

# CHAPTER- I

## INTRODUCTION

### 1.1 Background of the Study

There are two theoretical approaches that are under use for the study of the interaction between human beings and environment. Those two are techno-centric approach and eco-centric approach; based on which relationship between man and environment is analyzed. Different ecological theories have been proposed and established to investigate the interaction of human beings and their environment. The concept of “evolution of organism” given by Darwin and “ecological system” by Ernest Hackle are important concepts in shaping the development of ecological studies in anthropology. Frake (1962) introduced a new approach known as ‘Ethnoscience’ or ‘Ethnoecology’ in the field of ecological/environmental anthropology. The relationship between traditional knowledge and science has always been very close in ethnobiology and in the broader field of ethno-sciences. Ethnobiology is the study of the reciprocal interactions between people and their bio-physical environment.

Indigenous people offer alternative knowledge and perspectives based on their locally developed practices of resource use. Many forest communities possess considerable knowledge of the natural resources they use. Case studies have shown that there exists a diversity of locally developed traditional practices applied for ecosystem management in various regions of the world. These practices include multiple species management and rotational harvesting of forest/natural resources. Rural people depend intensely upon forest resources for their livelihood. The long term deliberate use of natural resources such as soil, water, pasture, wild animals and woods develops local people’s knowledge and skills, which is applied for sustainable management of such resources. Understanding the trend of indigenous resource use and management system is essential in the arena of sustainable natural resource management. Forest management system of indigenous societies is rooted in the cultural values, norms and belief systems practiced by such communities.

Himalayan forests are taken as a part of a cultural landscape linked to livelihood concerns of those who are living in close with nature and natural resources. Traditional ecological knowledge operating at the eco-cultural level is a recent development and is a powerful tool for sustainable management of forest/natural resources at a cultural landscape level. The Himalayas are considered as a storehouse of natural resources. Traditional ecological knowledge is sum knowledge of spiritual, religious and sacred values put into resource use and local practices passed down from one to another generation. Traditional ecological knowledge is embedded in the livelihood strategy of local people and is reflected in their life ways strategies. It is often noticed that traditional ecological knowledge practiced in an indigenous community is carried out in the delicate vessel of culture, rituals, and legends.

Indigenous people generally hold excellent knowledge about the reproductive habits and life history of plants and animals. Indigenous people's knowledge systems are commonly studied in the field of ecological anthropology or human ecology. It is said that project to develop/conservate ecology should give high emphasis to traditional ecological knowledge systems; as such systems are proven technology designed for management of natural resources at local level. At present a number of anthropological studies have focused on the traditional resource harvesting systems of indigenous/aboriginal people in various part of the world. Their knowledge systems have been considered as a creation of direct adaptive responses to their local bio-physical environment.

The term "tradition" used in describing traditional ecological knowledge systems does not imply that this knowledge is old or non-technical in nature, but is consider as "tradition-based", because it is created in a manner that reflects the traditions of the communities. Such knowledge is collective in nature and is often considered as the property of the entire community which does not, belongs to single individual or clan group within the community. Over many generations indigenous people have developed a holistic traditional ecological knowledge system of their lands, natural resources and environment, which is a more or less integrated knowledge system that focuses more on cultural adjustment to bio-physical environment at local level.

## **1.2 Statement of the Problem**

Traditional ecological knowledge, grounded in social institutions and mediated by social practices, has been regarded as superstitious or non-scientific and consequently of no practical use for forest resource and environmental management. It is worth noting that despite growing awareness of traditional ecological knowledge in the field of natural resources management, such knowledge systems are rapidly vanishing in a number of Asian countries. Indigenous/traditional knowledge system embedded in the cultural practices is likely to be lost irretrievably when the culture or society experiences drastic socio-economic changes. The loss of traditional ecological knowledge thus influenced local level land-use-practices and forest resource management.

Over exploitation of natural resources in favor of capital formation is the prominent factor for depletion of such resources. This has results various problems like land degradation, desertification, denudation, landslides, floods, drought and several other environmental hazards. Once the cultural practices that function as the basis for indigenous management practices are lost, the knowledge systems rarely survive to be passed down from one to another generations. Forest resource management is viewed as an integrative approach designed with combination of socio-cultural and ecological phenomenon. It is mistaken to view forest management practice only in the term of silvicultural approach. This issue has to be viewed in conjunction with the social, cultural, religious and ecological dimensions for its sustainability.

Application of the 'TEK' to forest resource management enables effective partnerships, supervision and ownership without which conservation is doomed. For effective management of forest and other natural resources learning from local people allows conservationists to integrate their programs with real human needs and desires. Such knowledge system supports scientific forest management system by providing baseline data that helps on filling information gaps between scientific and indigenous forest management systems. It is thus more important to find the common factors that motivate people to cooperate and strengthen the capacity of the community institution.

Anthropologists are the specialists who bridge the natural and social sciences through application of various ethno-sciences. Ecological anthropologists are well trained to explore, document and manage the connection among sacred places, cultural values, religion, biodiversity, conservation and sustainable development. Development of new paradigm in the field of sustainable resource management considered significant role of anthropologist for forest resource management. The use of 'TEK' in the form of customary ecological management practices has been recognized as a powerful conservation mechanism particularly in indigenous communities.

Documentation of traditional ecological knowledge system is a fundamental approach for preserving such knowledge systems both for current and future generation, as well as for protecting intellectual property rights. Comparatively very few studies have been done in Nepal concerning the significance and application of traditional ecological knowledge systems. Few ethno-botanical researches have been undertaken by ethno-botanists in Nepal to provide insight into the level of ecological knowledge held by various indigenous peoples. Still literature deficit, research on the loss of traditional ecological knowledge system, especially in facet of creation and diffusion mechanism of such knowledge system in the context natural resource management.

'TEK' and its application via customary ecological management plans can be useful in conservation and management of forest resources in indigenous communities like lower Manang. The lower Manang people are very rich in forest biodiversity, which in a way is the reflection of their belief systems and customary practices experienced from generation to generation which has played implicative role for sustainability of their forest resources. In brief, this study mainly focused on finding out answer to following research question.

- ) What role does traditional ecological knowledge system can play for sustainable management of forest resources in lower Manang?
- ) What are the medium for transfer of traditional ecological knowledge system from one to another generation?
- ) What are the domestic and universal threats for the erosion of traditional ecological knowledge system in lower Manang?

### **1.3 Objective of the Study**

#### **General objective**

The broad objective of the research is to explore the role of traditional ecological knowledge (TEK) system and traditional institution for sustainable management of forest resource in lower Manang.

#### **Specific objective**

1. To explain norms and value systems pertaining to the conservation and management of forest resource in lower Manang.
2. To describe local processes and actors involved in the communication and exchange of traditional ecological knowledge system.
3. To explore the implicative role of religion, cultural values and belief systems for management of forest biodiversity in lower Manang.

### **1.4 Definition of the Terms**

#### **1.4.1 Technical Terms**

##### **Aspect**

Usually refers to the direction towards which a slope faces. An aspect commonly plays a role in determination of vegetation/forest types.

##### **Cultural operation**

General term for series of operation includes felling, weeding, cleaning, thinning, girdling or poisoning of unwanted growth. This is usually done to promote the power of development of the crop or to minimize the after effect of felling damage. It is typically known by the term 'silvicultural operation'.

##### **Dominant**

Particularly refers to those plant communities, which comprise the greatest influence on its character. Dominant tree species hold its position with highest tree height and forms upper canopy in the forest.

## **Forest**

An ecosystem characterized by a more or less dense and extensive tree cover, often consisting of stands varying in characteristics such as species composition, age structure, class and associated processes and commonly includes meadows, streams, birds and wildlife.

## **Forest management**

The broad term generally refers to the practical application of biological, physical, quantitative, economic, social and policy principles to the regeneration, management, utilization, protection and conservation of forest to meet specified goals and objectives on maintaining the productivity of forest.

## **Pruning**

Silvicultural operation concerns mainly on removing live or dead branches from standing trees for the improvement of the tree or its timber.

## **Light demander**

Usually refers to those plant species that demand plentiful of light for its best development. Light demander species need high light intensity in the early stage of its development or throughout its life cycle.

## **Shade demander**

Refer to plant species that requires at least some degree of shade in its early stage for normal development. Shade demander plant species cannot tolerate more than desired light intensity and is sensitive to high solar radiation.

## **Succession**

Succession is a term that denotes to gradual replacement of one plant community by another in the development of vegetation towards a climax.

## **Thinning**

A felling made in an immature stand for the purpose of improving the growth and form of the trees that remain, without permanently breaking the canopy.

## **1.4.2 Term in Ecological Anthropology**

### **Conservation area**

An area especially dedicated to the protection and maintenance of biological diversity and associated resources, which is managed through legal or other effective means. Conservation area is usually inhabited by indigenous people and it focuses much on preservation of cultural and biological diversity.

### **Cultural ecology**

Cultural ecology is the study of the adaptation of human societies or populations to their environments, emphasizing the arrangements of technique, economy and social organization through which culture mediates the experience of the natural world. Fikret Berkes (1998) defined cultural ecology as “an ethnological approach that sees the modes of production of societies around the world as adaptation to their environment”.

### **Ecology**

Ecology is the study of organisms in relation to the surroundings in which they live. These surroundings are called the environment of the organism. The environment is made up of many different components, including other living organisms and purely physical features such as the climate and soil type. Ecology generally contains a set of concepts and principles derived from evolutionary theory that are used to explain the adaptation and evolution of animal, plant population and communities.

### **Ecological anthropology**

Ecological anthropology, also known as environmental anthropology is the study of how people interact with their social and biophysical environments. It represents the link between the science of ecology and human culture. The overall goal of ecological anthropology is to explain human thought, behavior and social organization by situating the study of population or individuals in interaction with their bio-physical or social environments. It is the sub-division of cultural anthropology and cultural anthropology is a branch of anthropology.

### **Impressive species**

Impressive species refer to those species that are regarded as sacred because they are different or physically outstanding and look like representing some feature of the divine. This might be because of its larger physical size and/or particular startling appearance. In other way such species have high subsistence and/or economic value to local communities because of the central role that it plays in people's culture, religion and livelihood.

### **Indigenous people**

The term Indigenous people is used to describe any ethnic group who have historically belonged to a particular region or country and may have different unique cultural, linguistic, traditional and other characteristic to those of dominant culture of that region. The indigenous people interact with the available natural resources and poses storehouse of traditional knowledge.

### **Keystone species**

Keystone species are those species that are critical to the community since their activities determine the community structure. The removal of such species causes major changes to the structure or diversity of community. They include organisms that (i) controls potential dominants (ii) provide critical resources (iii) act as mutualists and (v) modify the environment. The keystone species vary from one ecological condition to another.

### **Sacred groves**

Sacred groves are special forest areas imbued with super natural powers and commonly embrace site for ritual, initiation and other special functions and ceremonies. Preservation of sacred groves is a global phenomenon with high significant of cultural and ecological dimensions; where farming, hunting, burning, tree felling, litter collecting and firewood gatherings are prohibited. Sacred groves as well as sacred landscapes are perceived as being inhabited by a pantheon of deities and demons, and tend to evoke a felling of amazing, mysterious and inspiring power. Taboo, totem, and sanction are common associations emotionally involves for protection of sacred groves.



## **Spiritual ecology**

Spiritual ecology studies the ecological system embedded with the spiritual and religious value in various religions. Generally these relationships are considered as interaction among physical, natural and spiritual beings, but practically this may not be true in all cases. Instead, this pseudo ecosystem model contribute major role for forest biodiversity conservation. Spiritual ecology is defined as a movement implied for conservation of forest resource.

## **Traditional ecological knowledge**

Traditional Ecological Knowledge (TEK) refers to the knowledge system acquired by indigenous or traditional peoples over hundreds of years through direct contact with the environment. It includes an intimate and detailed knowledge of plants, animals and natural phenomena. It is dynamic and evolves as people build on their experiences and observation with various natural resources over time. Traditional ecological knowledge system is grounded in defined place, and is most often found among societies that have engaged in natural resource use in a particular place over a long time period.

## **Values**

Ideas that individuals have about what is good and bad, right and wrong, important and unimportant, harmful and safe, just and unjust etc. Such phenomenon is mostly determined by indigenous societies. Values are loaded in the people's mind that differs directly with socio-cultural diversity.

## **World view**

The term world view is a religion based or a group phenomenon, used to refer to the common concept of reality, shared by a particular religion-group or group of people. Such phenomenon usually forms a unique culture or a unique ethnic group. World view is a mental model of reality, a framework of ideas and attitudes and a comprehensive system of beliefs with the answer for wide range of questions about the existence of world, human and life forms. World view is the basic way of interpreting things and events that pervade a culture so thoroughly that it becomes culture's concept of reality.

## **1.5 Significance of the Study**

The emerging ethno-scientific approach to traditional ecological knowledge system fuses the methodologies of ecological anthropology and conservation biology to underscore the past and current relationships between nature and culture. The main objective of this study is to identify and record traditional ecological knowledge system practiced in lower Manang, so as to document such knowledge systems. This achievement may help in incorporating traditional ecological knowledge systems with scientific ecological knowledge systems in support of formulating appropriate technology and policies that contribute to achieving sustainability in management of forest resources in lower Manang. The specific significance of this study can be listed as follows:

- ) It helps in the documentation of traditional ecological knowledge systems concerning forest resource management, which could assist in formulating better policy for conservation and management of forest/natural resources particularly in lower Manang.
- ) This could contribute to the role of anthropologist, with the notion of anthropological perspective, as nature conservation so far has only been the concern of foresters, environmentalists, ecologists or biologists.

## **1.6 Limitation of the Study**

'TEK' research usually requires a long time period of study. Long term study can only be able to understand and interpret the relation between social and ecological systems. Being an academic study this has the following limitations.

- ) This research focuses only on the ecological/environmental aspect of indigenous knowledge systems practiced in lower Manang.
- ) Since 'TEK' is considered relevant only if validated by scientific ecological knowledge, so the findings of this research should not be directly implemented on scientific forest management plans and policies.
- ) As 'TEK' is spatially specific and is grounded in religion and cultural practices, the findings of this study should not be simply generalized.

## 1.7 Theoretical Framework

**Source:** Gupta, H.K., 2007

### **Figure 1.1** Theoretical framework analyzing social system and ecosystem

The above listed theoretical framework demonstrates the interaction between ecosystem and social system. The social system is everything about people, their population and social organization that shape their behavior. The social system is a central concept in human ecology because human activities and its impact on ecosystem are strongly influenced by the social systems. Human beings thus are a part of the ecosystem. Values and knowledge together form a common worldview that individual and a society shape the information and translate indigenous knowledge systems into action.

As a consequence of human activities material, energy and information move from ecosystem to social system. On using materials from ecosystems, people formulate plan and policies on harvesting natural/forest resources for its sustainability. This on other hand helps in solving basic needs, where people transfer policies from social system to ecosystem. Thus the social institutions linked to forest resource management are associated with socio-cultural and traditional belief system. Social norms, customary right and the community consciousness put into practice are directly based on the availability and abundance of common property resources. The worldview is a holistic perception of nature and is shaped extremely by dominant religion practiced. The nature, intensity and magnitude of 'TEK' and strength of nexus developed depend upon the ecological, social and cultural contexts.

### **Theorizing human- environment relationship**

Many studies have been conducted with reference to human-environment relationship. Such relationship is related to land-use planning, environmental degradation and sustainable development. Findings of such research problem include perspectives that respond a direct connection between indigenous livelihood practices and sustainable forest resources management practice. Some theorists have developed conceptualizations that refer to relationships between culture and/or ethic identity and conservation. Other approaches have formulated arguments that suggest integrating traditional ecological knowledge systems with conservation efforts for enhancing sustainable environmental and biodiversity conservation.

This research employs a framework of cultural ecology that examines how rural communities and their socio-cultural practices plays role for sustainable management of forest resources at local level. Cultural ecology is employed in this study as an approach that conceptualized the relationship between man and their bio-physical environment which is mediated by cultural practices. This study revolves round the application of traditional ecological knowledge systems into forest resource management, which is grounded in local level social institutions and is mediated by cultural practices and belief system.

**Source:** Berkes, F., 1999: 13

**Figure 1.2** Framework for analysis: knowledge-practice-belief complex model

The above mention conceptual framework for the analysis of construction mechanism of traditional ecological knowledge system is classified into four interrelated components as shown in above figure. First, the local knowledge of land, animals and plants include knowledge of the identifications, classification, life cycle, reproduction of species and their ecological relationship with their physical environment. Second, the natural resource management systems include practices, tools and techniques developed and set forth for management of such resources. Third, social institutions include set of rules, social and cultural norms and customs. Finally, the worldview of indigenous peoples includes the way in which indigenous peoples see their environment and give meanings for such phenomenon, which is a holistic perception of local environment and inter-dependency among its components.

## 1.8 Conceptual Framework

**Figure 1.3** Conceptual frameworks for 'TEK' implication

Figure 1.3 clearly illustrate that traditional ecological knowledge system is constructed as a consequence of traditional resource management practices and is implemented by indigenous/traditional institutions. Traditional ecological knowledge systems produced through deliberate observation of environment (landscape) is transmitted to successive generation through various mode of transmission process. This includes formal mode, informal mode (based on formality) and vertical mode and horizontal mode (based on level) of transmission. The traditional institution works as a knowledge implementing agency, by enforcing social norms, values and belief systems.

Within local communities the limitation of legitimate forest use rights are set forth by social norms rather than by formal administrative decisions. Indigenous forest management practices engage management practices like controlled/closed harvesting and other wider application such as social fencing. This in a way is triggered by enforcing traditional laws and values systems. This approach works as a social regulation regulating the use of forest resources, which also helps on enhancing productive capacity of forest. Cultural groups thus implement a series of rules or social norms, constituting institutions to govern the management of forest/natural resource. Traditional ecological knowledge system thus is applied by combining the knowledge and skills that are build up as a product of a person's or community survival strategies in the context of prevailing natural resource management practices.

The conceptual framework shown in above figure state that 'TEK' is bounded by two complex systems i.e. knowledge transfer systems and knowledge enforcing/implementing systems. The socially created traditional ecological knowledge system is flexible and culturally bonded, which is applied in a traditional or indigenous forest, pasture and wildlife management practices. Hence the survival of traditional ecological knowledge system is directly linked with continuity of knowledge transmission process and existence of traditional institutions. Consequently it concludes that forest management practices should not be conceive as a specialized activity of a single knowledge systems, but rather it should be taken as embedded to specific cultural setting, that can be applied in any participatory forest conservation program.

Figure 1.4 presents the various component/elements of traditional ecological knowledge systems pictorially in a web appearance. In this illustration 'TEK' exists within a web of indigenous knowledge systems. At the center of this web are elements of the culture associated with spirituality core, which is often overlooked by ecologist/biologist and quantitative forest researcher. This code of ethics and behavior govern the people's relationship with the earth. This picture also shows that if the components of this web are taken one step further the remaining 'data' points would weaken the structural integrity of the web. Likewise the 'data' points are interconnected to the web and cannot be fully understand when they are removed from their contexts. 'TEK' is embedded in the codes of rituals and behavior that govern people's relation with earth. The traditional forest management practices are thus formulated by combine knowledge of plant, animals and eco-cultural landscape.



## **CHAPTER- II**

### **REVIEW OF LITERATURE**

#### **2.1 Theoretical Overview**

##### **2.1.1 Traditional Ecological Knowledge (TEK)**

Traditional Ecological Knowledge (TEK) is a sub-set of indigenous knowledge system apprehended by indigenous people. It is also recognized as local knowledge unique to a given culture or society. 'TEK' is rational and reliable knowledge that has been developed through generation of intimate contact by native people with their lands. 'TEK' as a modern concept has its birth in the marriage of ethno-biology and human ecology. As defined by Berkes (2008), 'TEK' encompasses (i) factual knowledge about ecological components and processes (ii) knowledge put into practices about environmental use, and (iii) the cultural values and philosophies that define human relationship with their surrounding environment and in wider prospect to natural world.

Despite, its widespread use, the term 'traditional ecological knowledge', is a problematic and fairly ambiguous term. In literature of ecological anthropology and human geography it has generally come to refer the knowledge that indigenous peoples have of the natural environment around them as a result of intimate and sustained contact with the land. In Sacred Ecology (1999:8), Berkes arrives at a working definition of traditional ecological knowledge system as "A cumulative body of knowledge and beliefs handed down through generation by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment."

On using the word "traditional" in the context of traditional ecological knowledge system, it is important to clarify that such knowledge system is cumulative and open to change. The meaning of 'traditional' therefore simply refers to a time-tested and wise knowledge system, adopted by the local communities. Traditional ecological knowledge system is relevant for forest conservation, environmental assessment and protected area management.

Marth Jonson (1992), an indigenous knowledge researcher defines 'TEK' as:

"A body of knowledge builds up by a group of people through generation of living in close contact with the nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use. The quantity and quality of traditional ecological knowledge system varies among community members, depending upon age, gender, social status, intellectual capability and profession. With its roots firmly in the past, traditional ecological knowledge is both cumulative and dynamic, build upon the experience of earlier generation and adapting to the new technological and social changes of the present."

Fikret Berkes (1998) considers four interrelated levels within traditional ecological knowledge systems, which he terms as 'knowledge-practice-belief complex model'. The model first includes knowledge based on empirical observations about local plants, animals and landscape, in the process of survival of human beings to given environment. The second focuses on the understanding of ecological processes and natural resource management systems (methods, tools and techniques). The third is the socio-economic organization necessary for effective coordination and cooperation (indigenous institutions). Finally the fourth referred to the worldview or "Cosmo-vision" (religion, belief and ethics). The term traditional as used in this context should not refer to something static and homogenous. Rather tradition should be understood as a filter through which innovation occurs, a tradition of invention.

As defined by Warren (1996), Traditional ecological knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language and agricultural practices, including the development of plant species and animal breeds. Traditional ecological knowledge is typically transmitted through oral statement and shared experience rather than through written communication and demonstration. Traditional ecological knowledge is based on empirical observation and accumulation of facts by trial and error.

