THE ROLE OF INDIGENOUS KNOWLEDGE IN COMMUNITY FOREST MANAGEMENT. CASE STUDY OF THE KOKE CHANTANANG FOREST COMMUNITY, SA KAEO PROVINCE, THAILAND

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ABSTRACT

Although indigenous knowledge has been widely documented in sustainable natural resource management, a growing gap remains between forest utilization knowledge and its application in the sustainability of community forest. This research focuses on the identification of the role of indigenous knowledge in community forest management among the Koke Chantanang communities of Thailand. The methods used include (1) a household survey using purposive sampling to gather information on the socio-economic characteristics of the villages and their utilization pattern; (2) in-depth interviews with key informants to identify the different types of knowledge applied in forest management and how this knowledge contributes to institutional building, forest protection, income generation and social mobilization; (3) participant observation to identify and obtain a full understanding of the utilization practices and forest utilization measures taken into consideration.

Results from one- way ANOVA shows that socio-economic factors that have had significant influence on indigenous knowledge include age, gender, and education status. It was also found that the indigenous people apply different types of knowledge in the utilization of forest resources based on the type of forest resources present. It also reveals that people have much concern for forest resource conservation. This research concludes that in resolving the livelihood issues of indigenous communities from forestry, indigenous knowledge rather than short term incentives plays an important role because it directly addresses aspects of biodiversity conservation and forest protection producing environmentally sustainable and socially equitable outcomes.

KEY WORDS: INDIGENOUS KNOWLEDGE/ COMMUNITY FOREST/ KOKE CHANTANANG/ SUSTAINABILITY/ THAILAND

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LIST OF ABBREVIATIONS

CBD	Convention on Biological Diversity
CIFOR	Centre for International Forest Research
FAO	Food and Agriculture Organization
ICESAR	International Covenant on Economic, Social and Cultural Rights
IK	Indigenous Knowledge
ILO	International Labor Organization
IUCN	World Conservation Union
LINKS	Local Indigenous Knowledge Systems
MPFT	Multipurpose Fodder Trees
NTFP	Non-Timber Forest Products
RECOFTC	Regional community Forest Training Centre
RFD	Royal Forest Department
TCSSP	Thailand Collaborative Country Support Programme
UDHR	Universal Declaration of Human Rights
UNDP	United Nations Development Program
UNICCPR	United Nations International Covenant on Civil and Political Rights
WDR	World Development Report

CHAPTER I
INTRODUCTION

1.1 Background and Justification

The international agenda on the state of the world's future has captured much interest about the issue of sustainability. Thus the global initiative of sustainable development, coined as the economic development that meets the needs of the present generation without compromising the ability of the future generations to meet their own needs, has been a moving target (Howell et al, 2008). This has however captured the interest and imagination of both the public and the policy makers. Today, many governments around the world are now seeking to achieve an optimal balance between environmental management, economic development and social values while meeting the needs of society on a sustainable basis (Davey et al., 2003).

In the forestry sector, adopting sustainable development in forestry means broadening our overarching goal, from sustainable yields to healthy ecosystems. This implies that societies have to maintain as well as enhance the long term health of the forest for the benefits of all living things, both nationally and globally while providing environmental, economic, social and cultural opportunities for the benefit of present and future generations. This implies that, forests should be regarded as part of a cultural landscape complex that includes indigenous societies as integral components, meeting their livelihood needs from forest based resources around (Ramakrishnan, 2001).

Numerous studies have left little doubt that the forest and forest products contribute to the well-being of the very survival of millions of poor rural households (Anold, 2002). Recent studies have even gone further by demonstrating how products from the forest clearly make a difference to the welfare of the most marginalized sectors of the community, delivering a range of financial and non-financial benefits (Shakleton et al, 2008). However, main issues typically attached to these benefits is that of the over harvesting of forest resources. The impacts of over-harvesting on forest products such as non-timber forest products on sustainability have received

considerable attention (Tickten et al, 2006, Peres et al, 2003, Endres et al, 2006). This has been found to be related to logging, deforestation and degradation. According to Bearer et al, (2008) timber and non timber such as fuel wood harvesting has dramatically reduced the total amount of forestland around the world. This therefore exposes the issue of utilization ethics and creates the question of whether there exist utilization ethics within local communities on the harvesting of forest products. Hence with the continued decline in quality and quantity of the forest, many attentions are now focusing on the management approach.

The indigenous forest management system in the past is being characterized by intensive burning for agricultural activities, cutting for timber and livestock grazing. Researchers such as Hermosillo, (2000) posited that the underlying causes of forest decline (deforestation and degradation) originate in some of the most basic features of society, such as the distribution of economic and political power, attitudes towards corruption, population growth, and flaws in the market system. Apart from the above mentioned causes, government intervention has been cited as another major influence of forest resource decline in many countries (Benhin, 2006). Many failures have therefore been experienced in the past management approach and as a call to this shift in paradigm, recent attention addresses the system transformation to a more social oriented approach with the involvement of communities, as well as attempts to find alternatives to these traditional systems through a participatory approach (Guatam et al, 2004: Michon et al, 2008). Participatory modes of development, in general and community-based forest management in particular, have been found to be widely accepted as a better alternative to traditional management paradigms, which have been discredited for being too expert-driven, centrally planned, and essentially top-down with strong adherence to principles of rationality.

In the ongoing context of theoretical debate on the role of community forestry to improve on livelihoods, Fometer and Vermaat, (2001) and Brown et al, (2002) strongly argue that community forest management does not have the potential to contribute positively to livelihoods and poverty alleviation, but what is typically important here is that, devolution of forest management authority to local communities on the one hand, has been identified as the best approach that provides a good opportunity to improve the living standards of the poor (Tanvir et al,2007). This is

chiefly because it allows for the full control and participation of communities in forest management activities.

Considering the many humanitarian issues associated with forestry, present concerns on the issue of community forest management revolve around how the indigenous people who make up these communities can enhance their livelihoods through the utilization of forests. While critics argue that the potential of the knowledge of these people in the management of natural resource is often seen as useless let alone underestimated, it has been very much tested and proven that indigenous knowledge plays a major part in natural resource management, improving livelihoods, enhancing a sound environment and contributing to the conservation of biological diversity.

This research is a continuation of the implementation of article [1]8(j) on the Convention of Biological Diversity. This research seeks to show that the local people poses a body of knowledge described here as the knowledge of utilization or "utilization knowledge" and that the people have an ethical code narrowed down as "utilization ethics" central to the sustainable management (utilization) of their community forest. This research argues that, in resolving the livelihood issues of local communities from forestry, indigenous knowledge rather than flash incentives plays an important role because it directly addresses aspects of biodiversity conservation and forest protection producing environmentally sustainable and socially equitable outcomes.

1.2 Statement of the problem

Much of the current day literatures have focused on the destructive aspects of the forest (Griffiths, 2005; Brookhaven, 1996). These destructive aspects have been identified as based on human dimensions which take different forms such as the quest for food and or living space. Although the developed nations currently face a high rate of illegal logging as well as deforestation, the situation is made even worse in the

[1] Article 8(j) of the Convention of biological diversity encourages the study of indigenous knowledge in promoting community base natural resource management.

developing countries where illegal logging estimates have been found to exceed legal harvesting rates. Forest fragmentation, the felling of trees for timber, firewood and building pole collection, uncontrolled fires, forest clearance for subsistence have been some of the major forest disturbance in developing countries.

Thailand is one of the developing nations currently facing major threats in the forest. The recent economic development in Thailand has been achieved at the expense of the environment and natural resources. Rapid population growth and economic development have put substantial pressure on Thailand's forest resources (Nalampoon, 2003). According to the FAO (2007), the total area of forest is estimated to be about 14,520,000ha, of which 28.4% of this consists of land area (FAO, 2007). Most of Thailand's primary forest is gone and only an estimated 6,451,000ha and secondary forest only covers about 20% of the land area. Despite the nation- wide ban on rainforest cutting in 1988, one of the major threats facing this forest is illegal logging. In 1991, the government revised the National Forest Policy within the framework of the National Social and Economic Development Plan (NSEDP) to set a 50 percent forest cover target of which 25 percent was considered as conservation forest and 15 percent production forest (FAO, 2003).

However, with the current rate of destruction occurring in the forest, the government of Thailand has restructured the forest management system with much emphasis on policy instrument on forest utilization. Therefore, the plan as stipulated in the National Reforestation Policy and contained in the National Forestry Policy Review recognizes the rights of the people to manage natural resources (Nalampoon, 2003). Within this framework, the Community Forest Bill has been considered by the parliament with the major objective to allocate forestlands to local communities to be managed by local people to suit their own needs. Community forest management therefore has been realized by the government as a way to address the issue of forest destruction while enhancing a sustainable environment.

With the National Economic and Social Development, there has been a reawakening by the Thai government which has solely used community forestry as a strategy to develop the forest resources with the institution of a Community Forest

Development Project. A studies by Salam et al (2006) on community forest management in Thailand shows that, community members are highly motivated and are much interested to protect trees because they are well aware that their livelihoods are under threat from depleting forests and that their tradition and culture are most related with nature. However, a major element that plays a role to the management of community forest is the knowledge of the indigenous people. Indigenous knowledge is increasingly being shown to provide important lessons and tools in the search for new conservation approaches (IUCN, 2006). Such knowledge and practices play an important role in biodiversity management and conservation.

Several studies have been carried out in which indigenous knowledge integration into resource management took different paths such as using traditional management rules as a framework, using value maps to adapt practices in time and space or by a zoning process that divides the land into areas in which different land uses are emphasized. However, little has been documented about the role that indigenous knowledge plays in community forest management. Despite the growing concerns for the protection of indigenous knowledge as highlighted by the Universal Declaration of Human Rights, the Convention on Biological Diversity, the draft United Nations Declaration on the Rights of Indigenous Peoples, the International Labor Organization Convention No. 168 and the International Covenant on Economic, Social and Cultural Rights (ICESAR), major problems arise from the management of natural resources due to the marginalization of indigenous communities, the neglect of their knowledge and the underestimation of their role in conservation.

Therefore, the problem with indigenous knowledge which forms the basis of this thesis is that, with the continuous underestimation of this knowledge, the role in which this knowledge plays in natural resource management which was the core of the Rio Declaration in 1992 and particularly the contribution of this knowledge in the management of community forest will hardly be understood. It therefore draws from different dimensions on the types of indigenous knowledge and the contribution of this knowledge to forest management and will be applicable especially when handling community forest issues.

1.3 Significance of the study

Community forestry has been a major underpinning for many development agencies for decades now, and particular emphasis on participatory development has been the focus of treaties produced by the Food and Agriculture Organization since the late 1970s. With the popularization of the concept of sustainable development typical referred to as the Bruntland Commission and a consequent strengthening by other conventions such as the Rio Summit of 1992, The World Bank, United Nations Development Programme, the Regional Community Forest Training centre and the Centre for International Forest Research, community resource management has been the main focus of the international agenda, with an unprecedented push on the decision making process..

However, with many efforts to improve community resource management, billions of dollars have been spent over the past years on research and development programs. Unfortunately, most of the research has not been very successful and often characterized by many problems. One of the major problems emanated from the fact that planners and decision makers do not collaborate with the people who are directly related with implemented projects. They underestimate the capabilities and inputs of the communities that have been managing these resources for centuries. Thus the idea that indigenous people are a step behind has often been the issue in decision making. Hence with the failures arising from development programs, planners are now trying to take a critical look at the grounds on which developments projects have often been carried out. Trying to create a more sustainable system of natural resource management has brought in the assertion that there is still more to be done in order to incorporate indigenous knowledge and the participation of communities in management initiatives (Scoones and Thompson, 1994: Barrow, 1990). This is because of its merits which are; firstly the designation of interventions that are welcome by many cultures, secondly to preserve indigenous knowledge and the skills relevant for development and lastly to ensure the proper control of resources by the indigenous populations.

Hence in the last few decades, the knowledge of indigenous communities has become a subject of considerable interest to planners and development practitioners (Warren, 1999; Dewalt, 1999). In the present day, research in indigenous knowledge

has been the core and even taken a multidisciplinary dimension and emphasizing on the bottom up approach. The reason to this can be explained by the fact that, indigenous knowledge is an alternative to the top down natural resource management approach (Kiptot, 2007). Hence the fact that there are many indigenous movements illustrates the importance of indigenous knowledge in the sustainable management of natural resources worldwide

Therefore this research intends to add to the already existing knowledge on the application of indigenous knowledge in biodiversity management, by drawing the contribution of this knowledge to community forest management. It also aimed at giving an answer to the IUCN questions of 1997 which are; how are the people and how is the ecosystem? Thus answers to these two questions will be addressed within the framework of the community in study and the forest ecosystem around them.

The very significance of this research is on the way the people of three communities namely Nong Pak Bung, Potong and Nong Mak apply their knowledge collaboratively to manage the forest. This is considered to be important because previous studies on ethnography have always concentrated on a single village or community. Very little attention has been paid to the collaborative effects of many communities involved in the management of community forest resources. This thesis thus seeks to identify the conditions under which the management of a single community forest is carried out by three villages and how they are able to apply their knowledge in the successful management of their forest.

1.4 Objectives of the study

1- To identify the different factors that contribute to indigenous knowledge of community forest management

2- To identify the forest utilization practices carried out in the community managed forest.

3- To identify and analyze the types of indigenous knowledge and the contributions to community forest management.

1.5 Research questions

This research considers the role of indigenous knowledge in community forest management. Its purpose is to strengthen indigenous knowledge, its capacity and capability to play a leading role in community forest management. In a bit to achieve this purpose, this research straightly puts the question that; **Can indigenous knowledge contribute to the sustainability of community forest management? If so;**

1- What factors and to what extend do they influence the indigenous knowledge of community forest management?

2- What are the types of forest utilization practices carried out in a community managed forest?

3- What are the different types of indigenous knowledge and how do they contribute to the sustainability of community forest?

1.6 Hypothesis

Community forest management is characterized by a number of different forest utilization practices. While working to meet the objectives of this research a series of hypothesis are considered. These hypotheses can be outlined as follows;

1) Ho:

1.6.1 The elderly people having lived for long have a better knowledge about community forest management than the younger people.

1.6.2 The men have a better knowledge on community forest management than the women.

1.6.3The married people who can share their experiences with husbands or wives have a better knowledge of community forest management than the unmarried people.

1.6.4 The level of education can also influence the indigenous knowledge of an individual, thus the more educated people have better knowledge of forest management.

1.6.5 The inhabitants who have lived in the village for so long while have better knowledge of community forest management than those settled for only a short period.

1.6.6 Those involved in activities related to forest utilization and management have a better knowledge on forest management than those not involved in forest harvesting activities.

1.9.7 People who have experience working outside have been used to different utilization options and thus have better knowledge on community forest management than people with no outside working experience.

1.6.8 People who have been using the forest for a long period of time have a better knowledge of forest management

1.6.9 Those people who have been getting information about forest management have a better knowledge that those with no information.

1.6.19Due to difference in geographical location, different villages will have different knowledge utilization.

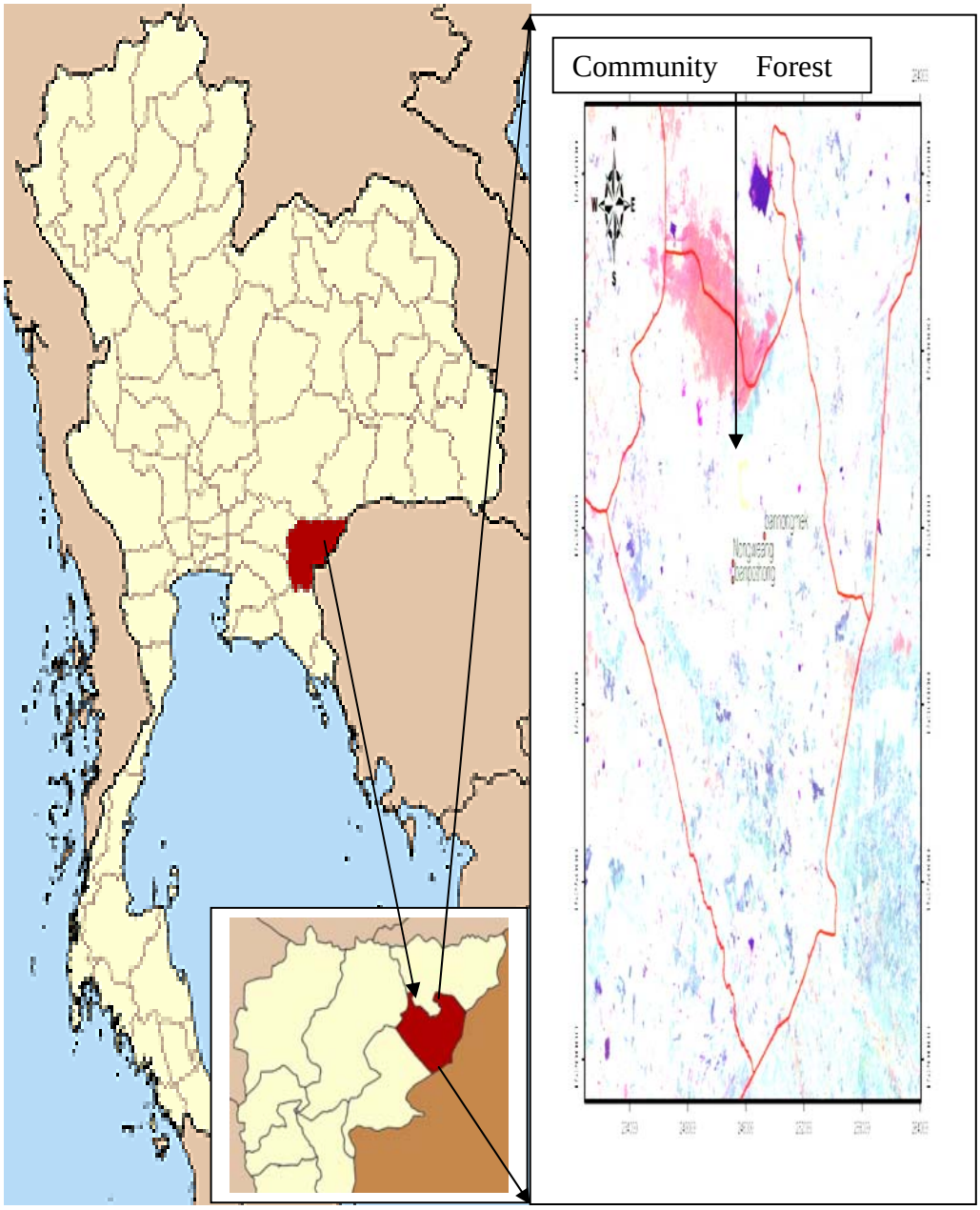
2) **H_0:** knowledge of forest utilization practices has an influence on indigenous knowledge of forest management.

3) **H_0**: The types of indigenous knowledge of community forest management have an influence on forest conservation.

1.7 Description of the research area

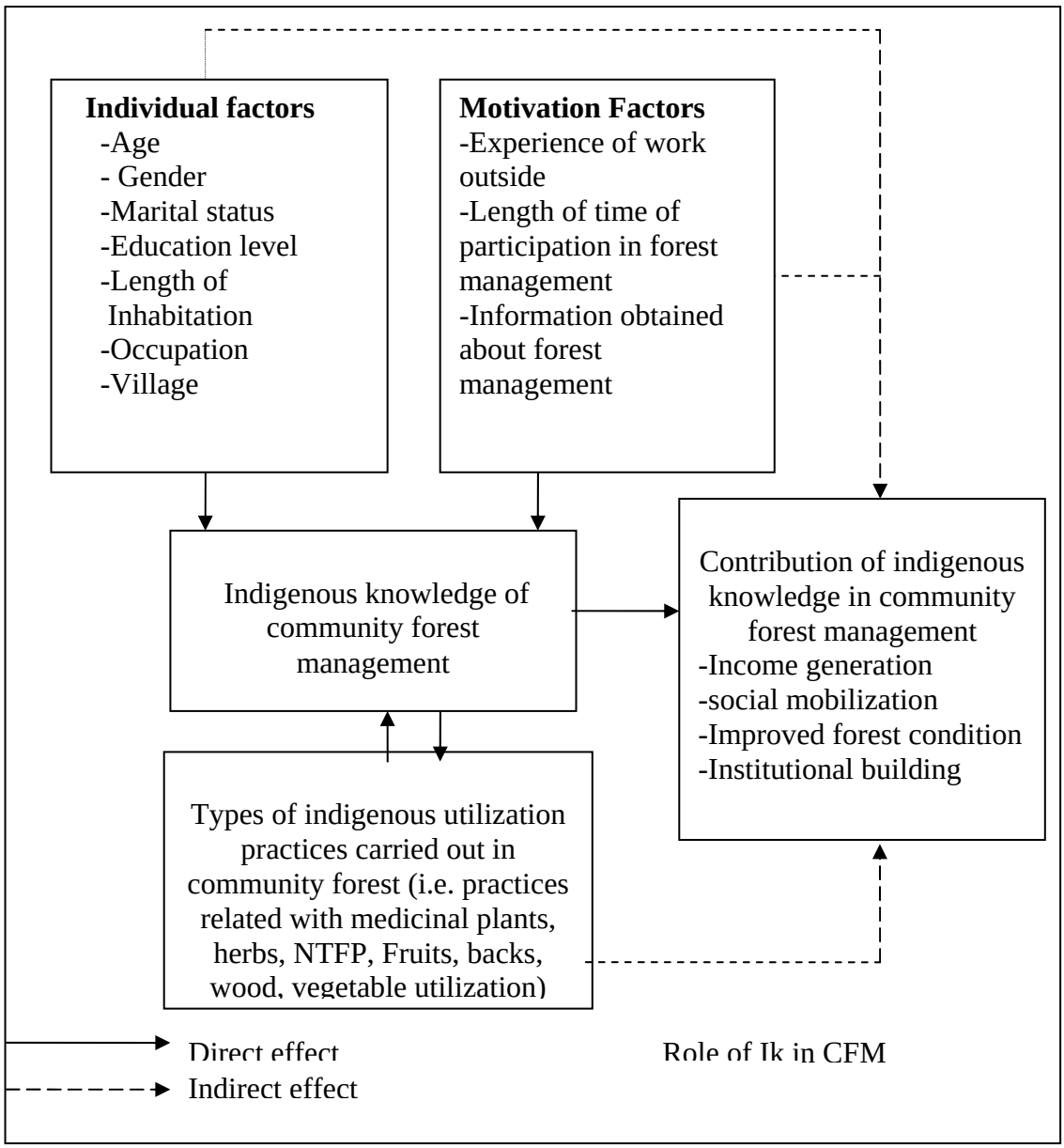
This research emphasizes on the role of indigenous knowledge in community forest management. The research covers three villages namely Potong (Moo10), Nong Mak (M002) and Nong Pak Bung (M008). These three villages are neighboring villages in Koke Sung district Nong Wang sub-district, Sa Kaeo Province in the North Eastern part of Thailand. These villages are situated between slightly different geographical coordinates which are respectively; 48P0244696 UTM 1533983, 48P0244674 UTM1533530 and 48P0247939 UTM 1534774 for Nong Pak Bung, Nong Mak and Potong (RFD, 2007).

Just like location, the socio-economics of these three villages is also variable. Nong Pak Bung village has a total population of about 199 households with a total population of about 683 people, 330 of them male and 353 female. Potong Village has a total of 126 households and a total population 593 people, made up of 277 men and 316 women. Nong Mak village has 174 households and a total population of 875 people of which, 435 are male and 440 are female. The location of these three villages entitles them to a characteristic similar occupation. The major occupation of these villages is agriculture or farming, while the people are also involved in minor activities such as gardening particularly vegetables and livestock rearing. The average annual income of these three villages range from 22,000-25000 Baht for Nong Pak Bung, 23,000-25,000Baht for Potong and 30,000-35,000 Baht for Nong Mak (RFD, 2007)



Map of Thailand (left) showing Sa Kaeo province (red). The three villages under study and the community forest (right) are shown on the Land sat image. The land sat image was adopted from Royal forest Department (2007)

1.8 Conceptual Framework



Conceptual Framework of this research

Indigenous people have been understood to possess knowledge that is necessary in resource management. In the context of forest management, the knowledge possessed by the indigenous people applied in community forest management, depends on many factors. Factors that are assumed to influence the type of knowledge of an individual which could be personal or motivation factors. The

personal factors assumed include the age of the individual, the gender of the individual, educational level, and length of inhabitation, income status and income. On the other hand, the motivation factors are assumed to be the experience of working outside, importance of forest product to the individual, the length of time of participation of in forest management.

