NATURAL RESOURCE MANAGEMENT:

AN ANTHROPOLOGICAL STUDY IN TWO VILLAGES OF MEGHALAYA

A Thesis submitted for the Degree of Doctor of Philosophy

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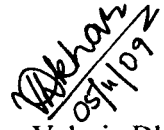
DECLARATION

I, Valerie Dkhar hereby declare that the subject matter of the thesis entitled "Natural Resource Management: An Anthropological Study in Two Villages of Meghalaya" is a bonafide study of my work and that the contents of this thesis or a part therof has not been submitted to this University or any other University earlier for any other degree or award of any prize.

This is been submitted to North-Eastern Hill University, Shillong, for the award of the degree of Doctor of Philosophy in Anthropology.



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Mrs. Valerie Dkhar

ABBREVIATIONS AND ACRONYMS

ADC – Autonomous District Council

CPR - Common Property Resources

CPRs - Common Property Regimes

FAO – Food and Agricultural Organization of the United Nations

FSI – Forest Survey of India

ICDP - Integrated Conservation Development Project

IFAD - International Fund for Agricultural Development

KHADC - Khasi Hills Autonomous District Council

MRDS - Meghalaya Rural Development Society

NERCORMP – North Eastern Region Community Resource Management Project

NTFP - Non-Timber Forest Product

PPRs - Private Property Regimes

P3DM - Participatory 3 Dimensional Model

SHG – Self-Help Group

UNEP – United Nations Environment Programme

UNESCO – United Nations Educational, Scientific and Cultural Organization

UNO – United Nations Organization

WHO - World Health Organization

WWDR – World Water Development Report

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CHAPTER I

INTRODUCTION

"Natural resources determine the course of development and constitute the challenge which may or may not be accepted by the human mind"

W. Arthur Lewis

Human desire for ultimate joy and comfort has led her/him to exploit nature's "free" goods to the extent of reducing its natural capacity for self-stabilization. As a consequence of this outright disregard for the impact of human activities on the environment, numerous environmental problems have arisen. It is an established fact that there exists a vital link between environment and life. The history of evolution of life has taught us that through the different ages, various forms of life appeared or became extinct in response to the prevailing environmental conditions. Human beings, in their pursuit of ever faster economic growth, are upsetting the environmental equilibrium and destroying their life-support system. Their capability to transform the environment can bring the benefits of economic development and an opportunity to enhance the quality of life. But the same power, when incorrectly applied, can also cause incalculable harm to the natural environment and consequently to human life itself.

There should be no delay in tackling the task of solving these environmental problems, as these problems have a cumulative impact. Delayed remedial action will cost considerably more and the damage may become irreversible. There is only one world to pollute; if this is ruined, there is no other. We survive only as long as the earth survives. Hence, environmental

management must regulate the demands and activities of human beings in such a way that the ability of the environment to sustain future development remains unimpaired. Efficient environmental management is a pre-requisite for sustained economic development.

One primary object of good management is provision of the maximum benefit to the greatest number of people for all time (Prakash 1986). Environmental management is the integrative ecological, cultural, economic and social process by which the environment is developed in a holistic and systematic manner through the optimal use of existing and potential resources in the biosphere for the ultimate improvement of human well being. It aims at the maintenance of long-term sustained yield from the biosphere, and should be designed to provide greater personal and social opportunities for present and future generations (Trivedi *et.al.* 2000). Thus, environmental management is a positive, not a negative "halt progress" or "back to nature" concept.

Ramade (1984: 9) defined resource as "a form of energy and/or matter which is essential for the functioning of organisms, populations and ecosystems". A resource in his words is "any form of energy or matter essential for the fulfillment of physiological, socio-economic and cultural needs, both at the individual level and that of the community"(*ibid.: 9*).

Environmental management is the process of allocating these resources, both natural and man-made, so as to make optimum use of the environment in satisfying not only the present basic human needs but also those of the coming generations. Thus, natural resources management falls under the wide canopy of environmental management. "Natural resources can be defined as objects, materials, creatures, or energy found in nature that can be used by humans" (Camp *et. al.* 2002: 4). According to Agarwal (1987: 130), "Natural resources are

raw materials obtained or derived from nature". Others like Kerr and Swarup (1997: 6) opine: "Resources that are not man-made, including all of the earth's natural elements and environmental factors". Natural resources can be broadly classified into renewable resources — those that can be replenished rapidly through natural cycles, e.g., solar radiation, tidal and wind energy, and all biological organisms like forests, grasslands, wildlife etc. — and non-renewable resources or those that cannot be replenished rapidly or not replenished at all through the natural processes like ores of aluminum, copper, mercury, fossil fuels and nuclear energy.

Human beings are heavily dependent on natural resources for their very survival. Natural resources of all kinds, particularly water, soil, forest, vegetation (flora) and animals (fauna) are the major resource base supporting and sustaining the human and cattle population. As a result of exploding human population, the pressure on limited natural resources has increased immensely. With an additional burden of population, the requirement of water, food, shelter and other essential commodities are expected to grow rapidly in future. Already, the resources are facing serious threat due to over exploitation, unplanned, unscientific and haphazard developmental activities associated with mismanagement in North-East India. The situation is expected to only become worse which will jeopardize the resource sustainability.

Expanding human population has resulted into expanding needs of humans. With scientific progress and technological development people have started utilizing natural resources at a much larger scale. Continuous increase in the population has caused increasing demand for resources. This has created a situation where the non-renewable resources may be

exhausted after some time. In order to have maximum production, we have started even taking loans from the resources meant for the future that cannot be paid back. As a result, we are using all those resources, which are in fact the property of future generations.

Till recently, we took all natural assets viz., air, water, soil, flora and fauna for granted, considering them as infinite and went about utilizing and exploiting these resources to the hilt. It is only recently that we have come to realize that these resources are finite and limited. These thoughts are reflected in our ancient works and sayings of great men. "During the Vedic period, the importance of maintaining the man-nature balance appears to be the dominant thought in our scriptures. Thus, conservation of resources was considered as a prerequisite for the well being of society. Conservation ethics also places emphasis on the equitable sharing of the benefits of natural resources, as stipulated in the doctrine of *Manusmirti* (7/99)" (Ghosh 2003: 8). In the Christian context, Rose and Fletcher (2007) write: "The gospel paints a vision of society that is relationally and environmentally sustainable" (2007: 7). The following stanza from the *Isavasya-Upanishad* is outstanding testimony to the best idealistic concept of ecological harmony in Hindu religion: "This Universe is the creation of Supreme Power meant for the benefit of all; individual species must, therefore, learn to enjoy its benefits by forming a part of the system in close relationship with other species. Let not the other species encroach upon the other's rights" – *Isavasya Upanishad*, chapter 1, verse 2 (Dwivedi 2003: 44). The gospel of Buddha and Ashoka's edicts also mirror this view. During Ashoka's time (272-232 BC), perhaps for the first time in the history of the world, ecological concerns became state concerns. His imperial edicts laid down rules of conduct that had to be obeyed with respect to the environment. Non-compliance was met with

punishment (Pant and Khanduri 1998). We have also heard of the Bishnois of Marwar of the 15th century, sacrificing their lives to protect the Kheidi trees. All this is indicative of the fact that though man was aware of the importance of environment, he got caught in the whirlpool of rapid modernization, development of science and technology and industrial revolution. Hence, the need to manage our natural resources has become crucial for sustainable development.

Agarwal (1987:131) defines 'natural resource management' as "planning and management of resources so as to secure their wise use and continuity of supply while maintaining and enhancing their quality, value and diversity". Natural resource management is an important issue that affects us all. Everyone's well being, indeed livelihoods, depends directly and indirectly on natural resources. The science of natural resource management is based on the ecologically sound traditional wisdom of farmers and its contribution towards augmenting productivity. Traditional values which are sustainable in nature need to be compared with values of modern systems. Projects to develop ecology should start with traditional knowledge as they are proven technology for natural resources management. In a real sense, every culture is the result of people's effort to survive and their attempts to optimise the use of available resources, i.e., soil, water and vegetation (Mishra 1998). In recent years, degradations of these resources and the environment have increasingly become the focus of attention because of their harmful impact on people's lives. Water scarcity, air and water pollution, energy scarcity, deforestation, soil-degradation — all of these natural resource degradation problems hamper people's ability to earn a living and reduce the quality of their lives.

Natural resource degradation problems can be analyzed as biological, physical or socio-economic. While all of these perspectives offer important insights, it is worthwhile to ask the following three questions: What factors lead people to degrade natural resources? What are the economic consequences of natural resource degradation? And what kinds of policies can be taken up to strengthen the way people manage natural resources?

The classic subdivisions of resources include renewable and non-renewable resources. Renewable resources are resources that can be replenished rapidly through natural cycles, e.g., direct solar radiation, tidal energy, wind energy, water energy and biomass energy (solar energy stored in wood, organic matter, food and other agricultural products) and all biological organisms (forests, grasslands, wildlife etc.). Non-renewable resources are resources that can be replenished slowly or not replenished at all through the natural processes. Non-renewable resources can be further divided into two categories, viz., recyclable and non-recyclable. The recyclable resources can be collected after they are used and can be recycled. These are mainly the non-energy mineral resources which occur in the earth's crust, viz., ores of aluminium, copper, mercury and other metals, deposits of fertilizer nutrients, e.g., phosphate rock and potassium and minerals used in their natural state (asbestos, clay, mica, etc.). Non-recyclable resources are those resources that cannot be recycled in any way, e.g., mineral energy resources such as fossil fuels (coal, oil and natural gas) and nuclear energy (uranium and thorium).

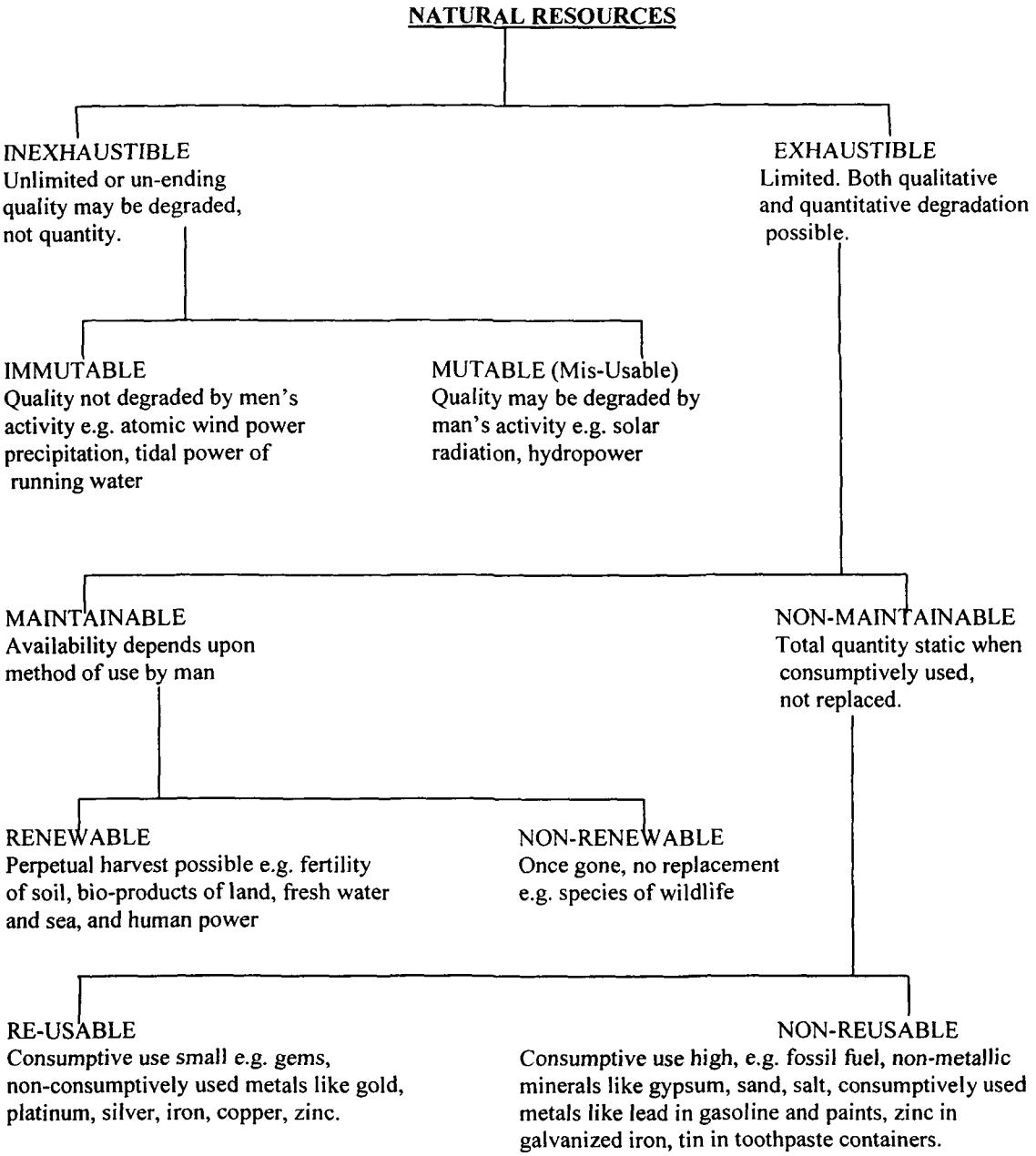
Renewable resources should not be taken to mean inexhaustible resources. All renewable resources are limited by the capacity of natural systems to renew them. For example, good soil is renewable only if protected from erosion. Similarly, ground water is

renewable only if water continues to percolate in the soil at a rate at which it is removed. Moreover, renewable resources are dependent upon non-renewable resources for their replenishment and vice-versa. For example, production of agricultural crops (renewable resources) depends on iron, copper and other metals used in agricultural machineries, and phosphate and other fertilizer components (recyclable non-renewable resources).

Although the above classification of natural resources is the most widely accepted one, yet different scholars have given different classifications. The major classes of natural resources, according to Howe (1979) are agricultural land; forest land and its multiple products and services; natural land areas preserved for aesthetic, recreational or scientific purposes; the fresh and salt water fisheries; mineral resources including fuels and non-fuels; renewable non-mineral energy sources of solar, tidal, wind and geothermal systems; water resources; and the waste-assimilative capacities of all parts of the environment. More generally, natural resources fall into four categories: basic natural resources such as land, water and air; natural resource commodities such as timber and fish; environmental amenities such as clean air and scenic views; and environmental processes such as pollution, soil erosion, groundwater recharge and species regeneration (Kerr and Swarup 1997).

Some authors prefer to classify resources into biotic or living resources, e.g., forest, agriculture, fish and wildlife, and abiotic or non-living resources, e.g., land, water, minerals etc.

Owen (1971) proposes a broader classification of resources. He gives a schematic representation of classification of natural resources as follows.



According to Sharma (1998), resources may be classified into the following types:

Based on Continual Utility

Some resources are exhausted soon, whereas others last for a long period. Thus, depending on the availability of resources, during our continuous use, a resource may be renewable (inexhaustible) – resource that can be renewed along with their exploitation and are always available for use like forests. However, formation of some resources like iron ore, coal and mineral oil takes several thousand years. Once they are used in unlimited ways they cannot be easily replaced. Therefore, if exploited at large scale, they will deplete fast. Hence, such resources are called non-renewable resources or exhaustible resources. For certain resources there is no final use, as they can be used continuously, such resources are known as cyclic resources.