Traditional ecological knowledge can be classified into four interrelate strata. The first strata at the village/local level, which includes the knowledge of local plants, animals their identification, folk taxonomies, etc. This sort of knowledge is largely based on diachronic observations. At the second level, 'TEK' exists in the form of land or resource management systems, which is inclusive of the first level and requires additional understanding of the functional relationships among various species and/or ecological processes.

The third level of analysis concerned with 'TEK' is embedded in the social institution or informal rules as practiced by communities or groups having a common stake and inter dependence in the natural resources, such as traditional resource harvester, traditional hunters, pastoralist, fisherman etc. The final stratum of 'TEK' analysis includes the worldview, which delineate a belief system and shapes interpretation of our surrounding world. Below mention figure illustrate two different levels of 'TEK' component. Level two components are more complex than level one component and are used into environmental assessments and management process. Traditional ecological knowledge refers specifically to all types of knowledge about the environment derived from experience and traditions of a particular group of people.

**Source:** Stevenson, M.C., 2005

**Figure 2.1** Levels of traditional ecological knowledge

## **Origins and Development of Traditional Ecological Knowledge**

The intellectual root of 'TEK' is in ethno-sciences (mainly ethno-botany) and human ecology. The field started with the documentation of lists of species used by different indigenous groups and elaborated a science of folk taxonomies of plants and animals and later of other physical component such as soil and land. The science of folk taxonomies is frequently associated with the name of Harold Conklin, who in the decade of 1950 documented the extensive plants knowledge and classification systems of indigenous group such as the Hanunoo of the Philippines. The early literature on traditional ecological knowledge systems is not based on the spiritual and religious values of species and worldview of indigenous communities. Instead it focuses much on other kinds of ethno-sciences, including indigenous agriculture, ethnobiology, ethnozoology, ethnoveterinary and ethnopedology.

The shift of emphasis from the documentation of species used by indigenous groups and their taxonomy, to a consideration of functional relationship and mechanisms of harvesting and management practices, give rise to the field of traditional ecological knowledge system. The field borrows from the cultural ecological tradition of the anthropologist Julian Steward, emphasized the study of adaptive processes and argued that social organization itself may be considered as an ecological adaptation of an indigenous/traditional people to their local environment. The relationship between traditional ecological knowledge system and science has always been close in ethno-ecology, its sub-branch ethno-biology and in the broader field of ethno-sciences.

By the mid-1980s, the rapidly growing literature on traditional ecological knowledge led to a recognition in the international arena of its potential application to contemporary resource and environmental problems. The early study in this field includes the studies of forest and biodiversity conservation in tropical ecosystems and traditional resource management systems in coastal fisheries, agro-pastuarilsim in semi-arid areas and the livelihood strategy in the Arctic. At present traditional ecological knowledge system is widely used in the field of environmental assessment and biodiversity conservation.

## **General Characteristic of 'TEK'**

Traditional ecological knowledge system encompasses indigenous and other local people's knowledge and beliefs about the natural world, and their ecological concepts. Traditional ecological knowledge can provide a long term perspectives on ecosystem dynamics, based on ancestral knowledge and interaction with habitats and species and thus assist in the analysis and monitoring of long term ecological changes. Traditional ecological knowledge system is based on empirical observation and accumulation of facts by trial and error as opposed to experimentation and systematic and deliberate accumulation of facts. Traditional ecological knowledge is also a fundamental component of cultural adaptations to natural conditions. The fundamental characteristic of traditional ecological knowledge can be listed as follows.

### **TEK is cumulative**

TEK is an over-growing body of knowledge. It has been developed over many generations and expands as each passing generation's experience is added to the community's tradition. TEK is a social capital of community which is formed with a long history of resources use in a particular area.

### **TEK is dynamic**

Though the term traditional ecological knowledge emphasizes continuity and long-term practices, it is important to note that this does not mean that it is static and unchanging. New information is continually added when there is change in environment, change in weather patterns and while a species are wiped out or introduced. 'TEK', thus is dynamic, adaptive and edifice process.

### **TEK is historical**

Due to cumulative and dynamic nature, traditional ecological knowledge system provides a historical understanding of environmental/ecosystem change. Traditional ecological knowledge system advocate that all living and non-living things are interconnected and affect each other. 'TEK' thus is based on data generated by resource users themselves in long time period.

### **TEK is local**

Traditional ecological knowledge is locally developed and provides highly specific and detailed information about areas of traditional resources use. A traditional ecological knowledge system is an attribute of communities with a long history of resource use in particular area. The spatial specification of traditional ecological knowledge is both its strength and a weakness.

### **TEK is holistic**

Traditional knowledge is taken as holistic knowledge system, meaning that all element of this system is viewed as interconnected and cannot be understand in isolation. Traditional ecological knowledge, world view and religion ecology are generally analyzed in a complex whole in the context of its application.

### **TEK is embedded**

TEK is part of a particular cultural context. A community's TEK is embedded in the matrix of its unique culture, history and traditions. It is difficult to interpret and use 'TEK' systems without understanding its cultural context. Generally codes of ritual and customary law express the relationship between man and environment in sustainable basis. The creation of stories and cosmologies explain the origins of the earth, natural resources and its people.

### **TEK is moral and spiritual**

In much indigenous culture, traditional ecological knowledge systems are grounded in a spiritual and reciprocal relationship between the people and their environment. The natural world is often understand as sentient, proactive and infused with spirits. Traditional ecological knowledge is valuable and in some cases it is problematic for recording, documentation and storing. Fikret Berkes (1999) considers three factors responsible for complexity in recording, documenting and storing 'TEK', which can be listed as follows.

- ) Dynamic and changing over time
- ) Spatial/Cultural specific
- ) Nonfigurative and conditional

### **2.1.2 Indigenous Knowledge (I.K)**

Indigenous knowledge can be defined as ‘body of knowledge built up by a group of people through generation of living in close contact with nature’. Indigenous knowledge as defined by Warren (1991) is “A body of knowledge built up by a group of people through generation of living in close contact with nature.” Generally speaking, indigenous knowledge evolves in the local environment, so that it is specifically adapted to the requirements of local people and conditions. It is also creative and experimental, constantly incorporating outside influences and inside innovations to meet new conditions. It is usually a mistake to, think of indigenous knowledge as ‘old-fashioned’, ‘backwards’, ‘static’, ‘conservatives’ or ‘unchanging’. Generally speaking, such knowledge evolves in the local environment, so that it is specifically adapted to the requirements of the local people and conditions.

Indigenous knowledge represents the accumulated experience, wisdom and know-how unique to a given culture, society and or community. It stands to a distinctive body of knowledge, which has evolved over many generations in a particular ecosystem. There are several terms that are often used to refer to indigenous knowledge. These are ‘local knowledge’, ‘indigenous technical knowledge’, ‘traditional knowledge’, ‘indigenous skill’, ‘peoples knowledge’, ‘folk knowledge’, ‘rural people’s knowledge’, ‘ethno-science’, ‘oral tradition’, and also ‘cultural science’. However the term Indigenous Knowledge (IK) is used by many social scientists’ to encompass all the above mentioned terms.

#### **Characteristics of indigenous knowledge**

- ) Is generated within communities
- ) Is location and cultural specific
- ) Is locally appropriate
- ) Is not systematically documented
- ) Is dynamic and flexible
- ) Is often tested over centuries
- ) Is transmitted through word of mouth
- ) Is tacit and cannot be codified

### **2.1.3 Human Ecology**

Human ecology is an academic discipline that deals with the relationship between humans and their natural environments. Human ecology investigates on how humans and human societies interact with nature and environment. Human ecology is the systematic application of ecological concepts, principles theory and research methods to the study of human populations and communities. Human ecology examines the way in which human population and natural resource relationships affect the adaptation of human population to desert, arctic, ocean, Trans-Himalayas and other type of forest ecosystem.

Human ecology is a sub-discipline of anthropology, geography or ecology. The inclusion or exclusion of human ecology in sociology properly varies between countries and schools of sociological thinking. Environmental sociology is a field of sociology which encompasses the interactions between humans and natural environment. A human ecological study is rooted in the methodological and theoretical cannon of anthropology and geography.

The emergence of cultural ecology as a theme within anthropology is formally associated with the publication of Julian Steward's book, "Theory of Cultural Change" in 1955 A.D. Cultural ecology is the study of the adaptation of human societies or populations to their environments, which emphasizes on the arrangements of technique, economy and social organization through which culture mediates the experience of the natural world. In the USA, human ecology was established as a sociological field in the 1920's, although the geographers were used this term much earlier than ecological anthropologist.

Basically the 19<sup>th</sup> century social scientist, from the academic background of anthropology, sociology and geography established human ecology as a distinctive discipline. Thus it has common meeting grounds for anthropologist, sociologist, human geographer and ecologists. In various ways human ecologist and ecological anthropologists have addressed pivotal environmental issues including population explosion, natural resources depletion and its consequences such as soil erosion, desertification and global climate change. It is common studied in the field of political ecology.



#### **2.1.4 Sustainable Forest Knowledge**

The dictionary definition of the word 'sustain', is 'to keep something going', or 'to keep it in effect'. No time limit is specified and therefore one might conclude that whatever 'it' might be could be kept on going as long as necessary or possibly indefinitely. Sustainable forest management thus is the management of forest resources according to the principles of sustainable development. Forestry is the art and science of caring for a forest to meet the needs of the owners and those of society. Sustainable forestry therefore, refers to caring for or managing forests in such a way that it continues to play the desired role and produce desired benefits as long as necessary. Simply stated, sustainable forestry is managing forest to meet the needs of today while providing the needs of future generations.

Sustainable forest management as a dynamic and evolving concept aims to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generation. It is characterized by seven elements which includes: (i) conservation of biological diversity ii) maintenance of productive capacity of forest ecosystem, (iii) maintenance of soil and water resources, (iv) maintenance of forest contributing to global carbon cycles (v) maintenance and enhancement of long term multiple socio-economic needs of societies' (vi) protective function of forest resources and (vii) legal, policy and institutional framework.

Traditional forest knowledge is an integral component of a network of linkages and relations developed between human beings and their bio-physical environment, which is based on long historical experiences and deep insights into the dynamic of forest ecosystems and the behavior and characteristic of animal and plant species that are of special economic, social, cultural and spiritual significance to local communities. Local communities on maintaining their distinctive cultural identities for their livelihood simultaneously ensure health of the forests ecosystem on which they depend. Traditional forest knowledge helps in scenario analysis, management planning and designing adaptive strategies for sustainable management of forest resources.

### **2.1.5 Importance of Traditional Ecological Knowledge**

There are many areas in which traditional ecological knowledge is significant. First, it is a source of biological knowledge and ecological insights. Second, indigenous knowledge is important for the sustainability of 'difficult-to-manage' ecosystems such as tropical and mountain rain forest. Third, it is important for community-based conservation by connecting human value with conservation values. Fourth, some traditional systems offer special interests for biodiversity conservation, because traditional ecological knowledge is based on multiple use principles. Fifth, in-depth local environmental knowledge and trends developed over time for a given site are important for environmental assessment and monitoring. Sixth, traditional ecological knowledge system is essential for "bottom-up" development planning.

### **2.1.6 Nature of Traditional and Scientific Ecological Knowledge**

Despite its importance and recognition in the international arena since after the decade of 1980s, the relationship between scientific ecological knowledge and traditional ecological knowledge system has remained controversial. There are both similarities and differences between traditional ecological knowledge system and scientific ecological knowledge system. Both kinds of this knowledge are ultimately based on observation of the environment and both result from the same intellectual process of creating order out of disorder. But they are different in a number of substantive ways.

Science combines a particular set of values with systems of knowledge based on empirical and temporal observation, rationality, and logic, as opposed to felt truths or lived experience. In comparison to this traditional ecological knowledge system is viewed in a larger social context where it is more spatially oriented, inclusive and holistic in practice. 'TEK' is an integral part of a culture, and tends to have a large social context. These features craft traditional ecological knowledge systems in such a way that it cannot be separated from cultural practices, spirituality and way of indigenous people's life. Scientific knowledge directs the use of quantitative measurement whereas 'TEK' is concerned much with qualitative information/measurement.

Western scientists gather quantitative data to build mathematical models of population dynamics. The models are used to calculate sustainable yields of resources. The yields are then recommended for implementations to decision makers as resources harvesting strategies or regulations. The traditional harvesters are more concerned with conditions (e.g. is species scarce or plentiful for use). In contrast the western scientific knowledge is concern with the yield estimation trends (e.g. increase or decrease of resources quantities).

**Table 2.1** Attribute of professional and traditional forest management

<b>Management</b>	<b>Professional</b>	<b>Traditional</b>
Control mechanism	Legal control (enforcing forest act, regulation, directives and by-laws).	Social control (enforcing social norms, values, taboo and traditional/customary law).
Harvesting technique	Commonly clear felling, rotational felling, coppice and selective felling.	Pruning, pollarding, natural thinning (primarily harvesting minor forest products).
Harvesting schedules	Systematized for well-organized production.	Mostly opportunistic based on livelihood consideration.
Regeneration	Seedling transplanting through nursery rising.	Wildlings transplantation, seed dispersal by wind and animals.
Major production	Timber and selected commercial non-wood.	Mostly non-timber forest products and timber wood.
Motive of production	Stand oriented, based on age class and interval.	Tree oriented, based to maintain wilderness.
Manager / Expert	Forest professional, ecologist/botanist etc.	Local/community and spiritual leader or mostly social worker.

**Source:** Colding, J., and Folk, C., 2001

From table 2.1 it is clear that forest management practices in professional and scientific approaches differs in diverse ways. Indigenous forest management system contributes much in the fields such as biodiversity conservation and maintenance of ecosystems services. Despite the professional forest management stress much on economy. The only difference between these two management systems is procedure of their implication mechanism.

## **2.2 Review of Previous Studies**

### **2.2.1 Status of Forest Biodiversity in Nepal**

Nepal's biodiversity is a reflection of its unique geographic position, altitude and climatic variation. The extreme altitudinal gradient has resulted in nine bio-climatic zones from tropical to alpine forest zone within short horizontal span. The physiographic data indicates that Nepal comprises of around 4.27 million hectare of forest (about 29% of total land area), which comprise 1.5 million hectares (10.6%) of scrubland and degraded forest, 1.7 million hectares (12%) of grass land, 3 million hectares (21%) of farmland and about 1 million hectares (7%) of uncultivated land. These forests types are further categorized into ten major groups i.e. tropical, subtropical broad-leaved, subtropical conifer, lower temperate broad-leaved, lower temperate mixed broad-leaved, upper temperate broad-leaved, upper temperate mixed broad-leaved, temperate coniferous, sub-alpine and alpine scrub forest.

The biodiversity in Nepal includes 856 species of birds, 175 species of mammals, 247 species of reptiles and amphibians, 180 species of fish and 640 species of butterflies. Similarly there are over 6500 species of flowering plants, over 1500 fungi species and over 3500 species of lichens. Out of 6500 species of flowering plants 370 are endemic to Nepal and about 700 species are known to possess medicinal properties. Nepal posses about 0.09% of the world's total landmass, nevertheless it is home to about 2.7% of the world's flowering plants, about 9.3% of the birds and about 4.5% of the mammal species. The country is ranked eleventh in Asia in terms of biological diversity.

However, the biodiversity in the country is vulnerable due to various social, economic, political activities, which is further accelerated by global climate change and utilization of forest resource for capital formation. A number of species of flora and fauna are on the verge of rapid extinction. Recognizing the significance of biodiversity in the national and global perspective, the National Parks and Wildlife Conservation Act-1973, has protected 26 species of mammals, 9 species of birds and 3 species of reptiles. Likewise, 19.7% of total land of the country is designated as protected areas. (MoFSC, 2002)

### 2.2.2 Study of Traditional Ecological Knowledge in Nepal

Relatively few studies have been done in Nepal, concerning the importance of traditional ecological knowledge system for management of forest resources. Ethno-botanical research has been undertaken to provide inside into the level of knowledge system held by indigenous mountain peoples. Messerschmidt, D.A. (1986), concludes that traditional ecological knowledge system about relationship between plants and animals is being lost in rural areas of Nepal. He also highlighted that the practice of maintaining and managing religious forest with its potentiality to incorporate into community forestry management is seen as an important ways of managing participatory forest resources.

Various cultural activities like, tree worship, establishment and maintenance of sacred sites inside forest and religious rituals conducted within religious and spiritual forests is taken as a alternate way for protecting forest resources in Nepal. Religious forests provide refuge for plant and animal species which may otherwise have locally been extinct. Religious forests are not commonly harvested and there is a belief that it is devoted in the name of the god. Few studies were done about indigenous pastureland management by anthropologist and botanist during the decade of 1980 in Dolpa district of western Nepal. But the Nepalese literature still deficit the study of traditional ecological knowledge systems and its application to forest management.

Stevens, F. (1996), in his book, 'Claiming the High Ground: Sherpa's Subsistence and Environmental Change in the Highest Himalaya', states that Sherpa believe that several types of forest spirits known as 'Lu' reside in their forest lands. It is believed that tree 'Lu' inhabitant's usually in the old Juniper (*Juniperus recurva*) and occasionally Rhododendron species, Willow (*Salix babylonica*) and Silver Fir (*Abies spectabilis*) trees. Thus Sherpa refuses to fell old and green Juniper, Rhododendron and Willow plant species. He had also mentioned that the Khumbu dialect of Sherpa is rich in forest terminology and they typically distinguish different forest species on the basis of utility, habitat and morphology of particular plant species. He had also mentions that Sherpa believed that collecting off-season forest products is as sinful as killing life.

The study of indigenous pasture management systems in Dolpa by Thapa, M.B (1986), states that historically in Dolpa there were two traditional institutions, which are directly or indirectly connected to forest resource management. They are 'Dratsang' (Lama hierarchic institution) and the 'Yuldigothe' (community hierarchic institution, headed by Mukhiya). He has also mention that in Lama hierarchic institution the chief Lama of the area has the responsibility to monitor and regulate forest resources. People need to take special permission from the chief Lama before collecting forest products and grazing their livestock. He also states that people used to respect the biophysical material that they use and this respect is manifested in the form of a wide variety of cultural practices that links culture and biological diversity.

Bhandari and Shrestha, (1982) mention that most of the indigenous studies in Nepal have been conducted in the field of medicinal plants in the field of general ethno-botany, focusing mainly on the local use of plants. They also conclude that several species of fuelwood have great cultural importance in Manang. *Betula utilis* and *Juniperus indica* woods are used in ritual and religious works. Traditional societies living in the forested area view the forest landscape around them as an integrated whole of their life ways and ensure its sustainability. Many traditional societies view the biophysical environment and human societies as being linked together in a web of relationships.

Bhattarai (1992) studied medicinal ethno-botany in Karnali zone and reported that the local people use more than 63 types of plant species for various purposes. Likewise Bhattarai and Shrestha (1986), studied indigenous plant knowledge in northern Annapurna region and concluded that the local people of Manang and Mustang are very rich in using poisonous plants. They had reported that the people of Manang used more than 56 medicinal plant species for various purposes. Ghimere, et al. (1996) studied about variation in knowledge relating to diversity of medicinal plant species, their distribution and uses in north west Nepal and concluded that this people bear sufficient enough knowledge about harvesting and processing of essential medicinal plant species for their domestic uses. Bhattarai and Chaudhary, (2006) have documented the traditional ecological knowledge of plants in Manang district.

### 2.2.3 Expression of 'TEK' in Religious Literature

The forests in Nepal are very important resources from a socio-cultural and economic point of view. There is hardly a single ritual in Hindu and Buddhist cultural practices, which do not require plants and/or its products for performing rituals. In Hinduism and Buddhism offering of plant or plant products is mandatory in every daily, seasonal, annual, periodic or occasional rituals. Religious forests are not easily harvested in Nepal and there is a belief that it is devoted in the name of the god. In Hindu theology, specific plants and tree species are believed to be incarnation or symbol of deities and other supernatural forces and are worshipped. Harvesting of worshipped plant species is thought to be against worshipped god. For example plant name 'Pipal' (*Ficus religiosa*), in tarai and mid hills and 'Bhojpatra' (*Beutula utilis*) in higher Himalaya is not easily harvested by Hindus and Buddhist in Nepal.

The Hindu Vedic literature has mentioned that the earth is as powerful as god and is a 'care taker' of all living creature, which also serves as a source of food/nutrition. Earth (land), water, fire, wind and sky all are considered to be attached with a sacred goddess. Traditional Hindu literature has mention about the marriage of a person to a tree or to fruit of the tree. The Buddhism literature states, that the sprit with or without its children lives in the tree. If the tree is perished, the spirit has to go away to seek a new house. It is believed that on deviation the spirit may cause many negative impacts like child illness or loss of property or reduction in quantity of crop production etc. 'Rig-Veda' mention that Hindu has to avoid eating the food which is raised without tillage.

Traditional Hindu books such as Ramayana, Mahabharata, Veds, all put intention for conservation of forest resources as a part of the cultural heritages. It is a well known Hindu legend that once the trees were so wide-spread that it becomes difficulty for the growth and creation of living beings in this earth. Lord Parichata becomes angry at this sight and destroyed the trees with fire and wind. When the majority of the trees were burnt, Soma (the god of forest) approached lord Parichatta and requested him to stop all this. Soma offered him her daughter Marisha (known as daughter of tree) in order to make this world more prosperous and productive for human settlement.

#### **2.2.4 Study of 'TEK' in International Arena**

Berkes, F. (2004) in his case studies from Canada highlight the importance of traditional ecological knowledge and make the argument that monitoring and assessment of forest resources by utilizing traditional ecological knowledge systems is most effective and impressive approaches. He also point out that 'TEK' system is based on observation over long time periods, which incorporate large sample sizes and involve the harvesters as a participation researcher. Colding, J., and Folk, C. (2001) have indicated three ways in which 'TEK' can complement for sustainable management of forest resource. These three ways are qualitative monitoring of forest resources, building resilience for management and providing long term observation and institutional reminiscence for understanding environmental change.

Berkes, F. (1993) in his book 'Traditional Ecological Knowledge in Prospective' state that aboriginal people in Canada have developed a unique cultural and spiritual connection with the land and has produce intimate knowledge about forest and other natural resources. Haruyama, Takako (2001) in his anthropological research from northern China has concluded that the totemic culture of the minority groups has contributed significantly towards the success of maintaining biodiversity in China. Gupta, A. (2005) in his study from Himanchal Pradesh of west India state that the indigenous people of western Himalayas have developed a unique cultural and spiritual connection with the land and forest, which plays significant role for forest conservation.

