.) Baker.	Selaginellaceae	BHRA-06
353	*Sergau*	*Selaginella plana* Hieron	Selaginellaceae	RKD 52
354	*Rengas*	*Semecarpus heterophylla* Hook. f.	Anacardiaceae	BHRA-24
355	*Rumput Terbung*	*Setaria plicata* T.Cooke	Poaceae	BHRA-10
356	*Jirak*	*Simplocos fasciculate* Roxb ex.A.DC	Symplocaceae	BHR 123
357	*Terung Rimbang*	*Solanum indicum* L.	Solanaceae	ANS 124
358	*Terung Pandan*	*Solanum melongena* L.	Solanaceae	ANS 71
359	*Pucuk lumai*	*Solanum nigrum*	Solanaceae	DD-200

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
360	*Terung akar*	*Solanum sp*	Solanacea	ANS 128
361	*Langoi*	*Solanum tovum* Sw.	Solanaceae	RKK 10
362	*Mentilin*	*Stauranthera caerulea* Merr.	Gesneriaceae	BHRD-130
363	*Bungkul*	*Stelechocarpus burahol*	Annonaceae	RKI 01
364	*Daun Melantang*	*Sterculia subpeltata* Bl.	Sterculiaceae	FF-201
365	*Saragaten*	*Symplocos adenophylla* Wall.	Symplocaceae	BHRI-01
366	*Medang Timun*	*Symplocos cf. cochinchinensis* S. Moore	Symplocaceae	RKJ 09
367	*Jirak*	*Symplocos fasciculata* Roxb. ex A. DC.	Symplocaceae	RKH 78
368	*Kayu Nuang*	*Symplocos rubiginosa* Wall.	Symplocaceae	RKJ 14
369	*Kopi Rimbo*	*Syzigium leptostemon* (Korth.) Merr. & L.M.Perry	Myrtaceae	BHRF-51
370	*Kelat*	*Syzigium lineatum* (DC.) Merr. & L.M.Perry	Myrtaceae	RKG 44
371	*Ubo Serai*	*Syzigium polyanthum* Miq.	Myrtaceae	BB-04
372	*Mentang Keladi*	Syzygium acutangulum *Nied.*	Myrtaceae	BHRI-18
373	*Jambu Kelawar*	*Syzygium claviflorum (Roxb) Wall. ex Steud*	Myrtaceae	BHRH-33
374	*Sepah*	*Syzygium fastigiatum* (Bl.) Merr. & L.M.Perry.	Myrtaceae	BHRI-24
375	*Kayu Kaliki*	*Syzygium lineatum* (DC.) Merr. & L.M.Perry	Myrtaceae	BHRI-40
376	*Tuba Serai*	*Syzygium polyanthum* Miq.	Myrtaceae	FF-06
377	*Juo*	*Syzygium sp.*	Myrtaceae	BHRF-86
378	*Kayu Bawang*	*Syzygium zeylanicum* DC.	Myrtaceae	RKH 79
379	*Bungo Cempako*	*Talauma candollii* Bl.	Magnoliaceae	RKF 07
380	*Cupak*	*Ternstroemia coriacea* Wall.	Theaceae	BHRI-62
381	Anonim	*Tetrastigma leucostaphylum* (Dennst.) A.Alston	Vitaceae	BHRA-18
382	*Akar Dauk*	*Tinomiscium phytocrenoides* Kurz.ex Teijsm. & Binn.	Menispermaceae	BHRG-25
383	*Surian Bungkal*	*Toona sinensis* (A.Juss.) M.Roem	Meliaceae	BB-15
384	*Surian Rimbo*	*Toona sureni* (Blume) Merr.	Meliaceae	BB-16
385	*Narung*	*Trema orientalis Bl.*	Ulmaceae	FF-05
386	*Jelapak*	*Trevesia sundaica* Miq.	Aralliaceae	RKK 23
387	*Nilau*	*Trichospermum javanicum* Bl.	Tiliaceae	RKI 08
388	*Biung*	*Turpinia sphaerocarpa* Hassk.	Staphyllaceae	RKD 50
389	*Gambir*	*Uncaria gambier* Roxb.	Rubiaceae	BB-17
390	*Akar kait*	*Uncaria glabrata* DC.	Rubiaceae	RKE 07
391	*Cupak Hutan*	Unidentified		RKI 50