Based on Origin

On the basis of their origin, resources may be biotic (organic) or abiotic (inorganic). Biotic resources are obtained from the biosphere, e.g., forest, wildlife, crops, coal, mineral oil, etc. resources composed of non-living inorganic matter are called abiotic resources, e.g., land, water, minerals, etc.

Based on Utility

Every resource has some utility, e.g., some are used as food, some as raw materials and others as sources of energy.

Natural resources are made by nature and the energy to make them comes from geochemical, geophysical and solar power. Humans may only modify natural resources. The monetary value of natural resources is what people believe the value to be. Our ignorance can

cause them to be greatly undervalued, which is a major problem. Humans are inherently ignorant; we simplify complex things and processes because we do not understand the "whole". Natural resources and the ecosystem processes producing them are the most complex systems we can imagine. Also, there are human values - ethics and morals - that give non-monetary value to natural resources. Humans themselves are a natural resource, and certain qualities of humans extend beyond their possessions and the direct services they render for other humans and the rest of the biosphere. This condition is expressed in our art and culture. Resources are the bases of both security and opulence; they are the foundations of power and wealth, they affect man's destiny in war and peace alike (Zimmerman 1951). The changing functions and utility of resources can be attributed to socio-cultural and technological evolution. Modernisation, lack of effective planning, population growth and other forms of exploitation have played a key role in the degradation of natural resources.

The ecological vantage point in anthropology was expressed as early as 1930s by Julian H. Steward (see Hardesty 1977). Some of the areas of interest to anthropologists are human ecology, ecological problems, and pollution effects on human population. Haeckel defined ecology as "The economy of nature – the investigation of the total relations of the animal both to its inorganic and its organic environment; including, above all, its friendly and inimical relations with those animals and plants with which it comes directly or indirectly into contact – in a word, ecology is the study of all those complex interrelationships referred to by Darwin as the conditions of the struggle for existence" (quoted by Dodson *et.al.* 1998:2). In other words, "Ecology is the study of the interaction between living things and their environment" (Sutton & Anderson 2004: 2). An integral part of this relationship is the

adaptation that these organisms make to their environment. Adaptation in man is the process by which he makes effective use of productive ends of the energy potential in his habitat (Durham 1976). Man's interaction with his environment in terms of economic ties, resources, geographical links, social structure and inter-cultural influences, etc. has been changing through the ages (Bhasin 1998). Neither man nor the environment is considered as static or constant. Adaptation has been viewed as a process by which man makes effective use of the energy potentials in his habitat. It can also be viewed as consequence of changes and transformation in cultural behaviour. These changes may be technological, organizational or ideological. Technology is the tool used by man in his search for food, protection and reproduction. Organizational aspect of culture relates to the network of social relations, roles and statuses that can be obtained in a human group. Ideology includes values, norms, knowledge, religious beliefs, sentiments, ethics, morals, etc. Cultural ecology is a methodological tool for determining how the adaptation of a culture to its environment may lead to certain changes in the culture.

The urge to exploit the resources to meet the varied requirements of the people in the ever changing scenario of dynamic change towards modernization and industrialization and the vast improvement in the technologies has led to a situation where our resources are exploited indiscriminately leading to faster depletion of the resources which has an adverse impact on the environment affecting the process of sustainable development. Due to industrialization there has been a larger flow of resources into the industries and these industries have been utilized indiscriminately, with no perspective on the need for future requirements undermining their economic and real values in relation to the human population.

Appropriate strategies are yet to be evolved for the efficient natural resource management and its efficient exploitation through conservation, afforestation, increase in watersheds, strengthening the conservation of water flows through bunding, development of green cover, development of alternative techniques of collecting and harvesting the forest produce to maintain the ecological base and to protect the natural environment. Anthropologists dealing with tribal societies have pointed out that those tribes or indigenous people who depend on natural resources for their livelihood have elaborate traditional systems of natural resource management. In the past, such traditional indigenous systems of natural resource management have often been judged backward, wasteful and destructive. But in recent times there has been a growing appreciation of such traditional methods of resource management. There is a very close relationship between water, soil and forest. It is impossible to delink one from another. The vicious circle of soil erosion has its origin in the defective land use and destruction of the vegetative cover of the soil itself. Once there is a defective land use, the vegetative cover is destroyed which in turn increases the run-off and soil erosion. The immediate aftermath of the above is abrupt reduction of the water retention power of the soil. If this happens, then land becomes barren and forest cover is destroyed.

The wisdom of farmers with respect to forest conservation and management, agricultural management, watershed development, and conservation of soil, water for sustained production in the selected villages are documented in the present study. This study is an attempt at deepening the understanding of traditional methods of natural resource management through an analysis of the forest, land and water conservation and management practices followed by the Khasis of Meghalaya over centuries. The present study attempts to

critically evaluate the status of resource availability, future demand, potentials for development and harnessing, and also tries to suggest ways and means of exploiting the natural resources for sustainable development of the state in the 21st century. It also attempts to examine and describe the role and impact of traditional institutions in natural resource management with special reference to forest, land and water.

REVIEW OF LITERATURE

Research in the area of natural resource management has followed several avenues. Initially, it was tribal or village communities living in the vicinity of forest which were responsible for using and managing natural resources like forest produce of various kinds according to their needs. Their institutions grew and took shape accordingly. Any such community has got prescribed and established procedure determining how each member will use different species of herbs, shrubs and trees and in which measures (MacIver and Page 1974). Not only that, even the pattern of seasonal utilization of the resources was prescribed by the complex of values, norms and procedures, i.e., institutions of the community and more or less accepted by its members. The village and community economy depends on the natural resources, say non-timber forest products (NTFP), available and the pattern of seasonal utilization (Malhotra *et.al.* 1992).

A clear distinction has to be made between renewable and non-renewable natural resources with the central feature underlying the distinction being the variation in resource utilization possibilities over time. Tahvonen and Kuuluvainen (2000) discuss the economics of natural resource utilization and outline some historical debates on the scarcity of non-

renewable resources like the British Classical Economists Debate, the US Conservation Movement 1890-1920, and the first neoclassical studies on natural resources. Grundy, Turpie and Jagger (2000) made a study on the implications of co-management for benefits from natural resources for rural households in northwestern Zimbabwe. The study examines the short and long-term uses of natural resources in northwestern Zimbabwe in a complex ecological-economic setting and addresses issues of resource management in Sub-Sahara Africa which has prompted the consideration of joint management policies that incorporate the needs of several stakeholder groups. They conclude that co-management provides for slightly greater net benefits, but the transaction costs associated with the establishment of co-management may be too high to justify this option. A number of studies have also focussed on the extent of extraction and use of wild biota (chiefly plants) by indigenous societies. The works of Malhotra *et. al.* (1992), Panayotou and Ashton (1992), Plotkin and Famolare (1992) have focussed on these issues. The estimation of their economic value has been illustrated in the illuminated works of Malhotra *et.al.* (1992), Neumann and Hirsch (2000), Chopra (1993) and Fui and Ismail (1994) and Godoy and Lubowski (1992).

Few natural resource economists in the country endeavour to expound the economic aspects of forestry and allied subjects. The basic object in doing so is to knit the various aspects of forestry with the principles of economics - theory and practice - and to show that silviculture, forest and wildlife management, forest utilization, land use for environmental and ecological stability, forest based economic growth and development, etc. are not isolated strands of knowledge but are integral components of the same fabric - that of man's behaviour in the ordinary business of life for resource use and its management in Indian context (Pant

1984). Shashikant (2000) makes an analysis of a dynamic approach to forest regimes in developing countries by incorporating the socio-economic characteristics of the user groups viz. the heterogeneity of the user group with respect to forest management and the direct dependence of the user groups on forests.

Case studies of management and profitable use of forest resources have flooded the Indian scenario. Researchers have in course of time studied various communities and explored their management practices. It has come to light that communities throughout the world do engage in some form of management practices, be it for forest, land or water. Sacred species, groves, forests and other ecosystems, which have been conserved for religious and cultural reasons, offer an opportunity to build on an age-old traditional ethos of conservation. Descriptive accounts of origin, religious and cultural practices and related to sacred groves/forests/eco-systems/landscapes have been extensively published in recent years in the works of Gadgil and Vartak (1976), Frazer (1980), Khiewtem and Ramakrishnan (1989), Ramakrishnan (1996) and others. Gupta and Rout (1987) have conducted a case study of management and profitable use of forest resources of Morni Hills of Ambala District in Haryana. Das Gupta (1996) has studied the forest management practices by the War Khasis of Meghalaya. Tiwari *et. al.* (1999) have written on the sacred forests of Meghalaya. Heltberg (2001) has analysed local institutions for forest conservation and management from a protected area in Rajasthan. Athparia's (2000) work on the forest resource management practices among the Karbis of the Hill Areas of Assam shows that they have no definite tradition to preserve or conserve their precious forest resources, although, to some extent and perhaps unknowingly, they follow some kind of natural resource preservation. D'Souza

(2001) writes that while the commercial forces and the people themselves are destroying forests in many parts of Nagaland, the Angamis have preserved them in one of the exemplary ways. Darlong (2002) has made a comprehensive study of forest policies and legislations in the Northeastern region and has cited the Mizos who had a long tradition of establishing village safety reserve forests and similarly the Khasis and Jaintias have a long tradition of maintaining sacred groves. These researchers have made immense contribution to this field and their case studies on the various tribes and people of India suggest that Indian traditional knowledge is alive today and very operational. They found that forest played a vital role in maintaining ecological balance and influenced to a large extent the socio-economic condition of local population. They view forest resources from the point of view of their protective role, maintenance, improvement and maximum production. Case studies of Mizo's safety reserve forests, Angami's practice of private ownership of land and forests, method of cultivation of both terrace and *jhum* fields, religious beliefs, and the sacred grooves of the Khasis have shed much light on the importance of traditional knowledge which have immensely contributed to the continued richness of forests and forest resources of the Northeastern region of India.

The value of land as a capital asset cannot be accentuated enough. Land is non-reproducible, but in conjunction with water and forests, it is expected to meet most of our needs on recurring basis (Satapathy 2000). His study shows that India's productive land base has been shrinking owing to social, economic, and political factors taking precedence over considerations of land capability. Studies by Tiwari and Singh (1995), Singh and Ghose (2000), Iyengar and Shukla (2000), and Satapathy (2000) have pointed out that there is a serious problem of land degradation in the Northeastern region due to human intervention

which have brought about a decline in the productivity capacity of land and this has caused a decline in soil productivity, deterioration in vegetative cover, decline of resources, pollution of air and ground water and has ultimately led to resource crunch. There is a compelling need for proper management of the Common Property Land Resources (CPLRs) in India (Iyengar and Shukla 2000) and eco-restoration of degraded land (Tiwari and Singh 1995). Soil conservation practices tend to slow down these degradation processes and increase soil productivity. Therefore, to achieve sound management of degraded soil, one has to adopt proper soil, nutrient, and water management practices (Singh and Ghose 2000).

The water requirement scenario calls for a sustainable development taking into account technical, economic, social, environmental, and institutional factors. Civilizations have even been compelled to shift from the region where water became deficient in amount, inferior in quality and erratic in behaviour (Mahajan 1989). Khulbe's (1989) study on the Kamaun Himalaya has brought to light the fact that degraded conditions of most of the watersheds are limiting factors for the development of the region and can be addressed only by the implementation of short and long term strategies for proper development of micro and macro watersheds. There is a need for proper water resource management which would require irrigation management, flood management, water supply facilities, hydro-power, industrial requirement and other uses. A sound and effective water management approach in the Northeast may come to the rescue of the neighbouring countries as well (Mitra 1999). Studies by Singh, Pradhan and Devi (1999) on the integrated water resource management of Manipur and by Agnihotri (1999) on the legal issues in the management of water in Meghalaya have highlighted the importance of a coordinated approach towards the better

utilization of water resources for different objectives - irrigation, hydro-power generation, flood control, transportation and environmental protection and the need for a proper legal framework for water resource management.

Gadgil *et.al.* (1993) state that due to the failure of pure legal protection in guaranteeing biodiversity conservation, it became necessary to search for solutions in the traditional conservation and resource management systems based on indigenous knowledge and local communities. Folke and Berkes (1995) consider traditional ecological knowledge as differing from scientific knowledge in being moral, ethically based spiritual, intuitive and holistic and having a large social context. But Gadgil and Berkes (1991) state that in contrast to the traditional ecological perception of nature found in indigenous societies, modern scientific management, with its roots in the utilitarian and exploitative worldview, assumes humans have dominion over nature. Maikhuri *et.al.* (1998) opine that there is a need for scientific evaluation of traditional conservation practices as all traditional practices may not be the best options in the present day world. Sustainable economies certainly cannot survive in the new circumstances. Monetary economy is increasingly becoming an attraction to the traditional people too. This line of thought has been well highlighted in the works of McNeely (1988) where he has tried to establish the relationship between incentives and conservation and Wells *et.al.* (1992) who opines that the Integrated Conservation Development Project (ICDP) attempts to use this approach of 'incentives and conservation' and is so designed to integrate conservation with the social and economic needs of the local communities. Dobriyal *et.al.* (1997) addresses issues on how traditional knowledge and conservation practices have served as the source of clews for many pharmaceutical innovations but local communities

have not been able to benefit from such indigenous potential. Posey (1990) estimates that less than 0.001 percent of the market value of plant-based medicines have been returned to indigenous peoples from whom much of the original knowledge came. Gadgil (1998) suggests value addition to biodiversity by building capacity of local communities and financial inputs should be organized as a national biodiversity conservation fund, which should be rationally allocated to local communities. Boojh (1992) suggests that the strategy for conservation should aim at the preservation of flora and fauna in their natural habitat in order to ensure and perpetuate their survival and this has helped in cementing the fact that traditional knowledge of management holds true even today. There is a need to preserve these ecosystems using successful traditional management practices appropriately blended with modern management techniques. There has to be a constant effort to raise awareness at all levels of the society, both about policies and legislations, and the need to manage the resources therein on sustainable principles as Misra (1992) has precisely pointed out that the impact of industrialization, modernization and the corresponding exploitative nature of humans on their environment has brought about a drastic effect on the environment and the culture of a society. There is urgent need for fresh thinking in the management of natural resources as there is a lot of concern about the erosion of local knowledge. Gadgil (1998) attributes this to the loss of community control over resources and Gupta (1997) blames it on insensitive state systems, which have taken over the resources. The use of forest resources for industrial development need not be regarded as an unmitigated evil. What must be sought is a right balance, to avoid destruction of forest resources and of tribal life in the name of industrial progress. Therefore, he feels that there is a need to stem the erosion of knowledge which

sometimes is a greater threat than the erosion of resource itself, develop contingent mechanisms among children and young people to keep the knowledge stream flowing, persuade biotechnology and other companies and institutions to develop greater reciprocity towards conservator of biodiversity and strengthen reciprocity amongst the beneficiaries of, and contributors towards green (crop), white (milk) and blue (fish) revolution. The empowerment of local knowledge experts will require building bridges between the excellence in formal and informal science (Gupta 1999). Vohra (1992) elucidates the idea that management of our water resources is inextricably interlinked with that of our land and biotic resources and cannot be understood in isolation. Therefore, he feels that an institutional arrangement should be created which would make it possible for a synoptic and integrated view of their various requirements. He therefore suggests that there is a clear case for transforming the Central Ministry of Water Resources into a Ministry of Natural Resources which would place under one administrative umbrella the various disciplines, agencies and programmes related to water, land and forest management.