On the other hand the knowledge of an individual applied in community forest management depends on the types of forest management practiced in which the individual is involved in managing the forest. Hence both the factors (personal and motivation) as well as types of indigenous forest practices are assumed to have a direct effect on the knowledge of community forest management. The knowledge in community forest management directly affects the role of indigenous knowledge in community forest management, while factors that contribute to indigenous knowledge and types of indigenous practices are suggested to have an indirect effect on the role of indigenous knowledge in community forest management. Hence the contribution of these aspects will determine the role of indigenous knowledge in community forest management.

1.9 Expected outcome

In this thesis, the expected outcome is the key aspect. This will solely be related with meeting the objectives of this thesis. Thus at the end of this thesis it is expected that the variation of different factors and their role in influencing the knowledge of indigenous people, the different indigenous practices in the utilization of the community forest in the study area will be exposed and the impacts of indigenous knowledge especially to participatory forest (with three villages using the same forest) management will be documented.

Two important gaps that this thesis seeks to cover is to examine whether indigenous communities actually possess a utilization ethics or they are driven by the general environmental out cry of forest conservation described as environmental ethics. Secondly, this research will also uncover whether every community member possess the forest utilization ethics. This thesis will finally make suggested recommendations in decision making process with respect to indigenous communities.

1.10 Definition of terms

Indigenous Knowledge;

This refers to traditional or local knowledge of the indigenous people that is applied in forest utilization and management. In this research, indigenous knowledge refers to the knowledge gathered during the period of time of forest utilization.

Utilization Ethics;

The code of conduct that controls the utilization of forest product in a particular community or by an individual.

Environmental Ethics:

The moral relationship of human beings to, and also the value and moral status of the environment and its nonhuman contents.

Forest Utilization Knowledge

The knowledge that regulates the pattern in which the traditional communities use and manage their forest resources. This includes the knowledge applied collection and involves the amount harvested, periods harvested and types of resources harvested.

Utilization Pattern

The pattern of collecting forest products or resources including the techniques, tools, type of products and size of the products, the frequency and seasonal timing of forest resource collection

Community Forest

An area of forest that is designated to a community in which control and management is a responsibility of that community and performed by the individuals of that community.

Community

A body of individuals who have a sense of common identity, who may share geographical, political religious or social similarities (Slack, 1998)

Sustainable Forestry

The care and use of forest and forest land in a way and at a rate that maintains all the animals and human capacity and human values for now and the future. Or, the practice of forestry in a manner that meets the needs of the present without jeopardizing the ability of the future to meet their own needs

Livelihoods

It comprises the activities, the assets and access that jointly determine the living gained by an individual or household (Ellis, 2000)

Forest Fragmentation

The process in which a forest is broken in to small islands of mature stand within a landscape of younger stands.

CHAPTER II
LITERATURE REVIEW

Introduction

This chapter covers the necessary literature related with this research. The main literature review involves different theories and definitions related to role, indigenous knowledge and community forest management. The chapter begins by giving a meaning of role as used in this thesis and revisiting some theories associated with role in general. Indigenous knowledge constitutes an important aspect in this thesis and thus the chapter places much importance in describing relevant concept of indigenous knowledge. Knowledge in general has been handled and transmission of knowledge from i.e. tacit to explicit knowledge which is a major underpinning of present day societies is highlighted. Indigenous knowledge has been contrasted with the so called western or scientific knowledge to expose the strength of indigenous knowledge in present day sustainable development.

Indigenous knowledge has therefore been described in relation to culture, its transmission, its importance, the belief systems and religion and the loss of this natural treasure. A picture of indigenous people is also given in this chapter. The last part of this chapter looks at the forest biodiversity and management. In effect, forest have been regard as a natural asset that could help change the lives of people and contribute immensely to achieving sustainable livelihoods. Various definitions therefore which constitute a major controversy within the ecologists as well as policy makers have been reviewed.

2.1Role types

The role described here is used as defined by the role of indigenous knowledge. Due to the complexity in giving a broader definition of role, this research pays attention to basic principles and concept of role and minor theories as well. Many definitions arise in consideration of role itself and often regarded differently by

different authors. Sarbin, (1954) defines role as a patterned sequence of learned actions or deeds performed by someone or something during interaction. Bates and Harvey, (1975) puts it as a comprehensive pattern of behavior and attitude. It is a normative expectation associated with a position within a social system (Allan and Van De Vliert, 1979), while Turner, (1979) defines role as a comprehensive pattern of behavior and attitude. That notwithstanding, role can either be performed or perceived. The rights and responsibilities which regulates the functions of people is said to be ideal role while and action practiced due to position is described as performed role and perceived role is one that is carried out by someone due to his responsibilities.

2.2 Knowledge system

2.2.1 Defining knowledge

Generally speaking, the definition of knowledge is such that it is hard to uncover since it is a point of debate among philosophers within the area of epistemology. The classical definition as proposed by [1]Pluto which has it that for there to be knowledge at least three criteria must be fulfilled that is in order to be counted as knowledge, a statement must be (i) justified**,**(ii**)** true and (iii**)** believed leading to what is known as the JBT account. However this gives rise to many controversies and to what is referred as the "Guttier problem" in which Gettier (1963) argues that, justified, truth and believe is not at all considered to be knowledge. He strongly argue that there are cases of beliefs that are both true and justified therefore satisfying all three conditions for knowledge on the JTB account, but that do not appear to be genuine cases of knowledge. Guttier therefore, argued that his counterexamples show that the JTB account of knowledge is false and thus, that a different conceptual analysis is needed to correctly track what we mean by "knowledge". However, this thesis does not intend to focus on the controversies but to give a simple picture of knowledge by revisiting some of the current definitions.

[1] In Plato's *Theaetetus*, Socrates and Theaetetus discuss three definitions of *knowledge*: knowledge as nothing but perception, knowledge as true judgment, and, finally, knowledge as a true judgment with an account. Each of these definitions is shown to be unsatisfactory.

According to the Oxford English dictionary, knowledge is defined variously as (I) expertise, and skills acquired by a person through experience or education through the theoretical or practical understanding of a subject, (ii) what is known in a particular field or in total, facts and information or (iii) awareness or familiarity gained by experience of a fact or situation. Clarke (2001) defines knowledge as **a body of facts and principles accumulated by mankind in the course of time.** Knowledge is also regarded as representative mental models stored in a brain as long-term memory, necessary for human understanding and thinking to external things (Fukuzawa, 2004). From all these dimensions therefore, knowledge constitutes an important part of present societies of which its transmission (i.e. from tacit to explicit knowledge) across organizations and communities is important when facing the challenges of globalization. A look at these two types of knowledge will better give an overview of what they refer to.

2.2.1.1 Explicit Knowledge

This can be defined as knowledge which includes information and skills that are easily communicated, documented and conveyed to others. It is the knowledge that is collected, stored, distributed and shared primarily as electronic or paper documents. This knowledge can therefore be formally expressed and transferred (Kothuri, 2002). The explicit knowledge approach holds that knowledge is something that can be explained by individuals even though some effort and even some forms of assistance may sometimes be required to help individuals articulate what they know. As a result, the explicit knowledge approach assumes that the useful knowledge of individuals in an organization can be articulated and made explicit (Sanchez, 2000).However the application of explicit knowledge to a community should be assured by the adoption of best practices.

2.2.1.2 Tacit Knowledge

Tacit knowledge on the other is that which is experiential and intuitive. It is the subjective and experience-based knowledge that cannot be expressed in words or sentences. It also includes cognitive skills such as beliefs, images, intuition and mental models as well as technical skills such as craft and know-how. This definition of tacit

knowledge refers to the individuals within an organization. In a community tacit knowledge is made up of the collective mindsets of everyone in the community (Kothuri, 2002). With the tacit knowledge it is believed that, knowledge is basically personal in nature and is difficult to extract from the heads of individuals (Sanchez, 2000). Within the context of a community setting, the tacit knowledge approach assumes that, the knowledge in a community and available in it will largely consist of tacit knowledge that remains in the elders of that community.

2.2.2 Indigenous Knowledge

Indigenous knowledge has often been used synonymously with local knowledge due to recognition of the fact that, the users of resources who are basically the local communities have a knowledge that is applied in decision making about their resource harvesting. The growing awareness on the part of decision making on traditional utilization practices is typically defined as utilization ethics is strengthen by the traditional adoption methods as well as the technologies and institutions implemented within a local context. This no doubt explains the shift in focus on the protection, documentation of traditional based knowledge in national, regional and global forums (Johann, 2007). Defining indigenous knowledge gives rise to the issue of attributing the value to this form of knowledge as perceived. This is as a result of the assertion by many researchers about the undervalue. Hence with these perceptions, this knowledge was seen as superstition within the general framework of development while useful knowledge was only generated in central places in universities, on research stations, in laboratories, then to be transferred to ignorant peasants and other poor people (Chambers and Richards, 1995).

However, to create a plurality requires a deeper understanding and appreciation of different definitions and understanding of indigenous knowledge within cultures. Many definitions have been proposed for indigenous knowledge systems, but all of them are incomplete, because the concept is still evolving (Johnson 1992; Berkes 1993; McCorkle 1994; Quiroz 1996; Berkes and Henley 1997). Literature in related fields uses various terms interchangeably to designate the concept of indigenous

knowledge, traditional ecological knowledge, traditional ecological knowledge and management systems, local knowledge, traditional knowledge, community knowledge, rural peoples knowledge, and farmers knowledge .While certain distinctions can be made, these terms often refer to the same thing (Reijntjes et al, 1992: Warren 1992; Roach, 1994; Lawas and, 1997).

According to Charnley et al, (2007), indigenous knowledge is viewed as a cumulative body of knowledge about the relationships living things (including people) have with each other and with their environment, that is handed down across generations through cultural transmission. Grenier (1998) defines indigenous knowledge as "the unique traditional and local knowledge existing within and developed around specific conditions of women and men indigenous to a particular geographic area. Indigenous knowledge, is embedded in the community and is unique to a given culture, location or society. The term refers to the large body of knowledge and skills that has been developed outside the formal educational system, and that enables communities to survive.

Indigenous knowledge includes knowledge, practices, and beliefs that are more or less integrated with one another. It is dynamic and evolves as people build on their experiences and observations, experiment, learn from others, and adapt to changing environmental conditions over time. Indigenous knowledge is place-based and geographically specific, and is most often found among societies that have engaged in natural resource use in a particular place over a long time period, such as indigenous peoples. This knowledge is passed from generation to generation, usually by word of mouth and cultural rituals, and has been the basis for agriculture, food preparation, health care, education, conservation and the wide range of other activities that sustain a society and its environment in many parts of the world for many centuries.

The potential for indigenous knowledge to contribute to biodiversity conservation has been widely recognized, as reflected by Article 8(j) of the United Nations Convention on Biological Diversity, which states that "the knowledge and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity should be respected, preserved, and applied (Multilateral, 1993).Within a long term historical analysis, indigenous knowledge has been understood to have undergone an evolution from a basic understanding of

specific natural elements such as plants, animals, water, air as well as the environmental changes (Alan, 1997)

Indigenous knowledge has been therefore found to be generated within communities, culture specific, systematically documented, concerns critical issues of human and animal life, dynamic and based on innovation, adaptive and is oral and rural in nature. The most successful indigenous knowledge initiatives so far are those that take the constraints of accessing the eco-systems and capacities of the resources of the poor people (i.e. their knowledge) into consideration. In Thailand for example indigenous knowledge have been documented in the use of fallow forest in the Northern part of the country where most of the species occurring in these forests are useful within the context of traditional subsistence-oriented economy and there exists an extensive indigenous knowledge concerning the potential uses of these trees (Vogt, 2003). Another classical example is the Honey Bee Network in India, an initiative aimed at gathering and organizing indigenous knowledge while recognizing, respecting and rewarding local creativity, traditional knowledge and contemporary grassroots innovations (Gupta, 2006). Therefore experience in knowledge for development initiatives has shown that a vast array of tools can be used to facilitate the sharing of knowledge. Mechanisms such as community practice, peer assists, proper communication are important to improve the exchange of indigenous knowledge.

2.2.3 Indigenous and scientific knowledge

Major differences seem to emerge between indigenous and scientific knowledge with respect to their history and distinctive characteristics. The fact that indigenous knowledge is concerned with the immediate and concrete necessities of people's daily livelihoods, while scientific knowledge attempts to construct general explanations and is one step removed from the daily lives of people, is not substantial. At the same time, many writers on indigenous knowledge agree that it also encompasses non-technical insights, wisdom, ideas, perceptions and innovative capabilities' (Thrupp, 1989). Despite the under estimation of this knowledge, indigenous knowledge is often seen as the base of the scientific knowledge. Studies centered on the complementary nature of knowledge systems (Richards, 1985), the

approaches to linking them up (Chambers et al. 1991), and studies focusing on their social interfaces (Long, 1989) have occasionally tried to reinforce this notion of their difference.

A difference between the traditional and scientific knowledge systems may be made on a substantive ground because of differences in the subject matter and characteristics of traditional and scientific knowledge, secondly, on a methodological and epistemological grounds because the two forms of knowledge employ different methods to investigate reality; and thirdly, on a contextual grounds because traditional knowledge is more deeply rooted in its environment (Chambers 1980, Banuri and Apffel, 1993). Scientific knowledge is therefore seen as an explicit knowledge that is transmittable in formal, systematic language. On the other hand indigenous knowledge is a tacit knowledge of the local or indigenous people, which is personal, content-specific, and therefore hard to formalize and communicate. Local or indigenous people acquire knowledge by actively creating and organizing their own experiences. Thus, the traditional knowledge that can be expressed in words and numbers represents only the "tip of the iceberg" of the entire body of knowledge possessed by indigenous people.

Thus it can be said that both indigenous knowledge and scientific knowledge are the result of the same intellectual process of creating order out of disorder (Berkes, 1993). The differences may be substantive or perceptual as the attitudes of most biological scientists and natural resource managers to traditional knowledge have always been dismissive. However, despite the difference in opinions evidence gathered show that, traditional people do possess scientific curiosity and that indigenous knowledge does not take into consideration issues of immediate practical interests.

2.2.4 Culture as a foundation of indigenous knowledge

'Indigenous knowledge' (IK) as a term has emerged over the two decades to describe the knowledge of a group of people local to a given situation, sometimes used interchangeably with 'local' knowledge (Ellen and Harris 2000). Many anthropologists have questioned the value of trying to distinguish IK as a special kind of knowledge. At the core anthropologists and those interested in applications of IK have very

different goals for characterizing peoples' knowledge. Practitioners are interested in knowledge that, regardless of source, is enactable with respect to their own practice.

Expressions of traditional culture embrace conceptual and creative aspects which include all kinds of literary and artistic works such as music, dance, song, pageantry, traditional visual designs and crafts, myths, legend, language, body painting, rock and ground painting, drama, religious ceremonies, rituals, narratives and poetry of which culture acts as a foundation. Indigenous knowledge as part of culture embraces all kinds of scientific, agricultural, technical, architectural, herbal, medicinal and ecological knowledge (Kamal, 2000). Traditional cultures have drawn much interest from the natural environment for centuries for medicinal purposes. Culture represents expressions, products, knowledge and practices that make up the collective heritage of indigenous peoples. Cultural knowledge involves the intangible and tangible aspects of the whole body of cultural practices, resources and knowledge systems that have been developed, nurtured and refined (and continue to be developed, nurtured and refined) by indigenous people and passed on by indigenous people as part of expressing their cultural identity (Arcioni, 2003).

2.2.5 Indigenous knowledge transmission

In addition to its practical aspects of ensuring sustained resource management, the transmission of indigenous knowledge has fundamental socio-cultural importance to every society. During knowledge transmission over several generations, social institutions are gradually crystallized. This implies that, routine or habitual ways of doing things gradually become the customary way that things are done. For children, a community's customary way eventually becomes the given-received social world or within the biological-physical world with which it overlaps.

In the process of transmitting knowledge to a new generation Ruddle (1993), argues that, the transmitter's sense of reality is strengthened. The social world, which is embodied in traditional knowledge, becomes enlarged during transmission. But of course each new generation of receivers of knowledge understands the history and context of its society's institutions only through increasing transmission. The rationale underlying custom, tradition, normative and actual behavior and rules and regulations

must therefore be provided to learners by teachers through consistent and comprehensive legitimating. In rural subsistence communities in particular, traditional knowledge is a central concern for the regulation and balance of exploitative pressures that permit an ecosystem to maintain stability and regenerative capacity. But almost without exception, most ethnographers, if they discuss childhood at all, have little to say about how traditional knowledge of specific skills is transmitted.

The impression conveyed is that skills are transmitted and acquired in a disorganized, unstructured and highly individualistic manner. Studies of the ecology of human subsistence and food procurement neglect the processes through which information concerning either the preservation of the system's integrity or its modification is transmitted from one generation to the next (Ruddle, 1993). However with much practical experience , it can be suggested that, indigenous knowledge can be transmitted through cultural mechanisms such as songs, proverbs, stories, folklore, community laws, common or collective property and inventions , practices and rituals (Simeone, 2004) , a responsibility that is often designated to community knowledge holders like elders.

2.2.6 Importance of Indigenous Knowledge

Finding the importance of indigenous knowledge and its potential in the sustainable utilization of natural resources has been a major discourse in sustainable development. A key notification was the issue on the top of the agenda of the Rio Summit emphasizing the holistic nature of traditional knowledge of natural resources which is an important opportunity to rally support for the maintenance and preservation of indigenous knowledge to protect ecological integrity. Several reasons have been attributed for the incorporation of indigenous knowledge into research. Firstly, indigenous knowledge can contribute to development by increasing self-sufficiency and strengthening self-determination (Thrupp, 1989). Using indigenous knowledge in research projects and management plans gives it legitimacy and credibility in the eyes of both local people and outside scientists, increasing cultural pride and thus motivation to solve local problems with local ingenuity and resources. Secondly, indigenous people can provide valuable input about the local environment

and how to effectively manage its natural resources. Outside interest in indigenous knowledge systems has been fueled by the recent worldwide ecological crisis and the realization that its causes lie partly in the overexploitation of natural resources based on inappropriate attitudes and technologies. With a realization that indigenous people have over the past managed the environments without significant damage to local ecology, many people now have a feeling that indigenous knowledge can provide a powerful basis from which other ways in resource management can be developed.

Local technologies rely on locally available skills and materials and are cost ineffective than external or new technologies. The importance of IK in present day sustainable development relies on certain characteristics (Dewalt, 1994), such as its representation of a life pattern being evolved with the local environment, that production implies subsistence only and that no single resource is exploited but the utilization of a wide range of resources. Within a community context, indigenous knowledge provides the basis for problem-solving strategies for local communities, especially the poor. It represents an important component of global knowledge on development issues. According to the 1998/99 World Development Report (WDR), knowledge, not capital, is the key to sustainable social and economic development. Building on local knowledge, the basis of any country's knowledge system, is the first step to mobilize such capital. Indigenous knowledge is an important part of the lives of the poor forming an integral part of the local ecosystem. IK is a key element of the social capital of the poor; their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own lives (Davies, and Ebbe, 1995)

Indigenous knowledge also provides problem-solving strategies for local communities and helps shape local visions and perceptions of environment and society. Typical examples include midwives and herbal medicine, treatment of cattle ticks by the Fulani using Tephrosia plants, soil and land classifications in Nigeria. water catching stone bunds in Burkina Faso, construction of buildings with natural "air conditioning" in the Sudan, Kpelle artisans' steel making technology in Liberia, agro forestry systems emulating the natural climax vegetation on the Kilimanjaro, settlement for land disputes between farmers and nomads in Togo, communal use and

individual allocation of land by the Washambaa in Tanzania, and local healers' role in post-conflict resolution in Mozambique(KLCAW,1998)

Therefore, it follows from these considerations that the preservation of indigenous knowledge is important for social and cultural reasons. For the group in question, indigenous knowledge is a tangible aspect of a way of life that may be considered. For the rest of the world, there are also tangible and practical reasons why indigenous knowledge is so important, quite apart from the ethical imperative of preserving cultural diversity.

2.2.7 The loss of Indigenous Knowledge

With the threats in the value of indigenous knowledge of communities and societies, indigenous knowledge systems, of biological and cultural diversity which forms interacting independent systems are also threatened with extinction giving rise to a major problem. Despite the general claim that indigenous knowledge is disappearing naturally due to the modification of tools and new techniques, the loss of indigenous knowledge at the recent times have been unprecedented due to rapid growth in population, growth in international markets, educational systems, environmental degradation and development process as well as pressures related to rapid modernization and cultural homogeneity.

Rapid population growth accompanied by government relocation schemes in the case of development projects compromises standards of living. Short term gains are preferred over long term sustainability and environmentally sound practices. Market oriented practice on agriculture in favor of the one cropping system is instead at the detriment of local knowledge. The recent policies that promote generic rice varieties are an example that reduces the value of more adapted species as the selection of this species by the indigenous people proves rather difficult (Grenier, 1998). Commercial food reduces the relevance of biological diversity and deforestation leads to many difficulties in finding and getting access to medicinal plants.

One of the most serious situations is the disruption in traditional channels of oral communication. The implication of this is that, younger generations are acquiring

different values and lifestyles as a result of exposure to global and national influences, and traditional communication networks are breaking down, meaning that elders are dying without passing their knowledge on to children (Langill, 2008). Another major reason for the loss of indigenous knowledge is due to the loss of language. The language disappearance trend is happening in many communities throughout the world. Just like Settee (2008) highlights, language's important relationship to knowledge and the survival of a culture requires that any discussion of indigenous knowledge systems must include language retention. The deliberate and state-imposed destruction of indigenous languages has caused the loss of traditional knowledge systems. The loss of language means the loss of human diversity and all the knowledge contained therein. Thus the impression of the indigenous people about local species and of their own traditional systems needs to be rebuilt. Some indigenous people and communities have lost confidence in their ability to help themselves and have become dependent on external solutions to their own problems, a situation that was rather difficult in the past.

2.2.8 Indigenous People

Debate on the definition of the term ‘Indigenous’ has gone on for several decades. Different states and communities adopt different definitions. In some countries, the very existence of indigenous people is denied altogether. The most widely used definitions are those used by the UN Working Group on Indigenous Populations and the International Labor Organization’s (ILO) Convention concerning Indigenous and Tribal peoples in Independent countries (IWGIA,2004). These set out the principle of ‘self-identification as indigenous or tribal’ as a basic criterion. Specifically, the ILO Convention applies the term to Tribal peoples in independent countries who 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.

According to The United Nations Special Rapporteur to the Sub-Commission on Prevention of Discrimination and Protection of Minorities, Indigenous communities, peoples 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 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 peoples, in accordance with their own cultural patterns, social institutions and legal systems.

Thus the term indigenous people can be used to describe any ethnic group who inhabit the geographic region with which they have the earliest historical connection. Many different formulations which describe indigenous peoples in a more strict term have been put forward by prominent and international organizations. Drawing on these, a contemporary working definition of "indigenous peoples" for certain purposes has criteria which would seek to include cultural groups and their continuity or association with a given region, or parts of a region, and who formerly or currently inhabit the region either. There are around 250 million indigenous peoples in the world, belonging to over approximately 5,000 groups and living in over 70 countries. They represent only 4% of the global population yet constitute 70-80% of the world's cultural diversity. Traditionally, indigenous peoples practice shifting agriculture, hunting, gathering, and fishing. They use an intimate knowledge of plants, soils, animals, climates and seasons, to exploit nature in a way in which the environment can sustain itself as well as their needs. Their practices involve careful management, control of population, the use of small quantities but a wide diversity of plants and animals, small surpluses and minimum wastage.

The United Nations International Covenant on Civil and Political Rights (UNICCPR) and the International Covenant on Economic, Social and Cultural Rights (ICESCR) state that all peoples have the right of self determination by virtue of which they freely determine their political status and freely pursue their economic, social and cultural development. However, because there has been dispute over the exact meaning of the term “peoples”, it is not clear to whom “peoples” refers. Some state governments oppose use of the term “peoples” in regards to Indigenous Peoples because they fear its association with the right of secession and independent statehood. Those states would prefer the terms “tribes” or “populations”, which do not have those

associations. On the other hand, Indigenous Peoples use the term “peoples” because of its association with inherent recognition of a distinct identity. “Indigenous People” is a compromise between these two positions. Indigenous Peoples and their advocates find the denial of being described as “peoples” and the inherent entitlement to self-determination a form of racism and continued discrimination (Anon, 2003).

2.2.9 Indigenous Belief Systems

Human life is a dynamic process of change and development. Beliefs share this process because it is inextricably linked to human life. The individual and society are perpetually changing which implies that, beliefs must be continuously refashioned and adapted to this ever changing set of circumstances (Braun, 2001).Although indigenous beliefs and cultural practices vary according to region, all groups share in a common world-view that the land and other natural phenomena possess living souls. The collection of stories of these powerful beings and the pocket of knowledge represented in these stories shapes indigenous lives both its history and future. Indigenous spirituality is a way of life whereby most information is traditionally passed down to new generations. This spirituality is generally transferred through generations through beliefs and rituals which are often associated in the form of social values (Fischer, 2005).Thus understanding the interconnection of indigenous belief systems which refers to all things being spiritually connected is therefore important.