Table A.28. (Continued) Vouchers of Identified Plants Specimens

No	Vernacular Name	Scientific Name	Family	Voucher Code
392	*Elang*	Unidentified		RKB 02
393	*Kayu Lidi*	Unidentified		BHRI-46
394	*Kayu Panjat*	Unidentified		RKG 51
395	*Kayu Salak*	Unidentified		BHRG-39
396	*Merpau*	Unidentified		RKI 51
397	*Peladas*	Unidentified		RKD 101
398	*Umbai*	Unidentified		BHRK-56
399	Anonim	Unidentified		BHRB-08
400	Anonim	Unidentified		BHRB-09
401	Anonim	Unidentified		BHRB-13
402	Anonim	Unidentified		BHRB-03
403	*Kayu Panjut*	*Urophyllum corymbosum* Korth.	Rubiaceae	RKG 51
404	*Spok'eng*	*Vernonia arborea* Buch- Hams.	Asteraceae	FF-110
405	Anonim	*Viburnum lutescens* Bl.	Urticaceae	RKG 04
406	*Molaseten*	*Villebrunea rubescens* Bl.	Urticaceae	BHRA-35
407	*Tirih*	*Vitex quinata* (Louis) F. N. Will.	Verbenaceae	BHRG-115
408	*Kayu Timah*	*Vitex trifolia* L.	Lamiaceae	ANS 01
409	*Kayu Kunyit*	*Xanthophyllum affine* Korth.	Polygalaceae	BHRI-35
410	*Kunyit Melai*	*Zingiber purpureum* Rosc.	Zingiberaceae	GG-10
411	*Nalam nasi*	*Zingiber sp.*	Zingiberaceae	BHRA-39
412	*Keloyang Besi*	*Ziziphus horsfieldii* Bl.	Rhamnaceae	RKJ 22

Table A.29. The Development of Conservation Area in Indonesia (2003-2005)

Conservation Area	**Number**			**Acreage (ha)**		
	2003	**2004**	**2005**	**2003**	**2004**	**2005**
Terrestrial:						
Nature reserve	214	219	241	4,463,399	4,332,259	4,524,849
Wild animal reserve	63	69	71	4,875,576	5,120,647	5,004,630
National Park	35	43	43	11,368,829	12,401,949	12,330,205
Tourism park	104	100	105	442,050	358,932	271,225
Grand forest	17	17	21	334,605	274,899	347,427
Hunting ground	14	14	14	225,993	225,993	224,816
Sub Total	447	462	495	21,710,452	22,714,679	22,703,151
Marine:						
Nature Reserve	9	9	8	216,555	216,555	404,080
Wild animal reserve	6	7	5	71,310	342,940	337,750
National Park	6	7	7	3,680,936	4,045,049	4,045,049
Tourism park	18	17	19	765,762	765,482	770,121
Sub Total	39	40	39	4,734,564	5,370,026	5,556,999
Total	486	502	534	26,445,016	28,084,706	28,260,151

Source: Directorate General of Nature conservation and Forest Protection, Ministry of Forestry (2006)

Table A.30. Terrestrial and Marine National Parks in Indonesia

No	National Park	Island	Acreage (Ha)	official establishment
1	Gunung Leuser	Sumatra	1,094,692	1997
2	Batang Gadis	Sumatra	108,000	2004
3	Siberut	Sumatra	190,500	1993
4	Bukit Tiga Puluh	Sumatra	144,223	2002
5	Tesso Nilo	Sumatra	38,576	2004
6	Kerinci Seblat	Sumatra	1,389,510	1999
7	Berbak	Sumatra	150,982	1992
8	Bukit Duabelas	Sumatra	60,500	2000
9	Sungai Sembilang	Sumatra	202,896	2003
10	Bukit Barisan Selatan	Sumatra	355,511	1982
11	Way Kambas	Sumatra	125,621	1999
12	Ujung Kulon	Java	120,551	1992
13	Gunung Halimun-Salak	Java	113,357	2003
14	Gunung Gede Pangrango	Java	21,975	2003
15	Gunung Ciremai	Java	15,500	2004
16	Gunung Merbabu	Java	5,725	2004
17	Merapi	Java	6,410	2004
18	Bromo Tengger Semeru	Java	50,276	1997
19	Meru Betiri	Java	58,000	1997
20	Baluran	Java	25,000	1997
21	Alas Purwo	Java	43,420	1993
22	Bali Barat	Bali	19,003	1995
23	Gunung Rinjani	Nusa Tenggara	41,330	1997
24	Manupeu-Tana Daru	Nusa Tenggara	87,984	1998
25	Laiwangi-Wanggameti	Nusa Tenggara	47,014	1998
26	Komodo	Nusa Tenggara	132,572	2000
27	Kelimutu	Nusa Tenggara	5,357	1997
28	Gunung Palung	Kalimantan	90,000	1990
29	Bukit Baka-Bukit Raya	Kalimantan	181,090	1992
30	Sebangau	Kalimantan	568,700	2004
31	Betung Kerihun	Kalimantan	800,000	1999
32	Danau Sentarum	Kalimantan	132,000	1999
33	Tanjung Putting	Kalimantan	415,040	1996
34	Kutai	Kalimantan	198,629	1995
35	Kayan Mentarang	Kalimantan	1,360,500	1996