OBJECTIVES OF THE STUDY

The objectives of the present study are:

- To study the natural resources management practices in Meghalaya with special reference to forest, land and water.
- To understand the role of traditional institutions in the natural resources management practices.
- To assess the impact of degradation of natural resources on the culture and economy of the people.

METHODOLOGY

"The central activity in anthropological research method is fieldwork" (Ericksen 2004: 43). Intensive fieldwork has been considered for nearly seven decades, to be a major, if not the distinctive, method of social and cultural anthropology, and until recently, the discipline has been concerned primarily with the study of small scale societies, primitive and peasant societies (Srinivas 2002: 1). Franz Boas in America and B. Malinowski in Great Britain set up ethnographic fieldwork tradition in anthropology towards the turn of the twentieth century. Intensive fieldwork, however, has traveled far since Malinowski did his fieldwork in the Trobriand Islands both with regard to the methods and techniques used, and the kind of communities and problems studied. The present study is primarily based on fieldwork in two purposively selected villages; the purpose being to identify villages where natural resources management practices exist but are significantly different.

Data were collected on the basis of household census, interview schedules and observation. In-depth interviews of key informants were also conducted which helped in procuring qualitatively rich data. The question of sampling the respondents did not arise as the researcher covered each and every household within the one village and two hamlets of the other village. The respondents were both men and women from different age, occupation, educational, religious and clan backgrounds. Villagers were generally busy with their work, so with tact and patience I had to wait for an opportune time to interview an individual. Secondary data related to the thesis were collected from various sources like government reports, books and journals, Internet and publications that involved similar studies.

Though the present researcher was an insider to the larger community under study she was an outsider in the villages. Hence, instant acceptance and rapport building were problematic. Therefore, contact was established directly with the headmen of the respective villages through local people. The purpose of the study was explained to them after which the people were generally friendly and cooperative.

The Villages under Study

Fieldwork was conducted in Thad Village, a low-altitude area, which falls under the Ri-Bhoi District and Nongkrem village, a high altitude area which falls under the East Khasi Hills District. People practise wet paddy cultivation in the former and in the latter they practice *bun* cultivation, a modified version of *jhum* cultivation, where plantation is done on raised beds after the initial clearing and burning of the vegetation in a chosen area and is basically a ridge and furrow method which has been developed locally to suit the difficult mountainous hilly terrain and high rainfall conditions of the area. Since the farming systems are very different in the two villages due mainly to different geographical terrains, there are significant differences in the way they manage their resources. The sole purpose of taking the two villages is to be able to contrast and compare the ways and means of natural resource management.

Another important reason for taking the above two districts is also the fact that the International Fund for Agricultural Development (IFAD) in its North Eastern Region Community Resource Management Programme (NERCORMP) project was concentrating its research on natural resource management in the West Khasi Hills and the West Garo Hills districts of Meghalaya. Therefore, the investigator has opted for Ri-Bhoi and East Khasi Hills

so that the data collected by her would not duplicate what the IFAD team was collecting, besides making it possible for her data based on intensive research to be compared with those collected by the international agency. Doing so would also mean a more comprehensive understanding of natural resources management of Meghalaya. However, in 2004 IFAD funded the project titled Meghalaya Rural Development Society in five districts of the State including Ri-Bhoi and East Khasi Hills, yet the two villages under study were not a part of the survey villages of the IFAD project.

The fieldwork for the present study was conducted between 2003 and 2005. The journey to Thad village, which is about 10 kilometres from the National Highway 44, was along the jeepable road for about 3 kilometres. Transportation posed a big problem as there were no vehicles available to reach the village except once in a week, that is, on the market day. If there was heavy downpour then it was very hazardous to travel by car and it was safer to travel on foot. Nongkrem village being quite near the capital of Meghalaya there was no problem of transportation.

CHAPTER II

THE KHASIS: A PROFILE

Introduction

The Khasis live in Meghalaya, a land of undulating hills, rolling grasslands, cascading waterfalls, snaking rivers, terraced slopes and thrilling wildlife. S.K. Chatterjee, a geographer, coined the word "Meghalaya" meaning "abode of the clouds". The name truly depicts the climatic condition of the state where the wettest place in the world is located. The climate of Meghalaya is generally temperate. The Khasi, Garo, and Jaintia tribes had their own kingdoms until the British annexed their land in early 19th century. Until the formation of Meghalaya as a State within the Union of India in 1972 it was divided into two districts – Khasi-Jaintia Hills District and Garo Hills District - under the rule of Assam.

The state has a total area of 22,429 sq. kms. and is located between 20 degree 1`and 26 degree 5` North latitude and 85 degree 49` and 92 degree 52` East latitudes. The altitude varies from 300 to 2000 metres above mean sea level (msl). It has predominantly hilly terrain with foothills as plains and flood-prone areas. It is bounded by the Brahmaputra valley of Assam in the North and Northwest, Cachar area of Assam in East and Bangladesh in the South and partly in the Southwest. It has about 496 kms. of international border with Bangladesh. Shillong, the capital of Meghalaya, was also the summer capital of undivided Assam from 1874 till January 1974. Shillong is located at an altitude of 1496 metres above sea level. The state has a population of 2,318,822 persons (Census of India 2001). The principal languages in the State are Khasi and Garo with English as the official language. The

State has a unicameral legislature consisting of 60 members (29 Khasi hills, 7 Jaintia Hills, and 24 Garo hills). In addition there are three Autonomous District Councils in the state, namely, Khasi Hills Autonomous District Council, Jaintia Hills Autonomous District Council and Garo Hills Autonomous District Council. These councils function in accordance with the provisions laid down in the Sixth Schedule of the Constitution of India. These councils have executive, legislative and judiciary wings and are under the control of the Governor of the State. Meghalaya sends three members to the Indian national parliament: one to the Rajya Sabha (upper house) and two to the Lok Sabha (lower house).

Physiographically, Meghalaya can be divided into three distinct geographical zones. They are the northern slopes, the central upland and the southern slopes. These three broad zones display different geographical characteristics, which are also manifested in the economic activities and socio-cultural life of the people. The highest part of Meghalaya is in the Khasi hills with Shillong peak at an elevation of 1961 metres while the lowest altitude is found in the southern and northern slopes bordering Bangladesh and Assam respectively (Syiemlieh 2003).

The population of Meghalaya is predominantly tribal. The main tribes are Khasi and Garo besides other plains tribes such as Koch, Rabha, Bodo, Baite, etc. The Khasis are also called the Hynniewtrep and are mainly divided into five groups namely Khynriam, War, Bhoi, Lyngngam and Pnar. Marwein (1987) says that Khasis are known sometimes by different names at different places. Khongsdier (1991) points out that the people have so far treated the Khynriam, Pnar, Bhoi and War as constituents of the same tribe called Khasi. Khasis inhabit the central upland of the Khasi Hills, Jaintias or Pnars occupy the Jaintia Hills, Bhois are

found in the low hills to the north and north-east of the Khasi Hills, Wars inhabiting the southern slopes of the Khasi Hills and Lyngngams living in the western portion of the Khasi Hills. They all speak a Mon-Khmer language that belongs to the Austro-Asiatic family (Das 1987) and have been indigenous in these hills for a long time. The various sub-tribes speak different dialects of the Khasi language and their *lingua franca* is based on the dialect of the Khasis of Sohra (better known as Cherrapunjee). The Garos are also an indigenous population of Meghalaya. They are also called Achik. Khasi and Garo are both matrilineal tribes.

Origin

The story about the origin of the Khasis has it that God created 16 families of them called *Ki Khad-hynriew Trep* (The Sixteen Huts). In the beginning they shuttled at will between heaven and earth. They talk of *Ka Jingkieng Ksiar* (A Golden Ladder) helping them in their downward and upward journey every morning and evening. Their landing ground on earth was Mt. Sohpet Bneng (Navel of Heaven), a mountain of magnificent grandeur on the eastern side of the Shillong-Guwahati Road (about 15 kilometres from Shillong).

According to a legend seven of the sixteen families wanted to remain on earth. God granted them their wish. They would not hear Him speak to them as before but would know His will, if they honestly sought it, in such forms as He might choose to reveal and manifest. The golden ladder symbolises the most precious possession the Seven Huts had gained but had lost *Mynsiem Ksiar* (Golden Soul). The seven families staying on earth are known as *Ki Hynniew Trep* (The Seven Huts). They were the first ancestors of the people now known as the Khasis (Khynriams), Pnars (Jaintias, Syntengs), Wars, Bhois and Lyngngams.

They proudly say that God Himself gave them this land. That is why their land tenure system does not permit their ruler, be he called a *Syiem* (King), a *Lyngdoh* (Priest), or a *Daloi* (Patriarch) etc. to levy any land revenue.

Physical Characteristics

From the anthropological point of view, the Khasis (or Khynriam, Pnar, Bhoi, War, and Lyngngam) belong to the Indo-Mongoloid group of the Mongoloid stock (Das 1981). Haddon (1929) describes the physical features of the Khasi as Asiatic Xenthoderm, having cephalic index of 78.6, nasal index of 86.00 and stature 1.569 m. They are usually short in stature, with bodies well nourished, and the males are extremely muscular (Gurdon 1990).

Demography

According to 2001 census, Meghalaya has a population of 2,318,822 of which 1,176,087 are males and 1,142,735 are females. The density per square kilometre is 103 with a sex ratio of 972 females per thousand males. The district-wise population breakup is as follows:

Table No. 2.1: Demographic Profile of the Districts of Meghalaya

District	**Headquarters**	**Area** (Sq. Km)	**Population**
1. Jaintia Hills District	Jowai	3819	2,99,108
2. East Khasi Hills District	Shillong	2820	6,60,923.
3. Ri Bhoi District	Nongpoh	2376	1,92,790
4. West Khasi Hills District	Nongstoin	5247	2,96,049
5. East Garo Hills District	Williamnagar	2603	2,50,582
6. West Garo Hills District	Tura	3715	5,18,390
7. South Garo Hills District	Baghmara	1849	1,00,980
Meghalaya		**22,429**	**23,18,822**

Source: Census of India, 2001.

Climate

The State is directly influenced by the south-west monsoon and north-eastern winter winds. The region experiences tropical monsoon climate that varies from western to eastern parts of the plateau. The Garo Hills districts have tropical climate characterized by high rainfall and humidity, generally warm summer and moderately cold winter. The Khasi and Jaintia Hills have high rainfall, moderately warm summer and severe winter with periodic depression below freezing point marked by appearance of ground frost at night and morning over higher elevated areas. The lower elevated areas experience fairly high temperature for most part of the year having a mean maximum of 23 to 26° and a mean minimum of 12 to 17° C. The mean summer temperature is 26°C and the mean winter temperature is 9° C and at times goes down as low as the freezing point (Marwein 1987). The mean annual rainfall varies from 2000 to 4000 mm with most rainfall concentrated from May to September. The climate of

Meghalaya plateau is influenced by elevation and distribution of physical relief. On the basis of weather condition, the Meghalaya plateau has 4 distinct seasons. They are: rainy season from May to early October, cool season from early October to November, cold season from December to February, and warm or hot season from March to April.

Occupation

The main occupation of the people is agriculture. The major agricultural products include paddy, areca nut, bay leaf, ginger, turmeric, broom-stick, etc. Those who do not possess land work as daily wage labourers. Some people are also engaged in business and services and some in trade and commerce.

Religion

Khasis are monotheistic. Many authors (Mawrie 1981, Marwein 1987, Gurdon 1990, Bareh 1997) call the Khasi religion animistic. To a Khasi, religion is a personal contract between man and God. The Khasis believe in one Supreme God whom they call *U Blei Nongthaw* or *U Blei Nongpynlong* (Creator-dispenser) (Marwein 1987). The deity is also occasionally addressed as *Ka Blei* (Goddess), which is not surprising in the matrilineal society of the Khasis. Minor deities include *U Lei Long Iing* who is the household deity and *U Ryngkew-U Basa* and *U-Phan-U Kyrpad* are venerated as village deities. They believe in a Supreme Being, the Creator *U Blei Nongbuh Nongthaw* who is omnipotent, omnipresent and omniscient. Accordingly, they hold it a sacrilege to symbolise Him or picture Him in any shape or form. God's three commandments, according to this religion, are:

1) *Kamai ia ka Hok,* which literally means "earn righteousness".

2) *Tip Briew -Tip Blei,* which literally translates as "Know man, Know God".

3) *Tip-Kur Tip Kha,* which means "know one's maternal relations and paternal relations".

Khasis perform various rituals and ceremonies to propitiate their ancestors and also to venerate their spirits. It is they who protect their descendants as long as they lead good lives and after death it is the hope of everyone to be able to join them in the house of God. They have their institution of priesthood. In respect of the some special ceremonials or of state religious functions, the services of the priests called *U Lyngdoh* are sought, but in cases of illness, those of *U Nongkha* (Diviner) or *U Nongknia* (Sacrificer) are looked for. Sacrificing animals such as fowls, pigs, cows, goats and breaking eggs are the part of the rituals to offer thanks-giving to God (Marwein 1987).

With the establishment of British rule, Christian missions began their work in the hills about 1841. In the Jaintia Hills work of the Christian missionaries started about a decade later. In both the Khasi and Jaintia hills, the Presbyterian Mission from Wales carried out the mission work. The Roman Catholics started their work about half a century later. The Christians now form a major chunk of the population of the state with an overall percentage of 70 (Census of India 2001).

Social Milieu

The Khasi society is characterized by matriliny. Monogamy is the general practice of the people. Nakane (1967) states that the core of the family comprises two persons – the maternal uncle who holds the authority and the youngest daughter who owns the property. Women are

accorded respect not only as those through whom the race or more precisely the clan is propagated but also in recognition of the fact that their commitments as mother and wife are a full time occupation. Responsibilities relating to regulation of the family are entrusted to men. Descent is traced through the mother, but the father plays an important role in the life of the family. In Khasi society, the woman looks after home and hearth, the man finds the means to support the family, and the maternal uncle settles all social and religious matters. Therefore, *Ka Iawbei* (progenitress), *U Suidnia* (representing maternal uncle) and *U Thawlang* (of the paternal ancestry) are revered.

Among Khasis, household responsibilities are shared between the maternal uncle and the father. The father earns for his own wife and children but in matters affecting the clan or the family, such as the arrangement of marriages, management of ancestral property and performance of religious duties, it is the uncle who makes the decisions though generally in consultation with other members of the family. Thus, there is virtually a three-fold division of family responsibility: the mother looks after the hearth and home, the father provides all that is necessary for the maintenance of his wife and children and the uncle attends to the business affairs that come before the family. A man does not forego membership of his own clan after marriage. His position in his wife's house is that of 'being in it, but not of it'. The impact of modernisation and of other cultures has no doubt eroded the maternal uncle's authority but by and large the convention is still honoured.