In Thailand for example, most houses have a small spirit shrine for *phaphuum*, the "lord of the place". This spirit is seen as a local ruler whose presence should be both recognized and respected. Similarly, the Thais also recognize individual spirits that protect the village, the Buddhist compound, and the province. All of these spirits are simply there, exercising their right to be respected and supplicated (Braun, 2001). In order to invoke the benevolent attention of these *saksit* forces, an individual must initiate the transaction by paying respect and making an appropriate offering. Also, ethnic groups in Thailand believe that nature is a living entity and is responsive to human actions (Santasombat, 2003). They also believe that they are surrounded by powerful spirits that can be potentially harmful and the virtuosity of Buddhist monks increases the Thai feeling of security. Indigenous beliefs within the globe might differ

between religion and locality, but in most cases, the belief is similar. In Africa for example the belief systems is different and diverse. For example, most people belief that, the earth is sacred and so everything lies upon it. Also, people belief that everything is related, alive and has spirit.

Indigenous belief systems have a concept of punishment by community elders which are imposed to members of the society who do not abide with the social regulations. The attitude of indigenous people with respect to the environment is also governed by a similar fear of formless in the form of Taboos (Santasombat, 2003) .Indigenous people believe in the existence of good spirit termed benevolent or bad malevolent spirits. The good spirits may reflect spirits of their ancestors, or loved ones such as temple spirits or house spirits or village spirits. The breaking of a taboo is accompanied by imbalances in the community or illness. The Orang Asli community in Peninsular Malaysia for example has their own beliefs and traditions dating back hundreds of years, as have the indigenous peoples of Sabah and Sarwak. Although not officially recognized, these beliefs are complex in their own way. These groups are influenced by a myriad of spirits which can bring good or do harm to individuals. Shamans, religious leaders and healers act as intermediaries between humans and the spirit world (Edo and Fung, 2005).

Another classical example of indigenous belief system is in Indonesia, where the indigenous understanding of laying the spirits of the dead to rest has been in place for hundreds of years which until today are still close to the hearts of the people, especially the villagers (Medley, 2004). Thus the land is where the ancestors are buried and also where each lineage originated. Many objects such as huge rocks and old trees are carved and revered as *lulik* objects (Soares, 2001). In this culture the spirits of the dead are treated with awe and fear. The *Akha*, an ethnic minority in of Northern Thailand preserves large trees as a form of respect to the spirit, while conserving natural resources (Satasombat, 2003). Other ethnic groups such as Lisu tribes in Thailand share the same belief in secrete forest and natural landscape such as the *amphamuhee as* well as the grave yard forest of the Hmong tribe.

2.2.10 Indigenous belief and conservation

Most communities are general associated with different beliefs systems. It is typically perceived that, these believe generally shape the lives of most communities and the respective individuals therein. In this way what is known as the environmental ethics is actually embedded in each of these belief systems and it determines to a certain extent the conservation potential of most communities. Thus indigenous communities may either belief in folktales, taboos or secrete groves as a way of preserving their knowledge.

2.2.10.1 Folktales

The term folktale covers almost any traditional narrative, either oral or literary. Its diverse forms include: The oral folktale which is handed from one generation to the other. On one hand, it is remembered and repeated, preserving its ancient core. The literary or written folktale has been easier to transfer from one country to another, mostly in the form of collections used for education, perhaps preserved by priests, and for entertainment, collected by writers and travelers. These written tales had also been altered by the various cultures that took them and made them their own.

Information and knowledge transfer within indigenous communities is done through folktales. Folktales, myths, legends and ceremonies are effective in the transmission of knowledge, wisdom, culture and moral values to the new generations (Santasombat, 2003), and to strengthen the respect for nature and the society. In Thailand for example, there is what is referred to as tales of the monk and jataka *t*ales. Every week on Buddhist Sabbath day, grandmothers spend one night at the *wat* where the day is spent listening to the monks as they chanted the story of Buddha's many lives and recited moral tales. These tales were composed by monks to teach some moral principle based on Buddhist teaching which was important to preserve the knowledge of the people (Vathanaprida et al, 1994).

2.2.10.2 Taboos

Taboos represent unwritten social rules that regulate human behavior. Such constraints not only may govern human social life, but also may affect, and sometimes even directly manage, many constituents of the local natural environment. Taboos may, at least locally, play a major role for the conservation of natural resources, species, and ecosystems (Gadgil et al. 1993). Taboos related to the natural environment initially may not have been intended for nature conservation. For example, species may be avoided because of their behavioral patterns and morphological characteristics or in the belief that they are toxic (Begossi 1992, Begossi and de Souza Braga 1992). Human perception of, and relation to, species may govern which ones to avoid. Species may be avoided simply because they occur in creation myths, because they represent religious symbols, or because they are pet animals. For example, several species associated with different gods and goddesses in the Hindu scripture are sacred among Hindus (Colding and Folk, 1997).

Taboos therefore act as a measure to conservation and are a mitigation measure to enhance harmony with the spirits. All indigenous communities expect its members to abide by taboos and avoid bad luck which could lead to harm to both to the individual or to the community at large. Cultural taboos and customary laws dealing with indigenes are strong in relatively isolated indigenous communities. It is linked to practices and religion and as local belief systems remain strong, it is possible for local elders and herdsmen of traditional forms of medicine to enforce the taboos (Heath and Kamperman, 2005). In Thailand for example, the standard greeting in Thai is a prayer-like gesture called the *Wai.* Taboos include touching someone's head or pointing with the feet, as the head is considered the most sacred part of the body, and the foot the dirtiest part. Stepping over somebody, or over food, is considered insulting. Books and other documents are the most revered of secular objects, therefore one should not slide a book across a table or place it on the floor (Anon, 2007).

2.2.10.3 Sacred groves

The belief systems are a fundamental aspect of people's culture and strongly influence their use of natural resources. The concept of sacred groves that traditionally serves as an area for spiritual rituals to appease nature-linked deities such as (land, fire wind, and sun) as well as sites of ancestral worship can be viewed as a symbol of spiritual service derived from nature. Traditional societies have sacred landscapes and ecosystems in a variety of ways, large and small as part of their belief systems (Rachid et al, 2005) Indigenous people have that belief in spirits of nature that revolves around the natural landscapes and sacred groves.

Sacred groves are therefore stands of trees or patches of forest that local communities conserve primarily because of their religious importance. These groves can also serve economic, medicinal, social, and cultural functions. Some plant species in sacred groves may provide emergency foods during periods of drought, crop failure, and famine. Also such sacred places can help protect watershed resources like springs, soil fertility and moisture, and ecosystem processes such as nutrient cycling. A variety of factors promote the conservation of biodiversity in sacred groves like general or selective limits or prohibitions on the use of biotic species. Also information may be kept secret from outsiders such as about species of ritual, medicinal, or commercial value. Sacred groves are thought to be special because of some extraordinary attributes that stimulate feelings of power, mystery, awe, transcendence, peace, and healing.

Sacred groves in India, for example, are traditionally associated with almost every village and temple. Today there are some 150,000 sacred groves covering 33,000 hectares in total. They range in size from a fraction of a hectare to a few square kilometers. While each sacred grove may be a relatively small island of biodiversity, they are numerous, and thus, collectively through space and cumulatively over time, they are of some environmental significance. In India and Thailand, sacred groves appear to be, in effect, a very ancient, widespread, and important traditional system of environmental conservation that long precedes more recent Western strategies for protected areas like wildlife sanctuaries and national parks.

Sacred lands are found everywhere around the world. In all parts of Africa, various tribes consider different types of groves as sacred. In West Asia, Babylonians and Assyrians had planted sacred groves. Palm forest with altar has been reported from Arabia. Sacred Oak grove was present in Asia Minor. Sacred mountains and lakes are present in Madagascar. Many Siberian people honored sacred groves. Village groves are present in Korea. In Japan, Shinto shrines, as a rule, are surrounded by trees. Buddhist temples in Japan and China have tree-gardens. Traditional Chinese honour sacred mountains with trees. Buddhist monasteries and temples of Thailand have sacred groves. Indonesia has monkey-forests (Jayarajan 2004). Thus sacred groves are to be considered as critical habitats offering resources directly as well as indirectly for the people of the locality.

2.3 Community Organization

A community as defined by Slack (1998) is a body of individuals who have a sense of common identity, who may share geographical, political, religious or social similarities. A community is not just a group of people bounded by a geographical links, such as a village, settlement or district, but also includes those brought together by lifestyle, religion, hobby, interest, etc. A community group often pursues a common goal, concern or interest on an entirely voluntary basis. Examples of a community or community groups include; local action groups, social or lunch club, youth club, community council, village/community hall association, neighborhood watch, playgroup, local history group, disabled access group, fishermen, tenants & residents association, village renewable energy action group. Two structures typically constitute communities. These structures include social organizations and institutions. Every community is thought to be made up of which constitutes part of that community in question. The structure in a community is made up of institutions and organizations

2.3.1 Social Institutions

This refers to huge places where most people in the community are familiar with which shape their way of thinking and their responsibilities within a community. Institutions represent mechanisms of social order and cooperation that governs the

individuals .They are identified with social purpose which gets into the lives of individuals .Institutions refer to ways in which people in a community behave. Social institution is a group of social position connected by social relations and performing social roles. It works to socialize the groups of people in a given institution. People within a given community are gathered into different social institutions such as families, religion, and education. Social institutional building is an important aspect of this research and falls within the impacts of indigenous knowledge in community forest management. Here institution therefore refers to more specific aspects of a community that is rooted in norms and regulations within a societal context to regulate human behavior and actions.

2.3.2 Social organization

This refers to a group which has specific goal or responsibility and has its own responsibility. Social organization consist of many arranged social life such as social groups, family, community, class, association, each of which sure different social standards. Social organizations can be in many forms. This depends on the social context. Take for example, in a family context; the corresponding social organization is the extended family. In the business context a social organization may be an enterprise, company, corporation, etc. In the educational context, it may be a school, university, etc.

However, it is important to note that, the term organization is sometimes used interchangeably with institutions. This particularly applies to situations where someone refers to a formal organization such as a hospital or a prison. On the contrary, organization and institutions may refer to separate phenomena, and significant difference will be that an organization refers to groups of individuals geared towards goals which are described as collective with established roles, methods of coordination, procedure, culture and space, while institutions will refer to ideas about how something should be done, or constituted in order to be viewed as correct (Jonsson, 2007).In this research, instead of using social organization, social mobilization is used and it refers to the prevalent social conditions hierarchies and dynamics in bringing the people together.

Most often the relations of people in a given community are usually divided into two categories. This forms the basis in which most development initiatives are planned and executed. From this distinction, communities can either be classified as being rural or as being urban. A major aspect involved in this division is due to the characteristics that each tends to poses.

2.3.3. Rural communities

Rural communities generally are described from the word rural which is associated with low population size, the distance from urban areas, the low degree of urbanization and types of economic activities. Although the definition of rural itself is many and varied, most definitions recognize either or both of the spatial and thematic aspects of rural and community (Ramsey, Everitt and Annis 2002).While the debates about defining rural community have been going on for years, this research does not place emphasis on such debates, but will rather look at a community similar to the dimensions of Statistics Canada cited by Ramsay and Beesley (2006), which looks at rural communities as those people living outside the main commuting zone of Large Urban Centers (LUC) of 10,000 or more people are considered to be rural and small town. The contributions of other authors who defined rural communities based on based on forms of association (Haigh and Murri, 1990), income sources (Flora and Flora 1988), and a combination of place, locality, and interaction (Cloke 1994) is also of importance. Rural can also be specified or defined based on health care service delivery.

2.3.4 Urban Communities

Just like rural communities, the concept of urban communities engenders negative images in the minds of many individuals. This is because this concept is associated with words like urban poverty, crime, drug abuse, dropouts, flight fear etc (Delgado, 1998). The concept of urban therefore has many different dimensions and it is very difficult to take a unanimous definition that all scholars, practitioners and settlers embrace. Thus the definition of urban community must take into consideration many dimensions including physical locality, resident composition and transactions of many kinds which could either be business, educational, personal, recreational or

spiritual. In addition, it should be noted that, urban areas are not static but they are ever changing both internally and the way they relate to the society.

According to (Delgado, 1998), any perception of urban communities must take into consideration three key elements which are the geographical, social rather that physical space and the presence of interaction between individuals to each other and to a larger society area, which may vary at times on degree of importance. Therefore**,** urban communities are areas with relatively high development, with high population density and diversity. This diverse people may execute different duties or perform different activities within the community such as business bankers, government worker, or industrialists. Urban communities are often regulated by legislation and laws of which religions lifestyles and administration are determined by these set of laws

Therefore from these two community distinctions, the community in this study tends to be more characterized by the rural community setting rather than an urban community.

2.4 Forest Biodiversity

2.4.1 Forest ecology and its controversies

Within the years, there has been a great dispute about what forest refers to. This controversy has always been in existence especially in cases where a forest changes in to something else such as a plantation. Although it may not provide a substantial or a very accurate description of what a forest is, most definitions rely on the actual percentage that comprise of tree cover. Hence what can be defined as a forest by an ecologist in an arid zone would instead be considered as a grassland or savannah with occasional trees by some conservationists. However, this dispute continuously exists till date especially between the international organization such as the Food and Agriculture Organization (FAO) and the World Conservation Union (IUCN).

2.4.2 Giving a definition to forest

The FAO defines forest as land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 ha and trees should be able to reach a minimum height of 5 m at maturity in situ (FAO, 1998). With respect to this

definition, a forest may consist either of closed forest formations where trees of various storey and undergrowth cover a high proportion of the ground, or open forest formations with a continuous vegetation cover in which tree crown cover exceeds 10 per cent. On the other hand, the World Conservation Union (IUCN) does not limit its definition to that proposed by the FAO, but considers forest to include forest nurseries and seed orchards that constitute an integral part of the forest, forest roads, cleared tracts, firebreaks and other small open areas, forest in national parks, nature reserves and other protected areas, such as those of special scientific, historical, cultural or spiritual interest; windbreaks and shelterbelts of trees with an area of more than 0.5 ha and width of more than 20 m and even plantations primarily used for forestry purposes, including rubber wood plantations and cork oak stands(IUCN, 2006) . But it should be noted that this definition of forest does not consider land predominantly used for agricultural practices. However, according to the Royal Forest department (RFD), the Royal forest Act of 1941, section 4, defines forest as land that has not been taken up or acquired by any other means according to land law (Nalampoon, 2003). The definition of forest however as conceded in this research, does not deviate completely from the definitions above, but forest is considered as an area which has been geographically defined constituting of communities such as trees , animals and other organisms which are ecologically similar and capable of providing some social, ecological and economic benefits.

Another aspect of debate is the consideration of plantations as forest. What happens is that in many countries, large plantations are considered to be forest .An important point to note about this consideration is the significant difference between these two aspects. The major difference can be explained by the fact that , though both consist of trees, plantations consist of trees that are of the same age as they were planted at the same time except for trees with a slight difference in time as to when they were planted. On the other hand, a forest consists of trees with rather different heights typically consisting of not only timber, but also non timber products, and also forming habitats for other animal species. Thus with these debates, there should be a consideration of the definition of forest which should be based on the local context as

is done by many different countries. Or more still, the definition of forest should therefore set its boundaries to give an understanding of their consideration.

2.4.3 Categories of forest

Within the context of forest, there have been many different categorizations which include Protection, conservation, production, regeneration, and degraded forests (Khamphay and Phouthone, 2007). Protection forest includes forest land classified for the purpose of watershed, prevention of soil erosion. Protection forest also includes areas of forest lands significant for security and protection from natural disasters while protecting the environment. Conservation forest is forest and forest land classified for the purpose of conserving animal species, plant species, nature and various other things which have historical, cultural, tourism, environmental, educational and specific research value.

On the other hand, production forest is forest and forest land classified for the purpose of satisfying the requirements of natural economic and social development and people's livelihoods, for timber and other forest products on a sustainable basis and without significant negative environmental impacts. Regeneration forest is young fallow forest classified for the purpose of regeneration and maintenance, to enhance increases in maturity towards a stage of natural equilibrium. Lastly, degraded forest is forest which has been heavily damaged and includes land without forest on it or barren land classified for tree planting and is often allocated to individuals and organizations for tree planting, permanent agriculture and livestock production, or for other purposes, in accordance with national economic development plans.

Thus from the description above, forest can be seen as an important source of rich variety of benefits which should be acknowledged. The forests are richly diverse ecosystems, the exact composition of which is greatly influenced by climate, soil, topographic conditions (Ellefson, 1992). They are a far reaching presence on worldwide landscape. They make considerable contributions to social and economic fabric of every society. This explains why many people have developed a great interest in the ways in which forest is commonly used including area of land cover by

forest vegetation, the extend of forest based employment, and income , and public recognition of the importance of forest resource issues.

2.4.4 Community forest management

In the past years**,** forest resources have been depleted at an astonishing rate due to several causes. In partial response, integrated approaches to natural resources management and livelihood improvement for sustainable development have become important measures during the last decades. Several strategies and national programs have been developed to achieve these aims though in many cases the policies are not effectively implemented. One of these policies includes community based forest management. It is now evident that the move towards community forest management is undoubtedly one of the most important forest policy developments of the past half century. This shift from the centralized local management results into the evolution (Michael and Durst, 2003)), testing and occasional institutionalizing of a wide range of community based projects. Thailand is a classical example whereby, over the past years, RECOFT has been undertaking the Collaborative Country Support Programme (TCSSP), in Sam Pak Nam village in Khon Ken province and several other communities (RECOFT, 2007), working with local communities to explore modalities and promote community based forest management. According to the Thai Community forest Act draft approved by the Thai cabinet on April 30th 1996, A community forest is considered to be any area that the community wants to designate a community forest whether it is within the limits of a conservation zone such as a national park, wildlife sanctuary, watershed area; or non-conservation zone such as a national forest or public use area.

2.4.5 Status of community forest management

In its broadest terms, community based forest management can take many different forms such as social forestry as well as joint forest management. Recognizing the above mentioned terms, it is evident that community forestry has evolved since the late 1970s from being an emerging concern in a small number of countries especially in the tropics to being a major concern in the forest policy in many countries around the globe. Certainly enough with the existence of these types of projects, so much

efforts and expenditure by the nongovernmental organizations, donors and communities focus their effort to achieve the main objectives of improving livelihoods.

However, the assessment of the status of community based forestry is often challenging and is associated with many problems. One of the major problems that results from assessing such status is defining what Community based forest management is all about. The first such definition was probably put in place by FAO. It defines community based forestry as any situation which intimately involves local people in forestry activities (FAO, 1978). Gilmour and Fisher (1991) included the control and management by local people as an identifying characteristic. Although other definitions are less specific about this, there is still a general agreement within the forest and the forestry sector that community based forestry involves some element of community participation in forest management with not just through the provision of labor but with some commitment for the improvement of the security of some of the products derived from the forest to those people living in and near the forest.

It is a process whereby the communities themselves are the legal owners of land or have assumed the responsibility for areas of public land. The communities have an agreement which is sometimes facilitated by nongovernmental organizations, foresters or others that a certain area of land will be marked and set aside as a community forest reserve (Moshi et al. 2006). Although it involves a series of steps, the acceptance of the village community and their promotion can be very important to ensure a long term respect of the area in question. A successful completion for such steps is very similar to that of a sacred forest whereby it is the forest communities who actually defines and thus protects the given area for their purpose. In the Khao Rao Thien Thon community forest in Thailand for example, forest management consist of a committee of 12 members, the chair, vice chair, treasurer, public relations officer, and 4 sub coordinators from 4 areas namely; (Khao Yao, Khao Ang, Khao Mo Ta Kruea, and Khao Mo Yai Ka), in which Local regulations on forest resource utilization are proclaimed with remarkable success., prohibiting timber extraction and hunting wild animals, and controlling bamboo harvesting (RECOFT, 2007).

2.4.6 Priorities in Community forest management

Community forest management system involves an active participation of the villagers at all the levels in the management process. This may consist of stages like the planning, implementation, monitoring and evaluation. It also involves equity which implies that the communities should be also involved in the sharing of benefits that are derived from the management process which should be equitable (Khamphay and Phouthone, 2007).Another very important aspect involved in community base forest management is how to understand and manage social change. Within the past, many efforts have shown that community management is most effective when all the necessary resources such as the existing capacities, relationships and the resources available to communities are linked with strong leadership skills and the right to tenure. With proper functioning, communally-based resource management systems and the local and indigenous knowledge on which these are based are important foundations for community based forest management (RECOFTC, 2007).In comparism to tenure system, it is highly observed that, Community management has an advantage over tenure systems for poverty alleviation, especially in addressing the needs of the poorest and promoting equity and empowerment (FAO, 2007). Therefore in order to succeed, community forestry needs that the long term goals be clearly defined as well as ensuring capacity building for the local communities. This is considered as a successful approach because it builds on traditional structures rather than replacing them and also, it shifts the focus to managing the resources from the forest just for timber to that which have value to local people such as the non timber forest products.

2.4.7 Non Timber forest products

In the past, the primary objective for forest conservation was simply to sustain the productive role of the forest for the timber industry. However, with a shift in forest management, the importance of indigenous use of forests mostly from non timber products is greatly recognized. Within the past few years, indigenous people are gaining access to significant benefits from non timber forest products (NTFPs). NTFPs are often common property resources. These include products like fuel wood, fodder, charcoal, fencing, poles, medicinal plants, and a variety of foodstuffs, such as game, fruit, nuts, mushrooms, fiber, resins and rattan with much importance.

Non timber forest products form the backbone of a subsistence and indigenous commercial economy in many parts of the world. In particular, they provide a vital contribution to the daily subsistence of many people. They commonly contribute to meeting food and other basic needs and also provide a source of input into the agricultural system and helps households control exposure to risk of various kinds. Therefore to overstate the important role of non timber forest products seems difficult but a better understanding of the magnitude and nature of the role of non-timber forest products is therefore central to making decisions about forest management that adequately reflect society's demands upon the forest resource (Arnold , 1995). Non timber forest products have actually been a point of interest and this makes it easy for a proper definition to be given to it.

2.4.8 Defining non timber forest products

The United Nations Food and Agriculture Organization defines Non-Timber Forest Products as products of biological origin other than wood derived from forests, other wooded land and trees outside forests, which may be gathered from the wild, or produced in forest plantations, agro forestry schemes and from trees outside forests (FAO, 1995). Therefore, non-timber forest products constitute a critical component of food security and an important source of income for the poor in many developing countries which are mostly indigenous people. In Thailand for example the contribution of non timber forest product to livelihood has been documented in two Karen people living in the Thung Yai Naresuan Wildlife Sanctuary in western Thailand (Delang, 2006). This makes the sustainable use and correct valuation of NTFP of increasing importance as more attention is placed on the potential of forests to reduce or address the problem of poverty.

Non timber forest products have been identified by the Food and Agricultural Organization as a safety net as well as a poverty trap. As a safety net, NTFPs serve as a source of emergency subsistence during times of hardship. This is typically true when there are crop failures, and even times of war and conflicts and could serve as the primary source of the income of many households. On the other hand, NTFP is a poverty trap because many indigenous communities depend on them due to high level

of poverty. Some researchers even argue that the value of NTFPs, both the use value as well as the monetary value can be higher than timber harvest or land conversion to pasture or agricultural land (Chhetri, 2005).

Thus, sustainable management of NTFPs is of importance because of their value as a perennial source of subsistence and income for local communities as well as for the conservation of biodiversity. The collection and sale of NTFPs brings a significant amount of annual house hold income of poor people in many different communities. This poor people typically include poor ethnic groups and other disadvantaged people including women because these are the major groups of people who frequently collect as well as harvest such products for trade making an essential component in the livelihood of communities..

2.4.9 Indigenous communities and forest

The long history of civilization has always shown indigenous communities to be highly dependent on the forest often termed “forest dependent communities”. In most parts of the world, it has been highly observed that wherever there is a large concentration of forest, there is usually a higher concentration of local communities and rural populations. Most of the people in these communities have lived their lives in severe poverty. With the absence of financial capital to support their needs and meet up the ever changing standards of living, forest communities always seek for ways to adapt in response to economic development. However with such a situation many communities tend to be highly dependent on the resources from the forest because of the lack of other options that can support their livelihoods.

Indigenous communities represent a very significant portion of the world’s poor, and a recent estimate suggest that there are about 60 million highly forest-dependent indigenous people .In most communities , it is the poorest households with less agricultural land , livestock, and even labor that are the main collectors of forest products. For these very poor households, while the actual amount of income that they get from forest products may be small, it may provide a very large proportion of the income of the households. Due to the importance attached to these communities, knowing their livelihood pattern is of importance.