Seeland, K. (1995), has mention that the 'Karen' communities of Thailand are able to identify forty-one different vegetation communities and habitat types within the landscape they inhabited. David Gregory Casagrande (2002), in his PhD thesis, 'Ecology, cognition and cultural transmission of Tzeltal Maya medicinal plant knowledge', mention that Maya people are the expert of ethno-medicine and have documented extensive knowledge about dermatological treatments. He also states that this people utilize different colorful medicinal plants for curing diverse medical disorder and has given few examples, that this people uses yellow roots extracts to treat jaundice, plants with red sap for blood disorder, pink leaves for red eye problem etc.



'TEK' usually provides a holistic view of landscape ecology which is not accessible to modern conservation biology. It is worth mentioning that exploration and documentation of traditional ecological knowledge systems is not for the replacement of scientific ecological knowledge systems. It is for formulating better management practices which is based on integrating both scientific and traditional ecological knowledge systems that can provide effective solution for forest management. This recognition is reflected in 'Our Common Future-1987', report of the World Commission on Environment and Development (WCED). The report pointed out that indigenous peoples hold a wealth of knowledge based on thousands years of experiences, and that their practices can offer modern societies lessons for the management of complex forest resources and mountain and arid land ecosystems management.

Recently, international attention has turned to intellectual property laws to preserve, protect and promote their traditional knowledge. In 1992, the Convention on Biological Diversity (CBD) recognized the value of traditional knowledge system in protecting species, ecosystem and landscapes and incorporated language regulating access to its use. The high level Brundland report (1987) recommended a change in development policy that allow for direct community participation and respected local rights and aspirations. Agreement on the trade related aspects of intellectual property rights (TRIPs), established rules for creating and promoting intellectual property of traditional communities. In response, the states who had ratified the CBD requested the World Intellectual Property Organization (WIPO) to investigate the relationship between intellectual property rights, biodiversity and traditional knowledge.

The studies of 'TEK' thus has a pivotal role both for protecting intellectual property right of traditional communities and for formulating better policies for sustainable management of their natural resources. In context of Nepal such studies are often neglected and are taken into consideration only by foreigner scholar. Similarly literature concerning traditional ecological knowledge systems is based mostly on ethno-botanical studies and shortfall studies of forest management systems. Thus, it has been expected that this study, to some extent, will be able to fill the shortfall of documentation of 'TEK' system.

# CHAPTER- III

## RESEARCH METHOD

### 3.1 Research Design

Research design occupies important place and position in the study of every research problem. Research design is the plan, structure and strategy of investigation conceived to obtain answer to research question and to control variance. The research design applied for this investigation is mainly descriptive as major past information is generated and is qualitatively demonstrated as an alternative to quantitative demonstration. Exploratory research design is also applied to collect data/information about traditional ecological knowledge system practiced in lower Manang. This helps in obtaining logical analysis of facts to draw a conclusion. No specific hypothesis was formulated and no specific variable has been taken as determinant.

### 3.2 Rationale of Selection of the Study Area

Lower Manang is lower part of Manang district and covers five VDCs i.e. Pisang, Chame, Tachi-Bagarchap, Dharapani and Thoche. This region also falls inside Annapurna Conservation Area (ACA). Majority of population in Manang district are Buddhist (74%) followed by Hindu (25%). Traditionally this district is divided into three administrative blocks i.e. Nyeshang, Nar-Phoo and Gyasumdo. The inhabitants of Nyeshang are known by the name of Nyeshangba or more popularly by the name of 'Manange' and of Nar-Phoo by 'Narba'. The inhabitants of Gyasumdo are mixed group of Gurung (majority), and other (minor) communities. Ethically, Gurung are the dominant ethnic group in lower Manang. Besides this, there are other inhabitants such as Lama (immigrants from Tibet, but settled in Manang for two to three generations), Bista (A caste group that reflect Tibetan life style culturally, religiously and ethically, but claims themselves as an affiliation to 'Thakuri' social group of mid-hills Nepal) and few minor number of disadvantage caste groups. These people have their own way of forest management practices.

### **3.3 Nature and Source of Data**

As per the nature of study more qualitative type of data and few quantitative types of data have been collected. In the same way the primary sources are taken as a major source of data collection for this research. The questioner is designed in such a way that it focuses much on gathering qualitative type of data. Primary data basically of qualitative character were collected by employing research technique i.e. semi-structured interview schedule, transect walk, focused group discussion and key informant interview. Interview with respondents like, local activist, conservationist, local healers (both physical and spiritual) and religion activist etc, were selected as a potential source for primary data generation. Quantitative data were collected through secondary sources like National Census Report, 2001, VDC profile, district development committee annual progress report and other socio-economic research done by various development organizations in Manang.

### **3.4 Sampling**

The total population of lower Manang is 4,042 (CBS, 2001), among which male population is 2,127 and of female is 1,915. Likewise total household number of lower Manang according to National Census Report, 2001 is 936 with 5.4 average household sizes. Though the total 936 households head appear to be actual respondent for this study but, keeping in mind the sensitivity of the research problems and general attribute of traditional ecological knowledge system research, only 200 households were considered as true universe for this study. This is done to avoid non-native respondent who are living there for one or two generations as household spectator. Similarly the fresh (new) immigrants are also excluded from respondent list.

After the formation of sampling frame, 25% of households (sampling units), which equals to fifty households were selected as respondents (sample) for this study using the systematic random sampling method. For finding out the first household number to be surveyed, lottery method was used to find out the 1<sup>st</sup> household to be surveyed. From this other houses among the universe have been found out at each fourth interval to include in the sample list.

### **3.5 Data Collection Tools and Techniques**

It is important to involve local participants in the design of research process in ecological anthropology. This helps in understanding the sensitivity of the nexus developed between social system and ecosystem. Hence, basically the participatory type of research tools and techniques are used in this research. Keeping in mind the reflection of research problem, following research tools and techniques were adopted to collect primary data for this study.

#### **Interview schedule**

This technique has been adopted as the main source of collecting primary data of qualitative nature. To collect required data a schedule with both open and closed ended questions was prepared and surveyed. Questions included in the schedule were framed in such a way that it can provide more qualitative data rather than quantitative data. (See appendix- 1 for sample schedule)

#### **Transect walk**

Working with the realm of ecological research often uses transect walk observation method. Transect walk is widely used in ethno-botanical and human ecological research. Few transect walk were made for this study within major villages inside study area with the help of local facilitator. In total 7 such transect walk were made by making 'S' shaped tract, vertically covering the selective ridges. The field book was used to record the availability of plants, animal species and other feature of landscape in specific ridge. Similarly the snaps of important cultural monuments were taken for certification.

#### **Observation**

An anthropologist generally uses participant observation method for field study. This is a straight forward technique, which emerge researcher into the subject being studied. The researcher had observed many sacred/religious forests and implication of such demonstration is instantly noted down in the field book. The observation method adopted was both structured as well as unstructured to generate both qualitative and as well as quantitative data.

## **Key informant interview**

For getting special insights into certain aspects and for collecting qualitative data, key-informant interview was carry out with the various informants from concerned agencies like village chief, Amchi (Tibetan herbal medicine healer), farmers and cattle herders. A list of such personnel was shortlisted during interview schedule survey by using snowball sampling method. Before conducting the interview each respondent was given a short hand orientation about role and importance of traditional ecological knowledge system and of traditional institutions for sustainable management of forest resources. The respondents were provided imperative knowledge about culturally, religiously and spiritually valuable plant and animal species of their community.

## **3.6 Data Analysis and Presentation**

Data gathered during field work are scrunized, classified and tabulated according to demand of issues discussed in different chapters. Quantitative data gathered form interview schedule were codified, in order to analyze it by using computer software program, statistical package for social science (SPSS) for windows. The attitude of respondents were measured in a strongly agree to strongly disagree (1-5) Likert scaling system. Statistical tools such as frequency distribution mean and percentage has been used frequently in different chapters under numerous headings and subheadings. The basic outcome of the study regarding importance of traditional ecological knowledge and its implication for forest management are presented in different tables.

The non quantifiable qualitative data were interpreted as anthropologically as possible. In most cases a photo snap are presented to replicate qualitative data. The perception and the view of a respondent regarding the construction mechanism of traditional ecological knowledge system is analyzed on the basis of corresponding socio-cultural practices and community belief systems. The non cultural, aspect of tree like, wood quality, chemical composition, silvicultural characteristics and habitat ecology are investigated referring the literature available in forest science. The ethno-botanical data were compared and crossed checked with findings of previous studies for its validation.

## CHAPTER- IV

### STUDY AREA AND PEOPLE

#### 4.1 Geographical Setting

Lower Manang is situated in south-east part of Manang district, and holds huge ecological diversity, ranging from lush sub-tropical forest at the lower altitude to high alpine pasture land at higher elevation. It borders in the south to Lamjung districts, in the north to Tibetan autonomous region of China, in the west to upper Manang and in the east to Gorkha district of Nepal. The total geographical area of lower Manang is roughly, 889.13 sq. km. The total population of lower Manang according to National Census Report, 2001 is 4,042 and covers 42.16% of total population of Manang district.

Gyasumdo is the part of the lower Manang, which holds major section of Marsyangdi valley from Chame to Tal and lies between 28<sup>0</sup> 27' to 28<sup>0</sup> 46' N latitude and 84<sup>0</sup> 10' to 84<sup>0</sup> 34' E longitude. The climatic conditions of lower Manang rises from subtropical to alpine and alters in vegetation type within short vertical distances. The landscape of lower Manang belongs to inner-Himalayas, which is enclosed by higher Himalayas from all sides. The forest vegetation comprises mainly of Alnus and Rhododendron (broadleaf forest) forest in a lower belt and Conifer (*Picea smithiana*, *Taxus baccata*, *Tsuga dumosa* and *Abies spectabilis*) and Birch (*Betula utilis*) in the upper belt.

##### 4.1.1 Status of Forest Resources

The North facing upper highlands with wet and sloppy area is covered with the dense forest of blue pine (*Pinus wallichiana*) and birch (*Betula utilis*). The lower elevation of northern aspect is dominated mainly with spruce (*Picea smithiana*), Himalayan yew (*Taxus baccata*) and hemlock (*Tsuga dumosa*). The drier south facing slope has occasional stands of Juniper (*Juniperus communis*, *Juniperus recurva*) with dispersed blue pine and scrub of other plant species. Riverain basin is dominated extensively by forest of Seabuckthorn (*Hippophae salicifolia*), Alnus and Willow plant species.

The lower Manang people uses forest resources primarily in three ways. The first and the most important are timber trees that are used for construction purpose as well as for firewood. Pine, Alnus and Fir are used for construction purpose whereas a considerable amount of Junipers, Pine and Birch are used for firewood. The next use of forest resources particularly is blue pine needles and juniper branches for animal bed. These needles are mixed with animal dung and are used as fertilizer to maintain the crop field fertility by maintaining normal soil P.H. The third, but prominent uses of plants in lower Manang is for medicinal use to treat various diseases and use as a source of aroma. Beside these forest products in a way is also taken as a source of income generation.

**Table 4.1** Major plant species of lower Manang

Scientific Name	Nepali Name	Elevation (M)	Major Use
<i>Abies pindrow</i>	Thingore salla	2100-3000	Timber/fuelwood
<i>Abies spectabilis</i>	Talispatra	2400-4400	Timber/fuelwood
<i>Alnus nepalensis</i>	Uttis	1800-3300	Timber/fuelwood
<i>Betula utilis</i>	Bhojpatra	2700-4500	Fuelwood/religious
<i>Juniperus indica</i>	Dhupi salla	3200-4700	Fuelwood/religious
<i>Juniperus recurva</i>	Dhupi salla	3000-4000	Fuelwood/religious
<i>Berberis aristata</i>	Chutro	1800-3000	Fuelwood/medicine
<i>Pinus wallichiana</i>	Gobre salla	2200-3600	Fuelwood/timber
<i>Picea smithiana</i>	Jhule salla	2100-3300	Construction/timber
<i>Rhododendron arboreum</i>	Gurans	1800-3300	Fuelwood/religious
<i>R. anthropogon</i>	Sunpati	4000-4500	Aromatic/religious
<i>Salix babylonica</i>	Bains	2500-3500	Firewood/fodder
<i>Taxus baccata</i>	Lauth salla	2400-3600	Fuelwood/religious
<i>Tsuga dumosa</i>	Thingure salla	2500-3500	Timber/fuelwood

**Source:** Field Survey, 2009

Table 4.1 shows that lower Manang embrace diverse form of plant species arising from lower temperate broad leaf forest of Alnus, Pine and Rhododendron at lower elevation to upper temperate coniferous forest of *Abies spectabilis*, *Juniperus indica* and *Tsuga dumosa* at higher elevation. The part above permanent tree line is covered with scrub of diverse plant species like *Rhododendron anthropogon*, *Juniperus recurva* and Caragan sp.

## **4.2 People and Settlement Pattern**

Gyasumdo people though being the part of the Tibetan lifestyle, refuse to call themselves as 'Manange' or 'Bhote', rather they like to link up their origin and oral history with the low land so called 'Pure Gurung' of the Lamjung district. However the low land Gurung contests to accept them as an orthodox Gurung tribe. The Gurung of Gyasumdo is of two major clan groups i.e. 'Khermai' or 'Char Jat' and 'Tharmai' or 'Sora Jat' or in other words, four and sixteen caste clans. These two sub-tribes are exogamous but each sub-tribe is endogamous. The settlement in Chame, Bagarchhap, Dharapani, Tal and Thonche are dominated with the Bhotiya (latter migrants of Tibet) people. The rest of the villages in Gyasumdo are inhabited by Gurung and Ghale. Though, the early Gurung were pastoralists, but at present their lifestyle is completely different from their past, due to various socio-economic and cultural changes.

## **4.3 Economic Setting**

The source of economy in Gyasumdo is the combination of agriculture, animal husbandry, trade and foreign employee. The trading pattern of the Gyasumdo people was drastically changed since after the failure of Trans-Himalaya trade with Bhot (Tibet) in 1959/60 AD. The failure of Tibetan trade had led to increase in the seasonal migration of Gyasumdo people to lower altitudes and provide an opportunity to enter into other commercial occupation. Most of the household surveyed for this study claim themselves of being well financial.

In the past the villagers in lower Manang used to practice common grazing system. The herder's are provided a remuneration of a goat on looking after the herds. This system is seldom on practices in the villages of lower Manang at present. Due to limited productive land most of the locals are engaged in other livelihood opportunities like tourism based enterprises, foreign employment and civil servants. Tourism provided chances of earning to lower Manang people. The structure of houses in lower Manang are close to one another and is generally build up of mud, cement and stones with stone roof. Economically the lower Manang people can be categorized in to three groups.



#### **4.4 Traditional Governance**

The traditional local governance systems in upper Manang valley i.e. 'Nyesyang' and 'Nar-Phu' is called "Dhaapaa Shaapaa" council system, which was never recognized as legal practices by Nepal government. This system is based on an equalitarian principle in society. In contrast to this system the lower Manang valley i.e. 'Gyasumdo' was historically dominated with tradition of 'Jimmawal Mukhiya' (the than government land revenue collector) system. They are also known as a headman of the village or simply a 'Mukhiya'. Although this system was abolished in 1964, some 'Mukhiya' still plays a leading role for maintaining law and order and social welfare in the village. At present in most of the villages of lower Manang these 'heads' are working as a village development committee's chairman or simply as its member.

#### **4.5 Religion**

The inhabitant's of lower Manang are primarily Gurung, Lama, Ghale, Punel, Thakuri and other minority caste groups. Ghyasumdo Gurung usually hires 'Khepre', a priest for reciting religious texts n performing their rituals. 'Khepre' is a kind of Gurung shaman who chants religious texts. Majority of Gurung employ Tibetan lama to recite funeral and other minor rituals, but there are still some Gurung who claim themselves as a Hindu followers. Many people from Thoche VDC were found to be claiming themselves as Hindu followers.

#### **4.6 Festivals**

Festivals in Ghyasumdo valley hold religious, cultural and ethnic significance. They celebrate various festivals like Lhosar, Metha, Mirga Naach (Deer dance) etc. Lhosar is a New Year celebration for people belonging to Lama, Punel and Gurung. Metha or archery contest falls on April-May for 5-6 days. On this occasion entire villagers appear in their traditional attire holding a pair of bow and arrows. Deer dance falls on third or fourth week of April and is celebrated in Tache village. It is mandatory to catch a Ghoral (*Nemorhaedus goral*) and offer its heart and liver for pleasing local deity known as 'Ton Devi'. People generally make a fun with filthy words in celebrating this occasion.

## CHAPTER- V

### RELIGION CULTURE AND PROTECTION: AN ASSESSMENT

#### 5.1 Folk System of Plant Nomenclature

##### 5.1.1 Ecological Knowledge at Plant Species Level

Folk classification of plant species in lower Manang is based on the various criteria such as presence or absence of flower in the plants. This is also based on the particular attributes of plant such as its life form, habit, habitat, morphology, utility and property. Other criteria of forest type classification include various factors like moisture content, light penetration, soil types, slope and aspect etc. Lower Manang traditional plant classification system is more comprehensive and is linguistically derived mainly from 'Tibetan-Burmo' dialect. The whole plant kingdom is divided into two sub-categories namely, into 'ngo-dhu' (herbaceous plants) and 'singi-dhu' (woody plants).

##### **Nomenclature based on plant habitat**

The plant kingdom is divided into different categories on the basis of specific habit and habitat of the plants. For example on the basis of habitat forest land is categorized as 'pang' (meadows) and 'nak' (forest). On the basis of habit plants are categorized as 'singbal' (epiphytic plants), 'dhotak' (plants growing on the stones). The name 'tshu tsa' is generally refers for the aquatic grass in which 'tshu' stands for water body and 'tsa' for grass.

##### **Nomenclature based on plant morphology**

This system is based on the structure of plant in reference to its color and appearance. For example the different species of Pedicularis are named with the prefix 'lugru' meaning 'sheep's horn', because the flowers bear a coiled beak similar to horn of the sheep. The suffixes 'karpo' (white), 'serpo' (yellow), 'ngonpo' (blue), 'marbo' (red) are used with reference to the colors of the flowers. Plant species are also classified in basis of its height, girth and size.

### **Nomenclature based on plant utility**

The utility of plant parts is another basis for identifying plant species in Gyasumdo valley. Terms are based on representing specific utility of plants providing suffixes or prefixes to specific plant species. For example the term 'mai' for medicine, 'dhuk' for poison, 'poe' for scent or aroma etc. The term 'silapoe' (*Jurinea dolomiaea*) has derived from two words 'sila (meaning the avoidance of bad smell) and 'poe' (meaning scent or incense). Thus, the plant name 'sailapoe' stands for the scent used to evade the bad smell.

### **Nomenclature based on plant property**

The plants are also named on the basis of their property. Properties of plant generally refer to its taste, odor and texture. For example bitter is locally called 'tik' (= tig). The plants with such taste are called 'tikta' (*swertia sp.*). Plants with choking (acid) taste are known as 'tsha' for example 'chumsa' (*Rheum species*). The name 'pangpoe' is given for the scented (poe) plant 'jatamansi' (*Nardostachys grandiflora*), which is found in the grassland (pang).

#### **5.1.2 Ecological Knowledge at Plant Population Level**

On the basis of density of forest, lower Manang people classify quality of forest on three major categories. The forest is termed as thick (thukpo), thin (tapo) and moderate (dingba). On the basis of size of fruits, roots and flowers, plants are categorized into various groups such as 'debu tshae' (plant with big fruit), 'debu tshung' (plant with small fruits), 'tsawa tshae' (plant with big root), 'tsawa tshung' (plant with small root), 'metog haeo-oa' (plant with distinct flower) and 'metog menpa' (plant with small or indistinct flower) etc.

On the basis of the structure and the property of the fruit plants are further differentiated into 'gang-po-chen' (plant with bean like fruit), 'debu numchen' (plant with oil yielding fruit). The woody plants 'sing' are differentiated into 'tserm-chengi-sing' (thorn bearing plant) and 'tserma mepe sing' (plant without thorn). A plant species with local name and taxonomic descriptions quoted in this heading and sub headings are derived from previous ethno-botanical and ethno-ecological studies carried out in lower Manang and are verified literally.

## **5.2 Sacred Forest, Tree Worship and Conservation**

Sacred groves are community based monuments of biological significance. They are special forest areas imbued with super natural powers and commonly comprise site for ritual, initiation, ceremonies and other special functions. Sacred groves are a global phenomenon and ancient tradition with high significant of eco-cultural dimensions. Wherever they occur, access to sacred groves is highly restricted, resulting in a hands-off achievement.

Lower Manang people have a strong belief system that their deities govern punishment for breaking rules set forth for the conservation of sacred groves. The rules of sacred groves vary from grove to grove but in most cases prohibition on felling of trees and killing of animals are more common. Sacred groves are recognized as a system that informally forces traditional communities to harvest natural resources in an ecologically sustainable way.

Lower Manang people believe that tree is the symbol of ancestral spirits and has been protecting sacred forest areas by imparting socio-cultural rules and customs to ensure the protection of forest/natural resources. Many sacred groves in lower Manang contain water bodies such as ponds, lake and streams. The vegetative mass that covers the floor of a grove helps on absorbing water during monsoon and release gradually during drought. Sacred groves perform several other functions beside conservation. For instance, it helps in maintaining micro-climate, recharging aquifers, enhances nutrient cycling, prevents soil erosion and provides aesthetic/ethical values.

In many sacred groves, Ghyasumdo people perform cultural rituals and ceremonies to appease the presiding deity for ensuring the well being of the community. It is also common for people to make individual offerings, often in exchange for wishes such as good health or prosperous life. Sacred groves are also closely linked to the livelihood of local communities and its legal status and management vary among regions and individual villages. In few groves of lower Manang extraction of forest resources from sacred grove is totally restricted, instead in many the collection of forest material such as fallen twigs, leaves, fruits seed and mushroom are allowed for local harvester.