In Khasi society, a man is isolated from his wife and children in such social matters as the arrangement of marriages, management of ancestral property and performance of religious duties. However, in recent times, as stated earlier, the father has a more definitive role to play

with regard to these matters. In non-Christian families, even in death, his bones must not lie with those of his wife and children. It must be deposited in a separate ossuary with those of his maternal relations. In well-organized families, the duties of the father and those of the uncle are clearly defined. Troubles, if and when they arise, are caused by intrusion of one into the other's sphere. This isolation of the husband from the wife's family is carried to a great length among Pnars, especially in orthodox families. Gurdon (1990) reported of the presence of the practice of the 'visiting husband' among them. Mawrie (1981) says that traces of it can still be found among the Pnars. Often the husband may only be at his wife's home during the night. By morning he is back to his maternal home for it is there alone he can act freely. In Khasi matriliny, the identity of the man being important at the same time as a father and as an uncle was all right when the matrilineal system was strictly adhered to. He is uncle to his nieces and nephews and works for them and their well being, and a father to his children. The changes that started more than a hundred years ago have seriously affected the system. At present "He is a man in two worlds" (Nakane 1967: 137, Mawrie 1981: 67) – the world of his family where he is the father and the world of the family where he is the uncle. His position and authority as the *kni* has climbed down rapidly and, as things stand, he is a man of divided loyalties (Holy 1986).

Khasis practise clan exogamy. Clans are strictly exogamous and this rule is observed by both Christian and non-Christian Khasis (Cantlie 1974, DasGupta 1984). If this rule is violated, which is rare the couple is ostracized from the clan and society and is considered as *Shong-Sang*, the greatest sin a Khasi can commit, which is believed to bring the wrath of the gods. Marriage with maternal uncle's daughter or father's sister's daughter is also prohibited

(Gurdon 1990). However, marriage with maternal uncle's daughter is not theoretically forbidden, especially after the death of the maternal uncle (DasGupta 1984). But no Khasi woman can marry any brother of her father or any son of her brothers. Otherwise she is believed to have committed another unpardonable sin known as *ka sang synkhen kha*. Thirdly, a Khasi woman cannot marry a son of her father's brothers, otherwise she commits another unpardonable sin known as *ka sansohpet kha*. Finally, a Khasi woman cannot marry her maternal nephew of her father so long as her own father is alive. There is a saying that nobody can give back the heart and bread of her father to his own clan. She can, however, marry any person whom she considers as *shibakha* (cross cousin) after the third generation.

Marriage involves the families of the bride as well as groom and is held along with celebrations and festivities, and is mainly initiated by the bride's family. Rings or betel nut are exchanged between the bride and the groom to complete the union. The groom then comes and lives in the bride's house. They remain there if he marries the youngest daughter but if he is married to the other daughters they set up a separate house of their own after a few months of marriage. The children belong to the mother and they take their surname from her and belong to the family of the mother. Nuclear type of family is prevalent, but the youngest daughter along with her family stays in the ancestral house with her parents and unmarried uncles, brothers and sisters.

In Khasi society the birth of a son and a daughter is equally welcomed even though they prefer girls for fulfilling the role of matriliny like transmission of property, expansion of lineage and looking after the parents in their old age. They believe that the birth of a child is a

gift from God. So, in olden days, women gave birth till the end of her fertility period. Now, some of them have accepted family planning.

In the past, scholars, missionaries and administrators alike have been confused between matriarchy and matriliny among Khasis. The confusion was more prevalent among the earlier writers for instance, Gurdon (1990: 76-78) wrote that Khasis were "a people who observe the matriarchate". Kharshiing (1988: 88) then declared that "the one great confusion that has persisted about the Khasis is that they are a matriarchal society; they are not so, they are very much matrilineal... It is a beautiful and correct observation on one of the basic structures of a Khasi way of life... not matriarchal but a matrilineal society..."

Separation and Divorce

The *raison d'etre* of a Khasi marriage appears to be the begetting of offsprings for the purpose of continuity of the race because barrenness and sterility justify separation and divorce (Gurdon 1990: 79). It also plays an important part in the system of kinship and can be initiated by any one of the parties concerned. For infertility, adultery, and incompatibility, separation can be obtained. However separations are seldom dragged to the courts; all they do is they leave each other and the husband returns to his mother's house. Re-marriage of widows, widowers and divorcees are recognized in Khasi customary laws, but in case of the death of a spouse, a minimum period of one year is generally allowed to pass before remarriage takes place. Marriage within a year of the husband's death is not considered proper and is seen as an act of fornication (*Klim*) (Bareh 1997). Customary laws do not allow a man to divorce his wife during pregnancy; he must wait till she delivers (Kharakor 1988: 50).

Rules of Inheritance

Khasis follow matrilineal system of inheritance of the ultimo-geniture type, whereby only the youngest daughter or *Ka Khadduh* is eligible to inherit the ancestral property. If *Ka Khadduh* dies without any daughter surviving her, her next elder sister inherits the ancestral property, and after her, the youngest daughter of that sister. Failing all daughters and their female issues, the property goes back to the mother's sister, mother's sister's daughter and so on. If there is no female successor to the property, a daughter may be adopted from the mother's kin group (Natarajan 1977). *Ka Khadduh's* property is actually the ancestral property and so if she wants to dispose it off, she must obtain consent and approval of uncles and brothers. Among the War-Khasis, however, property passes to the children, male or female, in equal shares but among the War-Jaintias, only the female children get the inheritance (Cantlie 1974, DasGupta 1984, Gurdon 1990, Bareh 1997).

Property in Khasi society is mainly of two types, viz., ancestral property or *Nongtymmen,* which Khongphai (1970: 13) defines as "the property one inherits from one's parents or grandparents" and acquired or personal property or *Nongkhynraw Nongkhynraw* or "the one which one earns while living or earning alone," i.e., before marriage (Khongphai 1970: 13). Some of the important Khasi concepts are *Kamai iingkur* or "property one acquires while living with his mother, brother and sister...or property belonging to his mother, that is to his clan" (Kharakor 1988: 103) and *Kamai iing khun iing tnga* consists of the "property one acquires after marriage" (Chattopadhyay 1985: 131). The latter consists of the property earned by the present members of the family. In case of inheritance, however, both are taken together. The *khadduh* acts as the custodian of the ancestral property and has to act according

to the wishes of all the members of the family. She is therefore a custodian rather than the owner of the family property and is instrumental in binding all her kins and she holds the property because she holds the religion of the family (Mawrie 1981). The sisters and brothers of the *khadduh* are known as *Nongmih-ing,* as they are supposed to move out of the house when they get married. They set up separate households and earn their livelihood independently. The ancestral house or *Ing-Kmie* being inherited by the youngest daughter enjoins upon her the obligation to act as keeper of the house. She is required to look after the family, her aged parents and to support her brothers and sisters in times of difficulties and distress. "The *khadduh* judges and arbitrates over whom to pull up and whom to give necessary help" (Mawrie 1981: 58).

The status of the youngest daughter is of special importance. She is the embodiment of everything that is enduring and sacred in the Khasi concept of family. Her house is called *Ing-Khadduh*, which has special sanctity. This is the ancestral house of generations of youngest daughters, which provides refuge or shelter for the indigent members of her family and also looks after their improvement. This undoubtedly accounts for the rarity of beggars in the Khasi society. As long as a man remains unmarried, he stays in his parents' house and contributes whatever he earns to the common fund. According to custom, the earning of a man before his marriage goes to his family, which later becomes part of the ancestral property. In spite of the high position of Khasi women, men too have their roles. They are not only sons, but also maternal uncles of their sisters' children, and act as counselors and guardians of their nephews and nieces. In their wives' houses, Khasi men are both husbands and fathers who bring up and provide for their children, their mother and sisters who are duly

respected as *Meikha* and *Kha*. A unique system prevails in the War area where equal shares are made amongst brothers and sisters. But the youngest daughter has the position of *Ka Nongri Iing* (keeper of the house) and in addition looks after *Ri Shyieng* (family lands). The eldest son is actually the manager and to him is given the lion's share of the property called *Ri Nongsaid,* as he has the position of *U Nongsaid* (Solicitor).

The issue of inheritance is one area where people are still very susceptible. The "special status" of *ka khadduh* as inheritress of "the lion's share" of the property has gradually helped her emerge as the heiress, and her image as the custodian is fading into the past. Today, however, many parents share the property with all daughters, and some even among sons.

Megalithic Culture

Khasis have a rich megalithic culture. The Khasi megaliths may broadly be classified into two categories - monumental stones and ossuaries (Bareh 1997). The common monumental stone consists of three menhirs in a group with a dolmen, but if the menhirs vary to five, seven, or nine, more than one dolmen are associated. While menhirs represent men, dolmens stand for women. The next type conforms to a square sarcophagus forming an ossuary where the bones of the dead are kept inside earthenware or a stone urn. Vertical and flat stones serve as wayside seats at important trading centres; stones were also raised as foundations of markets and ancient places of settlement. They have a multifarious significance being set up as covenants among contracting parties, being connected with feasts, whereas some serve as

boundary marks and serve as obelisks. Majority of Khasi megaliths are associated with funeral ceremonies, hence representing memorials of the dead.

Mineral Resources

Meghalaya has abundant natural resources, including coal, limestone, kaolin, feldspar, quartz, mica, gypsum, bauxite, etc. Its sillimanite deposits (a source of high-grade ceramic clay) are reputedly the best in the world and account for almost all of India's sillimanite output. Meghalaya has no heavy industries. Small-scale industries include cement, plywood, and beverage factories, in addition to a newly established electronics plant. Internal communications are poor and many areas remain isolated. There are no railways in Meghalaya. A national highway runs through the State from Guwahati (Assam) in the north to Karimganj (Assam) in the south. The only airport in the state is located at Umroi, 31 kms from Shillong.

Flora

81% of the population of the state live in the rural areas and are dependent on agriculture for livelihood. Besides the major food crops of rice and maize, the State is also renowned for its horticultural crops like orange, lemon, pineapple, guava, litchi, banana, jack fruits and temperate fruits such as plum, pear, and peach. Potato, ginger, turmeric, black pepper, areca nut, bay leaves, betelvine, short-staple cotton, jute, mesta, mustard and rapeseed etc. are some of the important cash crops in the State. Apart from the above the State has achieved success in the cultivation of non-traditional crops like tea, cashew nut, oilseeds, tomato, mushroom,

and wheat. New emphasis is laid on pulses, oilseeds and cash crops. Besides agriculture, the allied activities of fishery, livestock, piggery, poultry and sericulture have immense potential and strength. The State's natural resources include diverse, dense, endemic and cultivated exotic flora, ranging from tropical and sub-tropical to temperate or near temperate kind, sustained by heavy and long rains. The total forest area in the State is 9,496 sq. kms of which only 722.96 sq. kms are under the control of the State Forest Department. The remaining areas are under the direct/indirect control of the district councils in the State. The reserved forests are managed under the prescription of the 'Working Plans' prepared by the State Forest Department and the Protected Forests are managed for the preservation of the catchment areas of water resources (Sengupta and Paul 2007). State owned forest lands account for 12 percent of the total forest area and contains some of the best forests (Dasgupta and Syiemlieh 2006: 47).

However, a very unique and fascinating feature of these hills is the presence of community forests and sacred groves, which are a part of the culture and legacy of Khasis. The scared groves of Meghalaya largely fall under the temperate type and due to ecological succession it represents the floral relic of the area evolved through millions of years. These are rich storehouses of vegetation wealth incomparable to any other type of forests in the State. These isolated pockets are untouched due to the religious beliefs and myths associated with them. Many of the endangered species of the State are presently confined to these pockets only. *Fagacaea* members dominate over others in these sacred forests. *Epiphytic* flora is quite abundant and is dominated by ferns and orchids. In Meghalaya, 40 endemic species out of 115 plant species from 67 families are threatened with extinction and 6 species are

endangered. 30 types of orchids are currently threatened (Shreeranjan 2001). The State is rich in species of flora and varies from open scrub (grassland) to pine forest in the central plateau region. The rest is covered by mostly deciduous to evergreen forests and transitional tropical moist deciduous pine forests.

Thus the forests of Meghalaya are a treasure house of valuable products such as timber, fuelwood, fodder, resin, tannin, gums, shellac, fiber, latex, essential oils, fats, edible fruits, honey and a large number of medicinal plants, bamboo, reed, broomstick, cane, ipecac, cinnamon and thatch grass. Azaleas and rhododendrons grow wild in the forests of Khasi Hills and Jaintia Hills and many kinds of beautiful orchids are found in the woods. The principal timber species are sal, teak, titachap, gomari, bol, pine birch and makri-sal. Meghalaya is well known for bay leaves and cinnamon. *Morus alba*, *Quercus semiserrata* and a number of other tree species play a vital role in the economy of the State, being the host plants for rearing of silk worms for sericulture. Many rare and interesting plants are also found endemic to the State like wild citrus and pygmy lily.

Fauna

Meghalaya is a paradise for botanists for its rich concentration of interesting and valuable flora. It is also no less a happy hunting ground for zoologists for its interesting, rare and diverse faunal wealth. It is considered by many biologists to have been the gateway through which many species of Indo-Chinese origin, particularly mammals migrated to Peninsular India. It is said that about 50% of the total number of mammal genera found in the entire Indian sub-continent can be seen in Meghalaya and its adjoining states in Northeast. Out of

the above, nine genera of mammals, such as Tupaia, Rhizomys, Cannomys, Chiropodomys, Micromys etc occur only in Meghalaya and its adjacent areas. Some of the most interesting animals found in Meghalaya are: Hoolock - the only tailless ape in India, Golden Cat, Leopard Cat, Jungle Cat, Large Indian Civet, Binturong or Bear Cat, Himalayan Black Bear, Barking Deer, and Pangolin.

In the forests of Meghalaya, especially in lower altitudes, multifarious species of birds can be seen in abundance. Some of the common birds are: Hoopoe, Long tailed Broadbill, Scarlet Minivet, Burmese Roller, Blue-throated Barbet, Red-vented Bulbul, Himalayan Black Bulbul, Himalayan Whistling Thrush, Spotted Forktail, Black-breasted Kalij Pheasant, Red Jungle Fowl, Jungle Mynas, Hill Mynas etc. Besides, hornbills including the Great Indian hornbill, florican, owl, black drongo and many other birds are also found. Reptile population in Meghalaya includes lizards and snakes, poisonous and non-poisonous. Important ones are: Indian Cobra, King Cobra, Coral Snake, Vipers, Python, Blind Snake, Copperhead, Red-necked Kulback and Green Tree Racer. Besides mammals, birds and reptiles, Meghalaya has a number of amphibians and fishes and insects. Amphibians like frogs, toads and fishes like rohu, mrigal, kalibaus, puti and many more of hill stream variety are found abundantly in Meghalaya. Among the insect population ants, flies, bees, beetles are common. Meghalaya's butterflies are world famous, among which are Blue Peacock, Karserhed, Orange Oak Leaf, Dipper, and the Bhutan Glory. It is for this exquisitely diverse, rare and wonderful animal life that Meghalaya is called a veritable nature's wonderland. The State has two national parks, viz, Nokrek and Balpakram and two wildlife sanctuaries, viz, Nongkhyllem and Siju.

Food

The staple food of the people is rice. They also take fish and meat. They have now begun to consume milk and milk products. Vegetables, roots and tubers also form a part of their diet. Common vegetables include onion, potato, brinjal, pumpkin, gourd, plantain flowers, yam, arum, cucumber, tomato, pulses like lentil and different types of beans. Different types of leafy vegetables, mushroom and bamboo shoots are collected from the jungles and consumed during the rainy season (April to September). It may be noted that nowadays, tea is another important ingredient of the breakfast and tiffin (DasGupta 1984).