2.4.10 Indigenous activities

The food and Agriculture organization of the United Nations in its executive summary made an effort towards documenting the activities of communities on the forest, described as highly variable (FAO ,1998). Those that live inside the forest constitute the socially marginalized people who make living out of hunter gathers or shifting cultivation. Apart of this group of people, there are also people whose livelihood strategies are based on farming but they also make use of the forest products. And there are also other people who are engaged in forest based commercial activities, they derive most of their income from commercial activities in the forest sector. As such, for many of these people, the role of the forest is without bound. They do not only perceive the forest as a source of economic subsistence in the sense of harvesting and selling of the forest products, but they also look at the forest as a way of life as it has continuously brought them together, socially, and culturally and so their knowledge, believe and values have been shaped by the forest.

Despite all the perception of the forest by the communities, their social and cultural values are often affected by many changes. Such changes in their arrangements will further contribute to poverty and cause community insecurity with many social and environmental risks. Within communities, prevailing issues which include globalization, marginalization, the disruption of community relationships and institutions by such rapid social changes often leads to loss of traditional knowledge, social as well as political conflicts that destroys the communities . All these challenges are often associated with the rights of communities, their knowledge and practice, giving the strong historical and cultural values.

Generally, forests and trees play an important role in the livelihoods of the indigenous communities which are mostly poor. Benefits include construction materials, fuel, medicines, cash and local ecosystem services, as well as farm inputs such as animal feed and nutrients for crops. Many of these same rural people are also forest producers, from indigenous communities with vast tracts of natural forests to individual farmers who plant trees along their farm boundaries. Some of them are described as low-income farmers who may earn 10 to 25 percent of their household income from non-timber forest products (Scherer and Kaimowitz, 2002). For many poor rural people in forested areas, commercial markets for forest Products and

ecosystem services offer one of the few available and sustainable options to overcome their poverty.

2.5 The gaps in Research

This section of the chapter stresses on some of the latest developments in research with the domain of indigenous knowledge. It identifies some of the previous research that has been carried out including some techniques and will examine some of the gaps in research within this area.

Actually many studies on indigenous knowledge had been carried out within the broad range on natural resource management covering aspects of agriculture, water resource management, fisheries management and even forestry. Grenier (1998). In his book "Working with indigenous knowledge: a guide for researchers", outlines a list of tools and techniques that can be used in research to elicit the importance of knowledge of the indigenous people. Under the auspices of [2]LINKS, the importance and potential of application of local indigenous knowledge system in the modern context has been studied. [3]Birkenholtz (2008) recently undertook a research on the use of indigenous knowledge in ground water practices in northern India. His objective was to trace the co-evolution between local and state ground water and irrigation knowledge and technologies. He found that, the interaction between local with state forms of expertise continue to result to the reorganization and hybridization of groundwater knowledge practices despite historical efforts of the state of displacement.

In the context of forestry many studies have been carried but within a certain limit. Makeyo et al (2008) studied multipurpose fodder trees (MPFT) in Ethiopian highlands, with farmer's preference and relationship of indigenous knowledge of feed value with laboratory indicators. They employed focus group discussions to assess farmer's preference criteria, and compared their preference between exotic and local multipurpose fodder trees evaluating the relationship of farmer's knowledge of feed value. Their finding was that farmers were able to discriminate effectively MPFT species that had high and low protein fiber content using their indigenous feed value

[2] LINKS (Local indigenous knowledge systems): promoting indigenous knowledge based sustainable resource management.
[3]Birkenholtz (2008): Contesting expertise: The politics of environmental knowledge in northern Indian ground water practices.Geoforum.Vol 39. Issue1.pp466-482

indicator system for all pair wise comparisons and concluded that farmer's preference criteria encompass multiple objectives beyond feed value and soil rehabilitation.

Related studies such as traditional forest management under the influence of science and industry (Johann, 2007), Forest planning and traditional knowledge in collective woodlands of Spain (Linares, 2007), Traditional forest knowledge and sustainable forestry (Ramakrishna, 2007) also fall within areas researched. The role of local knowledge has even been studied in determining shade composition of multi-strata coffee systems in Chiapas, Mexico [4](Pinto, et al 2007).It is therefore evident that little has been covered within the area of community forest management. Although indigenous knowledge may have been studied in many communities the impact of this knowledge on community forest has not fully been covered. Specifically, the utilization ethics on which forms the basis of this research is still questionable. Thus this research seeks to fill these gaps in research within the domain of ethnography while it should be able to generate necessary recommendations for decision making.

2.6 Conclusion

This chapter generally x-rayed the fact that most communities are governed by particular lifestyles and belief that shape their conservation ethics. The chapter began by demonstrating that the role performed by any individual in a community determines his personality in that community and is often done in an interactive manner. Due to the complexity in defining role, role theory is often used to give a meaning of social life and a characteristic behavioral pattern of people with a given community. However within a community, knowledge constitutes and important part and thus the chapter found that the transmission of knowledge from one generation to another in an important underpinning of development. A definition of indigenous knowledge as a cumulative body of knowledge was also identifies while it was also realized that the major challenges that face this body of knowledge is its underestimation and the lack of its incorporation in many decision making process. However what is important is that, the term indigenous knowledge as used in this thesis, has many synonyms and

[4] Pinto et al (2007). Used interviews with vegetation transect and participatory workshops to determine the density, frequency, dominance, and utility and importance value for all species surveyed. Farmers were grouped by cluster analysis on the basis of their land area time producing coffee and age of coffee. A total of 74 shade species were recorded and classified as temporary, suitable or unsuitable as shade species by farmers based on phonology, foliagedensity,crown shape and amount of litter composition

other expressions such as local knowledge, traditional knowledge, and traditional ecological knowledge can be used with the same meaning.

Indigenous knowledge therefore constitutes an integral part of cultures and tradition with its importance identified in many facets such as in subsistence, medicinal purpose, in resource utilization and diversified production systems, in the resolution of conflicts within a community, environmental assessment and even in planning and development. Despite all the critics of this body of knowledge, a contrast between scientific and indigenous knowledge shows that, indigenous knowledge is more holistic, oral and based on practical approaches, long term compared to the western form of knowledge. Indigenous belief systems such as taboos, sacred groves, shamans, play a vital role in conservation and religious systems have also been found to be important in the preservation of nature.

The chapter also found that despite all the relevance of indigenous knowledge in present day development, this knowledge has been eroding and determinants such as changes in lifestyle, environmental degradation, population growth, growth in international markets, relocation schemes and growth associated with development projects. These determinants have been found to cause unprecedented rates of the loss of indigenous knowledge at the current times. However a major controversy is identified in the definition of indigenous people but that which is most often used is that proposed by the United nations working group on Indigenous people.

In the context of forest biodiversity, the chapter found that forest itself is very dynamic and is been looked at in different dimensions. This therefore gives rise to debates over its definition. However, the definition of forest from the Royal Forest Department of Thailand is given. Section 4 of the 1941 Royal Forest act regards forest as land that has not been taken up or acquired by any other means according to land law. Therefore managing the forest for sustainability must consider social economic and ecological concerns in or order to meet up the development targets as identified in this chapter.

The chapter concludes with an important impression about community forest management. It shows that this form of forest management is not new in Thailand but marks an important continuation in improving the livelihoods of most communities as have been identified in many case studies. Numerous efforts to meeting this objective

has been supported by the Royal Forest Department and the Regional Community Forest Training centre in build capacity towards this approach.

CHAPTER III
METHODOLOGY

Rational

This research which centers on the role of indigenous knowledge in community forest management marks a continuation of ongoing researches within the domain of ethnography. The research was conducted in the Koke Chantanang community forest in Nong Waeng sub district, Sa Kaeo province of Thailand. A number of emphases were placed in this research in studying the people and their knowledge and the contribution of their knowledge in the management of their forest. This chapter therefore describes the methodology and the research design while it also describes the data analysis techniques used in the analysis and interpretation of the information gathered.

3.1 Research Design

The research is basically qualitative which requires primary data with the gathering of data from field survey and secondary information from related research and documents. The research is basically qualitative because it identifies the role of indigenous knowledge and how it is applied in the community forest management. It is based on social science research such as in-depth interview with key informants from the three villages and direct observation. Quantitative data collected in this research involved exploring the different factors that will contribute to the knowledge of forest utilization of an individual in the community. Qualitative data will be based on in-depth interview to tap the knowledge of the people. A combination of qualitative and quantitative data will help in meeting the objective of this research.

3.2 Selection of Study Site

This research targets three villages in Sa Kaeo province of Thailand, where community forestry exist as a successful case study providing livelihood opportunities to these communities with limited alternatives and producing greater contributions. Due to the remarkable success of this community forest whereby three villages have been granted asses to utilization producing ideal characteristics, the distinctive characteristics have captured the interest of the researcher who is interested in identifying how the knowledge of these communities has been applied in the management of their forest. Considering many challenges often associated with the management of natural resource including multiple users, this case study has been identified with little conflicts among the users and drawn greater interest for its consideration.

3.3 Target population

The target population for this research is drawn from three villages in the Koke Sung district of Sa Kaeo province. These populations consist of local residents who utilize and manage the forest. These three villages consist of Nong Pak Bung, Potong and Nong Mak. The three villages are considered because in that sub district, only these three villages have the authority or permission from the Royal Forest Department (RFD) for administering forest management. Therefore, despite the illegal penetration of neighboring villages to harvest forest products from this forest, the right and recognition to forest assess into the Koke Chantanang community forest has been approved only to these three villages and by which their utilization of this forest through harvesting and other forest related activities are considered as legal. This explains why these three authorized villages are all considered in this research such as to gain an inside of the whole management process as it is related to all three villages. How the knowledge of these people contributes to the success of management of the community forest is of primary concern. Table 3.1 summarizes the characteristics of the three villages.

Table 3.1 Village population and household Number in the study area

Village	District	Sub district	No. of Households	Population
1. Nong Pak Bung	Khok Sung	Nong Waeng	199	683
2. Potong	Khok Sung	Nong Waeng	126	593
3. Nong Mak	Khok Sung	Nong Waeng	174	875
Total			**499**	**2,151**

Source: Royal Forest Department, 2007

3.4 Sampling Size

The sample size for this thesis was determined using the percentage method for estimation of sample size proposed by Bontum (1992). Estimation of sample size from this method is as follows.

Table 3.2 Population and sample size determination

Population (total number of people)	Sample size (percentage)
100-900	25
1,000-9,900	10
>10,000	1

For every of the three villages, the sample size was determined from this method. The sample size for every village can be illustrated in table 3.3 below.

Table3.3 Household number and sample size for each village in the study area

Village	Province	District	No. of households	Sample size
Nong Pak Bung	Sa Kaeo	Khok Sung	199	50
Potong	Sa Kaeo	Khok Sung	126	31
Nong Mak	Sa Kaeo	Khok Sung	174	43
Total			**499**	**124**

From the approach proposed by Bontum (1992), the sample size of this research is 25 percent of 499 households or 124 households. Households sampled are those households which have a better knowledge of the different components of forest resources identified as components of indigenous knowledge.

3.5 Data Collection

3.5.1 Secondary Data Study

Analyzing documents is an important data collection process which serves a supplementary source (not a primary source of data) (Baker, 1988). Burgess, (1991a) placed documents into primary and secondary sources. Primary sources have a direct relationship with the population studies and provide first hand information of situations. Secondary source of data in this research was obtained from the Royal Forest Department and place more attention on information about the community and the forest. Information analyzed in this research constitutes documents containing information on village demographics, community forest area, major forest management approach, and village socio-economy and village regulations. The list of traditional medicinal plants and their uses will be analyzed as well as stories and beliefs of the communities. Documents provided in-depth information on the problems and success faced by the communities

3.5.2 Household Survey

124 households were chosen ore household survey. Household surveys in this research are justified by the fact that households constitute the basic unit of each of the communities. It is used to describe attitudes and behaviors as well as other relationships which are necessary to test the hypothesis (Baker, 1988). Household surveys was be conducted by using a structured questionnaire to obtain an understanding of the general characteristics of every household as well as the utilization pattern and their knowledge of forest utilization. From every household, information was obtained from the household head who was either the father or mother of the house or the eldest in the entire household. In a bid to get qualitative and quantitative information on village characteristics,, household surveys is the best approach.

Household survey was conducted by using the purposive sampling technique. This type of sampling is most popular when handling research of a qualitatively nature (Patton, 1990). It is based on targeting predefined groups. It is well applicable in research situations where the researcher wants to reach the targeted sample very quickly and where the population is difficult to locate. It therefore does not lay emphasis on sampling for proportionality and identify subgroups within the population which are more accessible. Dane, (1990) points out that the advantage of using purposive sampling is that it gives an opportunity for the researcher to gain good grounds on what people typically believe. It permits the selection of respondents whose qualities and experience permits an understanding of the context in question.

This research approach was therefore employed in selecting household respondents from each of the villages based on their knowledge of forest utilization. These respondents were selected because they are considered to possess much knowledge in forest utilization and they have lived long enough to witness the changes in utilization. In order to meet the objectives and answer the questions this research poses, the questionnaire was designed to cover four parts.

- **Part One: Demography:** The first part focused on the factors that contribute to forest knowledge or knowledge of forest utilization. This section identified factors such as age, sex, level of education, marital status, income, ability to travel, responsibility in the community, and length of inhabitation. These questions were both open or closed ended. However, some questions which did not give direct answers were coded.
- **Part two: Types of indigenous knowledge.** This section was both qualitative for the different types of indigenous knowledge in utilization of particular forest products. This section identifies the different types of indigenous knowledge of forest utilization. Specifically this research pays particular indigenous knowledge components, such knowledge of Medicinal plants/ herbs, edible food (vegetable and mushroom), wood, resin, and fruits. These resources have been considered because they have a directly serve the livelihoods of people both in terms of income generation, health, and shelter and food security. The perceptions of the respondents were taken into consideration. This section examined the type of knowledge the people use in harvesting these products. With respect to the different knowledge types,

consideration was given to the season of collection, amount of collection, and reasons for their collection.

- **Part three: Perception of the respondents**. This section of the questionnaire made use of open ended questions that were directly related to what individuals perceive about forest ecosystem and management. It involved questions about some taboos or bans, experience of working outside, length of forest utilization and acquiring information.
- **Part four: Contributions**: The last part of the questionnaire indentifies the contribution of indigenous knowledge in community forest utilization and management. Since the management of this community forest is regarded as a successful case study, particular focus was placed on the contribution of indigenous knowledge to social mobilization, income generation, forest ecosystem condition and institutional building.

3.5.3 In-depth interviews

In-depth involved direct interviews or group interviews with key informants. Key informants provided details on the nature of utilization of forest and were very instrumental in providing recommendations. Since understanding indigenous knowledge is rather a complex and dynamic process, the choice of key informants for in-depth interviews was made possible by contacting the village head and one elder for each village. Interview was conducted with the use of open ended questions, and the researcher listened to informant by focusing on their knowledge. Six key informants were selected for this research. They provided information about knowledge of forest utilization. Selecting key informants was also considered with particular emphasis on the depth of their forest utilization knowledge. Interview was both structured and unstructured.

The **structured interview** was designed to cover major aspects such as forest productivity and seasonal availability, some priority products harvested from the forest and the criteria for their evaluation of these products. Forest productivity was considered because this will give the trend of forest yield with time. It also provided information on the health of the forest ecosystem. Priority products on the other hand also provide information about their knowledge of selection. In this case priority forest

resources were limited only to five products due to time limitation. The criteria for selection was are explained by the key informants.

Unstructured interviews also made use of the key informants identified for in-depth interviews. Just like the structured interview, the unstructured interview comprises of village heads, and elders. It is an extension of the structured interview. The primary reason was to raise further discussions on the aspects identified in the structured interview such as forest productivity, priority forest products and criteria for selection.

3.5.4 Participant Observation

This involved full participation in the forest management process. It involves the observer who is the researcher and the people in participation. Thus participant observation was carried out by taking part in household and forest based activities such as the processing of some forest resources to identify the inherent knowledge applied. This was done in a bid to understanding the issues that have been faced in the forest utilization process. It also aimed at giving a deeper understanding of the role of indigenous knowledge in management. The major focus was centered on the state of forest ecosystem, the relationship between people, and their behavior. The participation in household activities was relevant in providing information on the various scenarios with respect to each household and their attitudes towards utilization, what they actually prefer and what they do not as well as what they belief and their knowledge and the factors that influence their knowledge. This was important to build trust and respect from the community members by taking part in activities and in providing first hand information with participant.

3.5.5 Field Walks

Field walks have generally been recommended to get an understanding of real situations. Just like participant observation, field walks were carried out in the forest area to identify some of the major problems and ask question on the measures that have been taken to redress the problems as well as solutions with respect to the utilization ethics.

3.6 Data Analysis

3.6.1 Analyzing factors that influence indigenous knowledge

This objective seeks to analyze the factors that will contribute to indigenous knowledge. The dependent variable is knowledge of community forest management. This research used One Way analysis of variance (ANOVA) to test how the different independent variables will influence indigenous knowledge. The strength of the linear relationship existing between two variables as indicated by degree of F-value reflected an indication of the pattern of variation of one variable in relation to the other according (Baker, 1988).

3.6.2 Variables and Measuring Level

Independent Variables:

Personal factors

Variables		**Measuring level**
1.10.1.1	Age class	Nominal Scale
1.10.1.2	Gender	Nominal scale
1.10.1.3	Marital status	Nominal scale
1.10.1.4	Education class	Nominal scale
1.10.1.5	Length of inhabitation	Interval scale
1.10.1.6	Occupation	Nominal scale
1.10.1.7	Village	Nominal scale

Motivation Factors

Variables	**Measuring level**
1.10.1.8 Experience of working outside	Interval
1.10.1.9 Importance of forest products	Interval
1.10.1.10 Length of time of participation in forest management	Interval

Dependent Variable	
Variable	**Measuring level**
Indigenous knowledge of CFM (Number of years of forest utilization)	Interval scale

3.6.3 Identifying the utilization practices

This objective seeks to identify the utilization practices of the people. This research met this objective by using descriptive statistics such as frequency, the mean, mode, standard deviation and percentage. The hypothesis was to test whether the utilization practices influence indigenous knowledge. This hypothesis could only be tested qualitatively and in doing this, particular emphasis was placed on a close examination of the direction of the linear relationship of the variables. With an increase or decrease in one variable, the corresponding increase or decrease was correlated accordingly.

3.6.4Identifying and analyzing the contribution of knowledge

The objective is to identify and analyze how indigenous knowledge could be very contributive to forest management. Income generation, social mobilization, forest protection and institutional building were aspects considered. It should be noted that the contribution of indigenous knowledge is a qualitative description of how the indigenous people, with their indigenous knowledge could organize themselves to meeting the aspects mentioned above. The hypothesis for this objective which is to identify if knowledge contributes to the aspects above will only identify if those aspects exist and how they are carried out.

3.6.5 Data processing

Data processing in this research began from the data collection stage. Baker (1988) suggests that, data processing in the field such as organizing writing and transcribing the interviews should be conducted while still in the field. This is

actually the basis for qualitative data which is the focus of this research. On the other hand, the quantitative data was processed after the conclusion of the field research.

Data processing for quantitative data began with categorization and identification of household questionnaires. To test for hypotheses, the relevant qualitative data were quantitatively coded .This coding process was open to qualitative interpretation and judgment.

3.6.6 Coding

This is a process of making categorizations for qualitative data and making descriptions for the implications and details of the categories (Baker,1988).In this research, coding was done after data entry and was based on scaling which involves the construction of instruments which associates qualitative constructs with quantitative metrics (Baker,1988).

3.6.7 Describing the data

Descriptive statistics will be used to describe the general characteristics of the variables in this research. This will provide summaries about the sample and the measures. The analysis in this research is both univariate and multivariate which will involve the examination of one and or two variable at a time. Major characteristics of a single variable will be the distribution, the central tendency and the dispersion

3.6.8 The distribution

This involved a summary of the frequency of individual values for every variable considered. Frequency distributions will be illustrated as tables in this research

3.6.9 Central tendency

This has been examined for categorical variables i.e. nominal variables (variables which are not ordered) and ordinal variables (variables which are ordered). These

variables are discrete and have been measured using the measure of central tendency which are (1) Mean which is the average value of the set of data per variable, (2) Mode which is the most occurring value of the set of data per variable.

3.6.10 Dispersion

Measures of dispersion such as the variance and the standard deviation will be carried out in this research. The second objective which is to identify the forest utilization practices carried out in community forest has been examined by description of the different

3.7 Data Validation

The validation of data in this thesis was conducted in a series of ways. To enable this research is valid; the data should be made valid as follows:

3.7.1 Triangulation

Although James (1997) identifies many types of triangulation, triangulation here involves the convergence of data from multiple data collection sources. This research converges data from three sources such as in-depth interviews, household surveys and from secondary sources which is very important in building coherent justifications. This was important to avoid bias during investigation process and by increasing the chances by collecting from a many sources by employing many methods. This research also made the findings to be more specific to the setting and the participants.

3.7.2Internal Validity

This refers to the way in which the researcher's reconstruction relates to the realities and the perceptions that the respondents express during the interviewing process (Baker, 1988).This involves the use of several data collection procedures in this research as has been discussed in data collection process of this study. The validity of the research has been established by assembling information from all the above listed methods.

3.8 Measuring indigenous knowledge

In order to elicit knowledge from respondents about management of forest, this research could not use the “emic” approach that was implemented by Kiptot, 2005 which examined issues from a local perspective because this approach relied on many assumptions and also the language used during the interviewing process was not much understood. This research could not also use the method of conversation and observation in order to fully understand the knowledge and perception of forest utilization since this can only rely on expert judgment. Therefore in order to ensure a justified and acceptable approach for indigenous knowledge, this research employed the approach which was used by Amitendu et al (2004) in his research which focused on indigenous knowledge in animal husbandry. This research therefore used a different method in the quantification of indigenous knowledge. The basic premise of this method is that respondents know and understand the forest so well in which they have been using and that answers to many questions can only be obtain on the collective experience in a community that has live and used the forest over years. Thus indigenous knowledge is considered to be the knowledge accumulated during the years of forest harvesting. It can be used to unpack the practices of successful utilizers. This method represents a rapid and relatively cheap way to elicit indigenous knowledge (Amitendu et al, 2004)

Table 3.4 Summary of the research procedure, methodology and outcomes of each step.

Procedure	**Methodology**	**Outcome**
Research Design	Selecting relevant type of research	Qualitative research
Study area selection	Survey	Study area
Key informant identification Target population identification	Expertselection(6 informants) Purposive sampling (124 households)	Key informant represents village heads and one elder Knowledgeable households
Data collection	In-depth interview	Forest productivity and seasonal availability, priority forest products collected and criteria for selection.
	Household survey	Respondents' socio-economic data and benefits from the forest
	Direct observation	Cross checking household and forest based activities
Data analysis	Qualitative data analysis	Different forest utilization practices, contribution of Ik to CFM, Factors influencing IK
	Quantitative descriptive analysis Descriptive statistic	Mean median mode, percentages of respondents socio-economic characteristics

Conclusion

This chapter focused on the research methodology employed in this research. It began with the rationale for conducting the research which is basically qualitative but employing some quantitative analysis. While it outlines the variables which are considered relevant in this research. The chapter also looked at the research design. It presented the details of the data collection methodology employed with keen consideration to techniques such as the in-depth interviews, the participant observation, documentary analysis (other sources) as well as the household surveys. At the end of this chapter, validation as an important aspect in the execution of research has also been identified. Descriptive statistics; Analysis of Variance and qualitative analysis are methods that have been used in analyzing the information required in meeting the objectives of this research.

CHAPTER IV
RESULTS AND DISCUSSION

Introduction

In this chapter, the results and discussions with respect to the research questions is presented. The chapter also presents results of the three hypotheses for this research. Each factor that has an influence on indigenous knowledge of forest management (forest utilization knowledge) is identified, analyzed and discussed. Secondly, the different utilization practices carried out in the community forest is also analyzed. Lastly, the types of indigenous knowledge and contribution to the management of the community forest are discussed. The indigenous forest resource management of the people around the Koke Chantanang community forest and the utilization ethics is examined as an identification of the ecological and conservation awareness of the people. A synthesis of the utilization of forest provides an insight of the way in which knowledge has been build up for generations and exposes the experiences of the people. Indigenous knowledge in these communities have been observed to reflect local experiences and perceptions that characterize their way of life which is significant in enhancing the sustainability of the forest. The results for this study are presented and discussed in the following sub headings.