The lower Manang people's socio-cultural, spiritual and religious belief systems are centered round the concept of 'sacred species', which has played an important role for management forest resources. Community are also found to be adopting measures like placing upper limits, closed harvesting and equity in allocation for resource utilization. This is done often through providing religious ethics against excessive consumption and creating common consensus for social punishment. This strategy can be listed as:

- ) Placing upper limits on resource consumption by imposing time and area restrictions, which ensure sustainability on harvesting resources.
- ) Forbidding the harvest of vulnerable species, by promoting religious taboos and ethics against consumption of critical plant species.

**Table 5.1** Major religious plant species of lower Manang

Scientific Name	Local Name	Nepali Name	English Name
<i>Abies spectabilis</i>	Tashing	Talis Patra	Silver Fir
<i>Pinus wallichiana</i>	Langma	Gobre salla	Blue Pine
<i>Betula utilis</i>	Takpa	Bhoj patra	Birch
<i>Rhododendron anthropogon</i>	Balusin	Sunpati	Rhododendron
<i>Rhododendron arboreum</i>	Marbosin	Lali gurans	Rhododendron
<i>Juniperus recurva</i>	Shukpa	Lekh dhupi	Juniper
<i>Salix babylonica</i>	Changma	Bainsh	Weeping Willow
<i>Taxus baccata</i>	Jhemersin	Lauth salla	Himalayan Yew
<i>Berberis aristata</i>	Kerpa	Chuttro	Wild Berry
<i>Tsuga dumosa</i>	Ghyaker	Thingre sall	Hemlock
<i>Hippophae salicifolia</i>	Tirchu	Dalichuk	Seabuckthron

**Source:** Field Survey, 2009

Table 5.1 shows that in lower Manang people consider sacredness to various plant species. The wide ranges of plant species are comprised into list of sacred plant species. These plants species are generally poses aromatic and medicinal values. Beside this, a plant species having various other functions like soil conservation, nutrition cycling, water recharger, religious, cultural, spiritual and ornamental values are listed into frame of sacred plant species.

### **5.3 Paradigm Shift Concept in Forest Management**

Traditionally foresters defined a sustainably managed forest as one which results in maximum timber harvests. In recent years, this definition has expanded to encompass economic, environmental and social qualities that contribute to the sustainability of forest dependent communities and ecosystems as well as the forest itself. In the same ways, the new paradigm emphasizes the intrinsic value of indigenous/traditional ecological knowledge system for its key role in sustainable management of forest/natural resource.

The 'paradigm change' perspective gives high value for indigenous/traditional knowledge, which could be used in negotiating resource conflict. Ecological ideas such as 'the balance of nature', the concept of the ecosystem and maximum sustainable yield provide an essential underpinning concept of sustainable forest management. The paradigm shift perspective of eco-centric forest management approaches focus on the principle that human should not see themselves as an external manager of forest resources. Instead, human must considered them as an integral component of forest ecosystem.

Indigenous knowledge is considered as a medium of empowerment, enabling local people to exercise their management skills and technical knowledge so as to obtain greater control over their own development. The 'institutional change' perspective considers that professional organization should esteem indigenous knowledge and try consciously to incorporate features of 'rehabilitated' indigenous management systems into their own formal method. Traditional ecological knowledge system thus contributes in achieving ecological, social, economic and cultural sustainability of indigenous people.

Traditional ecological knowledge represents multiple bodies of knowledge accumulated through many generations in close interactions between people and the natural world. 'TEK' and its application via customary ecological management practices can be useful in modern conservation programs. The use of 'TEK' in the form of customary ecological management practices has been recognized as a potentially powerful conservation mechanism, particularly in countries where indigenous cultures are still largely extant.

#### 5.4 Taboo as a Socio-cultural Mechanism of Forest Management

Taboos, generally refers to an unwritten and orally transmitted community rules that govern human behavior. These socio-cultural constraints plays major role in management of forest resources and ecosystems. Taboo system ranges from providing total protection of entire plant communities to protection of desired plant species, throughout or during critical stage of its life history. The role of taboo systems in case of lower Manang can be listed as below.

**Table 5.2** Implication of taboos in forest management

Taboos	Consequence	Ecological Implication
Trees on the riverside must not be cut down.	River water will dry up.	Control soil erosion and increase infiltration.
Forest god must not be disturb and neglected.	If so, whatever blessing achieved before may be withdrawn or introverted.	Dense forest is preserved in the name of forest god.
One should not enter into the forest with metal equipments in monsoon.	If so, forest god may be angry or relocated from original dwellings.	Harvesting timber and firewood in rainy seasons increase fungal infection, this helps in reduction.
One should not collect forest products before its fruits are ripen/dropped.	If so, will reduce one's crop yield or may result to crop failure by diseases.	Provide ample chances of falling seeds and spores, increase regeneration.
One should not light fire in the forest intentionally.	If so, person has to suffer from starvation.	Control forest fire and improve regeneration.

**Source:** Field Survey, 2009

Table 5.2 illustrates that most taboos practiced in lower Manang has directly or indirectly reflected the requirements of sustainability of forest resources. More importantly, it has been observed during field survey that, as compared to forest related laws, rules and regulations, some taboos, totem and religious sanction are more easily accepted by traditional people in lower Manang. Such system in a way has played an unseen role for sustainable management of forest/natural resources. In the same way the indigenous people of lower Manang are more concerned with spirituality component of forest resources.

**Table 5.3** Diverse form of resource taboos adopted in lower Manang

<b>Appearance</b>	<b>Function (Action)</b>	<b>Implication (Reaction)</b>
Segment Taboo	Regulate resource extraction.	Ensure/Impose sustainable harvesting of resources.
Temporal Taboo	Regulate access providing closed time interval.	Regulate overharvesting of forest/natural resources.
Method Taboos	Controls harvesting process.	Motivate effective harvesting technique for management.
Life-cycle Taboo	Discourage exploitation of plant species during critical stages of its life history.	Ensure life cycle of desires plant species, for fulfilling various human need.
Habitat Taboo	Restrict access to resources inside specific habitat.	Assist in managing sacred/religious forest groves
Species Taboo	Encourage an individual to protect target/desired plant species through its life form.	Boost favorable environment for growth of target plant species via customs/rituals.
Doorway Taboo	Prohibit entering into specific/desired forest areas.	Depress habitat destruction at any plant communities or specific habitat types.
Totemic Taboo	Forbid harming specific plant species attached to certain clan/caste group.	Ensure protection of plant species by certain clan group during its lifecycle

Taboo and totem, one of the most disputed and complex socio-cultural phenomenon was formed during the long historical natural adaptation and social intercommunication. Table 5.3 demonstrates that diverse form of taboo and totem systems function together for forest sustainable management of forest resources in lower Manang. Such functions are generally understood as a veto enforced for the protection and utilization of forest resources. Taboo, totem and religious sanction through the social and cultural impression plays a constructive role for sustainability of forest/natural resources in indigenous communities like lower Manang. Despite this fact, some taboo, totem and belief systems has played negative role for conservation and management of specific plant/animal species and for biodiversity conservation. A case study has shown that few plant and animal species has been harmfully articulated.



**Table 5.4** Religious value of major plant species in lower Manang

Local Name	Religious Values	Timber Properties
Lauthsalla	Climbing on this tree is forbidden and it is believed that this tree is a house to evil spirits and devils.	Leaves contain an alkaloid poison, which can be fatal to livestock. Leaves also contain toxic acid, used as anti-cancer in placental cancer in women.
Lokta	As its flower looks like genital organ of lord 'Shiva', it is sacred to 'lord 'Shiva'.	The bark contains flabby subsistence, from which pulp is derived for producing paper.
Chuttro	Used as a beverage and is dear to lord 'Shiva'. Since this tree is gregarious looking it is symbolized with evil/deities.	The root bark is used as medicine and bole bark is used to prepare dye. Plant gives berry like fruits used as fruits.
Dale-Chuk	Forbidden to use as firewood, as it burns poor and evoke pungent smell on blistering.	Plant produces berry, which is vital source of vitamin-'C' and 'K' and is used as fruit juice.
Bhojpatra	This plant is believed as a magic box and possesses the power of warding off demons.	Bark produced outer sheath, used as holy paper. The infusion of bark is carminative.
Dhupisalla	Leaf percolate aroma, when combusted. One of the holiest plants in Buddhist society.	Bark produces volatile resin duct. Resin of juniper species evokes smell on combustion.

Table 5.4 present the religious values and timber properties of major plant species of lower Manang. From the content of this table we can say the plant species which are considered sacred by lower Manang people are of high significance in terms of its biological and bio-chemical properties. Many of these plant species are used for deriving raw material for preparing medicine. This concludes that knowingly or unknowingly indigenous people from lower Manang have been protecting such plant species by placing taboo, totemic values and other sanctions through cultural and religious impressions. A type of anti-cancer acid derived from leaf of Himalayan yew (*Taxus baccata*) is used for treatment of placental and uterus cancer in women. Similarly many of such plant species found in the forest of lower Manang are used for treating various internal and external diseases of humans and domestic animals.

## 5.5. Religion, Ecology and Wildlife Conservation

Both the Hindu and Buddhist of lower Manang follow ancestral worshiping and animism in the form of deity worship. Animism means the belief that a supernatural force animates and organize the universe or the belief that things in nature, e.g. trees, mountains and the sky, have souls or consciousness. This belief system and affection towards nature, as a zoolatry (worshiping of animals) and totem (considering plants and animals sacred) has contributed much for conservation and management of forest resources in lower Manang.

Buddhist monks from lower Manang considers the musk deer and blue sheep (Himalayan ungulates) as a zoolatry reincarnation of Lord Buddha. In the same way snow leopard (*Panthera uncia uncia*), known as ‘Pangche’ is consider as one of the most sacred mammal species of Himalayas. The lower Manang communities give high religious values for number of Himalayan pheasants (large birds) and scavenger i.e. eagles and vultures. The most outstanding are Himalayan Monal (*Lophophorus impejanus*), Lammergeier (*Gypaetus barbatus*) and Himalayan Griffon (*Gyps himalayensis*).

**Table 5.5** Perception on sacredness of wild animals

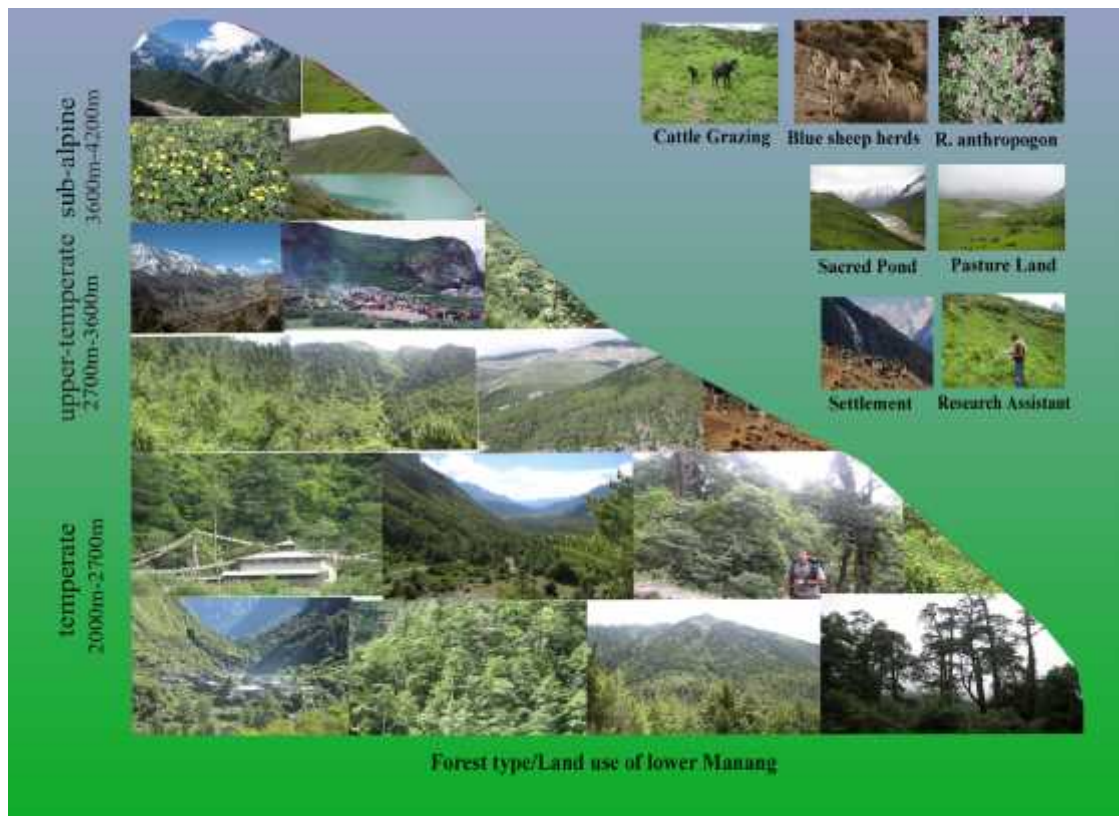
Sacred Wildlife	Scientific Name	N=50	
		Frequency (f)	Proportion (p)
Barking Deer	<i>Muntiacus muntjack</i>	16	32.0
Ghoral Deer	<i>Nemorhaedus goral</i>	11	22.0
Musk Deer	<i>Moschus chrysogaster</i>	43	86.0
Blue Sheep	<i>Pseudois nayaur</i>	24	48.0
Snow Leopard	<i>Panthera uncia uncia</i>	13	26.0
Himalayan Monal	<i>Lophophorus impejanus</i>	12	24.0
Common Leopard	<i>Panthere pardus</i>	11	22.0
Red Panda	<i>Ailurus fulgens</i>	18	36.0
Lammergeier	<i>Gypaetus barbatus</i>	42	84.0
Himalayan Griffon	<i>Gyps himalayensis</i>	36	72.0

Cultural biodiversity denotes the links between biodiversity and human diversity. Cultural biodiversity is also known as 'deep ecology'. Deep ecology is concerned with spiritual dimension of the environmental movement at community level. Lower Manang people cultural biodiversity is the cumulative approach developed in practicing deep ecology of Hinduism and Buddhism. One of the most illustrative influences of Buddhist philosophy in nature and wildlife protection in case of lower Manang is the doctrine of rebirth. This doctrine holds a notion that human beings can be reborn as animal or an animal can be reborn as human beings. This philosophy promotes the belief system that respecting wild animals in a way is a respecting to own ancestors.

Lower Manang people have developed traditional custom laws, which can be taken as legal norms for forest management and overall biodiversity conservation, which in a way has established as a 'village rules'. They have a variety of rules regarding protecting their pasture and wildlife resources. Table 5.5 clearly shows that lower Manang people considered musk deer (*Moschus chrysogaster*) and blue sheep (*Pseudois nayaur*) as most sacred wild animals in their locality. They hold a belief system that this animal is considered as a reincarnation of Lord Buddha. A wide variety of Himalayan eagle and vulture are taken as a sacred avifauna and belief that these avifaunas are the care taker of the Himalayas. Many species of Himalayan birds, mammals and reptiles are considered as sacred animals by lower Manag communities.

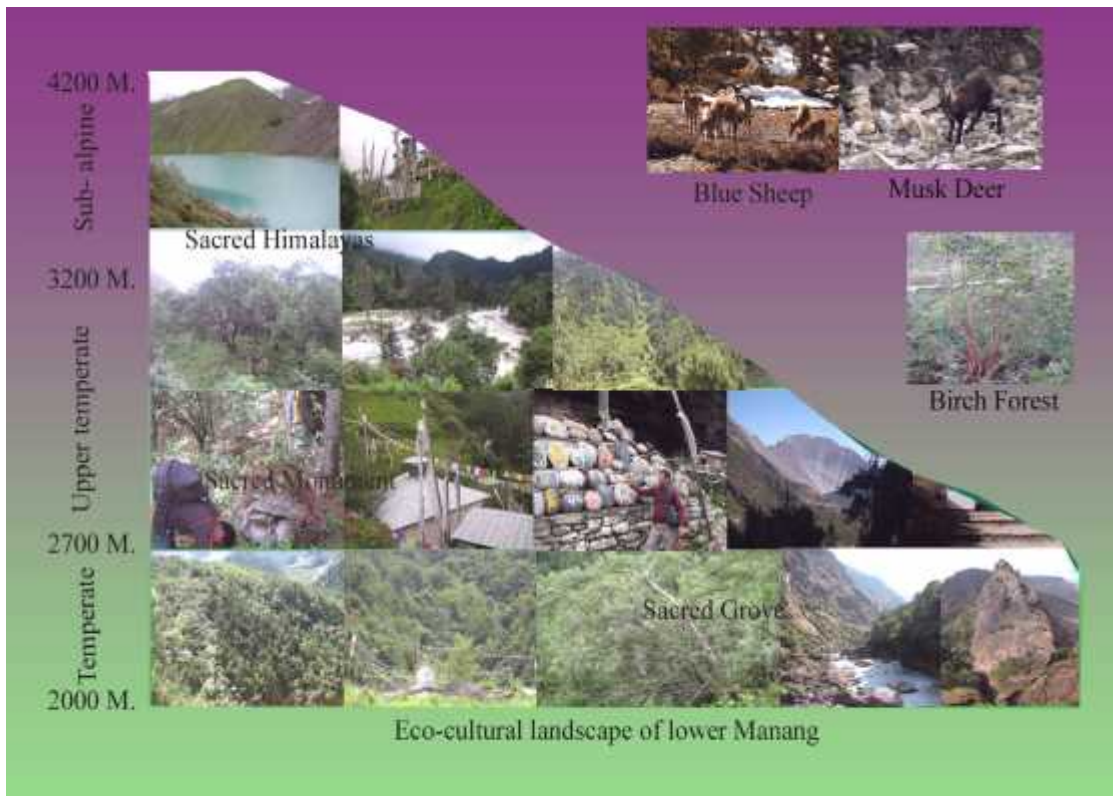
Lower Manang people hold a belief systems that most of the Himalayan ungulates like musk deer, blue sheep and other small mammals are created by the god to feed the 'Pangche' i.e. snow leopard (*Panthera uncia uncia*). Snow leopard is taken as a king among mountain wild animals. Protection of such top level predator wildlife species by providing religious values reduces the dependency of such predator species on domestic livestock. From this we can conclude that all these religious, spiritual and anthropogenic activities have contributed a lot in maintaining status quo of Himalayas and her ecosystem. Understanding the construction mechanism of 'deep cultural ecology' and its implication thus plays a significant role for participatory wildlife management and biodiversity conservation in the higher Himalayas.

## 5.6. Graphic View of Forest and Eco-cultural Landscape



**Figure 5.1** Succession of forest landscape in lower Manang

The land mapping information of lower Manang shows that it has 146.75 sq.km (16.50%) of forest land, 68.83 sq.km (7.75%) of bush land, 416.83 sq.km (46.85%) of barren land, 190.30 sq.km (21.40%) of grass land, 66.38 sq.km (7.46%) of permanent snow land, 0.17 sq.km (0.02%) of rocky land and another 0.17 sq.km (0.02%) of sandy land. Small area of Dharapani and Thoche VDC exterior to the Marsayngdi river lies outside the conservation area. Almost all parts of settlement in lower Manang falls into upper-temperate agro-ecological zone. The forest type in lower Manang rises from lower-temperate broadleaf forest to alpine zones. Lower temperate forest bears forest of *Alnus* and *Pinus* species. Upper temperate forest bears mixed broad leaf forest of rhododendron and juniper species. Similarly sub-alpine enclose forest of *Abies spectabilis*, *Betula utilis*, *Juniperus indica* and *Caragana species*. The alpine zone lies between last tree line and permanent snow line and poses shrubby species of junipers, cotoneaster and ephedra.



**Figure 5.2** Eco-cultural Landscape of lower Manang

Landscapes that are dependent upon deliberate human intervention are called cultural or anthropogenic landscape. Such landscape holds the inter relationship between spiritual beliefs, religious practices and environment. This inherent relationship between man and environment supports the coexistence of forest landscape, wildlife and human survival. Thus sacred natural sites are likely to become important nodes for habitat restoration, dwelling for rare species, and link between ecological corridors. The overall forest land in lower Manang can be divided into three major categories i.e. sacred forest, intensive use forest and wilderness forest. Sacred forest can be further divided into two sub-categories, spirits forest and religious forest. The spirit forest is further divided into two general types i.e. ghost forest (spirits dwelling forest) and worship forest. Wilderness forest denotes to type of forest which is left for conservation because of its inaccessibility. Wilderness forest is known as 'safety forest' and supports numerous wildlife species. Intensive use forest is used for collecting basic forest products. Intensive use forest is known as 'supply forest' and usually does not embrace religious monuments.

## 5.7 Chapter Summary

Taking into consideration of fact and findings mention in different sub-heading of this chapter, we can conclude that traditional socio-cultural mechanism of fostering systematic and regulated use of forest resources is one of the principal factors for sustaining forest resources in indigenous community. It has been proved that lower Manang communities are able to govern the full range of different forest types within their landscape applying their traditional ecological knowledge systems. The taboo and totem labeled for forest harvesting in support of religious or spiritual values of special plant species, belief systems, traditional management systems and historically created community consciousness are powerful motivators for sustainable management of forest resources and landscape in case of lower Manang.

Rural society in most cases has an intimate relationship with their bio-physical environment, which promotes the limited use of forest resource by using traditional ecological knowledge systems. The belief systems, rituals, values and doctrines of various worlds' religion (Buddhism and Hinduism) plays very significant role in sustainable management of forest resource. In case of lower Manang the access to sacred forest grove is controlled by spiritual beliefs and social custom. Lower Manang culture and religious systems are centered on maintaining religious forest, the sacred species, sacred groves and sacred landscape, this has played significant role in forest biodiversity conservation.

The ecological experience of communities led to the development of local regulation and institutions, which help in maintaining the use of natural resources in perpetual ways. Traditional ecological knowledge is rooted in the past and intricately connected to the culture and values of a community in the present. This knowledge system has significant contribution to sustainability of forest resources as well as to the broader goals of sustainable development. It is thus important for any developmental organizations to sensitize knowledge systems and approaches before launching any integrated conservation development activities. Traditional ecological knowledge systems thus, works as a basis for participatory biodiversity assessment and monitoring and helps in mainstreaming developmental activities to the line of bottom-up approach.