Political Organization

Democratic values are deeply embedded in Khasi social life (Mawrie 1981). The Bhois fall under the jurisdiction of the Syiem of Mylliem and the Khasis of Nongkrem under the Syiem of Hima Khyriem. The villages have their own *Dorbar Shnong* (Village Assemblies) headed by the *Rangbah Shnong* or the village headman who is assisted by an executive committee of elected elder members of the village. The *Rangbah Shnong* is elected by the village assembly. A number of villages together form a *Raid* headed by the *Basan Raid* who is an elected leader known by different names such as *Lyngdoh* in the Bhoi and War areas, and *Doloi* among the Pnas (Jaintias). The *Raids* constitute their own *Dorbar Raid.* "This system forms the basic foundation of Khasi democracy" (Mawrie 1981: 91). The *Rangbah Shnong* and his *Dorbar* decide upon all matters pertaining to the village. The people choose their own village headmen and elders and these look after judicial and administrative affairs of the village.

The institution of local government has been one of the pillars of Indian administrative system, particularly in the frontier areas. This practice of self-governance is centuries old in the Khasi Hills. Khasis managed their essential social, economic and political affairs through their *Syiems* (Chiefs) on the basis of popular will and consent, freely expressed, for ages (Bhattacharya 1980).

The *Syiem* is the head of the estate and runs his day-to-day administration with his cabinet whose functions extend to the administration of markets, collection of judicial fines, etc. He takes up judicial cases from various units and villages in which he acts as a judge and his council as a jury according to the powers, which the District Council has entrusted. In the past the *Syiem* and his council determined foreign relations. According to a tradition, a *Syiem* should be proficient enough to carry out the administration in the interest of the people for whom he and his Deputy Syiem were to receive adequate training in the art of administration. No provision was ever made in the estate budget for his maintenance. A *Syiem* is succeeded by his nephew or grand-nephew or by his own brother. This rule prevails in appointments to all offices in his estate. Women are the custodians of ancestral property, but are not entitled to succeed to the office of chieftains (except temporarily in the absence of a legitimate male to hold the office). However there is a *Syiem-Sad*, a mother, maternal aunt or sister of a *Syiem* who is regarded as the official custodian of the estate ceremonies (Bareh 1997).

Khasis have 25 existing estates, 16 of which are known as Syiemships, one is a Wahadadarship (*Wahadadar* seems to be derived from Arabic *uh-dadar* which means civil official), 3 are *Lyngdoh*ships (*Lyngdoh* means priest, *Lyngdoh Nongsynshar* means Priestly King) and 6 *Sirdar*ship (Village Chief or Elder). Other non-estates (called 'British areas' in

the erstwhile administration) comprise 32 villages in Khasi Hills District. *Doloi*ships (*Doloi* in Tibetan is associated with a religious shrine, a usage adopted by the Ahoms to re-designate the highest officers in the State and perhaps imitated by the Jaiñtias.). All these offices are highly elective (Syiemlieh 2003).

One of the important features of the Khasi-Jaiñtia polity and the core element of their democratic set up is *dorbar* through which the entire population participate in moulding policies, and taking legislative and judicial decisions. The hierarchy of *dorbar*s is as follows: *Dorbar Hima Pyllun* which is at the highest or Syiem's level, *Dorbar Hima* which stands at the level below that, *Dorbar ki Shnong,* a *dorbar* of villages next and finally *Dorbar Shnong,* a village durbar. In *Dorbar Hima Pyllun* all the population of the estate participate. In *Dorbar ki Shnong,* in view of the difficulties in organising such a vast gathering, only male residents, especially village delegates, local officials, and heads of clans participate. At the district level there is a *Dorbar Raij* (commune) whose composition varies from place to place. In the *dorbar*s the matters discussed and debated range from petty issues to political, social, economic and environmental affairs pertaining to the area under its control. *Dorbar*s are usually held in the open and constitute typical open-door councils. The councillors sit in concentric rows. The counting of heads, which is always preferred to raising of hands, usually indicates voting. Women are excluded from such sessions but in some places they are allowed to listen to the debates as observers. It is considered as a divine agency and a strict rule of conduct and verbal engagement is observed. Anyone who violates the rules and strict code of conduct is excommunicated and may even lose his 'citizenship'. A *dorbar* is generally known

as *Ka Dorbar ki Blei* meaning the *Dorbar* of Gods, which has been a strong foundation of the society in the Khasi-Jaiñtia Hills.

Market

The people have periodical markets for sale of articles available in their respective areas, inspite of having permanent markets. These weekly markets are localized and the people in the neighbouring areas come to participate either as vendors or buyers. It provides the villagers with the opportunity to sell their products and to purchase those they need. In the market two kinds of commodities enter, i.e., general-purpose commodities produced inside the region and special-purpose commodities brought from outside the region. Among the former mention may be made of rice, corn, oil, earthenware, baskets, leafmats, vegetables, ropes, etc. and the latter include mill cloth, tailored garments, mirrors, cosmetics, etc (Vidyarthi and Rai 1985). Traders from different villages and towns flock to sell their products and merchandise. The villages falling in a radius of 20-30 kms have each a fixed separate weekly market place. These weekly markets play an important role in the life of the people. The market brings together people from different adjoining villages not only for economic but also for social and religious activities. The market is the most powerful channel of communication in the tribal region. Any announcement of community interest may be broadcast there and it will get relayed all over the area immediately (Vidyarthi and Rai 1985). It has obtained a place in the social organization of the people and proves to be a meeting place of kinsmen and friends from neighbouring villages.

Thad Village

The area covered by the undulating hills sloping down north from the Shillong plateau in Meghalaya and tailing off into the Brahmaputra valley is known as the Bhoi area. These hills are interspersed with rich narrow alluvium valleys that are famous for rice cultivation. It is in this area that the village Thad is located. It is inhabited by the Bhoi Khasis.

Thad falls under the Umsning Community Development Block and under the Mawhati Assembly Constituency. To reach the village a person has to take the Mawhati (*Jaggi)* road from Umsning that leads to Mawhati and further down to Assam. The village has two schools that cater to the needs of education. A government deficit Lower Primary School functioning from nursery to class IV, and a village supported school from class V to class VII are there. For classes VIII onwards the students go to schools outside the village. They often opt for schools situated in Umsning, which is much nearer to them than traveling to Shillong.

Majority of the village population belongs to Christian faith. There are three denominations of Christianity in the village - Presbyterian, Church of God and Catholic. Of the three, according to the census conducted by me, majority of the people belong to the Presbyterian denomination. The most likely reason for this is that this was the first church established in the village. There seems to be a demarcation of settlements based on religion. Most Presbyterians live close-by and cluster together in the main village known as Shnong Heh which consists of localities called Jronglum, Current, Lum Myrsiang and Lum Rngi. The Catholics and the people belonging to the Church of God live in localities surrounding Shnong Heh or in localities known as Shiliang Um, Kseh, Makri, and Lum Sohsai. There are, however, exceptions to this broad pattern. People of the village are very religious and they

attend the church services regularly. A locality known as Lumsuna is the area where the people belonging to the Khasi indigenous religion are found. However they are assimilated with the Christian way of life. The people in the village belonging to the indigenous faith do not perform any life cycle rituals. When a person dies he or she is buried in the graveyard specially allotted to them by the village.

Nongkrem Village

Nongkrem is one of the important villages falling under the East Khasi Hills District. It is a very big village and includes 8 hamlets, namely, Mawmuthoh, Nongkyndong, Ur-Masi-U-Joh, Rngi Kseh, Warbah, Kharbuli, Mawlynnei, Mawpynthaw, Iew Pomtiah, Kynton U Mon and Lamlyer.

Fieldwork for the present study was conducted among the Khasis in the hamlets of Mawmuthoh and Nongkyndong of Nongkrem village under the Khyrim Syiemship. It is under the Mawryngkneng Community Development Block, and falls in the Nongkrem Assembly Constituency. It is situated in the outskirts of Shillong, the capital of Meghalaya. Information and data gathered by me by conducting interviews with key informants of the village suggest that there is a wide variation in the socio-economic conditions of the people belonging to the two hamlets. Mawmuthoh is a purely agricultural hamlet and Nongkyndong has a mixed economy with educated and literate people working mostly in both government and private sectors. The purpose behind the choice of these two hamlets was to observe the ways people belonging to different educational and economic backgrounds perceive their environment and their natural resources and how each group manages and conserves them.

The religious affiliation of the villagers varies considerably. They belong to different denominations of Christianity as well as to the indigenous Khasi religion. There is a very strong presence of the Khasi indigenous religion in the village, which holds three phases in life very dear and significant to their faith - birth, marriage and death. Khasis belonging to this religion in the village perform elaborate ceremonies, rituals and rites either to celebrate the joys of life or mourn the death of the people there.

Being a semi-urban area and in close proximity to Shillong, Nongkrem is comparatively more developed than Thad village. It has a number of schools at the primary level and one government deficit upper primary school. The teachers are generally from Shillong town with a few exceptions from the village itself. A well-established commercial market complex is established, where all basic amenities are available with shops providing modern attires too. A majority of the people are government employees, businessmen and local traders. Very few people practise agriculture, except in a few hamlets that are situated at a relative distance from the main hamlets.

CHAPTER III

LAND RESOURCE MANAGEMENT PRACTICES

Land is crucial for the economic, social, and cultural advancement of all concerned. Although it is part of man's natural heritage, access to land is controlled by ownership patterns. Land is partitioned for administrative and economic purposes, and it is used and transformed in myriad ways. More recently, the need for thoughtful and careful stewardship of the land, together with the more intensive use and management of its resources, has emerged as a matter of major concern.

This chapter deals with all the aspects of land ownership patterns, land utilization, soil conservation and records information on maintenance system and technologies which have been used traditionally as well as presently in two purposively selected villages of Meghalaya, with a view of comparing and analyzing how the land management systems differ, if at all, in operation and whether due to this there is a significant impact on the overall natural resources availability on the two villages.

Land, water, air and light are the natural endowments that are vital for existence of life. According to the FAO (1995), "Land is a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface including those of the near-surface climate the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes, and swamps), the near-surface sedimentary layers and associated groundwater reserve, the plant and animal populations, the human settlement

pattern and physical results of past and present human activity (terracing, water storage or drainage structures, roads, buildings, etc.)."

It is the basis for many life support systems, through the production of biomass that provides food, fodder, fibre, fuel, timber and other biotic materials for human use, either directly or through animal husbandry including aquaculture and inland and coastal fishery (the production function). According to FAO (1995) land has the following functions:

- Land is the basis of terrestrial biodiversity by providing the biological habitats and gene reserves for plants, animals and micro-organisms, above and below ground (the biotic environmental function).
- Land and its use are a source and sink of greenhouse gases and form a co-determinant of the global energy balance - reflection, absorption and transformation of radiative energy of the sun, and of the global hydrological cycle (the climate regulative function).
- Land regulates the storage and flow of surface and groundwater resources, and influences their quality (the hydrologic function).
- Land is the storehouse of raw materials and minerals for human use (the storage function).
- Land has a receptive, filtering, buffering and transforming function of hazardous compounds (the waste and pollution control function).
- Land provides the physical basis for human settlements, industrial plants and social activities such as sports and recreation (the living space function).

- Land is a medium to store and protect the evidence of the cultural history of mankind, and a source of information on past climatic conditions and past land uses (the archive or heritage function).
- Land provides space for the transport of people, inputs and produce, and for the movement of plants and animals between discrete areas of natural ecosystems (the connective space function).

The suitability of land for these functions varies greatly over the world. Landscape units, as natural resources units, have dynamism of their own, but human influences affect this dynamism to a great extent, in both space and time. The qualities of the land for one or more functions may be improved (for instance, through erosion control measures), but more often than not land has been or is being degraded by human action (FAO 1995).

Land provides food, fuel, fodder and shelter besides supporting secondary and other economic activities and life supporting systems. It is therefore essential that the land mass be preserved continuously in a manner so that life can be supported eternally on earth. However, there has been a continuous depletion and degradation of land resources. The quality of land is deteriorating due to increasing degradation brought about by various factors. These include soil erosion due to general mismanagement, over grazing, cultivation, large scale deforestation, desertification, water logging, saline and alkaline soil, toxic effects, reckless mining activities, road construction etc. Land, in the holistic sense, is not a fully "renewable" resource. In many senses it is finite natural resource. Components of the land may degrade in their intrinsic quality, or direct economic value, by direct or indirect human action or natural

processes such as climate variability. Degradation of one component, such as through deforestation, may negatively influence one or more of the other components such as soil, water flow or microclimate. Degradation of soil conditions is probably the most widespread and pernicious form of deterioration because it affects a major life-supporting system and its natural recuperation may take centuries. Artificial soil rehabilitation or amelioration is often very expensive. If seriously degraded soils are located in zones of marginal climatic conditions or other low-potential areas, it may instead be preferable to conserve and improve areas of prime agricultural land through judicious intensification (FAO 1995).

Land use and land management practices have a significant impact on how we achieve natural resource targets, work towards sustainable use of natural resources, maintain agricultural productivity and foster prosperous regional communities[1]. In a broader sense land resource management includes land-use planning as agreed between stakeholders – legal, administrative and institutional execution; demarcation on the ground; inspection and control of adherence to the decisions; solving of land tenure issues; settling of water rights; issuing of concessions for plant and animal extraction (timber, fuelwood, charcoal and peat, non-wood products, hunting); promotion of the role of women and [other] disadvantaged groups in agriculture and rural development in the area; and safeguarding of traditional rights of indigenous peoples (FAO 1995). Improved land management that ensures better resource use and promotes long-term sustainability is basic to future food production and to the economic welfare of rural communities. Because of the dynamic aspects of land management, a flexible and adaptive process approach for monitoring the quality and quantity of the world's land

[1] http://www.nlwra.gov.au/national-land-and-water-resources-audit/land-use: 13/09/2009.

resources (such as soil, water, plant nutrients) and for determining how human activities affect these resources is essential (FAO 1997). Sustainable land management means managing land without damaging ecological processes or without reducing biological diversity. It requires the maintenance of the following key components of the environment: biodiversity, the variety of species, populations, habitats and ecosystems, ecological integrity, the general health and resilience of natural life-support systems, including their ability to assimilate wastes and withstand stresses such as climate change and ozone depletion and natural capital: the stock of productive soil, fresh water, forests, clean air, ocean, and other renewable resources that underpin the survival, health and prosperity of human communities. Land is often managed for multiple benefits, such as agricultural production, biodiversity conservation, water quality, soil health and supporting human life[2]. To ensure long-term sustainability, land managers need to consider economic, social and environmental factors. Some management practices place enormous pressures on land, damaging ecosystems, reducing biodiversity and degrading soils and waterways and therefore sustainable land management requires a coordinated approach[3]. Major issues of land management are decline in quality of soils as rooting environments, erosion and loss of topsoil by wind and water, loss of vegetation cover, including woody perennials, acidification, soil fertility decline and plant nutrient depletion, salinity and salinization, particularly in irrigated systems. While many of these processes are natural, their impacts are aggravated by inappropriate management systems and human-induced pressures. The effect of this is to reduce the productive potential

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[2 and 3] http://www.farmpoint.tas.gov.au/farmpoint.nsf/On-farmManagement/96F6AA37A8279A45CA25731B00091FA3: 13/09/2009.

of the land and to reduce its capacity to serve as a natural filter or resilient buffer for other land uses. The common features of a land degradation problem commonly asserted are that erosion and runoff are caused by 'deforestation', 'overgrazing' and 'over-cultivation' (FAO 1997). Sustainable land management means managing land without damaging ecological processes or reducing biological diversity (Osman 2009). It requires the maintenance of the following key components of the environment: *biodiversity*: the variety of species, populations, habitats and ecosystems; *ecological integrity*: the general health and resilience of natural life-support systems, including their ability to assimilate wastes and withstand stresses such as climate change and ozone depletion; and *natural capital*: the stock of productive soil, fresh water, forests, clean air, ocean, and other renewable resources that underpin the survival, health and prosperity of human communities (Wansbrough 1998). Land is often managed for multiple benefits, such as agricultural production, biodiversity conservation, water quality, soil health and supporting human life. To ensure long-term sustainability, land managers need to consider economic, social and environmental factors.