Table A.30. (Continued) Terrestrial and Marine National Parks in Indonesia

No	National Park	Island	Acreage (Ha)	official establishment
36	Bogani Nani Wartabone	Sulawesi	287,115	1992
37	Lore Lindu	Sulawesi	217,991	1999
38	Bantimurung-Bulusaraung	Sulawesi	43,750	2004
39	Rawa Aopa Watumohai	Sulawesi	105,194	1990
40	Manusela	Maluku	189,000	1982
41	Aketajawe-Lolobata	Maluku	167,300	2004
42	Lorentz	Papua	2,505,600	1997
43	Wasur	Papua	413,810	1997
44	Kep. Seribu	Java	107,489	2002
45	Kep. Karimun Jawa	Java	111,625	2001
46	Bunaken	Sulawesi	89,065	1991
47	Kepulauan Togean	Sulawesi	362,605	2004
48	Taka Bone Rate	Sulawesi	530,765	2001
49	Kepulauan Wakatobi	Sulawesi	1,390,000	2002
50	Cenderawasih	Papua	1,453,500	2002
	TOTAL		16,375,253	

Source: Directorate General of Nature Conservation and Forest Protection, Ministry of Forestry (2006)

GLOSSARY

Adat:	local customary system
Ajum arah:	a ritual of advising a new couple on various aspects associated with initiating married life, particularly in obtaining a piece of farmland
Bilik:	rice barn, usually made from bamboo or timber
Blukar mudo:	young secondary forest (*rapohen)*, usually between 4 and 10 years old
Blukar tuo:	old secondary forest (*rapohen*), usually more than 10 year old
Buyang:	the largest-size *kiding* (bamboo woven container)
Depati:	a title for a customary leader
Desa:	village
Dukun:	*orang tuo* who is specialist in practicing traditional healing
Dusun:	(small) village, this term is used interchangeably with *desa*
Galeh panting:	a kind of traditional bamboo basket to carry heavy goods on one's back
Gantang:	a local measurement unit; roughly equal to 2.5 kg.
Jambu kalko :	a number of locally important perennial fruits and beans such as durian (*Durio zibethinus* Murr.), and *petai* (*Parkia speciosa* Haask.). Some people use a term of *jambak jambu kalko*.
Jin:	supernatural being
Kalbu:	sub-clan of a level greater than the *marga*
Kasam:	a sour-tasting fermented food
Kenduri:	a feast
Kenduri psko:	an annual cultural festival or a festival after the annual rice harvest
Kepala desa:	official village leader

Kiding: a multipurpose bamboo woven container

Larangan: a level of taboo that proscribes people from performing certain practices and/or behavior on particular times and/or sites.

Marga: a sub clan or family lineage. This term also refers to a loose alliance of villages inhabited by the sub clan or lineages

Melambeh: a tradition of clearing a small plot about 100 m^2 before initiating shifting cultivation in old-growth forest (*rimbo gano*)

Orang gunung: literally, "the mountain people"; in Serampas the term refers to spirits or mythological creatures

Orang tuo: This term literally mean an elder. However, Serampas also commonly use the term to refer shaman and other people who are knowledgeable about local rituals and traditions. Serampas also frequently use the term *dukun* to refer to an *orang tuo* who is specialist in practicing traditional healing

Padang kulit: cinnamon agroforest

Pamuncak: historically the lowest level of government representative in the marga system

Pangkal tahun: a session of *kenduri psko* to discuss farming and other associated issues.

Pantangan: a level of taboo that persuades people to avoid certain practices and or behavior at particular times and/or sites. The term *pantangan* is frequently combined with *larangan (pantangan dan larangan)* to refer to some practices and/or behave that are not only avoided but also prohibited

Pasirah: head of a *marga*, sometimes used interchangeably wit *pamuncak*

Pelak: a patchy small garden in an area separated from home but close by the village, mostly consisting of vegetable and spices

Piagam: a document of royal edict

Pinang: betel nut (*Areca catechu* L.)

Pinang-sirih: a quid of betel for chewing, consisting of betel nut, betel pepper leaf, gambir (*Uncaria gambir* Roxb.), lime, and a piece of tobacco

Pondok:	bamboo hut, usually erected in upland rice farms
Poyang:	supernatural beings as representation of people's ancestors
Pusako:	village heirloom
Rapohen:	secondary forests
Rimbo gano:	old-growth forests
Rimbo:	literally, "forest"; for this dissertation, this term refers to old-growth forest and/or customary forest
Rumah gedang:	village hall
Sandang:	the smallest sized *kiding* (bamboo woven container)
Sangkan:	a piece of cleared land originating from old-growth forest (*rimbo gano*) that has been cleared but allowed to fallow without ever cultivating any single crop on the land, that has regrown into secondary forest
Sawah:	irrigated rice field
Serawai:	small ornamented *kiding*
Stambuk:	written customary document
Tapan:	medium-sized *kiding*
Tengganai:	a male representative of an extended family (usually the elder)
Ulu aye/ayi:	the earlier term of hutan adat (customary forest)
Umo:	upland rice farm (rice-based shifting cultivation field)
Uras:	a package of plants used for certain cultural rituals

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