4.1 Profile of the study area

4.1.1 History of the research area

In the eastern border of Thailand, facing Cambodia at Aranyaprathed, Sa Kaeo is located**.** Its long history has dated back since the Suwannaphum and Dvaravati periods. The archeological sites of Khamer arts and stone inscriptions are an outstanding example of this civilization. Administratively, Sa Kaeo has been a district of Prachin Buri and later upgraded to a province since December 1993. The neighboring districts are Ta Phraya, Wattananakhon and Aranyaprathet. It is divided

into 9 districts of which Koke Sung is one of the districts. The study was conducted in a community in Koke Sung District about 165 km from the Thailand Cambodia border. The district covers an area of 439.7 km^2 with a population estimated in 2005 to be approximately 25,686 density of 58.inh/km^2.The villages are Nong Pak Bung, Potong, and Nong Mak making up approximately 2151 people with about 499 households. According to the village heads the land typically belongs to the state but have been offered the rights to communities. The community forest under study is about 1.5km from the communities and covers a surface area of approximately 1,400km^2 (RFD, 2007).

The people of this area are mainly members of the Thai- Lao ethnic group. They speak the Thai-Lao language but write in official Thai alphabet. Some of them constitute minority ethnic people who have migrated from Cambodia. The customs and ways of life are unique and different from those of the other regions of the country. They have glutinous rice as a staple of food for three meals per day. Their families seem to be the main place not only for staying but also for knowledge transfer. This is well understood from households where some three generations live in each family in this area. The people live in houses with high raised floor and a triangular roof. The style of these houses has several interpretations. They believe that the high raised floor should provide space for cattle at night time to guide them against theft as well as it also provides space for their agricultural tool.

4.1.2 Land use and community forest

The land use pattern of this area can be pictured by understanding how land is categorized in the whole country. The basis of all land laws in Thailand is that all lands belong to the crown or state (Prachaiyo, 2000). The land certificate given to each land holder defines the land in different categories. Land tittles therefore define the area of land that should be owned by individual households. Just like in most parts of Thailand, most land is owned by an individual with accordance with land titles and land certificates. The people use their land for building houses, for field cropping, paddy fields, and fruit and vegetable orchards. This land has been allocated to the community with a fixed boundary. The people own pieces of land for living while

most of them have other land area for rice cultivation. These can be realized as the basic necessities of their lives. Field crop planting is characteristic to many households while recreation land, fruit plantation and large land areas are owned by some wealthy people. The land use pattern in this community is differentiated with areas closer to the forest occupied by paddy fields where the soil is a bit dry with cash crops such as cassava and sugar. These lands are now facing a decline of fertility since rice has been planted in the same piece of land for decades. The farmers have not been able to afford cost of maintaining the soil properties. The closeness of the community to the forest illustrates a typical complexity of the paddies, the people and animals.

The community forest in this area is mixed deciduous where annual rainfall is about 1,270mm/year with all the trees shedding their leaves and stagnant growth usually occur during long periods of long dry periods. The forest covers about 1,400 km^2 of land and located about 1,5km to the community. The community began management in the late 1999s. There are no legal rights but the RFD informally allowed the community to manage the forest with traditional management regimes. The protection system is voluntary where most members have a high interest in participation. According to the village heads, the forest has suffered undergone a decline in the past two decades due to pressures for more farmlands and with massive cutting of trees, with all completely dried in summer. One important species is *Shorea rhoxburghii* which is uniquely scattered in this area. However, the area has a tropical Savannah climate where the dry season and the wet season are sharply separated from each other. The forest floor with annual accumulation of litter is the main source of mushrooms. The decomposition of litter offers habitat for many kinds of mushrooms. In the beginning and middle of the rainy season, plenty of mushrooms are found in the forest. The farmers gather them every day in this season. Most of them are gathered for domestic food, but some farmers make commercial gathering with a huge amount of various mushrooms.

Table 4.1: Profile of the study area

Characteristics	**Condition**
A. Demography	
1.Population size of the community	About 2,151 people (499 households)
2.Number of villages	3
3. Size of the users	Most villagers
4.Population composition	Thai-Lao ethnic group
5.Population density	Low
6.Economic composition	Mostly farmers (own 10-15 rai of land)
B. Community forest attributes	
1.Type	Mixed deciduous with low bamboo, *Shorea rhoxburghii*, medicinal plants, shrubs
2.Distance of forest from village	About 1.5km
3.Condition of community forest	Moderate (with less under story cover)
4. Size of the forest	About 1,400 km^2

4.2 Factors contributing to indigenous Knowledge of forest management

This section covers the village socio-economic characteristics and will identify the different factors that contribute to knowledge of forest utilization between respondents. The factors under identification are those proposed in the conceptual framework for this study. They include age, marital status, educational level, occupation, gender, length of time of using the forest, experience of working outside the village, acquisition of information about forest management. The insights gained from household survey were the basis of answering this part of the research question. Thus the research question to be answered here is what factors and how do they influence indigenous knowledge of community forest management.

4.2.1 Age distribution and frequency for the three villages

Age is one of the influential factors under consideration to the knowledge of indigenous people. The age distribution was identified with a lot of variation (Table 4.2)

Table 4.2: Frequency distribution of respondents' age

Age Class (years)	Number	Percentage
20-30	10	8.0
31-40	39	31.5
41-50	39	31.5
51-60	25	20.2
61-70	9	7.2
71-80	1	0.8
>80	1	0.8
Total	**124**	**100**

The table illustrates the frequency distribution of respondents' age characteristics. From the different age class distribution (Table 4.2), only 2 respondents were more than 71 years and above. 10 respondents ranged were aged between 20-30 years constituting 8% of the total population. 39 respondents making up 31.5% of the population was also recorded for respondents aged between 31-40 years and 41-50 years. While knowledgeable respondents were few in the 20-30 age class and above 70 years, it was observed that most knowledgeable respondents were aged between 31- 60 years old.

Age is therefore an important variable when considering the use of indigenous knowledge in forest utilization. Respondents below 30years of age are not well experienced in forest utilization and therefore are not very knowledgeable with indigenous methods of forest harvesting. Those aged between 31-60 on the contrary have been utilizing the forest for many years and have experienced most of the ecological changes in the forest. These results are similar with that conducted by Adekunle et al, (2002), when they documented indigenous control methods for pests

and disease for cattle in Northern Nigeria. They found that the most knowledgeable respondents were those aged above 30- 60 years. Figure 4.1 explains the age distribution of respondents from the three villages.

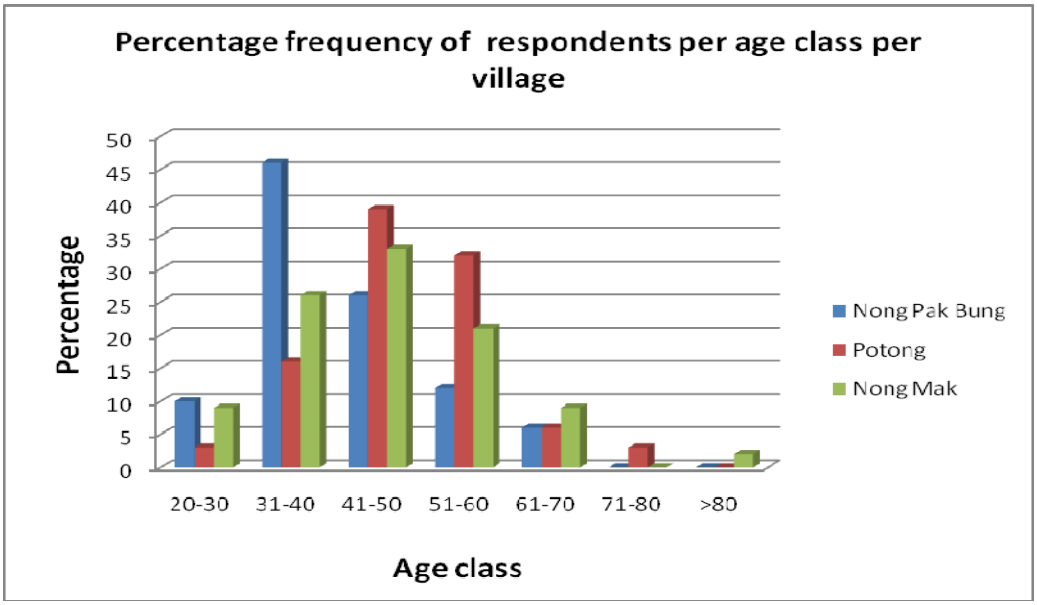


Figure 4.1: Respondents age distribution from three villages.

Figure 4.1 shows that the percentage age distribution of knowledgeable respondents from the three villages shows a gradual rise in percentage and then drops down as people grow older. While the trend is true for all three villages, there is a slight change in Nong Pak Bung and Potong in that after 80 years, there are fewer respondents (knowledgeable respondents) to give account of forest utilization. Thus it can be seen that as the population get older, there will be decreasing number of people to give accountability about knowledge of forest and therefore offers a major challenge for knowledge transmission. . These results are similar to that conducted by Yewhalaw and Teketay, (2008), when they studies ethno botanical knowledge and practice in the Oromo ethnic group in South western Ethiopia. They found that among other factors, a correlation between age and knowledge shows that older traditional healers could identify more number of medicinal plant species than younger ones reflecting their high level of knowledge.

4.2.2 Gender distribution of respondents

Table 4.3: Gender distribution of respondents

Gender	Number	Percentage
Male	50	40.3
Female	74	59.7
Total	**124**	**100.0**

Table 4.3 reveals that from the sample population, 40.3% of the respondents were male while 59.7% were female. Gender is not looked at here as a very significant factor because this depends on the sampling method with the number of respondents interviewed. The dominance in the percentage of women may be explained by the fact that the women were easily reached during the interviewing process. Secondly, most women stayed at their homes during the day when the men had gone to their farms explaining why most men could not possibly be intervened. Even when appointments were made to visit respondents in their paddy fields, the women were those who were easily contacted.

Table 4.4 Age and gender status for three villages.

Age class (years)	Male (%)	Female (%)
20-30	1.61	5.65
31-40	16.94	15.32
41-50	19.35	12.09
51-60	10.48	9.68
61-70	4.03	3.23
71-80	0.81	0.0
>80	0	0.81
Total	**100.0**	

Table 4.4 shows the different gender comparism per age class for all three villages. It can be seen that from the lowest age class (20-30 years), women actually dominate this age class with a percentage of 5.65% as opposed to just 1.61 % for male. Female also dominate in other classes such as between 31-40 years and even the age class greater that 80 yrs. The men are slightly dominant in the 61-70 years and 71-80 years age classes. However, talking about gender here is on a general scale covering the three entire villages. Individual knowledge of forest management might therefore differ. From Table 4.4, we cannot come into conclusion that the men are more knowledgeable since this table just gives a picture of the sample population. Variation in numbers may be as a result of the sampling method which was also limited to the sample size.

4.2.3 Education Status

Table 4.5: Respondents education level per village

	Nong Pak Bung	**Potong**	**Nong Mak**
Education Class	**(%)**	**(%)**	**(%)**
No Schooling	0.0	0.0	2.4
Nursery	2.4	0.0	0.0
Primary	29.8	21.8	26.6
Grade 1-3	4.8	2.0	0.8
Grade 4-6	3.2	1.6	1.6
University	0.0	0.0	3.2
Total		**100.0**	

Table 4.5 gives describes the education status of the respondents. It can be seen that from the sampled population 2.4% of households have not had any schooling and all come from Nong Mak. 2.4% of the respondents acquired nursery education and all come from Nong Pak Bung. From those who acquired primary education, 29.8% come from Nong Pak Bung, 21.8% come from Potong and 26.6% come from Nong Mak. It was found that most respondents have attained only primary education. However, university education has not been common to respondents but 3.2% of

respondents from Nong Mak have studied up to the university. It can therefore be said that those knowledgeable households have never had sufficient formal education as can be explained by their very low level of education. This low level of education is as a result of low income of households which makes it difficult for them to pursue education. However, what is important to note here is the difference between knowledge. Although most households do not have formal education (knowledge), they have a good knowledge of forest utilization. This draws a clear boundary between formal knowledge and traditional knowledge.

4.2.4 Marital status

Table 4.6 Marital status per household per village

	Number	Percentage
Single	14	11.3
Married	101	81.5
Divorce	1	0.8
Widow	4	3.2
Widower	4	3.2
TOTAL	**124**	**100**

Marital status was found to be an important factor within the households with knowledge of forest utilization. Table 4.6 reveals that the marital status actually differs between respondents. Most respondents were found to be married. The married respondents constitute 81.5% of the respondents while respondents who were divorce were least represented (0.8%). The widows as well as the widowers constitute similar proportion of the respondents making 3.2 %. It implies that marriage forms an important factor on indigenous knowledge. From interviews it was found that most people are encouraged to marry because it is a tradition of the community. A family constitutes a place of unity and knowledge transmission of the people. Being married ensured that, people could share common ideas while developing new ones.

A chart of marital status in percentage (Figure 4.2) shows that considering all three villages, married households represents approximately 82% of the entire

population, while the divorced constitute 1%. While single respondents also constitute a greater part of the population, the widows and widowers constitute a similar percentage (3%). This reveals that marital status is a very important traditional indicator of this community which is an important in bringing the people of diverse family backgrounds together.

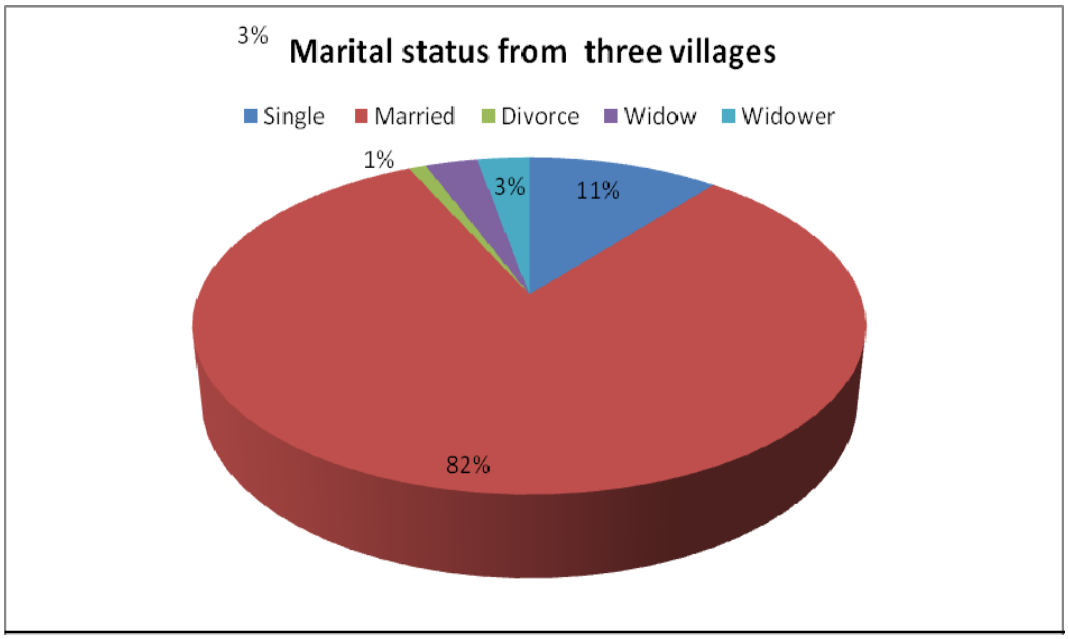


Figure 4.2: Marital status of respondents from three villages

4.2.5 Main Occupation status of respondents

Occupation is another factor which was considered having a contribution in knowledge of forest utilization. This research paid much attention to some major occupation types such as such as those who are actually employed, self employed, unemployed, those working with the government, business, and laborers.

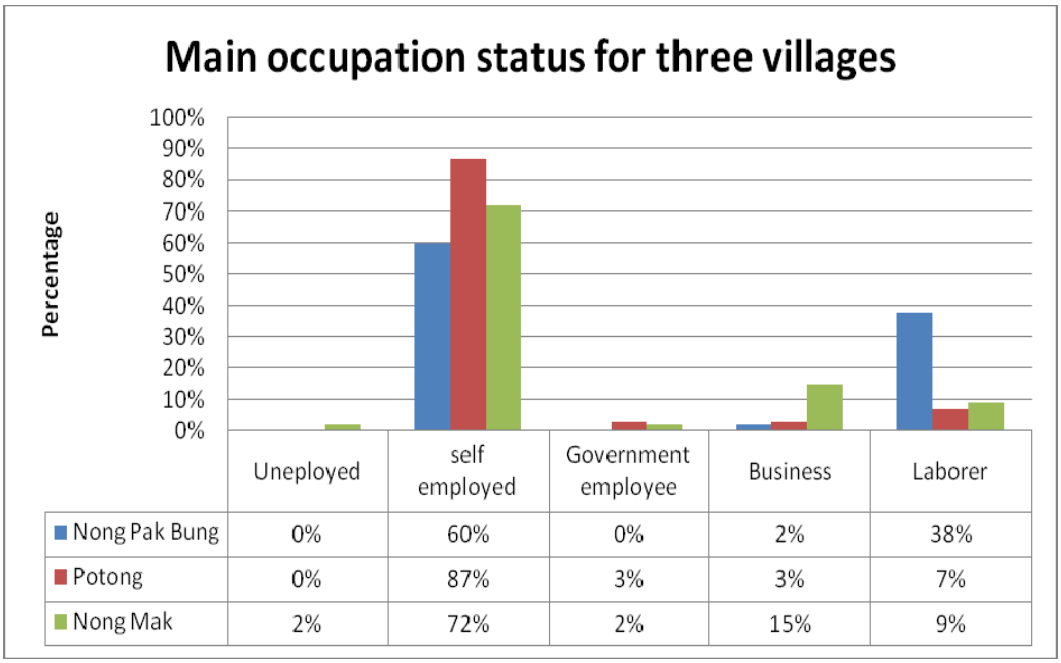


Figure 4.3: Main occupation status of respondents from three villages

Figure 4.3 shows that most respondents in the study area are actually self employed. The highest percentage of self employed respondents was in Potong village with about 87% while the lowest self employed occurring in Nong Pak Bung (60%). Laborers also make up a larger percentage in Nong Pak Bung household (38%), while unemployment is not common to the respondents from Potong and Nong Pak Bung. Self employed in these communities implies that the households have their farm lands in which they carry out agricultural practices. Rice cultivation or paddy fields are generally owned by households of these villages and they derive food for subsistence from this activity. Laborers like in the case of all three villages are those who are hired to do some work on a daily basis. They may have very small land areas for cultivation and can be taken to do some work for others in a bid to earn more income. Laborers are hired to perform jobs like taking care of cattle in the field and are paid depending on the negotiation made for that job which might be monthly or yearly.

Business is not very common to Potong (3%) and Nong Pak Bung (2%) villages, but it is relatively higher in Nong Mak. This might be explained considering the location of these villages. Nong Mak happens to have more accessibility to trade due to its proximity to transport while the other two villages are located a few

kilometers away from the road side. It can be seen that the employed are less represented in forest utilization and management. Most knowledgeable respondents are unemployed or self employed. Their lack of employment may always force them to visit the forest so as to meet up with their daily needs. Working with the government has very little contribution to the level indigenous knowledge as revealed by the percentage of respondents. Findings also reveal that forest collection is not major occupation of households.

4.2.6 Experience of working outside

Table 4.7: Respondents number of years of working outside the village

	Nong Pak Bung (%)	Potong (%)	Nong Mak (%)
Never	72.0	51.62	46.51
<5 yrs	20.0	19.35	32.56
5-10 yrs	4.0	16.13	11.63
>10 yrs	4.0	12.90	9.30
TOTAL	**100.0**	**100.0**	**100.0**

Duration of working out of the village by respondents was one of the factors under identification. It's influence on the knowledge of the indigenous people in managing the forest was carefully considered. Respondents were asked for how long they have lived and worked outside the village to access if this may have a contribution to their utilization knowledge. Results (Table 4.7) from all three villages reveal that knowledgeable respondents have never travelled out of their villages and constitute 72.0% of households in Nong Pak Bung, 51.0 % in Potong and 46.51 % of households of Nong Mak. Most knowledgeable household heads have continuously been living in the village since birth. Those who have travelled out of the village constitute 20.0 % in Nong Pak Bung, 19.35% in Potong and 32.56% in Nong Mak. Most of them travelled to Bangkok and have worked in processing industries, shopping malls while others served as security guards. Respondents who have lived

out of the village for more than ten years constitute a smaller proportion estimated at 4.0% in Nong Pak Bung, 12.9 in Potong and 9.3% in Nong Mak.

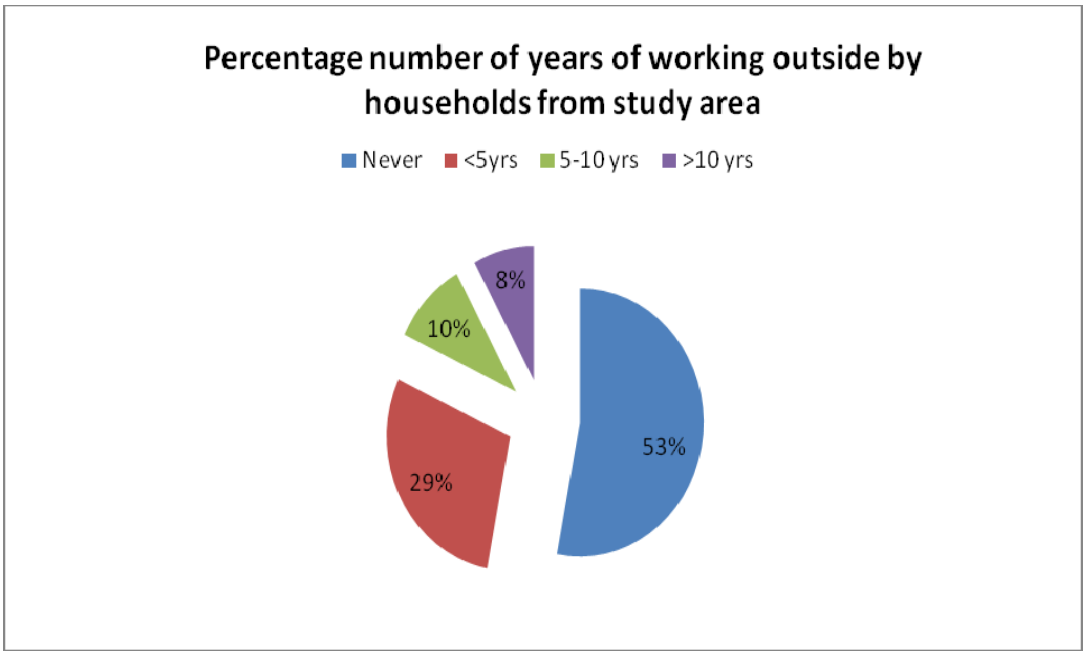


Figure 4.4: Percentage duration of working outside by households per village

Figure 4.4 represents the percentage of respondents and the number of working years out of their villages. It reveals that most knowledgeable respondents never gone out or worked of their village constituting 53% of respondents. Those who have lived out of the village for < 5 yrs represent 29.0% and most of the respondents have spent about 3 yrs outside. With respect to the objective of this research it can be said that, length of time of living outside the village has less influence on traditional knowledge of forest management. From results it can be seen that indigenous knowledge is negatively influenced by the number of years of living out of the village. Most knowledgeable respondents are those who have never gone out of their villages or those who have lived out for less than five year. Thus with many years of respondents living in the village, their knowledge of forest management improves as people get more closer and familiar with the culture, norms and tradition as well as the traditional utilization practices which constitute the core in building their knowledge.

4.2.7 Number of years of forest utilization

Table 4.8 Length of time (years) of forest utilization by respondents

Length of time	Nong Pak Bung (%)	Potong (%)	Nong Mak (%)
Never	0.0	0.0	0.0
<5yrs	3.4	5.0	3.2
5-10yrs	5.6	8.0	12.0
>10 yrs	31.5	12.0	19.3
Total	**100.0**		

Table 4.8 represents the percentage of respondents per the number of years they have been involved in forest utilization. The table shows that most knowledgeable respondents have used the forest for greater than 10 years. They constitute 31.5% in Nong Pak Bung, 12.0% in Potong and 19.3% in Nong Mak. Analysis also reveal a very low percentage of respondents involved in forest utilization for <5 years. They make up 3.4% in Nong Pak Bung, 5.0% in Potong and 3.2% in Nong Mak. While most households have been utilizing the forest for greater than ten years, analysis shows that all respondents have been involved in forest utilization.

From the table it can be said that, knowledge of forest utilization is more to those who have utilized the forest. However it can also be said that as households utilize the forest for a longer period of time as represented by the number of years, more households tend to improve their knowledge through consistent forest utilization. This can clearly be explained by the fact that knowledge entails beliefs, practices and tradition with respect to living closer to the forest. Respondents who have always lived in and closer to the forest must definitely be used to different ways of using the forest.