Landownership Pattern

The UNO report on progress in land reform (1970) has given the definition of ownership of land as "the right to use land, together with the right to transfer that right to other. Both of these rights are more or less circumscribed by national or local laws, so that the exact context of 'ownership' varies from society to society".

The pattern of land ownership plays an important role in land use and agricultural planning. An understanding of the land ownership and related laws gives an insight into the

problems faced by the society in implementing agricultural development and land use planning. There are many actual or potential conflicts with respect to land among different owners, claimants, actual land users and otherwise affected persons and communities. Clarification and security of land rights are essential for the success of an integrated approach to the planning and management of land resources. Settling these rights reduces conflicts between stakeholders, increases the confidence required for sustainable land use practices by the actual land cultivators or protectors, determines the respective responsibilities, and provides the basis for a fair and environmentally-sound allocation of incentives, subsidies or taxes. Land tenure may be defined as the terms and conditions on which land is held, used and transacted (FAO 1995).

Landholding in Meghalaya traditionally means operational holdings, as there was no concept of individual ownership under the traditional land ownership system. Land in Meghalaya is a very important resource since 81 per cent of its population is either directly or indirectly dependent on agriculture (Directorate of Economics and Statistics, 2003). The pattern of operational holdings in the State is characterized by the predominance of small and marginal farmers (below 2 ha.) who operate 65 percent of the total cropped area. The table below shows the number and area of operational holdings by different size groups in the State.

Table No 3.1: Landholding Size, Number and Area in Meghalaya

Size Group	Size Class (Ha.)	Number of Holdings	Area (Ha.)	Average size of Holding (Ha.)
1	2	3	4	5
Marginal	Below 1.0 Ha	71502	34770	0.49
Small	1 – 2 Ha	43963	54687	1.24
Semi-Medium	2 – 4 Ha	38938	94172	2.42
Medium	4 – 10 Ha	5755	26963	4.69
Large	10 Ha & above	183	2186	11.95
	Total	160,341	212,778	20.79

Source: www.megagri.gov.in

The form of land ownership and accompanying laws in Meghalaya are quite different from those in other parts of the country. Even within Meghalaya these differ from place to place and from tribe to tribe (Marak 2007). Meghalaya has three tier administrative structure, which influences landownership and management (including forests). At the apex level is the State Government (executive, legislative and judiciary) with constitutional powers to legislate and implement laws in the State. At the next lower level are the Autonomous District Councils (ADCs hereafter), which are also elected by the people and are responsible for administrative matters (including forests) as per the customs and traditions of the three tribes at the district level. At the third level are the traditional institutions at the village or cluster of villages level. Majority of the landownership and transactions is neither recorded nor any cadastral survey has been conducted except in small portion in the plains of West Garo hills (Karna 2005). The land tenure system is influenced by the customary law of the tribal people inhabiting the area and in Meghalaya it is broadly of two types, viz., *ryotwary* and customary. The principle of *ryotwary* system is that the government deals directly with the actual landholder without the intervention of intermediaries. In customary land tenure system, the right to use or to dispose off usufructory right over land depends on whether such rights have

been recognized as legitimate or not by the community. The rules governing the transmission of these rights are usually explicit and generally known to all members of the community (Marak 2007).

The land tenure system (and forest management) in Meghalaya is mainly regulated by the traditional social-political institutions of the tribal groups. Khasis have an elaborate local political structure influencing the control and management of land (Chowdhury 1978, Bareh 1997). In the traditional political system of Khasis each clan has its own council known as *Dorbar Kur*, which is presided over by the clan headman. The council or *dorbar* manages the internal affairs of the clan. The next level is of village, which has a local assembly known as *Dorbar Shnong*, i.e., village *dorbar* or council. It is presided over by the village headman called *Rangbah Shnong*. The inter-village issues are dealt by a political unit known as *Raid*. Raid has its own council, called *Raid Dorbar*, presided over by the elected headman/priests known as *Sirdar/Lyngdoh*s. Next in hierarchy is the supreme political authority known as *Syiem*ship. *Syiem*ship is the congregation of several *Raid*s and is headed by an elected chief known as the *Syiem* (or the King) (Dev *et. al.* 2003).

In Khasi custom, there are many laws related to land and its ownership. Therefore the classification of land ownership is extremely complicated. Haloi (1984) has identified the following four types of land ownership in Khasi hills.

- Private land
- Group land
- Community land, and
- Government land

Private Land

The land over which a single owner or individual family enjoys all the right at will and in no case is subjected to the control of any superior authority is defined as private land. Bareh (1997) says that the owner of this type of land enjoys all the rights over the land. The owner can sell or buy it at will. No owner needs to pay any revenue to any authority. The Land Reform Commission (1974) clarified that the state assembly or any other assembly has no control over the private land except with regard to the settlement of dispute and as when they are brought to the assembly of the village.

The customs related to *Ri Kynti* or private land privilege *Ka-Khadduh* (youngest daughter) with absolute possession of land. If the parents of the family do not have any daughter the family brings *Ka Khadduh* from mother's sister's family. In her absence, the family prefers a cousin daughter from the mother's side. Through *Pynbem* (a land distribution ceremony) land is distributed amongst the sisters of the family. The mother with an uncle or a brother living in her house, or with husband or alone may apportion the land among her children. In case of her mother's death before apportioning the land, the *Ka-Khadduh* by herself cannot dispose off the property. And when the mother is no longer alive, *Ka-Khadduh* as the custodian of the ancestral property is to be assisted by her elder sisters or brothers in its management. A purchased plot of land also becomes an ancestral property of the family just after one or two generations.

Group Land

The land over which the owner's right, especially transferable right, is subjected to the control of a group, can be defined as group land. The group may consist of a branch of a clan or a group of clans. The members of each and every group are the owners of the land. Each and every group has its own *dorbar* (assembly). As described by Chowdhury (1978), all members of the concerned group enjoy user right, occupancy right and heritable right at will over the land but no one is entitled to sell the land individually. According to the Land Reforms Commission (1974), the right of transfer rests upon the decision of the concerned assembly or group.

Community Land

The community land cannot be transferred by the user or even by the community assembly. All other rights pertaining to the land are subjected to the control of the community assembly. A community may consist of one clan or more than one clan. It may cover a single village or many villages. Each and every member of the community can enjoy user-right, occupancy right and sometimes even heritable right, but only after having the approval of *Raid-Dorbar* or community assembly. *Raid-Dorbar* has the authority of allocation and distribution of community land. However, it cannot sell community land for it is not transferable. If one fails to use and occupy the land after three consecutive fallow years, then the land automatically goes to the community assembly and the assembly allots user-right and occupancy-right over such lands to others. If the occupant maintains it he can inherit it, but in no case he can enjoy the rights to transfer. According to the Land Reform Commission referred to above, if one has

made permanent improvement through the cultivation of permanent crops and by raising fruit trees or by converting the land into wet paddy fields or by making permanent buildings etc. he may be endowed with transferable rights. Of course a person loses all rights if he leaves the plot or lets it become a jungle growth. The community assembly decides the period after which the property may be treated as having reverted to the community.

Government Land

The community land that has been leased, purchased or acquired under various rules issued from time to time by the government can be defined as government land. According to the rules, the government enjoys all rights over the land. Such land can be of the following types:

- Exchanged land
- Purchased land
- Leased land, and
- Acquired land

As the Khasi Hills and Jaintia Hills districts have not yet been cadastrally surveyed, the government has prepared no record of land ownership. So, it is very difficult to say the actual area under different types of land owned by various authorities in this region. In general, the wet-rice fields, which are permanently cultivated, are basically under private ownership. But, the *jhum* lands can either be under private ownership, group ownership or community ownership. Similarly the forests are under group, community or private ownership. The villagers also have some user-rights over the forests, which are under public ownership.

Gift and Will

Gift appears to be quite in vogue in the two villages under study. Gifts are made in favour of the eldest or the other daughters and in certain instances to the sons as well. All the gifts of land seem to be motivated by a desire to soften the rigours of the custom of female ultimogeniture of Khasi custom. According to Khasi custom the youngest daughter inherits the mother's property. So the other daughters may sometimes undergo difficulties and hardships. A considerate and kind mother, therefore, gifts away a part of her property to the other daughters during her lifetime. No gifts to the youngest daughter are known, which confirms that the mother has always thought of provisions for daughters who would get no share of the inheritance. Will does not exist, but there is a custom of respecting the wishes of the parents or grandparents who sometimes made their verbal wishes as to what should be done regarding their property after their death.

Tenancy

An owner creates tenancy by leasing out his land. Though lease is a form of transfer it has a special significance of its own. Lease is a partial transfer, because only the right of use and occupation is made over to the lessee but the right of re-entry is retained by the lessor. For this partial transfer the lessee has to pay rent periodically and if he fails to do so, the lessor may exercise the right to re-entry.

Rent is, therefore, an important feature of the system of tenancy, and so is the period of lease. The right of re-entry is equally important, as it involves ejection of a tenant. These leases (i.e., agricultural tenancies) are governed by customs and usages or by separate

legislations known as tenancy laws. Rent exacted by the landlords is high. Cash-rent as well as crop-rent are prevalent, but the latter is more prevalent and popular. In crop-rent, the rent is paid in fixed amount of crop or paid as a share of the gross-yield of the crop. In case of sharecropping, in the villages under study, it is observed that 1/3 rd share goes to the landlord and 2/3rd share to the tenant. The landlord supplies neither bullock, nor plough nor seeds. It is thus seen that the custom in matters of tenancy leans in favour of the landlord rather than the tenant.

Ri Kynti or private landowners do not pay any land revenue to the government. They hold it revenue-free forever on the strength of customs. But they can realize rent from persons who take their land on lease. An individual acquires rights over land in mainly three ways: (a) by reclamation of available waste land, (b) by transfer, and (c) by inheritance.

(a) According to Khasi custom, any villager is allowed to cultivate as much land as he can. But he cannot fence over a big plot of land which he cannot cultivate by himself and keep it for himself as his own, for speculative purposes or for settling tenants. Now-a-days, due to pressure on land, a restriction has been introduced – he has to take prior permission for cultivation from the headman and the *Syiem Raid.* In olden days, this custom was not always followed, but due to gradual diminution of available waste land, obtaining of the permission is now insisted upon.

(b) The second method of acquiring rights over land is by transfer, i.e., sale, gift, mortgage, lease or exchange. The chief forms of transfer are sale and gift. Transfer of a tribal land to a non-tribal has now been prohibited by legislation. This prohibition was first introduced by the United Khasi Jaintia Hills District (Transfer of Land) Act, 1953. In view of

this, the State Legislature of Meghalaya enacted the Meghalaya Transfer of Land (Regulation) Act of 1971, which is applied to all the districts of the State. The relevant provision (Section 3 (1)) of this Act runs as follows: "No land in Meghalaya shall be transferred by a tribal or by a non-tribal to another non-tribal, except with the previous sanctions of the competent authority."

(c) Inheritance among the Khasis follows a general pattern, i.e., the youngest daughter inherits the property and is regarded as the custodian of the family property. However, there is exception to the rule as in the case of the War-Khasis, where the children of both the sexes inherit the ancestral property, but the ancestral house goes to *ka khadduh* or youngest daughter. In the villages, this norm is slowly being eroded, well-to-do parents give a share each to all their daughters but the ancestral house is still inherited by *ka khadduh.* They have pointed out that along with the changes in other aspects, the inheritance of property by females has also faced with lots of changes. As of now daughters are mostly found to move out to form neo-local families, the family property is either divided or given to all the daughters. The reason behind this is that since they belong to a matrilineal society, their daughters, regardless of the birth order, should be treated equally and should be provided for so that they can be independent and self-sufficient in case of any calamity or tragedy that may befall upon them. This rule, however, does not apply to their sons since they feel that the sons after marriage will have to leave the house and live with their wives and children. If a part of the ancestral property be given to the son it will surely pass on to his children who belong to a different clan, and to a Khasi clan is the most important social unit, which is sacred and sanctified, and they will do whatever it takes to protect it and the clan property.

Role of Traditional Institution in Land Resource Management

In the Khasi hills the local administrative units are the traditional institutions. One of the traditional institutions commonly found is known as *Hima*, a territorial and political unit of several villages. Under *Hima* there are villages which function as autonomous units. This traditional institution manages and controls its own territory according to customs and traditions (Nongkynrih 2002). Thad village falls under *Hima* Mylliem and Nongkrem village under *Hima* Khyrim. The traditional institution or *Hima* is a cluster of villages, which are multi-clan in character but mono-ethnic in composition (both are majority Khasi populations), and with multiple religious persuasions. From the point of modern-bureaucratic administration, *Hima* falls under the East Khasi Hills District of Meghalaya and under the Khasi Hills Autonomous District Council (KHADC) which confirms the election and succession of Chiefs and headmen and the protection of traditional customs and practices. There are three types of political administration in Meghalaya:

1. Meghalaya Legislative Assembly, the Government and its various departments
2. Three Autonomous District Councils (Khasi, Jaintia and Garo)
3. Traditional Institutions, each having their own territorial unit, comprising several villages. Each village has its own territory and is represented by a headman selected from among male adults

The *dorbar* of Thad village is very firm in its management of land resources. The *Ri Raid* is usually allotted to households who do not own land so that they are able to cultivate. If, however, the people do not cultivate in three years, after the allotment has been made by person it goes back to the community. A case involving a family was narrated to me by an

elder which took place a decade ago, in which the couple after marriage moved away from the maternal house to set up neolocal residence. The couple was allotted a plot of land by the *dorbar* to cultivate. The couple built a thatch house on it and started living there. After a year, they returned to the maternal house because the wife delivered a baby, thus deserting their house, and never returned. At the end of the third year, upon seeing that the land was left barren, the couple was asked to return the land to the community since they did not use it for cultivation. The main intention of the *dorbar* was to allot it to someone else who was more in need of it. A huge argument broke out over this issue which resulted in convening an emergency meeting of the *dorbar*. After much debate and deliberation, the couple was asked to forego the land. It may be pointed out that sometimes the punishments meted out by traditional *dorbars* seem harsh and unwarranted, yet from information gathered after conducting in-depth interviews it was discovered that most respondents believe that *dorbar* acts on behalf of the people. Decisions taken by *dorbar* are accepted by the public.