## CHAPTER- VI

### DATA ANALYSIS AND PRESENTATION

#### 6.1 Socio-cultural Scrutiny of Respondent

Anthropological research focuses more on 'analysis' rather than on 'measurement'. Research in ecological anthropology is qualitative in nature and stress more on verbal and pictorial data for validation of facts. Despite this reality, the simple statistical tools like mean, percentage and frequency have been used in this research to describe the characteristics of data and variables. The qualitative data in some cases has been mention on tabulation form to make the finding more comprehensible, meaningful and attractive.

**Table 6.1** Gender of respondent based on caste/ethnicity

Caste/Ethnicity	Gender of Respondent			Total (%)
	Male	Female	Total	
Gurung	20	14	34	<b>(68.0%)</b>
Lama	11	2	13	<b>(26.0%)</b>
Bista (Thakuri)	2	0	2	<b>(4%)</b>
B.K	1	0	1	<b>(2%)</b>
<b>Total</b>	<b>34 (68%)</b>	<b>16 (32%)</b>	<b>50</b>	<b>(100.0%)</b>

**Source:** Field Survey, 2009

Table 6.1 demonstrates that among total respondents sampled, 68 percent are males and 32 percent are females. Based on caste/ethnicity of respondents 68 percent are from Gurung caste tribe, 26 percent from Lama caste tribe, 4 percent from Bista (Thakuri) and 2 percent from disadvantage caste group. This shows that the ethnic composition of lower Manang holds majority of Gurung caste tribe. Despite the ethnic composition of lower Manang can be listed into heterogeneous community structure comprising mainly of Gurung, Lama, Bista (Thakuri) and few marginal caste group. Except, few disadvantage caste group the ethnic groups of lower Manang can be listed inside a single frame of Mongolian race forming a complex whole.

**Table 6.2** Occupation of respondent based on caste/ethnicity

Occupation	Caste / Ethnicity				Total
	Gurung	Lama	B.K.	Bista	
Agriculture	16 (47.1%)	6 (46.2%)	1 (100.0%)	1 (50.0%)	<b>24</b> <b>(48.0%)</b>
Hotel/Restaurant	6 (17.6%)	2 (15.4%)	0 (.0%)	1 (50.0%)	<b>9</b> <b>(18.0%)</b>
Spiritual work	2 (5.9%)	2 (15.4%)	0 (.0%)	0 (.0%)	<b>4</b> <b>(8.0%)</b>
Official work	6 (17.6%)	1 (7.7%)	0 (.0%)	0 (.0%)	<b>7</b> <b>(14.0%)</b>
Daily wage work	3 (8.8%)	2 (15.4%)	0 (.0%)	0 (.0%)	<b>5</b> <b>(10.0%)</b>
Students	1 (2.9%)	0 (.0%)	0 (.0%)	0 (.0%)	<b>1</b> <b>(2.0%)</b>
<b>Total</b>	<b>34</b> <b>(100.0%)</b>	<b>13</b> <b>(100.0%)</b>	<b>1</b> <b>(100.0%)</b>	<b>2</b> <b>(100.0%)</b>	<b>50</b> <b>(100.0%)</b>

**Note:** Figures in parenthesis indicate percentage

**Source:** Field Survey, 2009

Table 6.2 clearly demonstrates that the respondent belongs to different occupational group. Among them 48 percent belong to agricultural occupation group, 18 percent to hotel/restaurant occupational group, 8 percent to spiritual occupational group, 14 percent to civil servant/official occupational group, 10 percent to daily wage work occupational group and 2 percent i.e. one student. This shows that most of the traditional ecological knowledge system holders included for this study are from agricultural background. The data shows that most of the respondent surveyed for this study belongs to Gurung caste tribe, most of who depends on agricultural and pastoralism for sustaining livelihood.

It was beforehand considered that rural farmer stands sound information of traditional ecological knowledge systems and thus are the exports of such knowledge systems. A rural people with a long history of agro-ecological activities have incorporated many of traditional ecological knowledge systems into their farming technologies. The occupational setting and local people's activities directly influence the production and handover procedure of such knowledge systems and continuity of indigenous/traditional institutions.



**Table 6.3** Religion of respondent based on caste/ethnicity

Religion	Caste/Ethnicity				Total
	Gurung	Lama	B.K.	Bista	
Hindu	14 (41.2%)	0 (.0%)	1 (100.0%)	1 (50.0%)	17 <b>(34.0%)</b>
Buddha	20 (58.8%)	13 (100.0%)	0 (.0%)	1 (50.0%)	33 <b>(66.0%)</b>
<b>Total</b>	<b>34</b> <b>(100.0%)</b>	<b>13</b> <b>(100.0%)</b>	<b>1</b> <b>(100.0%)</b>	<b>2</b> <b>(100.0%)</b>	<b>50</b> <b>(100.0%)</b>

**Note:** Figures in parenthesis indicate percentage

**Source:** Field Survey, 2009

Table 6.3 clearly demonstrates that 34 percent of respondent belongs to Hindu religion and 66 percent to Buddhist religion. Based on caste/ethnicity 41 percent out of 34 Gurung respondent belongs to Hindu religion and 59 percent belongs to Buddhist religion. Similarly, among 13 Lama caste group respondents all of them belong to Buddhist religion. Only one respondent from disadvantage caste group belongs to Hindu religion and one respondent from Bista (Thakuri) caste group belong to Buddhist religion. This table reflects a scenario that the entire Lama ethnic group respondent belongs to Buddhist religion. This also point out that the Lama are the latter immigrants in lower Manang, who were influenced by Buddhist religion in Tibet. Despite the lowland Gurung claim them as belonging to Hindu religion while the higher elevations Gurung assume that they belong to Buddhist religion.

Traditional ecological knowledge system is shaped mainly by the dominant religion and common world view practiced in specific topographic region by definite religion group. This states that the construction of lower Manang traditional ecological knowledge system is fusion of knowledge system shaped by religion ecology of both Hinduism and Buddhism. It is said that Buddhism practiced in Tibetan highlands was extremely dominant in lower Manang communities before 18<sup>th</sup> century. Soon after the construction of modern Nepal dwelling in lower Manang were open for other inhabitants of low land Nepal. Especially the mid-hills Gurung from adjoining region of Lamjung district settle down in lower Manang for various purposes. This makes lower Manang communities to incorporate their culture with Hindus.

**Table 6.4** Literacy of respondent based on caste/ethnicity

Category	Caste/Ethnicity				Total
	Gurung	Lama	B.K.	Bista	
Illiterate	12 (35.3%)	2 (15.4%)	0 (.0%)	0 (.0%)	14 (28.0%)
literate	22 (64.7%)	11 (84.6%)	1 (100.0%)	2 (100.0%)	36 (72.0%)
<b>Total</b>	<b>34</b> <b>(100.0%)</b>	<b>13</b> <b>(100.0%)</b>	<b>1</b> <b>(100.0%)</b>	<b>2</b> <b>(100.0%)</b>	<b>50</b> <b>(100.0%)</b>

**Note:** Figures in parenthesis indicate percentage

**Source:** Field Survey, 2009

Table 6.4 clearly illustrates that 72 percent respondents belong to literate category and 28 percent to illiterate category. Based on ethnicity/caste group 35 percent of respondents from Gurung ethnic group belong to illiterate category and 65 percent to literate category. In the same way 15 percent of Lama ethnic group belongs to illiterate category and 85 percent to literate category. This indicates that the literacy of Lama ethnic group is higher than Gurung ethnic group and some of the religiously educated Lama respondent holds a good inspiration of traditional ecological knowledge system. There was only one respondent sampled from disadvantage caste group and that falls under illiterate group. In contrast to this, two respondents from Bista (Thakuri) caste group fall under literate category.

It has been noticed that there is less correlation between the level of education and traditional ecological knowledge system content in an individual. What matter much for traditional ecological knowledge system content in a person is, whether a person maintains his/her livelihood with direct relation to forest/natural resources or not. But obviously many researches have noticed that education compels a person to change their livelihood and hence drive him/her from local practices to professional. Studies had shown that collaborating participatory management process is a prerequisite for a successful transfer of traditional ecological knowledge systems and the concept of sacredness to any bio-physical and forest resources is determined by dominant culture practices in definite community.

## **6.2 Contextual Analysis**

### **6.2.1 Traditional Forest Management Practices**

A major characteristic of traditional forest management systems differentiating it from professional forestry is its institutional setting. The 'rules' of indigenous forest management and professional forestry is based on different norms regarding the role of forest and the organization of management. Traditional communities manage their forest resources by controlling and/or by limiting the access to forest resources in support of traditional law and orders. This is done by transferring the pressure of demand on specific forest stands/patch to other forests stands or by following rotational or periodic harvesting practices.

Most of the communities in lower Manang have imposed a kind of sanctions or punishment to the offenders on behalf of breaking their traditional rules and regulation set forth for the conservation of forest resources. Such penalties might be either economic or social or religious or of all kinds. It is noticed that lower Manang people generally collect forest products usually from lower elevation during winter and from higher elevation throughout summer. This practices helps in reducing concentrated pressure within single forest stand.

### **6.2.2 Resource Harvesting and Distribution Procedure**

Distribution of forest products is a complex phenomenon in itself. In lower Manang different villages have their own way of resource distribution practices. The rules regarding the distribution of forest resources are set forth with the common consensus of household head, in chairmanship of village head and head of local level conservation and management committee. The equity and disparity in resource distribution is examined by village head and head of the traditional institutions. Such institutions also charge an individual in case if committed an offensive activities. At present (after the establishment of conservation area) the conservation area management committee (CAMC) plays significant role on formulating plan and policies for conservation and management of forest resources. CAMC is a VDC level legalized institutions responsible for management of conservation are within concern VDC.

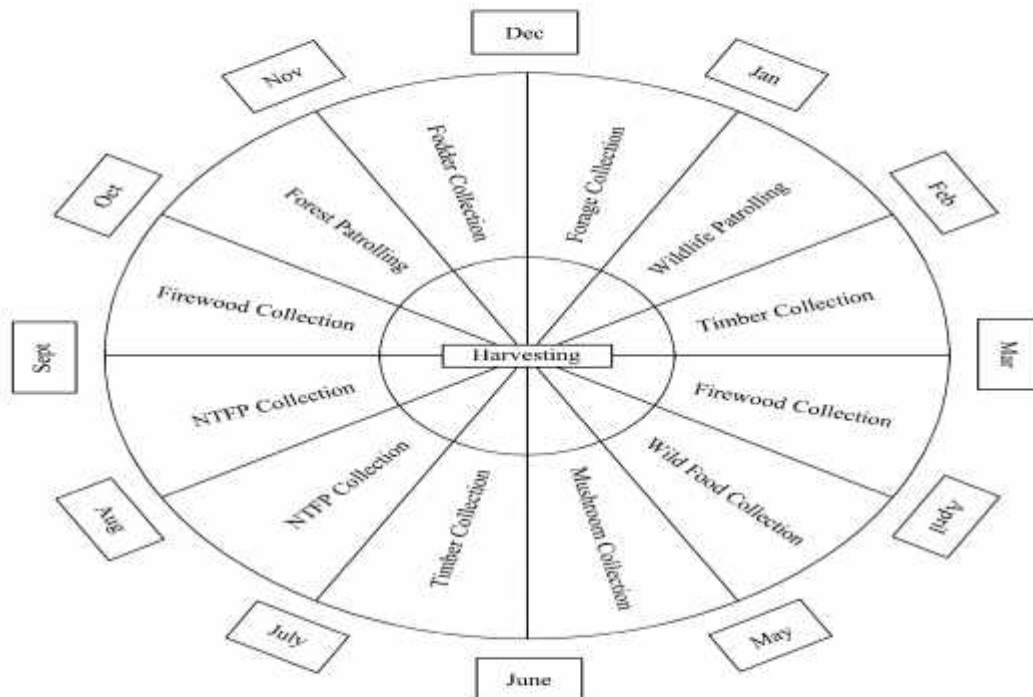
**Table 6.5** Comments on utility of seasonal harvesting calendar

Utilization Basis	Response	
	Frequency (f)	Percentage (%)
On harvesting Non Timber Forest Products	19	38
On harvesting timber and firewood	5	10
On harvesting all kind of forest resources	14	28
Have no define timeframe	4	8
Don't Know	8	16
<b>Total</b>	<b>50</b>	<b>100.00</b>

Table 6.5 clearly demonstrates that 38 percent respondent states that their community strictly follows traditional/seasonal resource harvesting calendar for harvesting various forest products including medicinal and other non-timber forest products. This indicates that these people are more sensitive for management of medicinal and aromatic plants. Ten percent of them said that they follow traditional/seasonal resource harvesting calendar for extraction of timber and firewood from forest. Similarly, 28 percent respondent answers that such practices are extremely in practice for harvesting all short of major and minor forest products. This point out that lower Manang people put less restriction for harvesting major forest products like timber and firewood and more restriction for harvesting minor forest products. Beside this few villages in lower Manang put restriction for access to all kinds of forest products. This specifies that their customary law and belief system has worked significant role for conservation and management of forest/natural resources.

It is recorded that each and every village in lower Manang has their own traditionally managed forest and are divided into different blocks for diverse consumption purposes. They have practiced deep indigenous knowledge systems for the protection and management of culturally and religiously important plant and animal species. The use right is generally restricted for outsiders and locals use forest only after receiving permission from concerned traditional and legal institution. In some villages of lower Manang it is not necessary to take permission from traditional institution for harvesting essential forest resources after the establishment of conservation area (ACA).

### 6.2.3 Seasonal Harvesting Calendar as an Operational Plan



Lower Manang people collect various forest resources on the basis of instruction guided by their seasonal forest resource harvesting calendar. The traditional harvesting calendar is generally an oral schedule put into practice through daily activities of traditional harvesters. The time period for harvesting is usually pre set up, but in some cases it is retuned on the basis of accessibility and abundance of favored forest resources. Lower Manang people collect firewood twice a year once in October and other in March. From November to December they collect dry grass for forage and in February they collect leaf litter to use as organic manure. From between mid July to mid October they collect medicinal plants. Forest resources and wildlife habitat are patrolled twice a year once in February and other in time between October to November. During monsoon people collect shoots of wild bamboo, leaf of wild vegetables and variety of mushroom and savor plants.

## 6.2.4 Pasture or Range Land Management

Indigenous pasture land management systems in lower Manang include various methods like rotational grazing, deferred grazing, carrying capacity estimation and livestock number reduction. Their management system relies on common practices and traditions developed by the resource users of preceding generations. In some cases cultural and religious activities influences more effectively than the system of oral practices for pasture management. The traditional pastureland management practices includes local ways of pasture status inventory, resource allocation, consumption pattern, enforcing operational rule, decision making and conflict resolution.

Concerning grazing of cattle, lower Manang pastoralist follows a common principle such as 'first come, first served'. Grazing land is managed by avoiding grazing on the areas which are previously grazed heavily. Other ways of sustainable pasture management is by keeping a low pressure on pasture through high mobility and dispersion of livestock vertically and horizontally around the pasture area, which is also known as 'trans-humans'. The rule for pasture management is set forth by creating common conscious in presence of the entire pastoralist or their headman. It was reported that the oldest pastoralist usually chair the gathering on making such consensus.

**Table 6.6** Remarks on traditional pasture management system

Management System	N= 50	Frequency (f)	Proportion (p)
Through rotational grazing		40	80.0
By charging grazing tax		14	28.0
By following grazing calendar		10	20.0
I don't know		6	12.0
By controlling the number of herds		20	40.0

**Source:** Field Survey, 2009

Table 6.6 clearly demonstrates that rotational grazing is considered as the most effective understanding of pasture land management practiced by lower Manang people. Besides this they also charge for grazing to non local pasture grazers. Such activities are usually monitored by head among pastoralists.

## 6.2.5 Wild Foods as a Source of Nutrition

In lower Manang there is strong tradition of collecting herbs, shoots, barriers, mushrooms and other naturally occurring wild foods. These items are collected either for traditional medicinal use or for use as food or spices and sometimes for cultural or spiritual uses. Nettle i.e. 'Sisnu' (*Urtica dioica*), is very commonly collected wild food and is used as soups. A number of mushroom species are collected during the monsoon season. Among berries, Seabuckthorn (*Hippophae salicifolia*) is extensively collected, but its role is mostly economic than domestic. This is because it is served as a high value juice for trekkers in the autumn season. Among the spices, 'Jimbu' (*Allium oreoprasum*) and 'Timur' (*Zanthoxylum oxyphyllum*) are collected and used for both domestic and commercial purposes. In some case wild foods are dried and are preserved for off-season. It has been reported that lower Manang people are well known regarding flowering and fruiting time of various wild plants that have been used as food items. These people are equally good on distinguishing toxic and nontoxic wild plants and variety of mushrooms.

**Table 6.7** List of plant species used as wild food

No	Nepali Name	Local Name	Scientific Name	Local Use
1	Ban Alu	Ban Alu	<i>Panax pseudo ginseng</i>	Tonic, boost
2	Jire Neuro	Lauru	<i>Siplazium sp.</i>	Vegetable
3	Jibresag	Todha	<i>Cphioglassum reticulatum</i>	Vegetable
4	Nigalo Tusa	Mato	<i>Arundinaria falcatas</i>	Vegetable
5	Ghue Neuro	Kalauru	<i>Dryopteris cocheata</i>	Vegetable
6	Padamchal	Pangue	<i>Rheum emodi</i>	Pickle, flavor
7	Seabuckthron	Tirchu	<i>Hippophae salicifolia</i>	Juice, vitamin
8	Siltumur	Kuntu	<i>Lindera neessiana</i>	Spice, flavor
9	Bhakur	Tendro	<i>Dioscorea sp.</i>	Vegetable
10	Chalne Sisnu	Polo	<i>Boehmeria platyphylla</i>	Vegetable
11	Jimbu	Jimbu	<i>Allium hypsisitum</i>	Spice, flavor
12	Timur	Seghu	<i>Zanthoxylum armatum</i>	Spice, flavor
13	Kukur Tarul	Nagueteme	<i>Dioscorea sp.</i>	Vegetable

**Source:** Field Survey, 2009

### 6.2.6 Belief Systems as a Tool of Silvicultural Operation

It is universal phenomenon that traditional ecological knowledge system does not function in isolation. Such knowledge system is often embedded in cultural practices and is imposed by local institutions. Taboos and other regulations are considered as critical social mechanism for forest resource management that helps on balancing ecosystems. The ecological experience of local antecedent with their bio-physical environment led them to develop local institutions and regulations. Such institutions and regulation plays a significant role for sustainable management of forest resources in lower Manang.

Forest resources in lower Manang have been conventionally managed by traditional village council. At present the legislative subordinate body responsible for conservation and management of forest resources at VDC level in Manang is Conservation Area Management Committee (CAMC). Traditional institutions design for forest conservation includes representatives from village head, local conservationist, spiritual and political leaders. Traditional institution plays a major role in maintaining sacred and spiritual forests, which helps in sustaining forest/natural resources and environment.

**Table 6.8** Diverse form of belief systems in practice

<b>Belief Systems</b>	<b>Values in Action</b>	<b>Implication</b>
Taboos / Prohibition	Vegetation in sacred groves and landscape is not cut down.	Enhance conservation.
Spiritual esteem	Big, old and tress having buttress is not cut down.	Protect seed sources.
Common belief	Tree species of religious, spiritual and cultural imperative is protected and worshiped.	Ensure sustainability of natural resources.
Totemic connectivity	Totemic connectivity is link up to specific plant/animal species by specific clan/tribe group.	Assist in conservation of desired species.
Spiritual connectivity	A concept of connection of every element to other is implemented.	Create awareness for conservation.
Religious sanction	Concept of sin and virtue stimulate people for protection of forest/natural resources.	Enforce conservation of natural resources.

**Source:** Field Survey, 2009

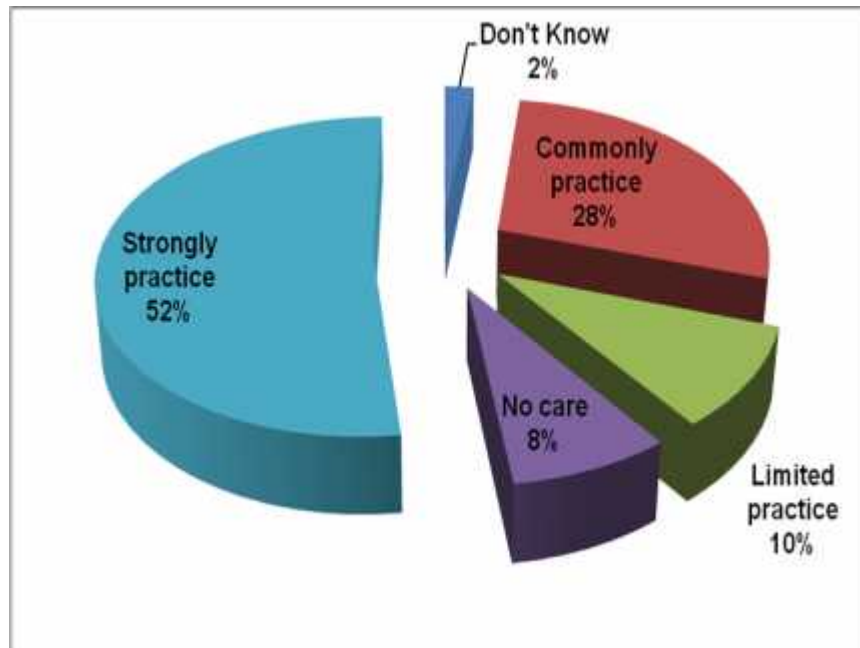


From table 6.8 it is clear that diverse form of belief systems works together for protection of forest resources. Such belief systems represent the summation of millennia of ecological adaptation of human groups to their local bio-physical environment. It is worth mentioning that the perspectives and belief systems of lower Manang communities towards forest management and conservation is similar in several respects to 'system theory' of modern ecological postulation. Many respondents of religious occupational group respond that they have five main belief systems which work as a guiding principle for sustainable management of forest resources in their vicinity. The belief systems practiced in lower Manang is based on following doctrine.