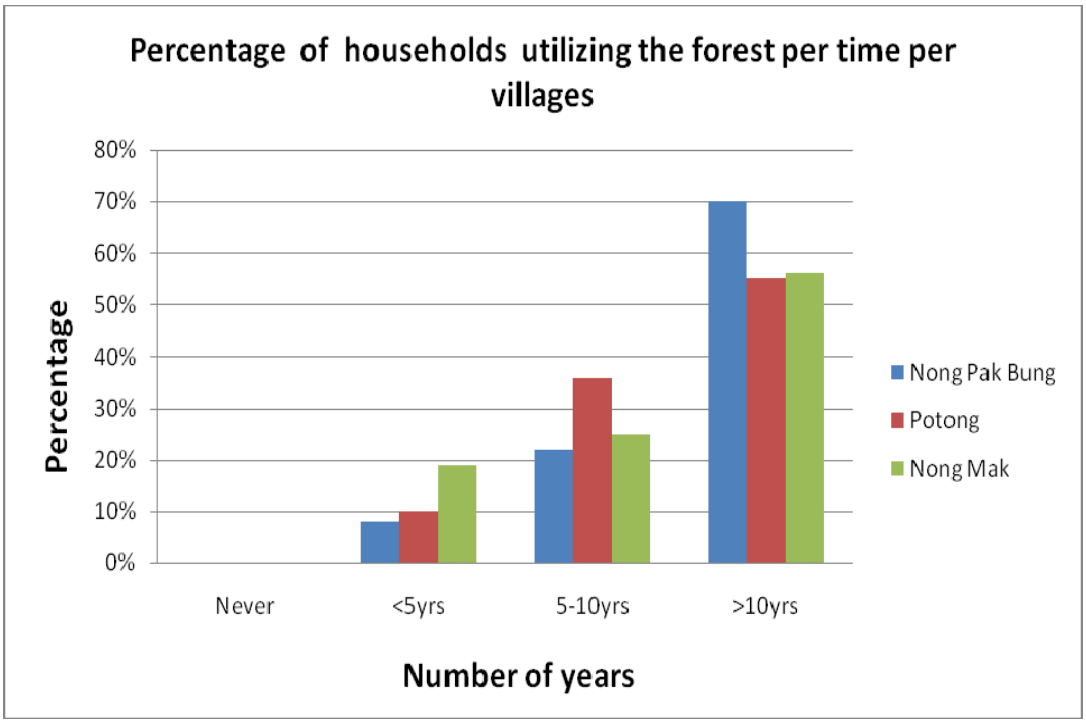


Figure 4.5: Respondents number of years of forest utilization

From Figure 4.5 it can be seen that all households have utilized the forest. This is a clear justification that knowledge of forest utilization exist more with those who utilize the forest. Figure 4.5 also shows a progressive increase in the number of respondents involved in forest utilization with increase in duration. It is therefore clear from this figure that most knowledgeable respondents have actually utilized the forest for a considerable number of years. Most of them have been using the forest since when they were young and accompany their parents to the forest to collect resources. Therefore, the more the people utilize the forest, the better the knowledge of forest management.

4.2.8 Acquisition of information about forest management

One of the major ways to preserve knowledge lies in documenting the way that this knowledge is transmitted. In trying to document how indigenous knowledge has been accumulated in this community, respondents were asked how they got their knowledge of forest utilization and management. This was to understand if acquisition of external (formal) knowledge for example from workshops or from training programs could be a contributing factor to their knowledge of forest management. This

gave a picture of respondent's category and a percentage frequency was tabulated (Table 4.9). Calculations were made with respective villages and expressed as a percentage of the total number of households sampled from each village.

Table 4.9: Acquisition of knowledge of forest utilization per household per village

	Number	**Percentage**
From parents only	112	90.3
From workshops	12	9.7
Total	**124**	**100**

The acquisition of knowledge about forest utilization simple tells how respondents have been able to gather their knowledge through time and this is also important in identifying the knowledge transmission process. Results show that most knowledgeable respondents have been able to generate their knowledge over time from their parents. Parents to children transmission accounts for 90.3% of total respondents. However other respondents were also able to have gathered their local knowledge their community meetings and training programs. These respondents constitute about 9.7% of the total respondents.

It should be understood here that, the transmission of indigenous knowledge from parents to children is very characteristic in this community. Most respondents acknowledged that they acquired knowledge while they were young. They usually accompanied their parents to the forest to collect resources. They have lived in the village and fully understand the culture, the religion, practices and the belief system from their parents. While this same method of knowledge transmission is apparent even in the present, networking also serves an alternative knowledge transmission process. Networking often involves discussions among members and friends of the community. Training programs such as the organization of community sensitization programs by the forest department also helps to improve the knowledge of households. These training programs are often organized involving all communities member either at the district or the sub district level. This finding however is similar with that posited by Wharp, (2001). He tried to discuss the perspective of indigenous knowledge and its

transmission. He argued that this body of knowledge which he called “living knowledge” is not written but rather transmitted orally through generations from grandparents to parents and to children.

4.2.9 Analysis of the socio-economic factors

The different factors that have an influence on indigenous knowledge were analyzed separately. The factors tested include gender, marital status, age, education, length of time of settlement, number of years of working out of the village and employment. The factors were tested using the statistical package for social science (SPSS). By comparing the means of the different variables, each factor and relationship of each with dependent variable analyzed by using One –Way ANOVA. Post Hoc test was later used to analyze the difference between different groups of the independent variables.

Table 4.10 Hypothesis thesis for factors contributing to indigenous knowledge

Independent	**n**	$\overline{X}$	**S.D.**	**F**	**Sig.**
Gender				**0.187**	**0.666**
-Female	75	35.64	12.48		
-Male	49	36.15	1.59		
Education Level				**2.852**	**0.018**
No schooling	7	34.57	11.94		
Nursery	1	45.00	-		
Primary	98	37.64	9.74		
Grade 1-3	11	28.45	9.75		
Grade 4-6	6	26.83	7.65		
University	1	16.0	-		

Independent	n	$\overline{X}$	S.D.	F	Sig.
Marital status				**5.661**	**0.001**
Married	101	35.27	10.76		
Single	14	31.93	11.97		
Divorce	1	29.00	-		
Widow	4	52.00	18.60		
Widower	4	55.00	8.9		
Age				**0.713**	**0.002**
20-30	10	17.80	3.55		
31-40	39	27.33	5.29		
41-50	38	36.61	5.34		
51-60	26	45.42	4.43		
61-70	9	56.66	3.00		
71-80	1	67.00	0		
>80	1	73.00	0		

Independent	n	$\overline{X}$	S.D.	F	Sig.
Employment				**1.316**	**0.268**
Unemployed	2	42.50	43.13		
Self employed	88	36.79	10.54		
Laborer	25	31.80	12.47		
Business	7	40.42	12.72		
Government.	2	32.50	2.3		
Experience working outside				**2.285**	**0.082**
Never	37	40.18	12.87		
< 5 yrs	66	33.98	11.16		
5-10 yrs	13	35.61	13.00		
>10 yrs	2	34.12	8.33		

Independent	n	$\overline{X}$	S.D.	F	Sig.
Acquisition of knowledge				**0.897**	**0.410**
Parents	62	37.12	12.88		
Workshops	6	38.83	8.75		
Both	56	34.42	11.08		

Length of time of using the forest				**0.817**	**0.487**
< 5 yrs	22	33.19	15.00		
5-10 yrs	29	37.13	10.67		
>10 yrs	73	36.21	11.48		

Results of hypothesis

Marital status: Considering the number of years respondents have been involved in forest utilization and comparing the mean of different marital status, results shows that the widowers have better understanding of forest management($\overline{X}$ = 55.00) than the married ($\overline{X}$ = 35.27) and the single respondents ($\overline{X}$ = 31.39), the divorced **(** $\overline{X}$ =29.00). However, statistical analysis found that respondents of different marital status have similar understanding of forest management with a statistical significance of (0.001) at a 95% confidence interval.

Age: By comparing the different age class and **c**onsidering the number of years respondents have been involved in forest utilization, it was found that respondents who are aged above 80 yrs have a better understanding ($\overline{X}$ =73.0) of forest management than those in the 20-30 age group ($\overline{X}$ =17.80), the 31-40 age group ($\overline{X}$ =27.33), the 41-50 age group ($\overline{X}$ =36.61), the 51-60 ($\overline{X}$ =45.42), the 61-70 age class ($\overline{X}$ =56.66). However statistical analysis shows that the different age groups have a statistically similar understanding of forest management. Analysis from the different age class shows a statistical significance at a 0.05 confidence interval.

Education Level: With respect to the number of years households have been utilizing the forest, it was found that, respondents with a very low level of education (nursery education) have a better understanding of forest management ($\overline{X}$ = 45.0) than those other respondents with a higher level of education as demonstrated by the mean. It was also realized that the higher the level of education attained by an individual the lesser the knowledge of forest management. Results also show that respondents with different level of education have different understanding of forest management with no statistical significance. Higher education might have been drifting individual's attention away from the village and eroding their local forest knowledge.

Table 4.11: Multiple comparison test for different marital status

Multiple Comparisons

Dependent Variable: IK

Tukey HSD

(I) Marital	(J) Marital	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1,00	2,00	3,39143	3,17191	,822	-5,3949	12,1778
	3,00	5,82000	7,93811	,948	-16,1690	27,8090
	4,00	-16,68000*	5,66786	,031	-32,3802	-,9798
	5,00	-19,68000*	5,66786	,006	-35,3802	-3,9798
2,00	1,00	-3,39143	3,17191	,822	-12,1778	5,3949
	3,00	2,42857	8,40259	,998	-20,8470	25,7042
	4,00	-20,07143*	6,30194	,016	-37,5281	-2,6147
	5,00	-23,07143*	6,30194	,003	-40,5281	-5,6147
3,00	1,00	-5,82000	7,93811	,948	-27,8090	16,1690
	2,00	-2,42857	8,40259	,998	-25,7042	20,8470
	4,00	-22,50000	9,62638	,140	-49,1655	4,1655
	5,00	-25,50000	9,62638	,068	-52,1655	1,1655
4,00	1,00	16,68000*	5,66786	,031	,9798	32,3802
	2,00	20,07143*	6,30194	,016	2,6147	37,5281
	3,00	22,50000	9,62638	,140	-4,1655	49,1655
	5,00	-3,00000	7,85990	,995	-24,7723	18,7723
5,00	1,00	19,68000*	5,66786	,006	3,9798	35,3802
	2,00	23,07143*	6,30194	,003	5,6147	40,5281
	3,00	25,50000	9,62638	,068	-1,1655	52,1655
	4,00	3,00000	7,85990	,995	-18,7723	24,7723

*. The mean difference is significant at the .05 level.

Where 1-maried, 2-single, 3-divorce, 4-widow, 5-widower

Table 4.12: Multiple comparison test for different age class

Multiple Comparisons

Dependent Variable: IK

Tukey HSD

(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1,00	2,00	-9,59474*	2,14451	,000	-16,0289	-3,1606
	3,00	-18,80526*	2,14451	,000	-25,2394	-12,3711
	4,00	-27,80000*	2,25769	,000	-34,5737	-21,0263
	5,00	-38,86667*	2,77239	,000	-47,1846	-30,5487
	6,00	-36,20000*	4,67385	,000	-50,2229	-22,1771
	7,00	-31,20000*	4,67385	,000	-45,2229	-17,1771
2,00	1,00	9,59474*	2,14451	,000	3,1606	16,0289
	3,00	-9,21053*	1,38428	,000	-13,3637	-5,0573
	4,00	-18,20526*	1,55385	,000	-22,8672	-13,5433
	5,00	-29,27193*	2,23684	,000	-35,9831	-22,5608
	6,00	-26,60526*	4,37747	,000	-39,7389	-13,4716
	7,00	-21,60526*	4,37747	,000	-34,7389	-8,4716
3,00	1,00	18,80526*	2,14451	,000	12,3711	25,2394
	2,00	9,21053*	1,38428	,000	5,0573	13,3637
	4,00	-8,99474*	1,55385	,000	-13,6567	-4,3328
	5,00	-20,06140*	2,23684	,000	-26,7726	-13,3503
	6,00	-17,39474*	4,37747	,002	-30,5284	-4,2611
	7,00	-12,39474	4,37747	,078	-25,5284	,7389
4,00	1,00	27,80000*	2,25769	,000	21,0263	34,5737
	2,00	18,20526*	1,55385	,000	13,5433	22,8672
	3,00	8,99474*	1,55385	,000	4,3328	13,6567
	5,00	-11,06667*	2,34557	,000	-18,1040	-4,0293
	6,00	-8,40000	4,43401	,488	-21,7033	4,9033
	7,00	-3,40000	4,43401	,988	-16,7033	9,9033
5,00	1,00	38,86667*	2,77239	,000	30,5487	47,1846
	2,00	29,27193*	2,23684	,000	22,5608	35,9831
	3,00	20,06140*	2,23684	,000	13,3503	26,7726
	4,00	11,06667*	2,34557	,000	4,0293	18,1040
	6,00	2,66667	4,71693	,998	-11,4854	16,8188
	7,00	7,66667	4,71693	,666	-6,4854	21,8188
6,00	1,00	36,20000*	4,67385	,000	22,1771	50,2229
	2,00	26,60526*	4,37747	,000	13,4716	39,7389
	3,00	17,39474*	4,37747	,002	4,2611	30,5284
	4,00	8,40000	4,43401	,488	-4,9033	21,7033
	5,00	-2,66667	4,71693	,998	-16,8188	11,4854
	7,00	5,00000	6,03392	,981	-13,1034	23,1034
7,00	1,00	31,20000*	4,67385	,000	17,1771	45,2229
	2,00	21,60526*	4,37747	,000	8,4716	34,7389
	3,00	12,39474	4,37747	,078	-,7389	25,5284
	4,00	3,40000	4,43401	,988	-9,9033	16,7033
	5,00	-7,66667	4,71693	,666	-21,8188	6,4854
	6,00	-5,00000	6,03392	,981	-23,1034	13,1034

*. The mean difference is significant at the .05 level.

Where1=20-30 yrs, 2=31-40yrs, 3=41-50 yrs, 4=51-60 yrs, 5=61-70 yrs, 6= 71-80yrs, 7=>80 yrs

From all the socio economic factors considered, results from Post Hoc test reveal that not all independent variables have a significant difference between the groups. Results show that at a 0.5 confidence level, there is a significant difference between the different age groups and the marital status. All other factors such as education, gender, number of years of working outside the village and the method of acquisition of knowledge were not found to have a significant difference at 95% confidence interval. There is a significant difference between married and the widows with a mean difference of 1, 6 68,000 and a significance value of 0.031. (Table 4.10) shows that there is also significant difference between different marital status such as that between the single and the widows (0.016) and single and widowers (0.003). From table (4.11), there is a significant difference in the age groups. The mean difference can be seen from the table as ranging from 9,59474 (between the 20- 30 and 31-440 yrs age class) to 3120000 (between 20-30 and >80 age class). The difference is statistically significant (0.00). However the difference between some groups is not very significant such as those between the (41-50yrs and 71-80yrs), and (71-80yrs and >80yrs).

The results from hypothesis testing have been in support of some significant factors that affect forest utilization knowledge. These factors include age, marital status and educational level. Results of this study are similar to that conducted by Ryan et al, (2005). They also applied an ethno botanical approach with in-depth interviews in identifying the factors in maintaining indigenous knowledge among ethnic communities in Manus Island. Factors that were found include gender, age, marital status, cultural subclass and habitation locality. The slide difference of other factors such as cultural subclass was due to the researcher considerations in handling the different factors which is based on existing theories and ethno botanical field walks. The studies in Manus Island found that the youngest informants aged between 18-30 have the least knowledge in all categories. These findings are also consistent with other ethno botanical studies, (Caniago and Siebert, 1998).

4.3 Community forest utilization practices by indigenous people

In order to meet the second objective of this research, community forest utilization was able to be understood. The utilization pattern of community forest by indigenous people was able to be understood through household survey. During this process, respondents were asked how they utilize the forest and the type of products harvested. The amount harvested, frequency and the consumption/sales pattern also constitutes necessary information in meeting this objective. The way the people use the forest reflects their forest utilization behavior as a result of their beliefs and practiced over a period of time. The main thrust is that an understanding of their utilization practice will give an insight in appreciating the way in which indigenous people apply their knowledge in forest management. From household survey it was realized that different respondents were involved in the utilization of different forest products and thus had a better knowledge in the utilization of the product than others.

4.3.1 Households utilization of medicinal plants

While knowledge of medicinal plants is posses by those who frequently involve in its utilization, the percentage of households directly involved in the utilization of medicinal plants varies between the three villages but rather less compared to other forest resource utilization. However a consideration of the different aspects of medicinal plants utilization, such as for consumption and sale pattern was important to give a vivid picture. Table 4.13 best explains this picture.

Table 4.13: Frequency distribution of medicinal plants utilization

	Trees	**Herbaceous plants**	**Shrubs**
Consumption only (%)	5.6	9.6	4.8
Sale only (%)	0.0	0.8	0.8
Consumption/sale (%)	0.0	8.0	1.6
Total (%)		**31.2**	

Table 4.13 shows that out if the total population, only 31.2% is involved in medicinal plants utilization from this community. The utilization pattern which is tabulated per the consumption sales pattern show that only 5.6% of the entire population harvest trees for medicine for consumption only and trees are not harvested for sale. 9.6% of the respondents depend on the herbaceous plants for medicine harvest for consumption only while 0.8% harvest for sale and 8% harvest for consumption and also for sale. 4.8% harvest shrubs for consumption only while 0.8% also harvests for sale only. From the entire community it was found that most community members do not involve in medicinal plants utilization. Knowledge of medicinal plants is restricted to those who have been ritually initiated into the tradition. The low percentage of respondents involved in the utilization of medicinal plants is because, most households think formal medicine from hospitals is more reliable. They have developed profound interest in formal medicine and believe they could stay stronger by taking formal medicine.

Just like many others, this finding is similar with that presented by Kazembe, (2008). He conducted a research on the social aspects of traditional medicine, traditional religion and gender in Zimbabwe. He found that indigenous Zimbabweans prefer western medicine because they think that the western medical systems are scientific while traditional medicine is not. However this is contrary to the findings of Satimia et al (1998). They used household surveys and participant observation to identify prevalence of skin disease in Tanzania and factors that influence the choice of healthcare, modern or traditional. They found that modern and traditional health facilities were equally used, but heads of indigenous households favored traditional medicine because it was cheaper to go to a traditional healer while modern medicine was thought to be more scientific.

Traditional healers (*moo phaen booraan*) who mainly use herbaceous plants *(samunphraj)* such as Hoary basil (*Bai maeng lak*) and holy basil (*Bai ka phra*) and other natural substances to cure diseases. The former is believed to alleviate cough and carminative agents while the later is believed to alleviate diaphoretic and digestive agents. Thus the sustainability of medicinal plants from the Koke Chantanang community forest is heightened by its use primarily for consumption. What is

important here is that, there should be a greater need to combine the two forms of medicine. This is important in performing some successful traditional treatments which modern medicine considers as superstition.

4.3.2 Household utilization of subsistence forest products

Subsistence forest products that most households depend on include vegetables, mushrooms and bamboo shoots. In this research, emphasis was placed on those forest products that were mostly utilized. The utilization of these subsistence products from the forest can be explained from table 4.14.

Table 4.14: Household utilization of subsistence resources for food

	Nong Pak Bung (%)	**Potong (%)**	**Nong Mak (%)**
Vegetables	38.7	37.0	11.3
Mushrooms	22.5	22.5	6.5
Bamboo shoots	31.5	29.8	16.0

Table 4.14 shows that the most utilized type of resources are mushrooms, vegetables and bamboo shoots. This is revealed considering the percentage of households involved in the utilization of these products. Vegetable utilization is lowest in Nong Mak (11.3%) while slightly similar percentage of households in both Potong (37.0%) and Nong Pak Bung (38.7). On the other hand, mushrooms utilization is same for households in Nong Pak Bung and Potong (22.5%). Households in Potong also harvest bamboo shoots most (31.5%) than households in Potong (29.8%) and Nong Mak with the least number of households (16%).

The percentage of households utilizing vegetables is lower in Nong Mak because, the households in this village practice vegetable domestication in their home gardens. On the other hand, households in Nong Pak Bung and Potong mostly engage in vegetable harvesting because they live closer to the forest and do not think domesticate much vegetables with most of their paddy fields around the forest. They easily can harvest from the forest before retiring back home from work. A similar reason can be explain for mushroom collection which is higher for Nong Pak Bung

and Potong. This is because households in these two villages do not have much income to obtain an alternative for mushrooms while in Nong Mak the households have more income and can go with much mushrooms consumption. The utilization of Bamboo shoots is lower than vegetables and mushrooms because mushrooms can be preserved for a long time and does not need to be harvested more often.

Table 4.15: Consumption /sales pattern (in percentage) of subsistence products of households

	Consumption		**Sale**	
	Number	Percentage	Number	Percentage
Vegetables	77	62.0	2	1.6
Mushrooms	74	59.6	1	0.8
Bamboo shoots	19	15.3	1	0.8

Table 4.15 shows that while the consumption of vegetables, mushrooms, and bamboo shoots is high, the sale is rather low. Results from analysis show that respondents that harvest vegetables for consumption constitute 62.0% of the sample population, while just 1.6% of the same population harvest vegetables for sale. Similarly, mushrooms harvesting for consumption constitute 59.6% of the entire respondents while 0.8% harvest for sale. While the percentage of households that harvest these products for consumption is greater for all these forest resources, it is clear from the table that dependence on these three resources either for consumption or for sale decreases from vegetables to bamboo shoots.

Most households in this community do not rely on sale of these products. This is because they consider that harvesting for sale will imply harvesting in large quantities and thus reducing the amount in the forest. Secondly, most households in this area can harvest these resources by themselves and nobody is willing to buy from another. Lastly it was found that households are not interested in the sales of these products because they do not feel comfortable with the market conditions. The amount of effort they input in harvested and processing these resources is much that they instead sell at a lower price. This therefore discourages the sales by households.

4.3.3 Household utilization of wood and grass products

Table 4.16: Percentage of household harvesting of other forest products per village

	Timber (%)	Grass (%)	Fuel wood (%)
Nong Pak Bung	0.0	3.0	4.0
Potong	3.0	0.0	0.0
Nong Mak	0.0	2.0	0.0

Table 4.16 represents the utilization of timber, fuel wood and grass by the three villages. From the sampled population (124 households), it can be seen that a total of 12% (3% for timber, 5% for grass and 4% for fuel wood) of the sampled population from the three villages are involved in the harvesting of these forest resources. 3% of the respondents in Potong were found to use timber while no household uses grass or fuel wood in the same village. Grass was found to be harvested by 3% of households in Nong Pak Bung, while 4% of households collect wood for fuel in the same village. No household was found to be involved in timber extraction and fuel wood collection in Nong Mak village but the households that utilize grass form 2% of the sample.

Most households in Nong Pak Bung and Nong Mak do not utilize wood for timber because these villages do not have any construction requirement that needs wood. Although most houses have been built from wood this resource is no longer allowed to be harvested. When needed, wood is often harvested from their farmlands rather than from the forest. However it can be seen that from the three villages, most households do not use wood for timber because of the regulations placed on timber extraction. Grass is also utilized by 5% of the entire population. The harvesting of grass is basically for feeding cattle and making roofs. Thus in Potong, grass harvesting is rare because very few people have cattle or take their cattle to graze. Fuel wood collection is practiced by only 4% of households due to bans in wood collection and also because many people do not rely of wood for cooking.

4.3.4 Frequency of harvesting of community forest products

The frequency of harvesting of products namely mushrooms, vegetables and bamboo shoots was also taken into consideration. In estimating the utilization of these products, the frequency of harvesting of these products per month was taken as a criterion for its sustainability of its management. The information obtained was that for the peak period which is believed to be the period in which these resources flourish, but an estimation of the annual harvest is made. The peak season actually varies from March to April for vegetable, and the month of August for mushrooms. This season was considered because most people harvest from the forest only during this period as the resource is most available. Table 4.17 describes this frequency as per the number of trips.

Table 4.17: Frequency of harvesting (number of trips) of forest products per year.

	Nong Pak Bung (number of trips)			**Potong (number of trips)**			**Nong Mak (number of trip)**		
	Mush	Veg	Bambo shoot	Mush	Veg	Bambo. shoot	Mush	Veg.	Bambo. shoot
Average	63	96	30	36	66	36	66	80	60
Min.	10	15	12	18	20	16	18	20	12
Max.	120	180	48	60	120	60	120	150	108

Table 4.17 shows the annual frequency of harvesting of products. The frequency of harvesting was collected for one month and an approximate quantity harvested per year was calculated from statistics obtained. Results show that the least average frequency of mushrooms collection (36 trips/ year) is in Potong while approximately twice the number of trips is made in Nong Mak for collection of the same resource. While an average of about 96 trips are made for vegetables collection by households in Nong Pak Bung, the least frequency (66trips/ year) occurs in Potong. While most households from all villages make most trips for the harvesting of vegetables, number of trips made per year to the forest for the collection of bamboo shoots was found to be least in all three villages.