Thad Village

Land Tenure System

Land tenure systems influence the use to which land is put for economic and social development. Yet land use determines whether a resource could be conserved or not and the level of conservation attainable for natural resources (Bassey 2003). Land tenure rights may be fixed by custom or law and are often explained as a complex bundle of rights, which together constitute the property, i.e., the right to control an economic good, in this case, land. This bundle of rights is often shared by contract with others. For instance, the owner might

transfer the right to cultivate the land to a tenant or the right to cross his field to a neighbour whose land is not directly connected with the road. Land tenure is a tool for conservation and it involves sets of rules and regulations used to control and manage natural resources: soil, water, wild living resources, and the environment. Land tenure systems are dynamic. They respond to socio-economic and political changes put in place for resource utilization. Tenure systems vary from one rural community to another but pivoted by three broad systems of communal, individual and family ownership. Over the years, land tenure has been the decisive factor in resource management at the local level. Unfortunately, the impact of tenure on natural resources allocation and exploitation is often ignored in public land policy. Yet land tenure issues contribute to deforestation, degradation of the environment, lowering of carrying capacities of soils, poaching and extinction of wild biotic resources (Bassey 2003). There are two main land tenure systems found in the village: *Ri Raid* or public land and *Ri Kynti* or private land.

Ri Kynti or private lands form a major share in the land holding pattern of the village. The land usually belongs to an individual household or family and they have sole user rights. *Ri Raid* or village land is a communal holding surrounded by *Khlaw Shnong* or village forest. Here, any member of the village can practise shifting cultivation or horticulture, especially those who do not possess land of their own. Permission from the village headman or *Rangbah Shnong* is a necessity. However, the villagers possess only occupancy rights and cannot transfer them. They have to use the land wisely and sustainably so as to reap maximum benefits and avoid degradation of the land for future use. They feel that a sustainable use of the land will result in economic gain not only for them but also for future generations. Here,

the villagers collect firewood and house building materials and a common playground is located where the common festivals of the village take place. The burial and cremation grounds are also located here.

Bun cultivation where the same plot of land is cultivated again and again was permitted to those villagers who did not possess lands of their own and a special hill was allotted to them for the purpose. The Lum Suna, a hill situated in the premises of the village, was cultivated by such farmers but the village *dorbar* in its general council meeting held in January 2004 decided to stop this type of cultivation with immediate effect due, according to the council members, its degrading impact on the hills. This has brought unrest and anxiety upon the poor landless farmers who state that without it they would surely starve because they needed products from *bun* cultivation to support them throughout the year. The matter is still being discussed but according to some leaders the council will probably remain firm in its decision. They state that such farmers will have to opt for alternative methods of livelihood.

Earlier, whether the land was owned by certain organizations or by individuals could not stop 'off-agricultural' season open-grazing of cattle but now a new rule has been implemented by the *dorbar* prohibiting open cattle grazing. How far this law can be implemented and carried out remains to be seen. The *dorbar* has also appointed two elders to implement these laws and drag any law-breaker to the *dorbar* so that he/she can be punished in the way *dorbar* deems appropriate. These elders will also look into general welfare of the village property.

Nongkrem Village

The village consists almost entirely of *Ri Kynti* or private land. From the data collected it can be safely assumed that the village has no record of community or village land. The land holdings predominantly belong to individual households and families and a few belong to the clans of the village.

Land Utilization

Land use means utilization of all developed and vacant land at a given time and space. It is related to conversion of land from one to another use (Kumar 1986). The use of land changes according to the changing needs of man. Stamp (1948) has classified the needs of man into six major categories, viz., the need of work, home, food, transportation and communication, defense and recreation. Land use at a given place and time is the result of interaction of a number of complex set of factors (Sharma 1989). These factors are traditionally put into three groups, viz., physical, economic and social (Chauhan 1966: 25). The study of land use not only concerns with land use classification, use and misuse of land, capability, land use planning, but it also deals with several socio-economic aspects like man-land ratio, changing pressure of man on land, land use changes due to dynamism of socio-political conditions and scientific innovations (Kumar 1986). Land ownership and security of tenure are two pillars on which land use and land resource management rest (Peprah 2005). Thus, the economic status and progress of the country may, to a great extent, be measured by the way in which land is used and maintained. At present, the important focal point is to put the land to right and optimum uses without disturbing the ecological balance. It means land should be utilized

in accordance with its suitability and capability. However, increasing population and changing needs of the time requires revision of land utilization, which is infested with problems of urban land encroachment and even encroachment of agricultural lands, thus, posing a big threat to the food security of the nation.

About 90 per cent of the total geographical area of Meghalaya is hilly. Plain land with fertile alluvial soil is located in river valleys in the form of narrow strips and in the fringes of the state to the north, west and south. The soil of Meghalaya varies from dark brown to dark reddish-brown in colour. The depth of soil varies from 50 to 200 cm in different parts of the state with texture ranging from loamy to fine loamy. The soils are rich in organic carbon with high nitrogen supplying potential, but deficient in phosphorus and potassium (Singh 2008). There is not much difference in fertility classes of the soils of the state. Four soil fertility classes, namely, High Low Medium (HLM), High Medium Medium (HMM), Medium Medium Low (MML) and Medium Low Medium (MLM) have been established in Meghalaya (Directorate of Agriculture, Meghalaya 2002). The Regional Centre of National Bureau of Soil Survey and Land Use Planning, Jorhat has classified the soils of Meghalaya into 4 soil orders which are:

Red Loamy Soils

The red loamy soils occupy the entire central part of the Garo Hills and central uplands of Khasi and Jaintia Hills from west to east except the valley part of Simsang River. These soils are suitable for the cultivation of potato, rice, fruits in hill slopes and terraces.

Red and Yellow Soils

The red and yellow soils are extended from west to east along with the southern slope of red loamy soils and are suitable for cultivation of rice and horticultural crops.

Laterite Soils

The laterite soils are extended from west to east in the northern part of the State. Most parts of this belt fall under rain shadow area as a result of which dehydration takes place and most of the nutrients required for plant growth are leached out from the soil. This belt is therefore not much important from the point of agricultural practice.

Alluvial Soils

The alluvial soils are found all along the northern, western and southern fringe of the State. The soil textures in this region vary from sandy to clayey-loam with varying degree of nitrogen and very much acidic in character. This belt is ideal for cultivation of rice and jute.

Land Use Pattern

There are considerable variations in the land use pattern in different parts of the State among different communities. However, it mainly depends on spatial and temporal variations, in physical environment, climate, soil condition and topography (altitude and slope). The natural vegetation also plays a significant role in deciding the type of land use. Land use pattern is envisaged on land capability profile. Since land capability in the mountainous region is determined by the characteristics of micro and mini watersheds, land use pattern is envisaged on the capabilities of each watershed. Thus the potential of each watershed is envisaged to be developed to yield sustainable land use. Table 3.2 shows the area under different land use

category in Meghalaya. Forest land is the dominant type with 52 per cent of the total area of Meghalaya, agricultural land amounts to 28 per cent, wasteland 19 per cent and water bodies 0.76 per cent. The built-up land is less than 1 per cent of the total area of Meghalaya (Singh *et. al.* 2008).

Table 3.2: Area under different types of land use in Meghalaya (Area in sq. km)

Class	**East Khasi Hills**	**West Khasi Hills**	**Jaintia Hills**	**West Garo Hills**	**South Garo Hills**	**East Garo Hills**	**Ri-Bhoi**	**Total**
Forest	1191.96	2808.37	1768.49	2054.86	1186.07	1554.63	1196.92	11761.30
Agriculture	760.21	1301.43	1430.93	914.04	470.68	675.42	793.19	6345.90
Wasteland	764.06	1135.01	605.13	689.47	177.52	404.06	377.84	4153.09
Built up	16.46	NA	NA	NA	NA	NA	NA	16.46
Water bodies	15.31	20.19	14.45	55.63	15.73	3.86	45.08	170.25

Source: NEDFi Databank (2002).

Land Utilization Statistics

Meghalaya follows the standard land use classification. Land utilization statistics of the State from 1996-97 to 2003-04 is presented in Table 3.3. It is quite satisfactory to note that over the years the total cropped area, area sown more than once as well as net area sown are increasing constantly. *Jhum* is the traditional cultivation of the local tribes. In the Garo Hills it is reported that permanent cultivation is practised only in the plains areas, which constitute a minor portion of the total cropped area. These cropped lands are scattered throughout the State.

Table 3.3: Land utilization statistics in Meghalaya 1996-2004 (Area in Sq. Km)

Land Classification	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Reporting area for land utilization statistics	22409.00	22409.00	22409.00	22409.00	22409.00	22271.00	22271.00	22271.00
1.Forest	9353.34	9339.98	9470.00	9415.03	9418.23	9505.33	9470.38	9472.19
2.Not available for cultivation	2236.95	2260.66	2224.95	2245.93	2154.84	2254.18	2253.21	2253.80
3.Other uncultivated land excluding fallow land	6323.55	6314.66	6214.20	6224.40	6303.23	6063.93	6008.24	5995.89
4.Fallow land	2344.78	2337.82	2286.00	2306.22	2314.40	2342.94	2383.92	2356.88
5.Net sown area	2164.18	2155.88	2213.85	2217.42	2218.30	2104.62	2155.25	2192.24
6.Area sown more than once	440.66	441.12	444.45	455.77	449.86	466.49	465.97	466.50
7.Total cropped area	2604.84	2597.00	2658.30	2673.19	2668.16	2571.11	2621.22	2658.74

Source: Directorate of Economics & statistics, Meghalaya, 2005.

The land utilization patterns in both the villages under study are recorded below. It may be pointed out that land ownership patterns in the two villages are similar, although there is marked difference in land tenure, terms of share, pricing and market value.

Forest

Forest forms a major chunk of the land. The forests of Thad village are both privately owned and group owned. The only group ownership of forest in Nongkrem is that of the *Law-Adong* belonging to the *Lyngdoh* clan whereas in Thad village most of the forests come under group ownership pattern. Since farmers in Thad village engage in wet paddy cultivation it is of vital

importance that the adjoining forest areas especially in catchment areas and those surrounding the agricultural fields are left intact. By doing so they not only protect their forests but also ensure a steady agricultural output. Perhaps it is due to this reason that most of the forest patches in the village are under maximum tree cover. On the other hand, most forests of Nongkrem village are either degraded or in very bad shape. The people are mostly dependent on rain-fed irrigation. The forest cover is also dependent on the kind of forest management system practised, and as discussed at length in the following chapter on forest resource management, these two villages have different methods of management, which reflect not only on their environmental settings but also on their agricultural systems.

Agriculture

Farming is by far the most significant use of land, employer of people and modifier of natural landscape, as well as, prime source of food supply, raw materials and domestic income in developing regions. Agriculture is an economic activity that manifests the complex inter-relationship between natural and human resources (Sharma 1989). The economy of Meghalaya is predominantly agrarian. However, agricultural land is accounted as only 48 per cent of the total geographical area of the State (Dhas *et al.* 2006: 8), and the pace of development in agriculture is lackadaisical. However the nature of the terrain does provide ample scope for other types of agricultural practices. There are two types of cultivation practised by the people in the State. They are shifting cultivation and terraced cultivation in the hilly terrain and settled agriculture only in the valleys and plains. Rice (*Oryza sativa* Linn.) and maize (*Zea mays* Linn.) are the two major food crops. Important fruits grown are

orange (*Citrus reticulata* Blanco), pineapple (*Ananas comosus* Merrill), lemon (*Citrus limon* Burm. f.), guava (*Psidium guajava* Linn.), jack fruit (*Artocarpus heterophyllus* Lam.) and banana (*Musa* sp.). Potato (*Solanum tuberosum* Linn.), jute (*Hibiscus cannabinus* Linn.), cotton (*Gossypium* sp.), areca nut (*Areca catechu* Linn.), ginger (*Zingiber officinale* Rosc.), turmeric (*Curcuma domestica* Valeton), betel leaf (*Piper betle* Linn.) and black pepper (*Piper nigrum* Linn.) are the chief commercial crops.

Broadly the low lying areas were put under paddy during *Kharif* (these crops are grown with the onset of monsoon and harvested in September-October) and pulses, paddy, vegetables and oilseeds during the *Rabi* (these crops are sown in winter from October to December and harvested in summer from April to June) season depending on the availability of residual moisture and irrigation facilities. Gentle slopes up to 20 per cent are put under other crops like wheat, paddy, maize, pulses, oilseeds, and vegetables, which not only contribute towards food security but also yield substantial revenue returns per unit of land and labour. Horticulture was taken up on slopes above 20 per cent and in border areas.

The economy of Thad village is basically agrarian as majority of the population depends directly or indirectly on agriculture. Agriculture is the main occupation of the people (86 per cent, see Appendix) and is the primary source of sustenance of the people of the village. Most of the existing systems of agriculture in the village are subsistence type. Cultivation is practised under upland and valley conditions as well as in the hill slopes. Paddy, maize, ginger, pineapple, banana, and papaya are the main agro-horticultural crops playing a predominant role in the economy of the village. Cash crops include tea, ginger, and

broom, which are commercially very important crops for the people. Among food crops, paddy and maize are main.

The most striking feature of agricultural systems practised by the farmers of the village is wet paddy cultivation. Paddy (*Kba* in local parlance) is cultivated in terrace fields or *hali*s. Paddy fields in the village, which remained barren after harvesting of winter paddy during 1990s, are now filled with green vegetables and tomatoes. This indicates a significant change in the cropping pattern in the village within a span of two decades. Now more and more farmers are taking up multi-cropping in the village. The motivation of farmers to adopt multi-cropping for better production and economy is seen as a positive step towards development. Therefore, emphasis is given on fast income generating vegetables like tomato and capsicum to enable the farmers to increase their income. The farmers are becoming aware of the importance of conservation of the soil where plantation of permanent crops such as tea may be taken to check soil erosion and rehabilitation of shifting cultivators.

The land with an assured supply of water is turned into terraces or *hali*s. Patches of forest are left between the terrace fields. Occasional patches of open jungle relieve the terraces and the slopes of the hills immediately underneath the villages. This practice is probably based on centuries-old observation that trees protect soil and water. They believe that if forests are not kept, there will be less water and less soil for the *hali*s. There is a sharp boundary between land under forest and land under *hali*s. This is because the fertility of a *hali* depends directly on the amount of land people can keep under forest cover, which is quite a lot in this village as compared to other surrounding villages.

Paddy cultivation is not only an economic strategy but a way of life. Therefore, it is important to understand its contribution to the cultural dimensions of rural life. The irrigation systems used for paddy cultivation largely determine the location of village settlements. The paddy irrigation infrastructure serves as a physical representation of the village community (Groenfeldt 2004). Family and community life is organized around the cultivation cycle, with periodic labour exchange for transplanting and harvesting, and social gatherings tied to agricultural rituals, which may be considered as the social capital of paddy agriculture. There is an interconnectedness of food, farming, and identity fundamental to traditional societies as well as modern ones. Identity based on particular foods and farming practices continues to be valued and, more specifically, local varieties of rice prepared in certain traditional ways. In a country like India the tasks of farming itself can be a spiritual practice where the daily experience of spiritual life is tied to the cultivation process. This is witnessed in the functioning of local population in the village, where there is a lot of coordination and balance between age-groups and gender when it comes to paddy cultivation. Each member of the family has a constructive role to play, right from preparation of land to the harvesting which then extends to the marketing. Roles are gender-specific and age-specific, which have resulted in strong organizations and mechanisms for cooperation at various levels within the farming community. The traditional agricultural modes of production (paddy cultivation included) not only assure us of food security but also security in terms of social, cultural, spiritual, economic and ecological well-being. In the light of the growing shift in paradigm from the traditional family and community modes of paddy cultivation to the industrially-oriented mode of production - a process which is gradually accepted as both necessary and inevitable

for growth and development – the question remains: is it a viable option? It is obvious that traditional practices of agriculture may disappear unless their values are promoted (Mishra 1998).