- ) Everything in this world is sacred and has a spiritual dimension.
- ) All living and non-living things are interrelated and effect each other.
- ) Earth is like a mother and it should be respected, thanked and cared.
- ) People should act in ways that maintain the balance of the eco-system.
- ) If natural resources are over harvested it will be evaporated forever.

A keystone species locally is a dominant predator whose removal allows a prey population to explode and often decreases overall biodiversity. If the removal of a single species causes major changes to the structure, function or diversity of a community then such species are known as keystone species to that community. Cultural keystone species are those species which serve in different ways, i.e. as a staple food or have important ceremonial or spiritual roles. Most of such sacred species basically functions as a principle agent in maintaining ecosystems. Uttis (*Alnus nepalensis*), Bhojpatra (*Betula utilis*), Dhupi (*Juniperus indica*, *J. recurva*), Lauthsalla (*Taxus baccata wallichiana*) and Sunpati (*Rhododendron anthropogon*) are some of most prominent cultural keystone species with significant ecological and cultural values in lower Manang. This all concludes that traditional ecological knowledge system is important not just for its own sake but also for its potentiality of serving in designing/planning effective conservation strategies for sustainable management of forest resources and restoration of ecological systems.

**Figure 6.2** Perception on religious forest management practices

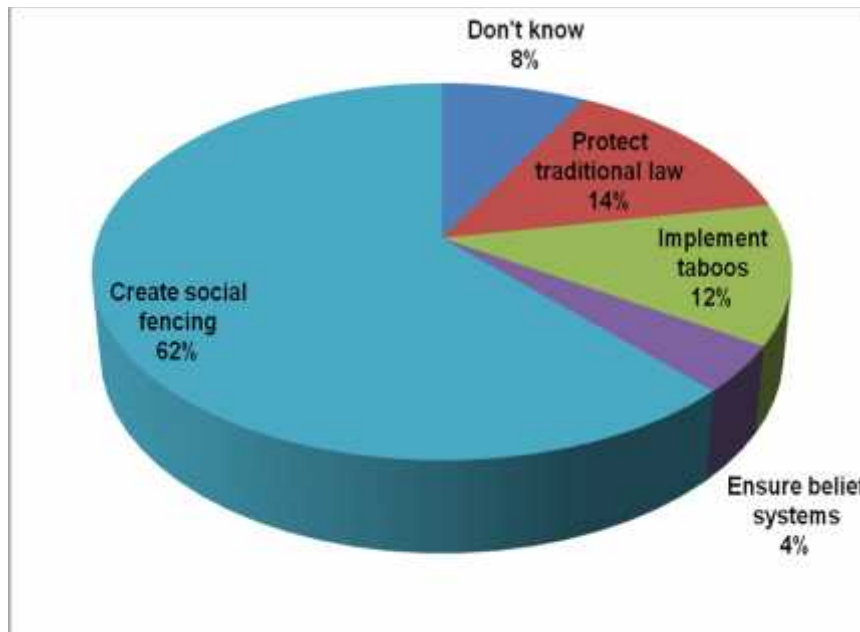


**Source:** Field Survey, 2009

Figure 6.2 clearly illustrates that 52 percent of respondents answered that they strongly practice the consciousness for protection of forest resources by considering sacredness to major plant/animal species. Twenty-eight percent respondents said that such performances are commonly practiced in their communities. Similarly 10 percent respondent answered that protecting forest with religious sentiments is rarely in practices in their communities. Despite, 8 percent respondents answer that they don't care on managing forest/natural resources by means of taking into consideration of its cultural and religious sacredness. One respondent i.e. 2 percent did not answer to this question.

The data mention above clearly highlights that the fundamental region for conservation of forest resources in lower Manang is its spiritual and religious connectivity, provided to specific plant/animal species. It is noticed that lower Manang people's cultural, religious and spiritual connectivity are directly linked in the midst of ensuring sustainable management and conservation of forest resources. Beside this a number of 'rules of thumb' developed by ancient resource managers and imposed in support of social norms and values has been playing implicative role for conservation of forest resources.

**Figure 6.3** Attitude on role of religion in forest management



**Source:** Field Survey, 2009

Figure 6.3 clearly demonstrate that 62 percent respondents advocate that the religion and religious faith works as a social fencing for protection of forest resources. Similarly 14 percent respondents state that religion helps in protection of traditional norms, values and practices pursued by an individual in daily activities. This helps in reminding an individual for what to do and what not. Twelve percent respondents gave emphasis on the argument that it is because of the religion that a person practices taboos and totem regarding forest resource management. Four percent respondents replied that religion helps in ensuring belief systems in a community and on an individual, which helps on protecting religious plant/animal species. Despite the consequences eight percent respondent fell hesitate to answer on this subject matter.

This concludes that lower Manang people provide justice for their religion and belief systems in contributing major role for sustainable management of forest resources in their communities. It has been noticed that these people have a common sense that it is necessary to keep 'back-up forest resources' when stock are low. This helps in maintaining species populations close to ecological carrying capacity, which is culturally constructed, mediated and is added as a flavor for conservation and protection of natural resources.

### **6.3 Perception on Nature and Structure of 'TEK'**

Traditional ecological knowledge generally provides a long term perspectives on ecosystem dynamics, based on ancestral knowledge and interaction with specific habitats. Such knowledge also assists in analysis and monitoring of long term ecological changes. Generally, traditional ecological knowledge is developed in the local environment, and is predominantly adapted to the requirements of local people and conditions. Knowledge held and generated within 'traditional' societies can be both new as well as old. Consequently, when traditional ecological knowledge is handed down from one generation to another it is modified in several ways and each generation keeps on adding part to the stock of knowledge. Hence it is usually a mistake to, think indigenous knowledge as 'old-fashioned', 'backwards', 'static' or 'unchanging'. Rather traditional ecological knowledge system should be considered as 'fossilized' and dynamic knowledge that fit well in non-commercial societies.

The local people of lower Manang manage their forest resources often by collective decisions among local peoples who operate under a common property arrangement. Cultural groups have implemented a series of rules or social norms, constituting institutions to govern and manage forest/natural resources. The traditional institutions liable for resource management systems allow harvesters to coordinate activities, cooperate in tasks and devise rules for social restraint. Traditional institutions in the sense of 'rules-in-use' provide abundant chances of orientation to the harvesters about harvesting resources.

Lower Manang people give importance to both knowledge system and institutional mechanism for sustainable utilization of traditional knowledge systems in their localities. In terms of livelihood strategies indigenous people of lower Manang have a common belief, which is stated as 'not putting all dietary eggs in one basket in a time'. It is a dialect that highlights for the sustainable utilization of forest resources. Such belief systems are based on the traditional principles of sustainability and contribute for sustainable management practices. In fact their knowledge systems are characteristically an attribute of societies with historical continuity in resource use practices.

**Table 6.9** Remarks on 'TEK' based on religion of respondent

Religion	Perception Category Level					Total
	Knowledge on species behavior	Traditional forest practices	Knowledge on climate	Knowledge of landscape	Don't know	
Hindu	3 (6%)	3 (6%)	6 (12%)	2 (4%)	3 (6%)	<b>17 (34%)</b>
Buddhist	5 (10%)	6 (12%)	10 (20%)	5 (10%)	7 (14%)	<b>33 (66%)</b>
Total	<b>8 (16%)</b>	<b>9 (18%)</b>	<b>16 (32%)</b>	<b>7 (14%)</b>	<b>10 (20%)</b>	<b>50 (100%)</b>

**Note:** Figures in parenthesis indicate percentage

**Source:** Field Survey, 2009

It is noted that most of the respondent were unable to answer what traditional ecological knowledge exactly mean to them. This is because of deficit of clear and precise leveling of traditional ecological knowledge systems. However, table 6.9 reflects that respondents conceptualize traditional ecological knowledge systems in five different statement levels, which in a way appear near to the unit meaning of traditional ecological knowledge system. Sixteen percent of respondents answered that traditional ecological knowledge means the knowledge on behavior of various plant and animal species. Thirty-two percent states that traditional ecological knowledge is the knowledge of local climatic circumstances. In the same way 18 percent respondent stated that traditional ecological knowledge is knowledge on traditional/indigenous forest management practices. Fourteen percent replied that 'TEK' is deliberate observation of landscape and its complex whole. Twenty percent respondent did not answer on this subject considering its ambiguity nature.

Analyzing respondent's statement based on their religion, it is recorded that 12 percent of respondent from Hindu religion group answered that traditional ecological knowledge system is the deliberate observation of forest resources and climatic conditions at local level. In the same way 20 percent respondents from Buddhist religion group show their accountancy with same statement. The people of lower Manang are familiar with large number of plants/animal species and their ecology, reproductive behavior and habitat preference.

**Table 6.10** Remarks on ambiguity nature of 'TEK'

Response on Ambiguity Nature of 'TEK'				Total
Level of Recognition	Age class of the respondents			
	20-30	31-50	51+	
Agree	6 (86%)	20 (67%)	6 (46%)	<b>32 (64%)</b>
Disagree	1 (14%)	2 (6%)	4 (31%)	<b>7 (14%)</b>
Neutral	0 (.0%)	8 (27%)	3 (23%)	<b>11 (22.0%)</b>
<b>Total</b>	<b>7 (100.0%)</b>	<b>30 (100.0%)</b>	<b>13 (100.0%)</b>	<b>50 (100.0%)</b>

**Note:** Figures in parenthesis indicate percentage

**Source:** Field Survey, 2009

Despite its wide uses traditional ecological knowledge system is often considered as unclear, confusing and abstract type of knowledge systems. The nonfigurative aspect of traditional ecological knowledge system reveals most biologist, ecologist and conservationist for its implication in planning and monitoring of any conservation program. Table 6.10 shows diversified views of respondent on question to the ambiguity nature of traditional ecological knowledge systems. A large number of respondents i.e. 64 percent showed their accountancy into ambiguity nature of traditional ecological knowledge systems. Fourteen percent of respondent refutes to this statement and answered that such knowledge systems are not absolutely complex. Large number of respondent i.e.22 percent stays neutral on answering this matter.

From above data, we come to know that, understanding the nature of traditional ecological knowledge system is a complicated task. It is noticeable that only the expert can go into wider applications of traditional ecological knowledge systems and its implicative role into forest resource management and entire biodiversity conservation. The emic behavior and thinking of an indigenous people are quite irrelevant to etic behavior and thinking of outside investigator or researcher. Traditional ecological knowledge systems thus can be defined as a more or less integrated system of knowledge, practice and beliefs complex, which is hidden in daily practices of indigenous harvesters.

**Table 6.11** Perception on traditional forest management system

Ethnicity	Category of Statements					Total
	Manage forest on natural stage	Forest protection method of ancestors	Manage forest for livelihood strategies	Manage forest by traditional institutions	Don't know	
Gurung	3 (42.9%)	11 (68.8%)	7 (77.8%)	8 (66.7%)	5 (83.3%)	<b>34 (68.0%)</b>
Lama	2 (28.6%)	5 (31.3%)	2 (22.2%)	3 (25.0%)	1 (16.7%)	<b>13 (26.0%)</b>
B.K	1 (14.3%)	0 (.0%)	0 (.0%)	0 (.0%)	0 (.0%)	<b>1 (2.0%)</b>
Bista	1 (14.3%)	0 (.0%)	0 (.0%)	1 (8.3%)	0 (.0%)	<b>2 (4.0%)</b>
<b>Total</b>	<b>7 (14.0%)</b>	<b>16 (32.0%)</b>	<b>9 (18.0%)</b>	<b>12 (24.0%)</b>	<b>6 (12.0%)</b>	<b>50 (100.0%)</b>

**Note:** Figures in parenthesis indicate percentage

**Source:** Field Survey, 2009

Table 6.11 clearly illustrate that respondent from different caste group conceptualize traditional forest management system differently. Fourteen percent respondent answered that by traditional forest management system they mean to manage their forest resources on pure natural stage without applying any silvicultural operation. Thirty-two percent respondent replies that traditional forest management system is the system of forest management procedure applied by their ancestors. Eighteen percent of respondent said that traditional forest management system means managing forest only for sustaining local livelihood without imposing any economic intervention.

In the same way twenty-two percent of respondents replied that it is the system of managing forest resources through indigenous institutions. Twelve percent respondent did not answer on this matter. From this we can derive a common understanding that people of lower Manang conceptualize traditional forest management systems differently and has utilize their knowledge to promote sustainable use of forest and other biological resources. In short we can conclude managing forest/natural a resource applying traditional method is basis of livelihood earning strategies for indigenous/traditional communities.

## **6.4 Exchange of Traditional Ecological Knowledge**

### **6.4.1 Communication and Exchange of Knowledge**

The exchange of knowledge system is important for continuous existence of traditional ecological knowledge. In general diffusion of traditional ecological knowledge system is important both for knowledge handover process and for its extension. Traditional ecological knowledge system is carried out in daily activities of an individual, and such habitual ways of doing thing gradually become the customary way and traditional practices of local people. Cultural transmission is a process of social dissemination in which cosmological beliefs and the technological knowledge are communicated and acquired. On the basis of formality, the exchange of traditional ecological knowledge system can be categorized into two forms, i.e. formal mode and information mode of transformation. On the basis of level of transmission, it can be classified into vertical mode and horizontal mode of transmission.

#### **Formal transmission**

In lower Manang formal mode of transformation of traditional ecological knowledge system is very weak. This is basically performed among social groups, connecting older generation (teacher) to younger generation (student). Transmission of knowledge systems helps on imparting specific knowledge on species identification, skill to use particular tools, rules and punishment regarding resources utilization. The knowledge transmission process is also determined by factors like age, gender and skill of learners.

#### **Informal transmission**

This type of transmission includes observation or replication of methods of resource harvesting techniques used by elders. A teacher (diffuser) in this type of transmission is typically mother and/or father of a learner. Informal mode of transmission of traditional ecological knowledge systems is generally occupied by cultural mechanism of transmission, which includes ceremonies, rituals and practice. The principal agent in informal transmission of knowledge is direct observation and trial and error process of daily livelihood practices.



### **Vertical mode of transmission**

This is a mode of transmission that takes between member of two succeeding generation. First, there takes place about familiarization of knowledge systems by instructor and later observation by the learner, which established as knowledge systems by putting knowledge into practice. The most common actors based in vertical transmission are teacher (donor) to student (user) and parents to offspring. This type of knowledge transmission is nearly eroded.

### **Horizontal mode of transmission**

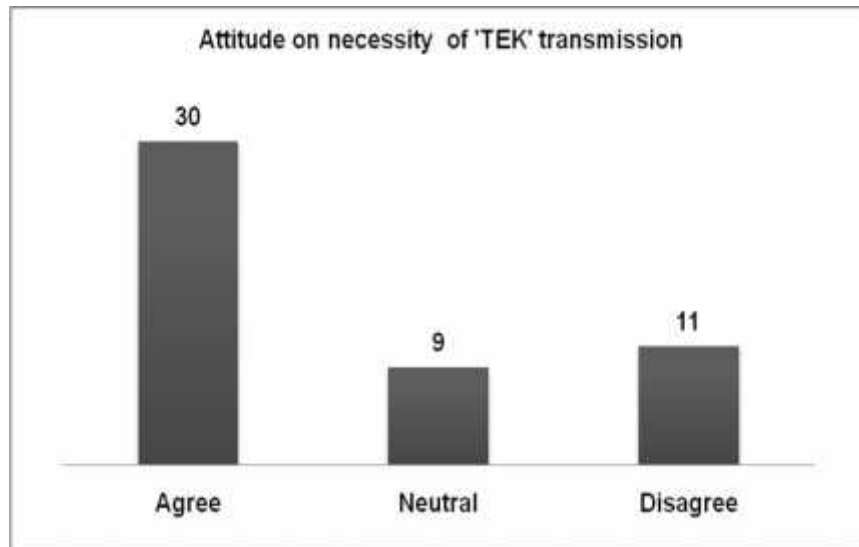
This denotes to transmission of knowledge systems within peer group or within siblings. In case of lower Manang such type of transmission is practiced generally during the time of daily activities such as gathering in forest for various activities like, herding, collecting fuel wood or harvesting wild foods. This short of transmission usually takes place between the chores of youth.

**Table 6.12** Remark on transmission mechanism of 'TEK'

<b>Means of Transmission</b>	<b>N= 50</b>	<b>Frequency (f)</b>	<b>Proportion (p)</b>
Listening from village elders		14	28.0
Learn through repetition		35	70.0
Through indigenous institution		11	22.0
From family member		15	30.0
I don't know		13	26.0

Table 6.12 shows that the most effective way for learning traditional ecological knowledge system in lower Manang is 'learning through repetition' i.e. 'learning by doing'. Other mechanism of transmission includes learning from parents (vertical transmission) and from siblings (horizontal transmission). Similarly, the means of transmission includes, through traditional institutions (formal transmission) and commencing through village elders (informal transmission). Transmission of knowledge system occurs between individuals of different generations within genealogy and between individuals of the same generation. Transmission process of traditional ecological knowledge system is an abstract procedure and is usually remain dormant during transmission.

**Figure 6.4** Opinion on necessity of 'TEK' transmission



**Source:** Field Survey, 200

Figure 6.4 clearly illustrates that 60 percent respondents answered that it is most essential to transfer traditional ecological knowledge system from one to another generation in favor of sustainable management of forest resources in their communities. Twenty-two percent of respondents refute with this statement. Eighteen respondents stay neutral in this matter. This study also uncovers that most of the respondent from (21-30) age group answer disagreement to the necessity of transmission of traditional ecological knowledge system. This states that young generation is quite inactive in movement towards reactivation of traditional ecological knowledge system.

Despite this fact, some of the youth from Pisang VDC has been playing active role for management of forest resources at local level. This achievement was grown up by reactivation of traditional institutions and knowledge systems in their community. Awareness on importance traditional culture for tourism promotion is another supporting factor enriching such activities. The most sensible reason for enhancing community consciousness in Pisang village is the maintenance of homogenous community structure, which creates consistency for legal action. These people consider that protection of traditional ecological knowledge systems require appropriate social institutions, which traditionally enforces social norms and value systems.

#### 6.4.2 Factors Affecting Transmission of 'TEK'

A number of socio-economic, cultural, ecological and historical factors are considered important in affecting transmission of traditional ecological knowledge. This study shows that in case of lower Manang lack of adequate time for orientation of children to traditional knowledge systems is a prominent factor reducing transmission of traditional ecological knowledge. This vacuum is created due to migration of children to far away from their residences for better schooling and other facilities. Engagement of adult members in other cash-driven economic activities and disrespect towards indigenous life ways and traditional institutions by young generation are other factors weakening transmission mechanism of traditional ecological knowledge systems.

**Table 6.13** Comment on attrition of 'TEK' system

Influencing Factors	N= 50	Frequency (f)	Proportion (p)
Education/awareness		13	26.0
Modern lifestyle		45	90.0
Migration/Resettlement		36	72.0
Innovation of alternative technology		10	20.0
Socio-economic change		27	54.0

Table 6.13 clearly stress that the vital factor responsible for erosion of traditional ecological knowledge system in case of lower Manang is modern (sedentary) lifestyle. The other prominent factor responsible for reducing transmission mechanism of traditional ecological knowledge systems is migration of local people to cities and immigration of non-indigenous people from adjoining districts to their homeland. The overall socio-economic change brought about by changing factors like modernization, urbanization and westernization hence reinforce together for 'erosion of traditional ecological knowledge systems. Globalization and modernization has liberated indigenous/traditional people from their local ecosystems to other locality. The innovation of alternative energy as a replacement for green energy is other factor responsible for weakening traditional ecological knowledge systems.

## 6.5 Chapter Summary

The local people of lower Manang are quite optimistic on preserving and reviving traditional forest in their localities. They are equally interested in the identification and documentation of such knowledge systems. This study concludes that their knowledge transmission process has been nearly eroded. This rate is increased by negative impact of various social, economic and cultural changes. This study points out that the plant knowledge is well preserved in those communities which has not undergone into a special commercial lifestyle. It has been recorded that the respondent from the villages far away from the tourist trail bears good level of 'TEK' systems. This might be because of less influences of changing factors in those communities.

Despite its fundamental significance the most recognized problem in applying traditional ecological knowledge systems in forest resource management is lack of a detailed and systematic management plan. Managing forest resources by applying such knowledge systems is limited only to enforcing sanctions, taboos and seasonal regulatory mechanism. From the technical point of view traditional forest management systems does not poses a distinct silvicultural operation. Thus there always lacks objectives of achieving certain biophysical goals in managing forest resources. This might be a concern for the protection and production of some desirable plant species and forest type.

The root barrier of traditional ecological knowledge systems in epistemological setting is its difficulty and intricacy on translating and addressing such knowledge systems with specific lines/shapes on maps or codifying it by number in tables. This all consider traditional ecological knowledge systems as problematic and deceptive knowledge systems. The traditional forest management system also lacks distinguishes silvicultural operations (practices) like pruning, thinning, cultural operation or removal of dying, dead and diseased trees. The major intension where traditional ecological knowledge systems are applied is ecological and social forestry rather than economic forestry. Despite the fact the relationship between traditional ecological knowledge and biodiversity conservation is mostly taken positive.

## **CHAPTER- VII**

### **SUMMARY FINDINGS AND CONCLUSIONS**

#### **7.1 Summary**

Anthropologists (social scientists) commonly indicate traditional ecological knowledge (TEK) by the terms like 'adaptively acquired knowledge', 'socially constructed knowledge' and 'sustainable knowledge'. Indigenous knowledge and traditional ecological knowledge is generally distinguished by the length of time consumed for shaping its arrangement and implications. The chronological differences between indigenous knowledge and traditional ecological knowledge is 'decades to centuries' versus 'millennia'. Ecological anthropologist in many cases has provided evidence that, what indigenous people do to their ecology (landscape) depends on what they think about themselves in relation to bio-physical environment.

Although a portion of traditional ecological knowledge system has been collected by ethno-botanist, biologist, human ecologist, anthropologist and geographer, who are interested in the ecological issues, only few of such knowledge systems documented and published yet due to the obligate limit regarding theoretical and conceptual framework in this field. It has been proved that traditional ecological knowledge has a wider application at local level forest conservation than general ecological theories, vegetation science or conservation biology. 'TEK' offers new biological knowledge and ecological insight that provides models for sustainable management of forest resources.