Collection of vegetables and mushrooms is most frequent because these forest resources play a vital role in the subsistence of households. Vegetable just like mushrooms is required for every day meals. These forest resources are usually prepared and eaten with rice. On the other hand, bamboo shoots harvesting is not frequent because these resources is preserved by most households and can be eaten for a longer period of time. This implies that households do not have to make frequent trips to harvest bamboo shoots. A second reason is that bamboo shoots are not often eaten as compared to vegetables and mushrooms thus their harvesting rate is low.

4.3.5 Harvesting of Non – timber forest products per Month

Table 4.18: Amount (kilograms) of non timber forest products collected per village per month

	Nong Pak Bung			**Potong**			**Nong Mak**		
	Mush (kg)	Veg. (kg)	Bamboo Shoot (kg)	Mush. (kg)	Veg. (kg)	Bamboo Shoots (kg)	Mush. (kg)	Veg. (kg)	Bamboo Shoots (kg)
Mean	5.0	7.1	14.5	2.0	1.8	9.3	4.7	4.2	6.5
Mode	5.0	1.0	15.0	1.0	1.0	10.0	2.0	3.0	3.0
Max	10.0	45.0	30.0	5.0	10.0	20.0	27.0	35.0	25

Where Mush= mushrooms, Veg. = vegetables

Table 4.18 is an illustration of the amount of forest resources harvested per month per village expressed in kilograms. The table shows that the mean amount of mushroom harvest per month is highest (5.0 kg) in Nong Pak Bung, with an approximate amount (4.7kg) in Nong Mak. Monthly vegetable and bamboo shoot collection from the area is highest in Nong Pak Bung (7.1kg and 14.5 kg respectively) while 9.3 kg and 6.5 kg on average of bamboo shoot are collected in Potong and Nong Mak respectively per month. Most households collect about 1.0 kg of vegetable in Nong Pak Bung and Nong Mak per month. The maximum amount of mushroom harvested is in Nong Mak village with an approximate 27.0 kg far higher than Potong

(5.0 kg) and Non Pak Bung (10.0kg). On the other hand, more amount of vegetable is harvested in Nong Pak Bung (45.0kg) than for Potong (10.0kg) and Nong Mak (35.0kg).

On the basis of the frequency of visit to the forest and amount of resource they harvest it can be said that the number of times visiting the forest is not proportional with the amount of products collected. Despite the frequency of households to the forest, this does not imply more resource collection than others with less frequently visits the forest. If a projection is made from the figures it can be seen that, since the table represents the amount collected by households per month during the peak period, the average amount that will be collected by households per year will not be above (60kg for mushrooms, 85kg for vegetables, and 168kg of mushrooms in Nong Pak Bung. The estimated amount of harvest for Potong will be 24kg of mushrooms, 20kg of vegetables and 108kg of bamboo shoots. The average amount harvested by households in Nong Mak will be 48kg of mushrooms, 40 kg of vegetables and 72 kg of bamboo shoots.

Therefore from the utilization practice, a description of the extend of sustainability of harvesting of forest products can be made. Although there is a dependence on forest resources, there is however a greater dependence on the community of resources. Most households depend on mushrooms, bamboo shoots, and vegetables. Results of the analysis shows that the utilization of products from the forest is sustainable in the sense that very less quantity is harvested per household the maximum of which is 45 kg for vegetable, 27kg for mushrooms and 30kg for bamboo shoots. This is relatively less compared to approximately twice that quantity reported to be harvested in by households in India per week (Davidar et al, 2008). It should be noted that these is considered as the maximum because the data taken was for the most flourishing season or what the people call “peak season”.

From the frequency of collection it can be said that most households make just an average of not more than 10 trips to the forest during the peak season. From the utilization practice it can be concluded that the people have some similar dependence on forest resources. This implies that most people harvest just a similar amount of forest products, they make an approximate number of trips to the forest, and also they

have similar dependence on type of resources. This implies that the utilization practice is consistent and is common to most households. This explains the claim that there is a particular knowledge of utilization which is indigenous to the people. However results from survey found that households had knowledge of utilization only after they started using the forest which concludes that the utilization practice highly contributes to forest knowledge.

4.4. Types of indigenous knowledge and their contribution to community forest conservation

Evolutionary ecologists look at conservation behavior as an act involving short-term cost that allows greater value to accrue in the future and focus on restraint in resource use (Brooks, 2008). This does not necessary implies that conservation behaviors necessarily leads to untouched environments, but rather can entail areas of non-use, selective management and intensive management of wild resources that can shape the ecological makeup of the landscape (Anderson, 2005). Given this definition, conservation behavior requires collective action among a population of harvesters to minimize impacts on the resource. Thus the collective action of the indigenous people in conserving the forest as a result of their local knowledge is the point of focus in this section.

This section focuses on analysis of different indigenous knowledge practiced and applied in forest conservation and management. The main focus is to identify and analyze how the indigenous people and their knowledge can contribute to the sustainable management of their community forest. It explores the inextricable relationship between utilization of community forest and its conservation techniques (Table 4.19).

Table 4.19: Types of knowledge, forest resources, harvesting period and villager's preference

Indigenous knowledge type	Forest Resource	Harvesting period	Knowledge applied	Respondents preference
Medicinal plants	Trees	End of year	Based on illness	
	Herbs	,,	,,	
	Shrubs	,,	,,	4*
	Climbers	,,	,,	
Food security	Vegetable	March-April	Leaf, taste, color	1*
	Mushroom	August begin	Color and Ants	2*
	Bamboo shoot	During need	Young shoot	3*
Construction	Rattan	During need	Mature rattan	8
	Grass	During need	Required quantity	5
	Bamboo	During need	Domestication	6
Energy	Fuel wood	During need	Dead wood only	7

Note: Knowledge applied refers to special indigenous conservation measures taken during utilization either in identification or harvesting, to ensure forest sustainability. Respondent's preference refers to the level of importance attached to specific resource (Ranked from 1-8). * implies very important

4.4.1 Indigenous knowledge of medicinal plants utilization

During the struggling with and adjusting to their natural environment, the indigenous people have accumulated through their observations and practice a body of indigenous knowledge of medicine. From in-depth interview it was understood that though this knowledge has been basically transmitted through generations, knowledge has also been developed through trial-and-error methods rather than a complete theory of medicine. Medicinal plants actually have been key resources of this people. Medicinal plants may not be evident in the present day living but plays a major role in indigenous people's health especially before the advent of modern medicine. The people have spent many years keeping a healthy condition out of products from the forest. The types of plants which are generally harvested for medicine include trees, shrubs, herbaceous plants and climbers. The leaves of the trees are usually harvested and sometimes the back and roots of the trees. These parts of the plant are harvested

carefully such that the plant is not destroyed. Harvesting of tree roots is done without the use of instruments to avoid destruction of the entire plants.

Figure 4.6: Medicinal plants harvested from the Koke Chantanang Community Forest

Figure 4.6 shows medicinal plant harvested from the forest. Each year, the monks prepare for the annual ceremony called *Paliwar sakan.* The monks visit the forest in the month of December for medicine plants collection used for back pain based on the formula. Like modern pharmaceutical formulas, specific parts of specific trees are effective only for one symptom. Although it exist, this knowledge is fading with the coming of modern medical doctors but many people still use medicinal plants for particular problems. The formula used in traditional treatment comprises of tree species based on the Thai tradition. When the medicine is prepared, it is distributed to every villager as a custom and tradition and to prevent unsustainable harvesting. Low levels of medicinal plant knowledge were found among the among the indigenous people due to acculturation, supporting the theory that medicinal plant knowledge is particularly vulnerable to loss.

Table 4.20: Some medicinal plants and their uses harvested from the forest

Local Name	Scientific name	Part of tree	Use
Sadao	*Azadirachta indica*	Back	Antimalaria
		Seed	Insecticide
		Flower	Stomach ache
ma kluea	*Diospyros mollis*	Fruit	Use to cure hookworm
man pla	*Fagraea fjragrans*	Leaf	Antimalaria, stomach ache
Po pit	*Helicteres isora*	Back	Stomach ache
		Root	Stomach ache
		Fruits	Irritation
sakae na	*Combretum quandragulare*	Root	Venereal disease
		Seed	Against infection from worms
		Leaf	Relief of muscular pain
Phayom	*Shorea roxburghii*	Back	Food preservation

Source: (Smitinand, 2001), Prachaiyo, 2000.

The people use their knowledge to enhance a sustainable utilization of these products and they fully understand the indigenous medicine system. Only the required quantity is collected which is solely used for treatment of family members or friends while sale of medicine is restricted. The people apply their knowledge in the identification of the plants that can be used to make the medicine. They have learned that certain herbaceous plants can be used to stop stomach ache and nose bleeding. They know that plants with certain smell are not consumed to avoid miscarriages. Other knowledge applied include the use of the hands in harvesting the plants as it is generally thought that harvesting with a tool such as a knife will destroy the plant. The people use their knowledge to identify where and in what season certain medicinal plants could be harvested. Rather than cutting the whole tree, the back of the tree is carefully taken out to avoid destruction of the tree. The people have what they

describe as a formula for traditional medicine which is compatible with a particular illness.

According to Constanza and Grinspoon, (2002) indigenous peoples' efforts to develop their own management plans in the utilization of medicinal forest resources are important not only in promoting ecological and economic sustainability, but also cultural sustainability, which is essential for the survival of the indigenous medical knowledge, values and traditions. The Darwins initiative in Peruvian indigenous communities is also in support of this idea by asserting to the fact that, one of the ways to improve on management and plan for sustainable conservation of forest is to work on indigenous populations to consolidate their traditional knowledge of medicinal plants and support it with scientific knowledge (Darwin initiative, 2008).

4.4.2 Indigenous knowledge of Mushrooms utilization

Mushroom serves as an important source of food for the indigenous people. They use it in almost every dish and can be eaten with rice which serves as a source of food for the people. They apply their knowledge in harvesting mushroom while taking into consideration aspects such as time of harvesting, quantity to harvest, kind of species harvested and location of harvesting. The people actually use their knowledge to identify when the mushroom is mature. They can predict the seasonal availability of mushroom. They usually harvest the mushroom in the rainy season since they consider this period as the period when mushroom is most available. The people have what is called the “peak period”. The peak period is identified with a change in weather conditions. There is actually restriction of harvesting in areas where re-plantation is carried out. When it dries for a longer period and after that a heavy rain comes, the people can understand with certainty that there is fresh mushroom in the forest. Thus the peak period is used for the period when mushroom is mostly available and is generally thought to come only once a year. With respect to forest sustainability, just enough mushroom is harvested and they have a sense of belonging that others have to collect as well. According to the people, the peak period starts in August. During this period, much mushroom is harvested because the people think at this period in which the mushroom has so much humidity, shoots and is of good taste. The People recognize mushrooms through their various colors, like yellow, white, half-white,

brown, blackish and dark brownish etc and different shapes. The local people also search these mushrooms under various tree species. They use their knowledge in predicting that decrease in mushroom availability is as a result of a decrease in precipitation.

Figure 4.7 (a)

Figure 4.7 (b)

Figure 4.7(a) shows an indigenous woman just from collecting mushroom from the forest. Figure 4.7(b) shows a typical meal served by the local people with mushrooms as an important food item.

During the peak season, there is networking in which the very early people to get to the forest come to the village and informs others. There is a high level of indigenous knowledge applied in the identification of mushroom for harvesting. According to the indigenous people, edible mushroom is identified from the type of insects and ants that surround it. If there are no insects on the mushroom, it implies that the mushroom cannot be eaten and is not harvested. The people know that insects can only be identified with mature mushrooms and those mushrooms which are not mature cannot be harvested. They also use their knowledge to distinguish the mushroom as good or bad based on the type of species. They know that the very mature mushroom is not good to consume because it has a low quality. They also keep in mind while harvesting that if harvest so much, it will decrease the quality of the

mushroom. In cases where mushroom availability is low, they apply their knowledge to vegetable consumption to meet up with their livelihoods.

Table 4.21: Common Mushrooms that farmers harvest in eastern Thailand

Local name	Scientific name	Way of consumption
1.*het na kho*	*Lentinus spp*	Local curry
2.*het na daeng*	*Lentinus spp*	Local curry
3.*het na lae*	*Ressular violeipis*	Local curry
4.*het na ua*	*Resulla heterophylla*	Local curry
5.*het phueng*	*Fayolus alveolaris*	Local curry
6.*het kradang*	*Lentinus praeriquidus*	Local curry
7.*het la ngok*	*Amanitta yaginata*	Local curry
8.*het cha kai*	*Russula delica*	Local curry
9.*het pho*	*Astreous hygrometricu*	Local curry
10. *het pluak*	*Terminitomycea Fuliginosa*	Local curry

Source: Prachaiyo, 2000

4.4.3 Indigenous knowledge of vegetables utilization

Unlike mushroom, vegetable can be harvested throughout the year but its availability increases during the dry season also considered as the peak season. In the case of vegetable, the knowledge of its harvesting is different. The peak season is considered because vegetable is thought to have new leaves during the dry season and it is at that period that the vegetable is good for consumption since the leaves are young and fresh. The peak period thus comes up from March to April. Most people usually harvest in May just after the dry season as the new rains come with fresh and healthy vegetable. Sustainable utilization knowledge of vegetable is that the vegetable is harvested for a week or two and after that the vegetable is allowed to recover. This is wise use of this resource and is very important in conserving the forest. Everybody in all the villages know that the normal tradition have to be respected for the sake of the sustainability of the forest. However most households consider some minor forest products as vegetable.

Most people do not harvest vegetable more often as they do not eat it more often. Most households try to create gardens around their residents in which they cultivate vegetable. They think that it is easier and quicker to harvest from their home gardens rather than walking longer distances to harvest from the forest. Thus indigenous knowledge also plays a significant role in identifying the cultivable species of vegetable and to reduce pressure from the forest. Good vegetable is identified when it has very little flowers and new leaves. Despite the consideration of the peak period in harvesting, vegetable can be harvested all year round because different species can be harvested at different periods of the year. Their home gardens where many fruits trees are planted provide the fallen stems and dried branches good for fuel. The home garden is an important source of fresh food for the family. Their live style is an important factor in preserving the forest of the region.

Figure 4.8: Cultivation of vegetable in home gardens

4.4.4 Indigenous knowledge of bamboo cultivation

Though bamboo is not common to the community forest, the utilization of bamboo such as for fencing, food (bamboo shoot) and basket making is indispensable. Due to its scarcity, the sustainable utilization of bamboo has been a major step of most households. The process of harvesting its self is carried out with much of the knowledge of the indigenous people. To ensure sustainability of the forest, bamboo is

not frequently harvested as most think that the bamboo shoot is decreasing and does not need to harvest much of it. The bamboo is collected from the forest by careful digging and processed in a special traditional method. The bamboo shoot is preserved in a way that could last for a long time. This is also aimed at reducing the pressure of the forest while allowing the bamboo to recover. While greater indigenous knowledge is applied in harvesting, the preservation of the bamboo shoot is done with a special indigenous technique. The shoots are boiled and packed in bags. This is to enable that the bamboo can last for over a year such that infrequent harvesting is ensured.

Figure 4.9 (a) Harvested bamboo shoots Figure 4.9 (b) Processing of bamboo shoots

Figures 4.9 (a) shows fresh shoots of bamboo collected from the forest while Figure 4.9 (b) describes the traditional processing of bamboo shoots. Due to its higher value in household economy the planting of bamboo is a main activity of the households in this area. The young shoot is mostly cooked in a local curry and salted bamboo is used in preparing various kinds of food. Most households plant bamboo around their houses. However, the people can differentiate with their knowledge the best species to be planted. In planting bamboo, most households select the species that can be eaten and that which will help to stabilize water resources in this area. Thus they take into consideration ecological factors when they do their selection.

Figure.4.10: Domestication of bamboo to reduce pressure on community forest.

The planting of bamboo around the villages does not only reduce pressure from harvest from the forest but the people believe that planting bamboo serves as a wind break at the beginning of the rainy season. Dry sheath of bamboo shoots is also used for rice and sheath storage. The most popularly planted bamboos are *Phai Liang (Bambusa nana), Phai dam khwan (Thyrsostachys oliverri), Phai bong (Drendrocalamus brandissi) and phai tong (Dendrocalamus strictus)* (Prachaiyo, 2000).

4.4.5 Indigenous knowledge of timber harvesting

Timber harvesting in this section is used to group wood for construction and fuel wood for cooking. With respect to fuel wood collection, dry wood is mainly derived from the forest. It is collected for the making of charcoal. They select the best quality wood with respect to its ability to form long fire. Species collected are thought to be of high quality with little water (dry). Dry wood is harvested because there is no taboo for its collection unlike fresh wood. However the people have a very strong commitment to preserve the forest and this makes them very strict to tree felling. Most people do not use wood nowadays because they have shifted to electric and fuel gas cookers. For those who use fuel wood, they ensure that a single charcoal production can last for one year.

Figure 4.11: Charcoal productions from dead wood collection

Although most of the houses in this area are made from timber, the cutting of trees from the forest is generally prohibited. In the past, wood for construction was collected from their farmlands. Most houses from this area were constructed many years ago and by then there was a negotiation in which every village member was supposed to contribute in building the house. After the handing over of control of forest to the communities strict restrictions have been outlined with emphasis on tree felling. Due to the restriction, the people have used their knowledge to plant trees in their farmlands since they will require it. Most trees that are used come from neighboring farmlands. Thus the success of the forest management in these communities has actually been contributed by the knowledge of the people to avoid illegal activities which can be of detrimental impacts to the forest.

Figure 4.12: Planting of trees on farmland to reduce pressure on forest

The knowledge of the people is very important in not only preserving the forest but also in the sustainability of the paddy fields. Therefore tree planting in paddy fields is not only aimed at preserving the forest but findings show that the people are also encouraged to plant trees in their farmlands because they think that tree leaves that fell on the paddy fields contains some ingredients of plant nutrients. According to Prachaiyo, (2000), this is an indigenous knowledge that has been developed by carrying on the same practice introduced by their parents for generations.

On the other hand, grass is used for construction but most of it comes from outside the forest since the forest has loosed much of its grass in the past years. Grass is either harvested for feeding buffalos or it may be used for constructing roof of buildings. They have grass all year round and could select the best grass for cutting. The people have a knowledge which identifies dry grass as the best for roof construction. According to their knowledge, dry grass is good because it can last for a longer period. They therefore harvest the grass in the dry season because it is only at this time that the grass is strong and could last for long.

Figure 4.13 (a) Roof made from grass

Figure 4.13 (b) Grass for feeding buffalos

Table 4.22: Harvesting Calendar by households in the community

Resource	J	F	M	A	M	J	J	A	S	O	N	D	Harvesting
Trees	x	x	x	x	x	x	x	x	x	x	x	x	All year
Herbs	x	x	x	x	x	x	x	x	x	x	x	x	“
Shrubs	-	-	x	x	x	x	x	x	x	-	-	-	“
Climbers	-	-	-	x	x	x	x	x	-	-	-	-	“
Vegetable	-	-	x	x	x	x	x	x	x	x	-	-	Rainy season
Mushroom	-	-	-	x	x	x	x	x	x	-	-	-	“
Bamboo shoot	-	-	-	x	x	x	x	x	-	-	-	-	Rainy season
Rattan	-	x	x	x	x	x	-	-	-	-	-	-	Rainy season
Grass	x	x	-	-	-	-	-	-	-	x	x	x	Dry season
Bamboo	-	-	-	x	x	x	x	x	x	-	-	-	Rainy season
Fuel wood	x	x	x	x	x	-	-	-	-	x	x	x	Dry season

Where (X)= harvesting period, (-) =period of non harvesting

4.4.6 Indigenous knowledge in forest protection

Indigenous knowledge plays a major role in forest protection. The various knowledge of the utilization such as that involved in medicinal plants, mushrooms, vegetables, fuel wood and bamboo collection enable the people to understand the different challenges that these resources face. The indigenous people therefore protect these forest resources for the future. They fully understand the issues contributing to the disturbance of the forest around them. A typical example is their knowledge of the cause of forest fires.

Table 4.23: Fire incidence in the community forest

Reasons for occurrence of fire	**Nong Pak Bung**	**Potong**	**Nong Mak**
Farm preparation	70.0	72.0	80.0
Charcoal burning	0.0	5.4	3.5
Hunting/Horney collection	14.5	10.3	12.0
Accidental	15.5	12.3	4.5

The reasons for fire incidences from respondents were taken to get their knowledge of forest protection. Most respondents thought that the reason for forest fires was from farm preparation. 70% of respondents from Nong Pak Bung, 72% from Potong and 80% from Nong Mak were in favor of this. Most people did not think that forest fires were caused by charcoal burning while 14.5% of respondents from Nong Pak Bung, 10.3% from Potong and 12% from Nong Mak think fires were caused by hunting and the collection of honey from the forest. With this local knowledge the people have shifted most of their traditional agricultural practices in favor of the forest. Charcoal production is now done far from the forest areas while slash and burn which is an indigenous farming practice has been forgone. Many indigenous people retain some trees in their farmlands. Most respondents acknowledged that they retain trees in their farmlands for soil improvement, firewood, medicine, timber, and even fruits which are all important for their livelihood.

4.4.7 Indigenous knowledge in social mobilization

Social mobilization is a movement which aims at creating a major thrust to solve problems of local and national magnitude by promoting participation of all possible sectors and civil society, mobilization of local resources with the use of indigenous knowledge and enhancement of people's creativity and productivity through mass campaign (UNDP, 2006). In the context of forest management, the concept has an extreme significance where a real change could be initiated by enhancing joint efforts against the alarming forest destruction. Social mobilization capitalizes on available resources and on situations that can help in moving a group of people to achieve a common goal. In the context of this research the role of indigenous knowledge of forest management helps in bringing the people together and shaping their ideas to a common goal as result of their consistent forest utilization.

Indigenous knowledge of forest utilization helps in local mobilization as issue of concerns is discussed with respect to local perspective. Since the forest is under the control of these people, issues of concern are identified and community action is implemented. In forest management, the people believe that the planting of trees in degraded patches of the forest is best during the rainy periods. This is a local knowledge that has existed within the community for many years. The people understand that better rainfall and water availability depends on the condition of the forest. They are encouraged to preserve the forest for future generation even if they are not extended any monetary incentives by the government. They know that the preservation of resources will mean free supply of fruits and other food supplements.

Most people expressed the forest as part of their tradition that is needed for the survival of the present and the future generation. For most others, living without forest is unperceivable as they depend on it for non timber products to meet their subsistence need. It is this dependence that has helped shaped their knowledge that they poses about flora and fauna conservation. The people therefore have to rally themselves and turn out in mass numbers to carry out forest bases activities. In order to make positive contributions towards forest protection. With the existing dependence on forest and developed knowledge about the resources, the villagers have developed some techniques and practices to ensure sustainable use of the products. Some of the

traditional practiced have been revived for the purpose of conservation as well as developing a new sense of belonging towards resource use.

Timber for construction is not allowed to be done indiscriminately or even practiced as it is thought to be a practice that destroys the forest. According to the villagers, bamboo is also collected only after it reaches a certain height and girth and it is cut at a certain distance from the roots such that small shoots can still grow of the plant. The mobilization of village people towards a mutual benefit in forest conservation such as the protection of water sources, provision of food, medicine and shelter, is a reflection of their local point of view which is aimed at enhancing forest conservation. This makes the community united within a grassroots movement and stands against any external threat from outside unsustainable influences.

4.4.8 Indigenous knowledge and institutional building

Local institutions are often made up of formal constraints (rules, laws and constitutions), informal constraints (norms, behaviors and self imposed codes of conduct) and their enforcement characteristics. Informal constraints are social taboos, setting out close areas, rituals and other repetitive cultural practices (Kajembe et al, 2001). Local institutions facilitate capacity building, participatory decision-making and sustainable approaches to forest conservation (Blunt and Warren, 1996). In this respect, indigenous knowledge was found to play a vital role in local institution process of the community which consequently helps to manage the community forest. The role of indigenous knowledge in local institutional process is that, the indigenous people have a knowledge which is often associated to traditional rituals norms and taboos which lead and direct various tradition activities in the community. They associate certain trees with some traditional rituals and designate certain areas of the forest as secrete sites only used for traditional ceremonies. In this case they put rules and regulations that hinder the harvesting of certain trees of the forest. They are responsible for organizing certain rituals in forest or punishing those who go against traditional norms through warnings or fines. Most of these regulations as well as norms are drafted in a village committee which also strives to monitor the forest.