The local people are more familiar with a given area and the species in it, than outsiders. Their ecological knowledge system is likely based on a longer time series of observation and broader contextual understanding of the local environment. Forest management concerns the process of making and implementing decisions about use and maintenance of forest resources in order to meet forest related desires of human societies. Traditional ecological knowledge systems motives to forest resources management focuses not only on biological and technical feature but also in institutional arrangements.

The term “tradition” used in describing traditional ecological knowledge system does not imply that this knowledge system is old or unethical in nature, but is “tradition-based”. It is “traditional” because it is created in a manner that reflects the tradition of the communities, therefore not relating to the nature of the knowledge itself, but to the way in which that knowledge is created, preserved and disseminated. ‘TEK’ is not disseminated quickly and it requires a certain amount of trust to get into it. This often causes possible methodological problems in capturing such types of knowledge system.

Traditional forest knowledge is an integral component and is based on long historical experience and deep insight into the dynamic of forest ecosystems and the behavior and characteristics of animal and plant species that are of special economic, social, cultural and spiritual significance to communities. ‘TEK’ thus is a combination of indigenous practices and techniques, locally adopted and distinctive to a community and has long been known to its important implicative role for sustainable management of forest resources.

Indigenous ecological knowledge provides the basis for problem-solving strategies for local communities, especially for rural subsistence livelihood based peoples. Adopting indigenous forest practices to development issues can help in improving the impact and ensure sustainable development goal. Traditional ecological and technical knowledge is rooted in the past and intricately connected to the culture and values of a community in the present. As culture is dynamic the traditional ecological and technical knowledge system evolves over time and encompasses the innovative technology.

One of the causes to failure of mainstream sustainable forest management is due to the lack of attention given for addressing the importance of traditional ecological knowledge systems to policies designed for forest management. It is most essential to incorporate traditional ecological knowledge systems into scientific forest management systems. In case of lower Manang it has been noticed that in comparison to laws, directives, regulation and by-laws regarding forest resource management, some taboos are more easily accepted by local people. Taboos thus plays positive role on protecting natural resources and contribute much on maintaining ecological balance.

This study is based on cultural component of forest resource management and focused much on the significance of traditional ecological knowledge systems for sustainable management of forest resources in lower Manang. Being purely an academic research it attempts to explore the role of traditional ecological knowledge system in sustainable forest management, rather than on the construction mechanism of such type of knowledge systems. Research tools like, field observation, interview schedule, focus group discussion, transects walk and key informants interview were used for this study.

The data gathered through primary sources for this study is thus qualitative in nature. Quantitative data is collected through secondary sources like previous study report on concerned topic and from National Census Report, 2001. This is an exploratory as well as descriptive research hence the data collected have been analyzed both qualitatively as well as quantitatively. This study has made use of ecological anthropological, human ecological and other social science approaches to explore the research question. The pictorial data and various types of field maps are presented for reflecting ground reality.

The lower Manang agrarian people have symbiotic relation with their forest resources and cannot separate their daily livelihood from using forest/natural resources. This study identified more than 86 types of different plant species, traditionally used by local people for various purposes. These people are equally knowledgeable and skillful in gathering wild food and medicinal plants. They possess a sound knowledge of habitat and ecology of different plant and animal species. It has been pointed out that almost all of the households are involved in collecting major or minor forest products in one way or other.

Indigenous organization and conservation area management committee (CAMC) hand in hand controls access to forest resources in lower Manang. Each village in lower Manang has their own forests resources and the invented boundary is put into practice for distinguishing claim over boundary. The occasional boundary disputes of this forest land are decided by the common consensus among the community members. The lower Manang people has a common feeling that their knowledge systems are being lost due to various factors like, poverty, immigration and rampant population growth.

## 7.2 Key Findings

Over many generations indigenous people of lower Manang have developed a holistic traditional ecological knowledge system of their lands, forest and environment. They have been practicing such knowledge system through local institution by enforcing traditional law and taboo system. They have also an emotional and spiritual relationship with their nature and natural resources and in a way perceive mountains, land and rivers all having spiritual essence.

The lower Manang people's beliefs are centered on the concept of sacred species, sacred groves, and sacred landscape. This plays an important role for sustainable management and conservation of forest/natural resources.

Lower Manang communities have their own traditional forest zoning system, method of management, protection and utilization systems, code of conduct and beliefs systems that contribute for management of forest resources.

The extent of utilization of traditional ecological knowledge system is very limited in case of lower Manang. However this research documented few contemporary forest management practices which are playing significant role for conservation and management of forest resources in lower Manang.

Indigenous institution in lower Manang falls into five categories, which are social, religious, political, judicial and economic. This institution directly or indirectly plays role for sustainable management of forest/natural resources.

In lower Manang forest management is maintained by collective choice decisions of local people who operate under a common property arrangement. Cultural groups have implemented a series of rules (customary law) or social norms, for sustainable management of forest resources.

Different groups conceptualize 'TEK' differently. However there are some areas of overlap, for example the entire respondent explains that traditional ecological knowledge is constructed in the process of local people's adaptation with nature. This study indicates that traditional ecological knowledge system in lower Manang is embedded in the local people's cultural practices of forest resource exploitation and their spiritual belief systems.



The major factors that contribute to erosion of traditional ecological knowledge systems are modernization and downbeat attitudes towards local institutions. Besides this a wide range of individual, cultural, biophysical and societal factors have been attributed to erosion of traditional ecological knowledge.

Traditional ecological knowledge is likely to be specialized by gender, age and personal experiences. In lower Manang female are comparatively excellent on ethno-botanical knowledge systems than their male partner. This is because of spending more time by females for harvesting various forest resources.

One of the most responsible factors for the transmission of traditional ecological knowledge is that knowledge holders usually teach only their family members. This study examine that vertical mode of transmission of traditional ecological knowledge systems in lower Manang has been severely eroded.

In lower Manang traditional ecological knowledge system associated with wild edible and medicinal plants seems to live and is effectively handing over down. This points out that the only one way of protecting and conserving such knowledge system is its continuous use and 'learning by doing or repetition'.

The rate of transmission of traditional ecological knowledge in lower Manang is very negligible. The vertical and formal modes of transmission have been nearly eroded. Similarly cultural transmission has gradually been omitted.

Lower Manang people have been managing their forest resources in support of spiritual, religious and socio-cultural beliefs systems which play a vital role for in-situ conservation and management of forest resources. Sacred forest in lower Manang can be divided into spirits forest and religious forest. Spirit forest is further divided into ghost forest and worship forest. Worship forest in the form of oral history is linked with dwellings of various god and goddess.

Traditional ecological knowledge is embedded in the daily activities of local harvesters. Incorporating traditional ecological knowledge system and scientific ecological knowledge system may produce new type of knowledge systems that could be practically applicable for sustainable management of forest resources and for overall biodiversity conservation/preservation.

Including traditional ecological knowledge into the main stream curriculum provides locally relevant ways of learning about the local environment, plants, animals, and geography. This will provides new generation a kind of promise for conserving, managing and protecting common property resources.

Traditional ecological knowledge system could be used as a source of primary data information system on conducting academic research in the arena of discipline like human ecology, anthropology, geography and to other ethno-sciences like ethnobotany, ethnozoology, ethnoveterinary, ethnoforestry etc.

Traditional ecological knowledge system is more likely to be successful for community based natural resources management system, which emphasis more on bottom-up development approach. Traditional ecological knowledge system is more applicable if the forest management objectives are motives with ecological and communal application rather than commercial application.

### **7.3 Anthropological Recommendation**

Traditional ecological knowledge is not a 'black box' that embraces everything within itself. This knowledge works only, if it is applied with socio-cultural process. The bottom-up development approach fits the nature of 'TEK'.

Equity in benefits distribution is one of the important mechanisms for any community based natural resources management approach. Such activities help on establishing democratic arrangement within institutional process.

It is important to preserve and reactivate cultural resources, since cultural resources and natural resources are linked to each other. This provides a favorable environment for survival of traditional ecological knowledge system.

Concern agencies need to enforce laws provided by legislation mention on trade related aspects of intellectual property rights (TRIPs). This protects traditional ecological knowledge (TEK) systems from being bio-piracy.

It is important to conserve cultural heritage, since cultural conservation and biodiversity conservation goes hand in hand. Cultural conservation works as a backup for endurance of traditional ecological knowledge systems.

## 7.4 Conclusion

Ethnoecology is the discipline that concerns much on how people understand the relationship between humans, animals, plants and physical elements of a local environment. Ethnoecology encompasses a study that describes local people's interaction with the natural environment. Traditional ecological knowledge system is sum knowledge of spiritual, religious, sacred and cultural values provided to forest resource that passed down from generation to generation. The tradition of associating trees with gods and deities can play significant role for sustainable management of forest/natural resources.

Indigenous peoples and their communities have a vital role in environmental management. This is because of the application of their huge ethno-ecological knowledge systems and traditional forest management practices. The growing importance attached to traditional ecological knowledge systems and concern on preserving cultural and biological diversity have raised policy, ethical and legal questions at the national, regional and international levels. The international dimension of this discussion has brought about clarity in the terminological use to represent traditional knowledge systems. It further helps in the development of policy about registration of such knowledge systems.

It is not true that traditional ecological knowledge systems include all aspect of indigenous knowledge system. Traditional ecological knowledge systems is concerned only with the ecological information including spirituality, values, normative rules and cultural practices regarding common property resource management. Local or indigenous people have a deep level of traditional ecological knowledge system, which is developed on adaptation to their bio-physical environment. Taboo, one of the most disputed and complex socio-cultural phenomenon is a central configuration of traditional ecological knowledge systems. It is not necessary for people to get forbidden for resource use. What considers much is the procedure and prerequisites that an individual or communities has to go under before harvesting forest resources. This helps on bringing sustainability in management of forest resources. Thus a resource in a way is taken as a part of cultural component.

Implication in itself is a broad term, which indicates to the hidden role played by an object or subject or a phenomenon. Traditional ecological knowledge is an abstract knowledge, often known as living knowledge. Thus it is very important to know the implication process of such knowledge systems into forest/natural resources management practices. Studies have shown that tremendous ethno-ecological information is stored in the minds and culture of indigenous peoples, which has played a significant role for sustainable management of forest resources. Despite, measuring the magnitude and volume of traditional ecological knowledge systems is a challenging task.

Local people are the key agents who are directly responsible for management and sustainable utilization of common property resources. The paradigm shift concept in the arena of sustainable development has found indigenous ecological knowledge very efficient for managing rural forest resources. Many field research conducted by anthropologist and geographer to improve, understand and documentations of traditional ecological knowledge systems have identified the strength and significance of such knowledge systems in biodiversity conservation. It is mentioned that unlike modern ecological principle indigenous resource management systems consider manifold prescription such as when, how much and in what way to exploits resource.

The socio-economic and other rival changes in lower Manang have restricted the chances of interactions between children and their elder at local level. It is very urgent to address this gap in order to reconnect children with elders and local level institutions. It has been proved that where there is high level of socio-economic diversification and personal mobility, higher is the risk for erosion of 'TEK' systems. More importantly, compared to laws, rules or legislations, some taboos are more easily accepted by native people of rural areas. A view of nature involving a web of relationship is significant from conservation point of view. Briefly we can conclude that demographic, cultural, technological, economic and governance factors are directly or indirectly responsible for erosion of traditional ecological knowledge systems in lower Manang. It is realized at international level that a nation should recognize and therefore supports local people's identity, culture and interests.

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# APPENDIX- 1

## Research Tools for Primary Data Collection

### Interview Schedule- 2066

Name of Surveyor: .....

Date: .....

#### Basic Information:

Name of Respondent: .....

Age: ..... Sex: .....

V.D.C: ..... Ward No: .....

Village: .....

Religion: a) Hinduism b) Buddhism c) Secular

Literacy: a) Illiterate b) Literate c) Other (specify)

Education: a) Under S.L.C b) Intermediate c) Bachelor and above

#### Occupation:

- a) Agriculture b) Hotel business c) Spiritual work  
d) Official work e) Daily wage work

#### A) Introductory Question

Q.No: A-1

From what forest type do you collect various types of forest products?

S.N	Forest Type	Timber	Firewood	Fodder	NTFP	Litter
1.	Community forest					
2.	Private forest					
3.	National forest					
4.	Religious forest					
5.	Plantation forest					

**Q.No: A-2**

What is your comment regarding participation of local people for conservation and management of forest resource in your communities?

.....

**Q.No: A-3**

Put your comments regarding management of forest resources through indigenous institution by applying traditional forest management systems?

.....

**Q.No: A-4**

What short of institution implement and monitor the relevance of traditional law and order regarding forest resource management in your village?

.....

**Q.No: A-4.1**

What kind of punishment does an individual has to go under if he/she breaks the customary law and order set forth for protection and utilization of forest resources?

.....

**Q.No: A-5**

Put your opinion regarding the implementation of following silvicultural practices on the basis of forest management practices adopted in your village?

S.N	Management Procedures	Code
1.	Planting tree on barren land	
2.	Collect forest product only from given site	
3.	Harvest plant species on the basis of its life cycle	
4.	Protect trees in the name of spiritual or religious forest	
5.	Remove unwanted trees through silvicultural operation	
6.	Collect forest resources on the rotational basis	
7.	Manage forest in accordance to operational plan	

**Code:**

1= Yes we do      2= No we don't      3= Yes, but to limited      4= Very common

**B) Traditional Forest Knowledge (TFK)**

**Q.No: B-1**

What do you understand by traditional forest management system? How has such knowledge systems applied for protection of your forest?

.....  
.....

**Q.No: B-1.1**

In what way does traditional/indigenous forest management system differ from scientific forest management system?

.....  
.....

**Q.No: B-2**

What are the criteria to be taken into consideration on classifying forest types and forest landscape in local level?

.....  
.....

**Q.No: B-3**

What are the criteria for classification of plant species in common family or genera? Also mention an example of such expressions.

.....  
.....

**Q.No: B-4**

What socio-cultural and bio-physical factor has to be taken into consideration before harvesting a variety of forest products from your forest?

.....  
.....

**Q.No: B-5**

In what way do you think that traditional forest knowledge can be well identify, improved and documented for its conservation and protection?

.....  
.....

**Q.No: B-5.1**

In what way do you think that traditional forest management knowledge systems can be utilized in management and conservation of forest resources?

.....  
.....

**C) Traditional Ecological Knowledge**

**Q.No: C-1**

What do you understand by traditional ecological knowledge system? Give an illustration of such knowledge system.

.....  
.....

**Q.No: C-1.1**

How do you think is traditional ecological knowledge constructed and whom do you think plays role in construction and extension of such knowledge systems?

.....  
.....

**Q.No: C-2**

In what way do you think that traditional ecological knowledge system can play role for sustainable management of forest resources at local level?

.....  
.....

**Q.No: C-2.1**

What are the medium for handover process of 'TEK' from one to another generation?

.....

**Q.No: C-3**

What are the mechanisms of managing pasture land via indigenous management systems and what role do indigenous institutions play for pasture land management?

.....

**Q.No: C- 4**

What are the factors you think to erosion of traditional ecological knowledge system?

.....

**Q.No: C- 4.1**

How traditional ecological knowledge could be applied for biodiversity conservation?

.....

**Q.No: C- 5**

Put your level of agreement or disagreement towards following statement?

S.N	Statement	Attitude Scale				
		Agree			Disagree	
		5	4	3	2	1
1.	TEK is rapidly disappearing					
2.	TEK should be conserved					
3.	TEK should be handover					
4.	TEK should be documented					
5	TEK should be incorporated					
6.	TEK is unclear and ambiguous					
7.	TEK depend upon personal attributes					

**Note:** TEK (Traditional Ecological Knowledge)

**Code:** 5= Strongly Agree

4= Agree

3=Neutral

2= Disagree

1=Strongly Disagree

**D) Ethno-ecology / Religion Ecology**

**Q.No: D-1**

What sort of spiritual and religious activities do you perform in the forest? Also mention where and when your community celebrates such performance.

.....

**Q.No: D-2**

What are the sacred plants and animal species found in your forest and what religious, spiritual and social importance does such species holds?

.....

**Q.No: D-2.1**

What are the plants species that are prohibited for harvesting in your communities?

.....

**Q.No: D-3**

Why do you think that your religion and cultural provided a mended for offering plant or plant products in any rituals and cultural performance?

.....

**Q.No: D-4**

Does your community follow a traditional or seasonal resource harvesting calendar?

.....

**Q.No: D-5**

How do you think that your religion plays a role in conservation of wild animals?

.....

**Q.No: D-5.1**

What are the wildlife species that has a scared value in your cultures and religion?

.....

**The End**



## APPENDIX- 2

### Transect Walk Survey Form

S.N:

Surveyor Name:

Date:

Range Name:

V.D.C:

Ward No:

G.P.S Point at Lowest Elevation Inspected:

G.P.S Point at Heights Elevation Inspected:

<b>List of Wildlife Species Observed</b>	<b>List of Plant Species Identified</b>	<b>Name of Cultural Monuments Observed</b>
1. ....	1. ....	1. ....
2. ....	2. ....	2. ....
3. ....	3. ....	3. ....
4. ....	4. ....	4. ....
5. ....	5. ....	5. ....
6. ....	6. ....	6. ....
7. ....	7. ....	7. ....
8. ....	8. ....	8. ....
9. ....	9. ....	9. ....
10. ....	10. ....	10. ....
11. ....	11. ....	11. ....
12. ....	12. ....	12. ....
13. ....	13. ....	13. ....

## APPENDIX- 3

### Ethno-botanical Survey Form

Key Question	Verification
Species name	a) Nepali b) Local
Found near (reference)	(name of place)
Indicator species	
Time of year (mature)	(specify time in months)
Methods of harvest	
Who harvest	
When to harvest	
For what use	
How often a year	
Where to vend	(specify type of market)
Parts used	
Tools used to harvest	
Method of preservation (only if)	
Ceremonial uses (religious value)	
Market/Economic value	(per kilogram or per piece)
Stories about this species (attached)	(in accordance with religious text)
Ecological relationship with other species	
How do you learn to harvest	
Transmission of harvesting knowledge	
Who transfer such knowledge	(specify relations type)
Any more you want to add	

## APPENDIX- 4

### List of Major Wildlife Species of lower Manang

#### Wildlife species (Mammals)

S.N	Nepali Name	English Name	Scientific Name
1.	Ratuwa	Barking Deer	<i>Muntiacus muntjack</i>
2.	Chituwa	Common Leopard	<i>Panthere pardus</i>
3.	Himali Kalo Bhalu	Himalayan Black Bear	<i>Selenarctos thibetanus</i>
4.	Kasturi Mirga	Himalayan Muskdeer	<i>Moschus chrysogaster</i>
5.	Ghoral Mirga	Ghoral	<i>Nemorhaedus goral</i>
6.	Dhedu Bandar	Langur Monkey	<i>Macaca mulatta</i>
7.	Heu Chituwa	Snow Leopard	<i>Panthera uncial uncia</i>
8.	Thar (Jharal)	Himalayan Tahr	<i>Hemitragus jemlahicus</i>
9.	Naur (Bharal)	Blue Sheep	<i>Pseudois nayaur</i>

#### Large Avi-fauna (Bird) species

S.N	Nepali Name	English Name	Scientific Name
1.	Munal	Munal Pheasant	<i>Tragopan satyra</i>
2.	Phokras	Koklass Pheasant	<i>Purasia marcrolopha</i>
3.	Chilime	Blood Pheasant	<i>Ithaginis cruentus</i>
4.	Danfe	Himalayan Monal	<i>Lophophorus impejanus</i>
5.	Ban Kalij	Kalij Pheasant	<i>Lophura leucomelanos</i>
6.	Hard Foruwa	Lammergeier	<i>Gypaetus barbatus</i>
7.	Himali Giddha	Himalayan Griffon	<i>Gyps himalayensis</i>
8.	Suparna Mahachil	Golden Eagle	<i>Aquila chrysaetos</i>
9.	Pahadi Sadalchil	Mountain Hawk Eagle	<i>Spizaetus nipalensis</i>

## APPENDIX- 5

### List of Major Plant Species of lower Manang

#### Plant species (Tree)

S.N	Nepali Name	Local Name	Scientific Name
1.	Lali Gurans	Gurans	<i>Rhodendron arboreum</i>
2.	Uttis	Uttis	<i>Alnus nepalensis</i>
3.	Paiyu	Piayun	<i>Prunus cerasoides</i>
4.	Okhar	Katutun	<i>Juglans regia</i>
5.	Jhule Salla	Jhemersin	<i>Picea smithiana</i>
6.	Kali Kath	Nogyasin	<i>Myrsine semiserrata</i>
7.	Talispatra	Kye (Thasin)	<i>Abies spectabilis</i>
8.	Bhojpatra	Bhuspat (Takpa)	<i>Betula utilis</i>
9.	Chutro	Kerpa	<i>Berberis aristata</i>
10.	Dale Chuk	Tarbu	<i>Hippophae salicifolia</i>
11.	Lekh Dhupi	Sukri	<i>Juniperus squamata</i>
12.	Kharshu	Seghu	<i>Quercus semicarpifolia</i>
13.	Bains	Langanackpo	<i>Salix wallichiana</i>
14.	Lauth Salla	Silingi (Jhamersin)	<i>Taxus baccata ( wallichiana)</i>
15.	Gobre Salla	Langma	<i>Pinus wallichiana</i>
16.	Thingure Salla	Kesin	<i>Abies pindrow</i>
17.	Dhupi Salla	Shupka	<i>Juniperus recurva</i>
18.	Sunpati	Balusin	<i>Rhododendron anthropogon</i>
19.	Lekh Dhupi	Phar	<i>Juniperus indica</i>
20.	Thigre Salla	Ghyaker	<i>Tsuga dumosa</i>