With the traditional rules and taboos, some trees are not allowed to be cut and other animals are not hunted. These rituals are very important and highly connected with conservation. The places usually used for rituals is not assessable to most harvesters as it is used to thank the ancestors for all the good things that have been occurring to the society and ask for the provision of some necessities such as higher yields. Results show that more than 80% of the respondents were aware of traditional rituals as well as taboos. Thus most people are aware of the community forest rules and they therefore conserve the forest as most believe that violating some of these rules may lead to misfortune. Thus, restrictions on the use of certain plants, animal or area prevent over utilization and depletion of natural resources in this area. These justify the belief that traditional institutions have their role contributed by their traditional knowledge and therefore influence decision-making on the use of natural resources.

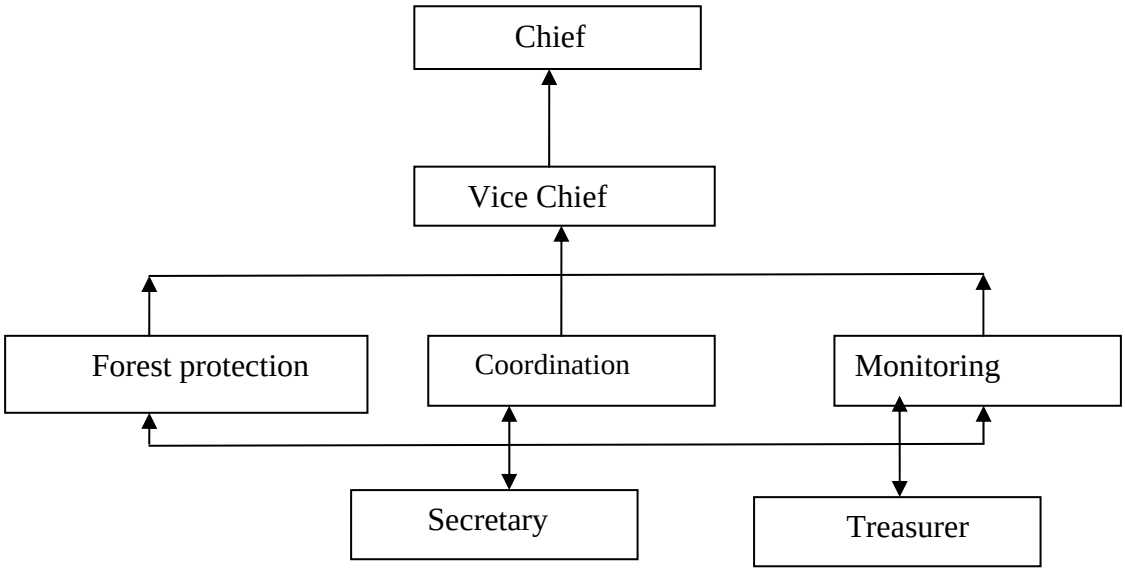


Figure 4.14: The institutional structure of traditional forest management

4.4.9 Income generation

Forest product constitutes a source of income of households in these communities. From a socio-economic point of view, the people are poor and with very little possessions. Indigenous knowledge plays a major role in income generation which in a way contributes in the sustainability of the community forest. While people depend on the forest, the harvesting of forest products is mainly for consumption. Findings show that, most households do not collect forest products primarily for sale or to generate income. It therefore implies that, the people have recognized the challenges they face and the growing need to conserve the forest form decreasing and also for sustainable use. Collection of forest products is not bias. In other words households who collect resources from the forest, have knowledge to harvest sustainably and just the quantity needed and to make others to collect as well. Those who have more may rather prefer to share among friends. While most households have alternative income sources such as the sale of rice, garlic, and cassava, income generation from forest is rather low due to need for sustainable management.

Table 4.24: Annual household incomes per village

Income (Baht/yr)	Nong Pak Bung	Potong	Nong Mak
Maximum	15200	16,250	34,200
Minimum	800	720	350
Average	3,065	5,003	5,925
Standard Deviation	2,799	5,114	8,080

The table shows the annual income generated by households from forest products. Forest resources that are often been sold include mushroom, vegetable, bamboo shoot and broom grass. Relatively, households in Nong Mak village make the highest amount of income (34,200 baht/ year) than the other two villages. The average income of Nong Mak from the sale of resources from the forest is approximately 5,925 baht/ year. Although the average annual income for Nong Pak Bung is the lowest (15,200 baht/ year) of all three, the minimum income of household is higher (800 baht

/year) than that for the other two villages. Income generated from the forest is low relative to the annual requirements of households, the villagers still think that managing their forest sustainably is important in preserve their cultural and spiritual identity. They still obey the regulations, taboos that is aimed at harnessing a control and management of the forest.

From a broader picture presented on the types of knowledge and the different contributions, it can be said that knowledge of forest management is different, the difference in which lies in the types of forest resources. Knowledge of medicinal plants harvesting is different from that of vegetables, mushrooms or the harvesting of fuel wood. However these different types of knowledge are focused towards an overall goal of forest conservation. The people actually have a collective sense of responsibility and awareness to forest conservation. This explains why the people ensure a sustainable management with particular attention on the amount of products harvested for sale most of which harvest basically for consumption. Their coordinated action in management is also reflected in their institutional setup with specific rules and regulations.

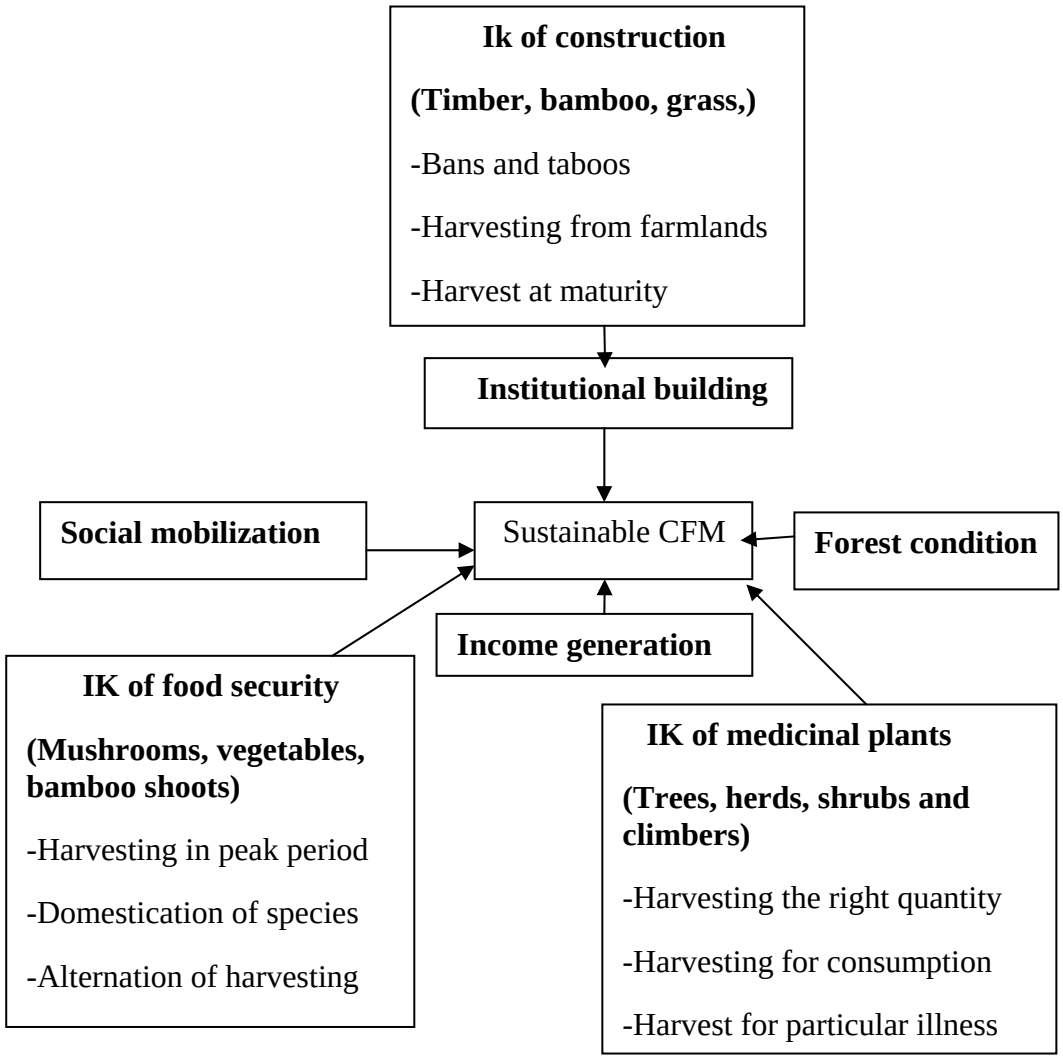


Figure 4.15: Sustainability of indigenous knowledge in community forest management

4.5 Conclusion and discussion

This research was primarily design to study how three local communities use and manage their community forest together. The point of focus in their management is on how the local communities use their knowledge in conserving the forest resources while they harvest. In studying the knowledge of the people, this research therefore identifies how indigenous knowledge contributes in the social mobilization process, the institutional building process and income generation. The involvement of the people in every of these activities from a traditional point of view reveals the role of their knowledge.

The chapter began by analyzing the different factors that influence indigenous knowledge. Each factor assumed to have an influence on indigenous knowledge was identified and discussed. Analysis shows that the factors that have significant influence on indigenous knowledge are education class, marital status and the age of an individual. These factors were found to be statistical significant at a 95% confident interval. The finding is similar with that conducted by Kolawole and Laogun, (2005) when they studied socio economic factors influencing the practice of indigenous knowledge to soil fertility conservation. They found that among other factors such as income, religion, farm size, age and level of education has a significant correlation with indigenous knowledge.

Secondly, the different utilization practices carried out in the community forest was analyzed and its contribution to knowledge is explained. Although slightly different, this research found that, the utilization practice of the people from the three villages is common. They have the same peak periods for harvesting of forest products but make slightly different number of trips to the forest. The amount of products harvested also differs ranging from mushrooms bamboo shoots, vegetables, herbaceous plants and even fuel wood. This result is similar with that conducted by the utilization of river reeds in the Okavango delta in Botswana (Mmopelwa, 2006). He found that the amount of reeds harvested was different between households from the three villages. The reasons for the difference in the amount of products harvested from the forest can be due to the distance to the forest and secondly because of size of household.

The continues utilization of the forest was a major contribution of forest knowledge. Lastly, the contribution of indigenous knowledge to the management of the community forest has been identified and analyzed. The main idea about this is how the people organize themselves towards managing the forest. The indigenous forest resource management of the people around the Koke Chantanang community forest and the utilization ethics was examined as an identification of the ecological and environmental awareness of the people. They are uncovered to be very determined and organized with a strong focus to better manage their forest. A synthesis of the utilization of forest provides an insight of the way in which knowledge has been build up for generations and exposes the experiences of the people. Indigenous knowledge in these communities have been observed to reflect local experiences and perceptions that characterize their way of life which is significant in enhancing the long term management of the forest.

CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter marks the conclusion covering the major findings in this research with particular emphasis on the objectives as well as answering the question posed at the first chapter. The findings from hypothesis testing also constitute part of this chapter. In this research three questions were posed as well as three hypotheses were stated. Priority areas where future research should focus are also highlighted in this chapter.

5.1 Conclusion

5.1.1 Factors contributing to Indigenous knowledge

The first hypothesis seeks to investigate the type of factors and to what extend these factors will influence traditional forest utilization knowledge. Socio- economic factors were considered to investigate this hypothesis.

H_0; Men, married people, the elderly, the more educated, long time settlement, higher income households, more involvement in forest activities, the employed, longer periods of working outside, have a better knowledge of forest management**.**

This hypothesis looks at each of these factors individually and investigates the influence of each factor on characteristic inherent to each respondent. Thus the identification of the factors was first considered and secondly the variation of each factor to forest knowledge was assessed. To investigate this hypothesis, the research employed the use of a statistical package (SPSS) in comparing the difference between the mean of the categories of the independent variable. The question that relates to this hypothesis is the first question of this research which is posed as follows

Question One: What factors and to what extend do they influence the indigenous knowledge of community forest management.

The findings of this research reveal significant influences from a host of motivation as personal factors. Gender was one of the personal factors which revealed that despite the majority of females in the sampling size, men tend to harvest a better understanding of forest utilization. Education was also found to have very little influence on the traditional forest knowledge as most people lose their local knowledge as they proceed with formal knowledge (education). Results on this factor reveals that those people with very little level of formal education could management the forest traditionally than those with advanced education. However, those people who are not widows were found to have good understanding of tradition management of forest although their number was so low compared with the married. Knowledge was also found to existed more with people who are above eighty years or above of age. At this time with a lot of experience and transformations can better give account of forest management. Furthermore, those who have a better knowledge in this community were identified as those who are unemployed and have stayed in the village all through their lives. It was also realized that, the organization of community forest sensitization programs play a profound role in building capacity of forest utilization.

5.1.2 Utilization practice of indigenous people

Forest utilization practice and knowledge of forest management from a practical point of view are believed to be inextricably linked. The second hypothesis was not only tied around forest utilization practice but was also broadened to cover its influence on tradition forest utilization knowledge. The way the people" indigenous people" utilize the forest exposes a growing need of interest that the people are not so much disorganized. It was therefore necessary to make a hypothesis on if traditional life style actually plays a vital role in meeting their livelihoods.

H_0: The different forest utilization practices have no influence on the indigenous knowledge of community forest management.

The second hypothesis was investigated by applying a descriptive method of analysis. However the research question that this hypothesis investigated was centered on the utilization of the forest by households of which the relation was analyzed qualitatively. The second question for this research was as follows:

Question two: What are the types of forest utilization practices carried out in community managed forest?

The utilization practice of the indigenous people centers on the harvesting of resources of non timber forest origin. These range from products of medicinal plants to products of subsistence and those used for construction. The time of collection, quantity collected, frequency of collection, the consumption sales pattern and the type of species harvested were major priorities considered. Medicinal plants include trees, shrubs, climbers and herbs. These species are harvested at the end of the year in preparation for the annual ritual ceremony held in December. Most households to not practice the sale of these plants and only harvest for consumption

Non timber forest products harvested include mushroom, wild vegetables bamboo shoots. Mushroom is mostly collected at the start of the rainy season. About 90 % of all the households depend on mushroom and vegetable. Most households also depend on multiple resources such as vegetable and bamboo shoot, while others depend on other resources like mushroom and bamboo shoot. These resources are very important to the households and most households harvest for consumption. However, the maximum frequency of harvesting of these products does not exceed ten trips per month, while one trip is the minimum for every household per month. On average households make more trips per month for bamboo collection, collecting about a dozen kilograms of the resource per month. Other major products such as timber for construction, fuel wood for cooking and grass for cattle or for roofing are also harvested on a define basis.

Cutting of trees for construction is infrequent and sale is highly prohibited. Fuel wood collection was found to be very less due to the introduction of modern

cooking technologies such as gas cookers. Households were not found to be involved in tree felling for construction. Instead, most people have constructed their buildings many years ago and many instead rely on trees from their farmlands. However more respondents were found to rely on grass cutting in Nong Pak bung village. The grass and trees which served as a landmark for grazers in this area in the past has reduced drastically. Grass is mostly used for making roofs for small huts for cattles like buffalo. In summary responds focusing on the second objective shows that although the people are currently facing the challenges of the currently social transformations, most people are still focused towards environmentalism and there is a greater commitment to protecting the forest for what they call the future of their community. They are proud of the forest as a gift of, which many others are not opportune to have .They also acknowledge that they have lived for many years with the forest and can identify condition of the forest in which they say has gone through three stages; a healthy forest, decreasing forest cover and presently an increasing forest in which they strive to see the health of the forest improve.

5.1.3 Question three: What are the different types of indigenous knowledge and how do they contribute to the sustainability of community forest?

Knowledge typically referred to as utilization knowledge or more still forest knowledge identified in this study include three types. These types include knowledge of medicinal plants, food security and construction. These three types or component of knowledge were found to be culture specific yet also varying with individual. Thus some households understood very much about the utilization of certain products while others were better in others. The contribution of the knowledge of the people was found to be very profound and eco-centric. The people have a sense of conservation and sustainable management of forest resources. Harvesting of forest resources is done with careful consideration of the need for others to harvest. This shows that the people are not income inclined but are interested in building better relationships through sustainable harvesting.

Harvesting of medicinal plants for example is not common to most households but mostly done by the most respected people of the community who are the monks. They harvest just the amount needed to sustain every community member. Harvesting

of species is done with respect of the illness. The people have what is described as a formula indigenous to them in which they apply in identification of the species of a particular illness. In addition, medicinal plant harvesting is done with sustainable techniques which show their commitment to avoid destruction. The entire tree is not cut but the back of the tree, the leaves or the roots are simply extracted. This shows that the people have awareness towards conserving the forest. Knowledge of food security includes knowledge applied in harvesting the subsistence forest products. This includes vegetables, mushroom and bamboo shoot. Vegetable collection is not destructively carried out as only needed quantity is harvested. Harvesting of vegetable and mushroom is mostly done during the peak period which generally describes the seasonal availability of these resources. Every household knows when the peak period comes each year. Traditional knowledge of preservation of bamboo ensures that the bamboo shoot lasts for a longer period. This reduces the frequent pressure on the forest. Domestication of trees species is done with a consideration of reducing forest pressure. Vegetable is planted in home gardens by most households and identification of species for domestication. These practices contribute so much in preserving the forest.

5.1.4 Key Question: Can indigenous knowledge contribute to the sustainability of a community managed forest?

The role of indigenous knowledge has been investigated within the boundaries of the Koke Chantanang community forest. Considering the dynamic yet enormous challenges currently associated with the multiple utilization of forest for sustainable development, the achievement of sustainability in forest management remains a moving target. This research draws attention from three villages, exposing a classical example of successful utilization of the forest. However, the management of forest by indigenous communities goes beyond their daily utilization but touches into the core of their knowledge. Therefore this research has just gone a long way to identify the knowledge applied in the utilization and management of the forest. Though basically qualitative, this research employed the analysis of a number of socio-economic factors that are thought to contribute to the forest utilization knowledge. But for this research to meet its core objectives, a consideration of these factors could not answer its

question. Therefore the utilization practice of the indigenous people and the type of forest knowledge was classified to give an appraisal of its contribution.

Findings show that, while certain factors such as gender, education, and marital status, length of time of using the forest or working outside the village could be very influential on forest utilization knowledge, the age of an individual makes a very significant contribution. However, the continues dissemination of information from external forestry sources is indispensable in achieving the sustainability of the forest. It was also realized that the people are not disorganized in their forest management, but are all committed to a grassroots objective to sustainably manage, preserve and protect the forest. The role of their knowledge revolves around identification of the period of harvesting from the forest, consideration of the quantity harvested and the diversification of resource availability through species domestication with the sole objective of reducing the pressure from the forest. A key finding was that knowledge of forest management is identical to resource involved users. It therefore comes to agreement that knowledge can make substantial contributions to community forest management.

5.2 Recommendations

5.2.1 Recommendation for decision making

1) The people are proud of the forest and committed to conserving their forest for livelihood and also for future generation. However, they currently face pressures from external threats such as the penetration and harvesting of forest products by other villagers without rights. Although the people handle this by restricting penetration and arresting defaulters, this remains a major problem to them. They think the intervention is needed to secure and protect their forest.

2) Knowledge of forest management remains a key treasure indigenous to the people of this community. However, it was found that the organization of forest training programs will help to improve their knowledge and contribute to the sustainable management of the forest.

5.2.2 Recommendation for future study

This research was limited to study the role of indigenous knowledge in the management of community forest where users include three villages. This thus did not identify other aspects which are thought to be studied and thus are recommended as follows:

1) To identify and study how cultural rituals may be important in the conservation of biological diversity.

2) To conduct a study on how the livelihood of this community has been affected since the handover of the forest to the communities.

3) To assess the acceptability of information by indigenous people on community forest management

4) To analyze how knowledge change could contribute to forest management

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APPENDIX

APPENDIX A

Questionnaire for Household Survey

Note: This questionnaire has been designed for household interviews to fulfill the objectives of this research. The design of this questionnaire was done by AKOMPAB EBAINJUIAYUK BENJAMIN, a Master of Science student in Natural Resource Management (International Programme), Faculty of Environment and Resource Studies, Mahidol University.

Introduction

The premise of this research is to explore the **role of Indigenous Knowledge (IK) in community forest management**. Hence any information provided will be treated with confidence and based only within the relevance of this research which is basically academic. It is my pleasure to gain this invaluable information from you, so please feel to express your opinion.

Vil. No.	**Household characteristics**							
	Family Relationship	**Gender**	**Age (yrs)**	**Education Level**	**Marital status**	**Main occupation**	**Other occupation**	**Monthly income**
	1.Immidiate family	1.Male		1.No schooling	1.Single	1.Unemplyed	1.Fishing	
	2.Extended Family	2.Female		2.Nursery school	2.Maried	2.Self employed	2.Agriculture	
	3.Tenant			3.Primary school	3.Divorce	3.Government employee	3.Forest collection	
				4.Grade 1-6	4.Widow	4.Business	4.Construction	
				5.Grade 6-12	5.Widower	5.Labourer	5.Other	
				6.University		Other		

2. Pattern of forest resource utilization

2.1 Resource utilization

Number	Component of Ik	Type of resource	Usage 1.Consume 2.Sell 3.Both	Season From	To	Frequency 1.Daily 2.Weekly 3.Monthly	Part of plant harvested (root/leaf/fruit/ seed/whole)	Amount collected (Quantity) (Kg)	Supply 1. Decreasing 2. Increasing 3. no change	Income (Baht)
1	Medicinal plant(Health)	Trees								
2		Herbs								
3		Shrubs								
4		Climbers								
5	Food security	Vegetable								
6		Mushroom								
7		Bamboo shoot								
8	Construction	Rattan								
10		Grass								
11		Bamboo								
		Rattan								
	Energy	Wood								
		Other								

Com. of IK	Type	Why do you harvest during this season?	Why do you harvest that quantity?	What aspects do you consider during harvest?
Med plants	Trees			
	Herbs			
	Shrubs			
	climbers			
Food security	Fruits			
	mushroom			
	Bamboo shoot			
	Rattan			
	Grass/ leaves			
	Bamboo			
	Rattan			
Energy	Wood			

3. Individual perception

Questions	**Responds**
Are you aware of the laws and taboos using the forest?	**Yes……No…….**
Have you ever worked out of this village? For how long?	**(a)<5yrs……... (b) 5to 10 yrs…..…..(c)>10yrs……..**
For how long have you been using the forest?	**a) <5yrs……... (b) 5to 10 yrs…..…..(c)>10yrs……..**
Have you ever got information on forest management? Yes or No?	**1) Parents……. (2) Government……..(3) Other…….**
Why do you like that the forest should be conserved?	**1) Food……. (2) Next generation……(3)Climatic stability**

Do you involve in tree planting? Yes…… …No……

What are the reasons for planting trees?

- To protect the forest…….
- To get more tree products……
- For income …….
- Other……..

Part 4: (Contribution)

Are there any indigenous practices used in managing the forest? Yes……No……..

If yes what are they and what role do they play in managing the forest?.....

Do you know any case of fire outbreak in the forest? Yes.....No.....

If yes what are the reasons of fire in the forest?.....

How can you compare the way you use forest in the past and now? 1) More..... (2)Less..... (3)Same……

Do you think the forest should be increased? Yes……..No…….no idea……..

Do you think the government should involve in management of forest? Yes……..No……

Is there any cultural value that the natural forests offers (or offered)? Yes…….No…….

If yes what are they? Sacred groves…… Traditional rituals…… Initiation of teenagers…….. Others (specify)……

Do you have further comments on how the forest reserve be best managed?.....

APPENDIX B
IN-DEPTH INTERVIEW

1. During which season do people harvest from the forest most? What is the reason?
2. In your opinion, do the people collect more from the forest? If yes/no why?
3. Do you have any taboos in forest management? what are they?
4. What are the types of laws put on forest utilization and how are they important?
5. In your opinion what are the most important products harvested and why?
6. Do you have any institutions in forest management, yes or no? If yes, what are they?
7. How can you compare the way the people use forest now and in the past, any change?
8. How can you compare the forest condition, in the past and present? Good or bad, why?
9. What is the main reason why people conserve/protect the forest?
10. Do you face any problems or conflicts using the forest? Yes or no? if yes what are they?
11. How do you solve these problems? Are you happy with way they are solved? Yes or no?
12. Do you think that the present way of forest management is good? If yes/no, why?

BIOGRAPHY

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