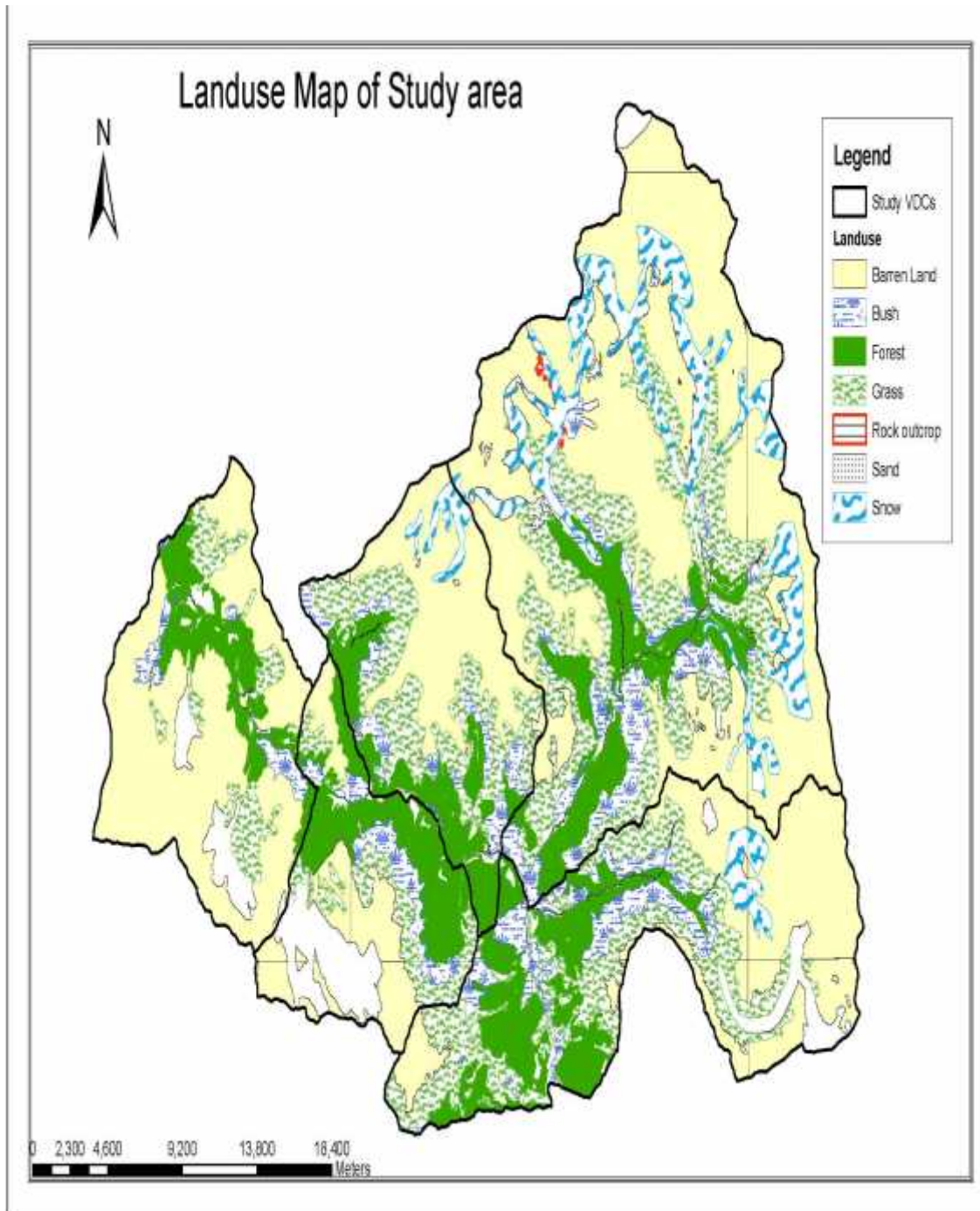
## APPENDIX- 6

### List of Medicinal Plants Used in lower Manang

S.N	Name of Species			Local Use
	Nepali	Local	Scientific	
1.	Nirmansi	Bhonmar	<i>Delphinium denudatum</i>	Liver problem
2.	Kutki	Katuki	<i>Neopicrorhiza scrophulariifolia</i>	Fever, anti-cold
3.	Ban Alu	Ban Alu	<i>Panax pseudo ginseng</i>	Tonic / Nutrition
4.	Jatamasi	Pangpoe	<i>Nardostachys grandiflora</i>	Aroma / Perfume
5.	Sugandhawal	Nakpe	<i>Valerana jatamansi</i>	Aroma / Incense
6.	Yarsagumba	Jivanbuti	<i>Cordyceps sinensis</i>	Tonic / Nutrition
7.	Panchaunle	Lova	<i>Dactylorhiza hatagirea</i>	Tonic, Bronchitis
8.	Satuwa	Satwa	<i>Paris polyphylla</i>	Intestinal problem
9.	Bojho	Chhotno	<i>Acorus calamus</i>	Throat pain
10.	Padamchal	Pangue	<i>Rheum emodi</i>	Skin diseases
11.	Seabuckthron	Tirchu	<i>Hippophae salicifolia</i>	Source of vitamin
12.	Siltumur	Kuntu	<i>Lindera neessiana</i>	Spice and dye
13.	Pakhanved	Progue	<i>Bereinia ciliate</i>	Anti-inflammatory
14.	Chiraita	Tite	<i>Swertia chirayita</i>	Fever and wound
15.	Jimbu	Jimbu	<i>Allium hypsissitum</i>	Spices, medicine
16.	Bhutkesh	Bhutkesh	<i>Selinum tenuofolium</i>	Aroma / Incense
17.	Lauthsalla	Jhemersin	<i>Taxus baccata</i>	Skin disease
18.	Guchichau	Tabae	<i>Morchella esculenta</i>	Gastric/Acidity
19.	Bikh	Bish	<i>Aconitum spicatum</i>	Insecticides
20.	Titepati	Sage	<i>Artemisia dubia</i>	Insecticides

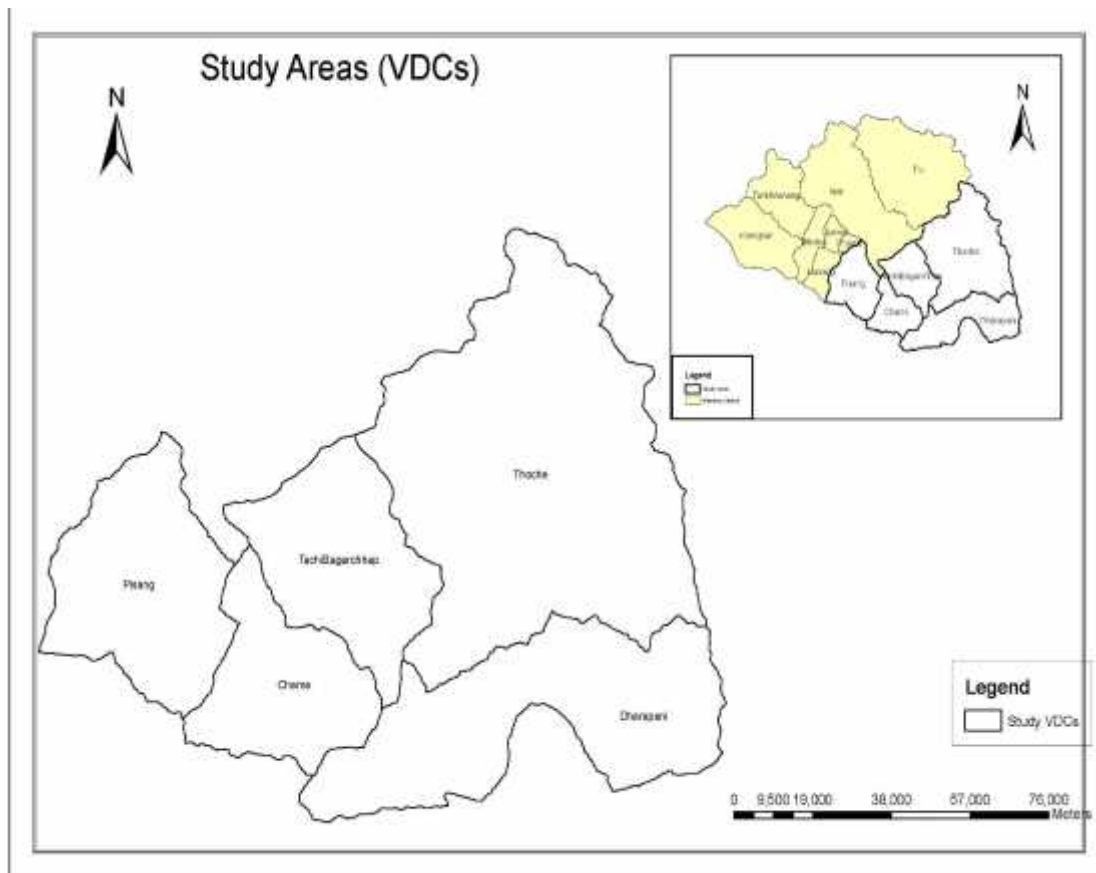
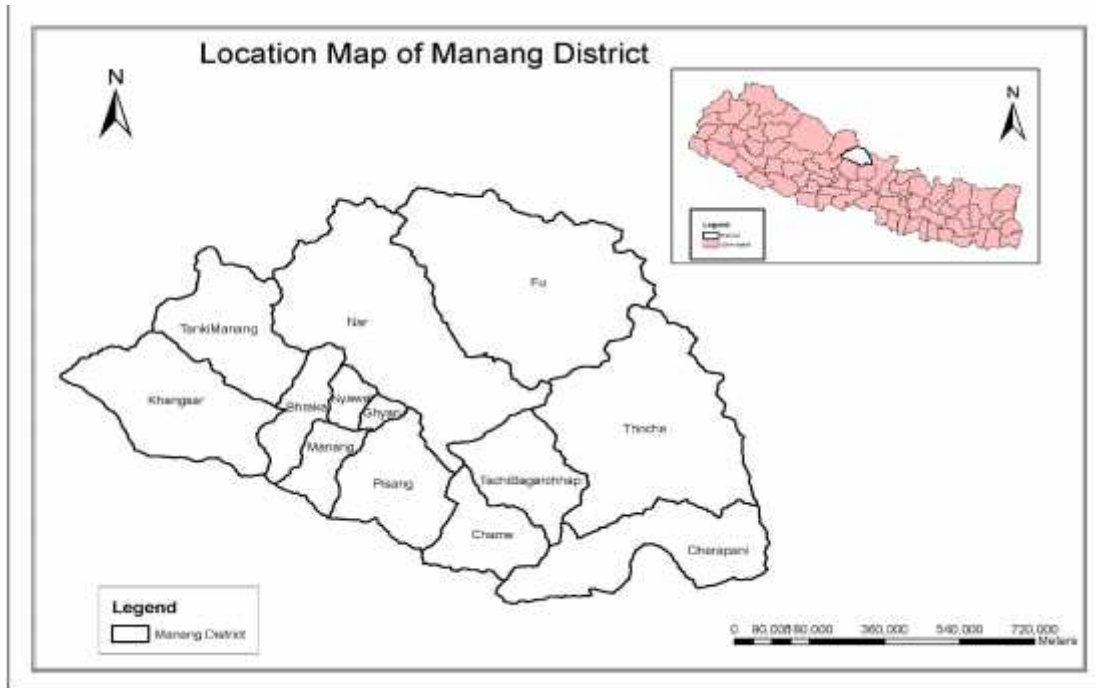
# APPENDIX- 7

## Landuse Map of Study Area



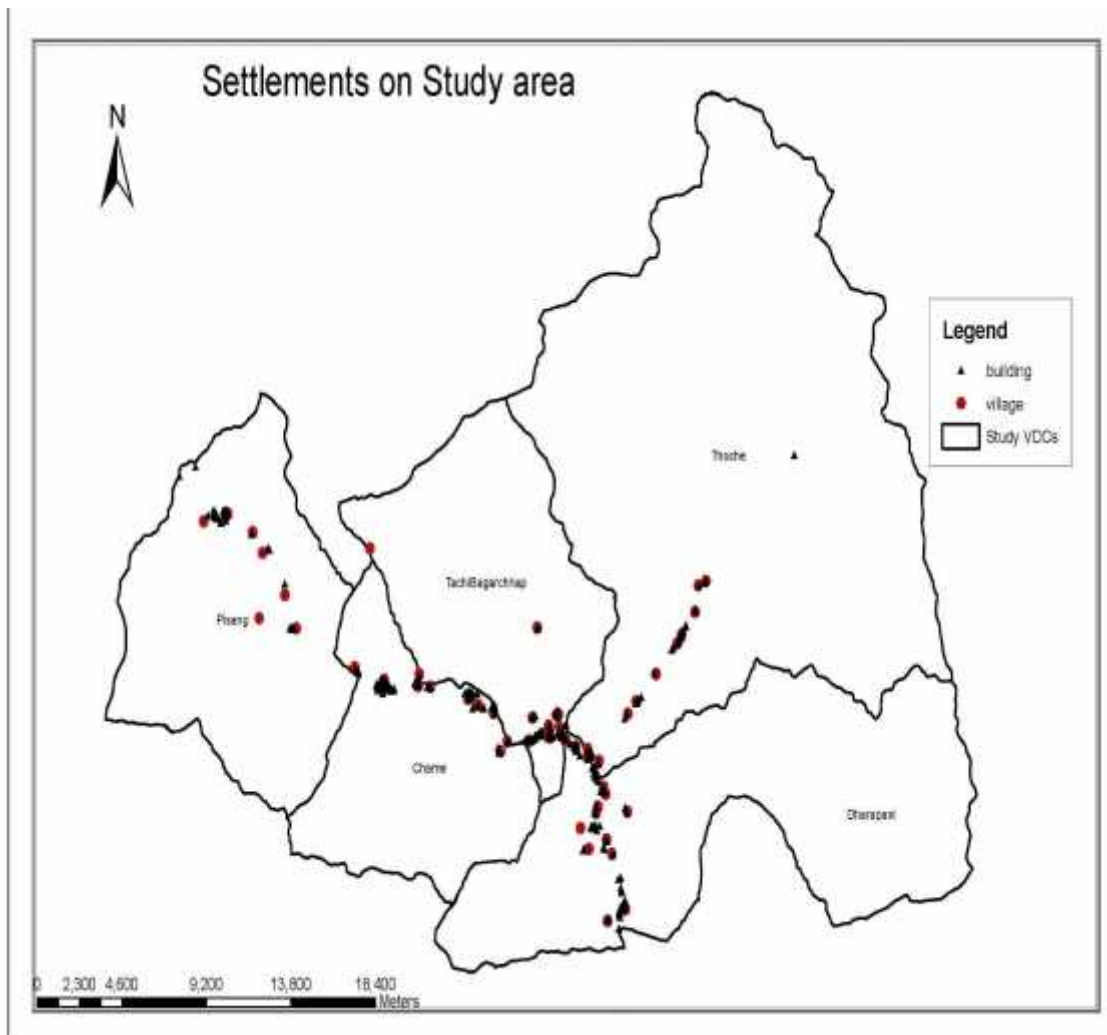
## APPENDIX- 8

### Location Map of Study Area



## APPENDIX- 9

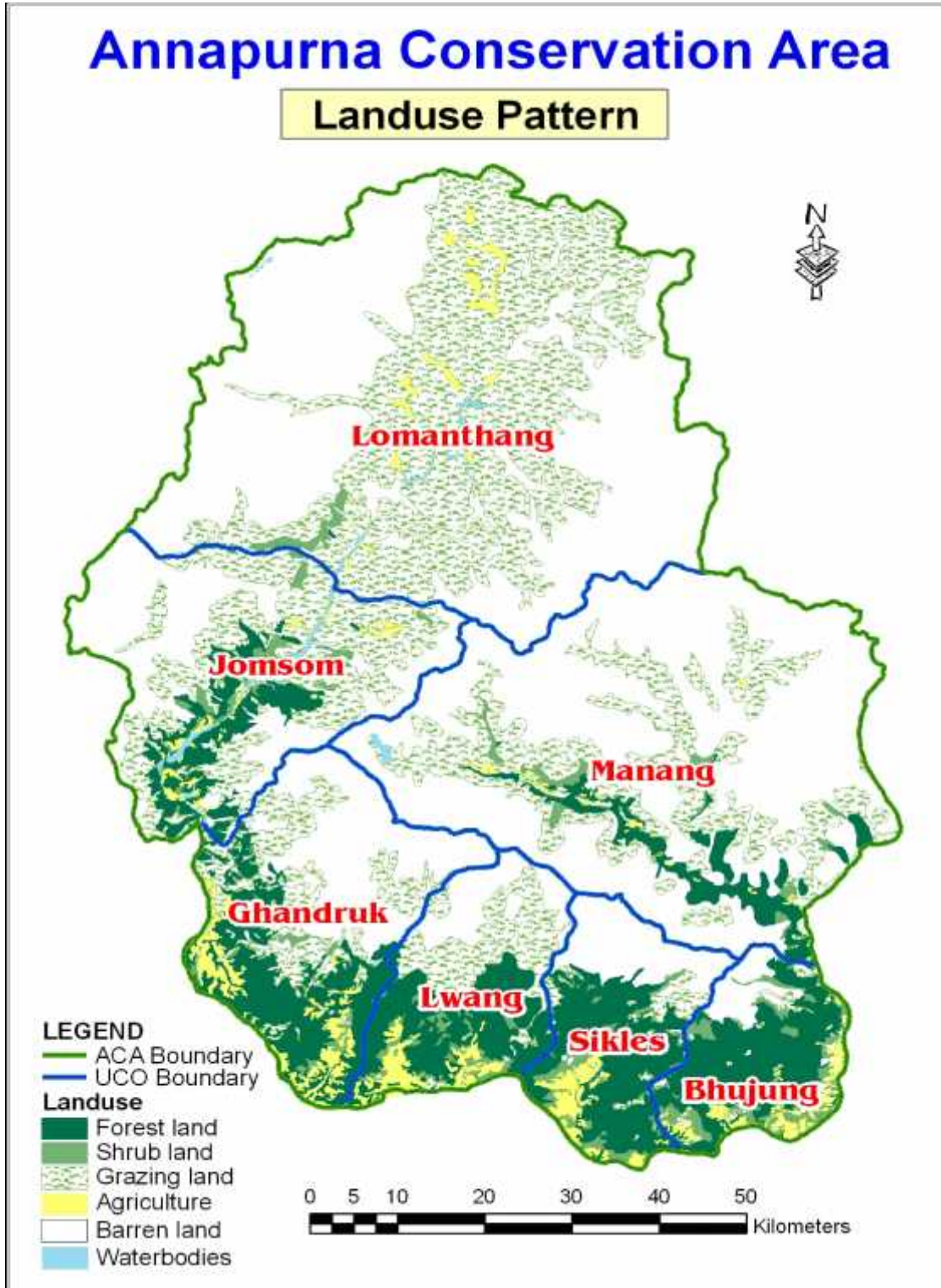
### Settlement Map of Study Area





APPENDIX- 10

Land Use Map of Annapurna Conservation Area



## APPENDIX- 11

### Photo Gallery



**Plate 1** Researcher conducting focus group discussion at Tal village



**Plate 2** Monastery inside sacred forest at Danaque of Dharipani VDC.

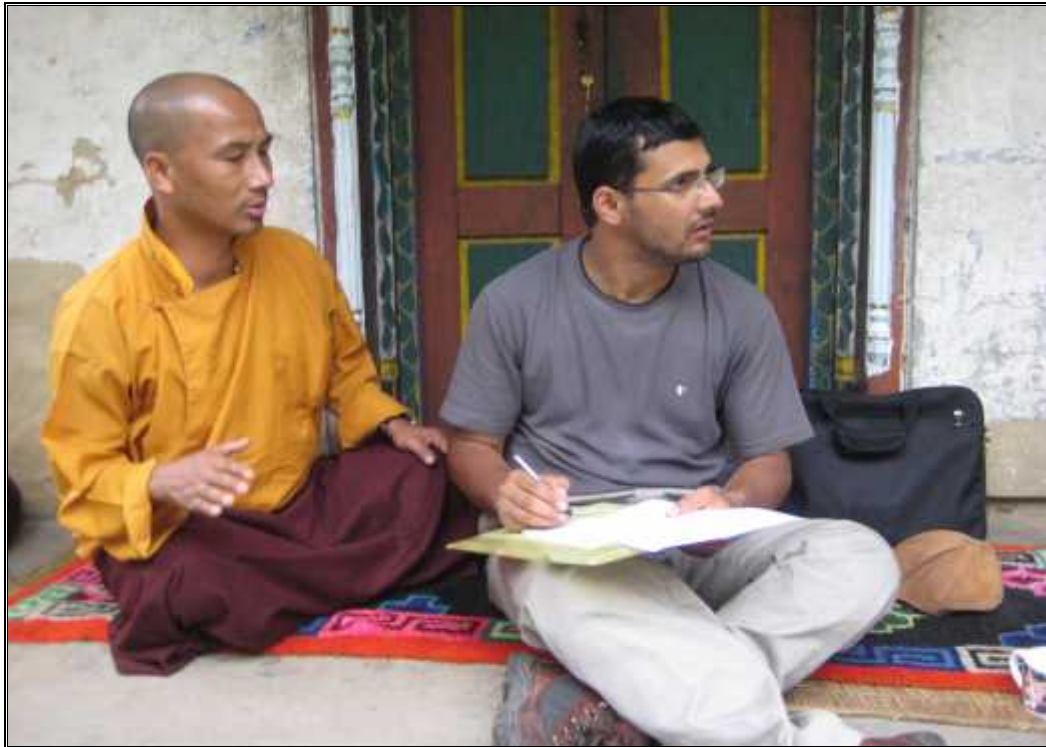




**Plate 3** Researcher collecting medicinal plants for sample survey



**Plate 4** Birch (*Betula utilis*), one of the sacred plant forest near Bhimthang



**Plate 5** Researcher taking interview with religious worker at Monastery



**Plate 6** Clan shrine under canopy of Himalayan yew (*Taxus baccata*)





**Plate 7** Seabuckthron (*Hippophae salicifolia*), one of the 'taboo' plant species



**Plate 8** Researcher dealing with D.F.O staffs at Chame, Manang



**Plate 9** Researcher recording G.P.S point during transect walk survey at Pisang



**Plate 10** 'Milarepa Cave', one of the sacred landscapes in Pisang VDC.