Nongkrem village is located in the higher altitude of the East Khasi Hills where the climatic conditions vary from cool during the summer season to extremely cold during the winter seasons. Agricultural crops that can withstand the cold climatic conditions thrive well in the village. Mawmuthoh hamlet consists of about 69.7 percent farmers and daily activities revolve around agriculture. In the Nongkyndong hamlet, however, people are more literate and a majority of them are government employees and business people who are mostly absentee landlords and lease their lands to poor landless farmers. However, it was noticed that they do have a tendency to keep kitchen gardens and grow crops for consumption purposes only. The common element in the two hamlets is that the people engage in animal husbandry like piggery in their backyards. Cattle-rearing is also a common phenomenon. Tenancy varies from person to person. Lease is usually for a period of three years.

The only commercial crops in the village are potato and cabbage of which the former is more important. This is part of the potato-growing belt of the district. Potato (*Solanum tuberosum* and *Phan* in khasi) is grown twice a year. Cabbage and maize occupy the second place. These crops are grown only once in a year. Carrots, tomatoes, garlic, mustard, fruits (pear, peach, plums, etc.) are also grown by only a few farmers because of the high cost of seed and fertilizer but low income. Among the food crops paddy is the preferred crop followed by maize. The mode of cultivation in the village is known as *Syllei* or *bun*, which involves planting the crops in *nur*. Nur is the agricultural land unit in the local Khasi language

and refers to a raised bed, which is usually 1-1.25m wide and 2-7m long. *Bun* literally refers to a forest. This is a modified form of *jhum* or shifting cultivation, which is commonly referred to as the slash and burn method (Dubey and Sah 2009). *Bun* method is basically a type of ridge and furrow method, which has been modified to suit the difficult mountainous hilly terrain and high rainfall conditions during the potato growing season and to cope with decreasing availability of land for cultivation due to increase in population.

Bun cultivation in Meghalaya continues to attract diverse opinions. Its critics consider it as an inefficient and wasteful form of agriculture, while others see this as diversified livelihood system that ensures sustenance along with conservation of associated rich cultural heritage about plants. The shortening *jhum* cycle (the intervening period between fallowing and returning to the same spot for cultivation) from traditional 30 years or more to 3 years on an average now is indeed a matter of concern. This is seriously impacting local livelihoods and environmental security of the village. However, given the farmers' knowledge and continuing adaptive innovations by responding to complex agro-ecological and socioeconomic dynamics, this system of farming with appropriate cycle provides the best options for sustainable use of land due to its inherent strengths and the institutions governing the practice. *Bun* plays an important cultural role in local customs, besides ensuring agro-biodiversity conservation and offering livelihood security to agricultural poor. It would be unfortunate if developmental programmes based on misjudged opinions about *bun* suppress this unique form of agriculture. A balanced approach to development which also recognizes the merits of this form of cultivation is needed so that this remarkable form of organic farming persists into the 21st century. Recent studies from the Eastern Himalayas show that

the practice represents enormous diversity of cultivation systems with farmers' ingenuity about local resource management (Darlong 2008).

Farmers perceive that cultivation of potato and other vegetables on raised beds along the slope help them in preventing the washing off of the entire crop during heavy rains and storms. The drainage channels laid along with these beds help in draining away the excess rain water without much affecting the crop on the raised beds. Besides, due to burning of the soil, there is low disease incidence and less infestation by pests and weeds (Dubey and Sah 2009).

Soil Conservation

Soil is a basic natural resource. Man depends on plants, and plants grow in the soil. Soil in fact occupies an important place in the biosphere - the life zone of the earth. Soil, a mixture of many solid, liquid and gaseous substances, forms the top most layer of the earth's crust. It has both the non-living and the living matters like mineral particles, decaying organic matter and microbes acting as a decomposer. Soil is the source for plants to grow. As the plants die the nutrients re-enter the soil for reuse by them. Such a cycling of nutrients over long ages keeps our soils live. Soil is the final product of interactions between the weathering of underlying rock, the climate, plants and the activities of many microbes and animals like earthworms and insects. All these physical, chemical and biological processes build up the soil layer over a period of time.

Effective soil conservation technology aims at obtaining optimum return from the land resources with minimum hazard in the form of degradation of the resource. Soil conservation

measures should be based on local resources to the extent possible. Considering the problems and potentiality of the village, it seems that a combination of different soil conservation measures such as contour bunds, bench terraces, earthen dams etc can be utilized. The soil conditions today are deteriorating and becoming harder because of overload due to the excessive use of chemical fertilizers, pesticides and insecticides. This affects the crops and plants as they wither and die. Top soil run-off due to heavy rain is also another reason for concern, deforestation and over grazing by animals are some of the factors which contribute to soil degradation.

Soil conservation methods in Thad village include agriculture with contour bunds and bench terraces. Contour bunds are bunds that are raised in elevation, usually placed in rows along the slope of the hills, which are the chief features of *bun* cultivation. The plants and crops are planted and cultivated at the top of the bunds. Bench terraces are a number of platforms or wide steps across the slopes of the hills made by cutting earth at regular intervals. These are mechanical barriers that break the slope length and reduce the degree of slope. These have vegetative check walls, which arrest the soil if run-off occurs. Earthen walls are built in order to protect the soil. Crop rotation also decreases loss and preserves the productivity of the land because the same crop year after year depletes the soil minerals. Plantation of trees and permanent vegetative cover in non-agricultural areas is the only effective way of protecting these lands and increasing their productivity. In doing so, these lands can be developed for growing fodder, fuel, fibre, fruit, and timber, which will make them reasonably remunerative. At convenient places, farm ponds are constructed in watershed areas and excess runoff water is stored. These farm ponds not only serves as silt detention and

flood moderation strucıures in the terraced field of wet-rice fields but also the stored water could be used to provide life saving irrigation to the agricultural crops to improve the production. The people follow these soil protective methods in order to check soil erosion and surface runoff, which may hamper the productivity of the soil and affect agriculture.

In Nongkrem the people generally do not have rigorous soil conservation methods. They do terrace the fields if possible, but most of them are landless farmers and lease the lands in for cultivation. Therefore, they feel that it is a waste of their time, energy and resources to invest in soil conservation techniques, as there is no guarantee that the landlords will give them the same plot of land for cultivation for the next season.

The results of this study reveal some important aspects for understanding knowledge and behaviour in land resource management. Some of the major findings include:

Land Tenure: There are two main land tenure systems found in the Thad village: *Ri Raid* or public land and *Ri Kynti* or private land, where *Ri Kynti* or private land forms a major share in the land holding pattern of the village. Nongkrem Village consists of *Ri Kynti* or private land only. From the data collected, it can be safely assumed that the village has no record of community or village land. The land holdings predominantly belong to individual households and families and a few belong to the clans of the village.

Gift and Will: Gift appears to be quite in vogue in the two villages under study. Gifts are made in favour of the eldest or the other daughters and in certain instances to the sons as well. All the gifts of land seem to be motivated by a desire to soften the rigours of the custom of female ultimogeniture of Khasi custom and so the other daughters may sometimes undergo

difficulties and hardships. No gifts to the youngest daughter are known, which confirms that the mother has always thought of provisions for daughters who would get no share of the inheritance. Will does not exist, but there is a custom of respecting the wishes of the parents or grandparents who sometimes made their verbal wishes as to what should be done regarding their property after their death.

Tenancy: An owner creates tenancy by leasing out his land. Rent is, therefore, an important feature of the system of tenancy, and so is the period of lease. These leases (i.e., agricultural tenancies) are governed by customs and usages or by separate legislations known as tenancy laws. Rent exacted by the landlords is high. Cash-rent as well as crop-rent are prevalent, but the latter is more prevalent and popular. In crop-rent, the rent is paid in fixed amount of crop or paid as a share of the gross-yield of the crop. In case of sharecropping, in the villages under study, it is observed that 1/3 rd share goes to the landlord and 2/3rd share to the tenant. The landlord supplies neither bullock, nor plough nor seeds. It is thus seen that the custom in matters of tenancy leans in favour of the landlord rather than the tenant.

Land Utilization:

Forest: Forest forms a major chunk of the land. The forests of Thad village are both privately owned and group owned. The only group ownership of forest in Nongkrem is that of the *Law-Adong* belonging to the *Lyngdoh* clan whereas in Thad village most of the forests come under group ownership pattern.

Agriculture: Agriculture is the main occupation of the people of Thad village (86 per cent) and is the primary source of sustenance of the people of the village. Paddy, maize, ginger, pineapple, banana, and papaya are the main agro-horticultural crops playing a predominant role in the economy of the village. Cash crops include tea, ginger, and broom, which are commercially very important crops for the people. The most striking feature of agricultural systems practised by the farmers of the village is wet paddy cultivation which is cultivated in terrace fields or *halis*.

In Nongkrem village, Mawmuthoh hamlet consists of about 69.7 percent farmers. In the Nongkyndong hamlet, however, people are more literate and a majority of them are government employees and business people who are mostly absentee landlords and lease their lands to poor landless farmers. The only commercial crops in the village are potato and cabbage of which the former is more important. Maize, carrots, tomatoes, garlic, mustard, fruits (pear, peach, plums, etc.) are also grown. The mode of cultivation in the village is known as *Syllei* or *bun*, which involves planting the crops in *nur* which is a modified form of *jhum* or shifting cultivation.

Soil Conservation: Soil conservation methods in Thad village include agriculture with contour bunds and bench terraces. In Nongkrem, the people generally do not have rigorous soil conservation methods. They do terrace the fields if possible, but most of them are landless farmers and lease the lands for cultivation. Therefore, they feel that it is a waste of their time, energy and resources to invest in soil conservation techniques, as there is no guarantee that the landlords will give them the same plot of land for cultivation for the next season.

The findings of this research indicate that linking local knowledge and practices is often not sufficient to address issues of sound land management. While local knowledge serves farmers generally well, the pressures in the contemporary world of markets can undermine what they know as the right thing to do for the environment. Therefore, the need for thoughtful and careful stewardship of the land, together with the more intensive use of its resources, has emerged as a major global concern. As discussed in the chapter, aspects of land ownership patterns, land utilization, soil conservation etc., differ in the two villages under study. This has serious consequences on their approach towards natural resource management, the impact of which is seen on the availability of biodiversity. Thad village can be termed as one where biodiversity and species richness has been retained to a certain degree whereas Nongkrem village seems to be still struggling with issues of conservation and management of biodiversity.

CHAPTER IV

FOREST RESOURCE MANAGEMENT PRACTICES

Forests are critical ecosystems that play a wide range of important economic, social and environmental functions. Forests provide wood for timber and fuelwood, and non-timber forest products (NTFPs), including food (berries, mushrooms, edible plants), fodder and others. Therefore, management and conservation issues pertaining to forest resources are of vital importance to the overall system of management of natural resources. This chapter focusses on all aspects of forest ownership, forest product utilization, both timber and NTFPs, forest management and conservation practices, forest fires, their causes and eventual consequences and social forestry as practised by villagers of the two villages under study, viz., Thad village and Nongkrem village.

A forest is a natural ecosystem having multi-species and multi-age trees as dominant community. Forest protects the land against soil erosion, droughts, floods etc. It increases water holding capacity of soil, controls surface run-off and checks silting and landslide. The litter derived from fallen leaves maintain fertility of soil by returning the nutrients. Forest also acts as refuge for wild life and provides protection to them against nature and man. It is the source of wood, timber and many products like fibre, medicines, fodder, and honey. It also has an accessory function that includes recreations and aesthetics. According to the United Khasi-Jaintia Hills Autonomous District (Management and Control of forests) Act, 1958 and the United Khasi-Jaintia Hills Autonomous District (Management and Control of Forests) Rules, 1960: "Forest means and shall be deemed to be a forest, if in the area, there are

reasonable number of trees, say, not less than twenty five trees per acre, reserved or un-reserved or any other forest produce growing on such area, which have been or are capable of being exploited for purposes of business or trade". The local communities are associated with natural forests, woody landscape, community forests and, of recent origin, social forestry, where each kind of plants has a differential slant with regard to its role and importance.

Forest management generally deals with maintenance and need-based use of the forest resources. Proper management of the forest helps it become productive and save it from being depleted. "Forest Management is that branch of forestry whose function is the organization of a forest property for management and maintenance, by ordering in time and place the various operations necessary for the conservation, protection and improvement of the forest on one hand, and the controlled harvesting of the forest on the other" (Prakash 1986: 3).

The First National Policy on Forest was formulated in 1894. Thereafter, the State began to manage the affairs of the forest. At about the same time the commercial exploitation of forest began. The exact impact of this policy was not realized till independence, as there was plenty of forests. After independence industrialization and urbanization started in India at an unprecedented rate. Large-scale deforestation took place causing ecological imbalance. In 1952 a new forest policy was introduced which recognized six vital needs as follows:

1. Evolution of a system of balanced and complementary land use (with regard to shifting cultivation),
2. Checking of soil erosion,
3. Establishment of free land,

4. Creation of small woods for grazing and collection of fuel and for domestic purposes (for the tribals),
5. Supply of timber for national needs, and
6. Realization of maximum annual revenue.

Meghalaya has a long history of community forest management. Throughout the pre-colonial period a substantial part of its forest remained in the hands of different communities. The process of changing forest management and tenure started after Indian independence, when some tribal communities' calls for autonomy led to the creation of autonomous district councils and the codification of customary forest laws. For all practical purposes, community-controlled forest land started to be managed by the autonomous district councils (Dasgupta and Syiemlieh 2006).

The forests of Meghalaya are rich in biodiversity and endowed with rare species of orchids and medicinal plants. Major forest types found in the state are subtropical pines, tropical wet evergreens, tropical semi-evergreens, and tropical moist deciduous. Sacred groves, mostly located in the Khasi and Jaintia hills, represent particularly highly valued vegetation in the area. The actual forest cover in Meghalaya is 16,839 sq. kms (75.08 per cent of the total geographical area) but the recorded forest area of the State is only 9,496 sq. kms, which accounts for only 42.34 per cent of the State's geographical area (FSI report 2003). This report has also classified forests into three categories *viz.*, Very Dense, Moderately Dense and Open Forest (Figure 4.2). A very small percentage of about 0.8 per cent (168 sq. km) of forest in the southern portion of the Garo Hills and Ri-Bhoi districts comes under very

dense forest category. Moderately dense forest is about 28.2 per cent (6323 sq. kms) and the rest 46.1 per cent (10,348 sq. kms) is open forest.

Only a small portion of about 1,124 sq. kms of the recorded forest is under the control of the State Forest Department while the remaining areas are managed and controlled directly or indirectly by the respective Autonomous District Councils of Khasi, Jaintia and Garo hills *as per the provisions of the Sixth Schedule of the Constitution of India. Few pockets of* undisturbed natural forests also exist in the State (Singh *et.al.* 2008).

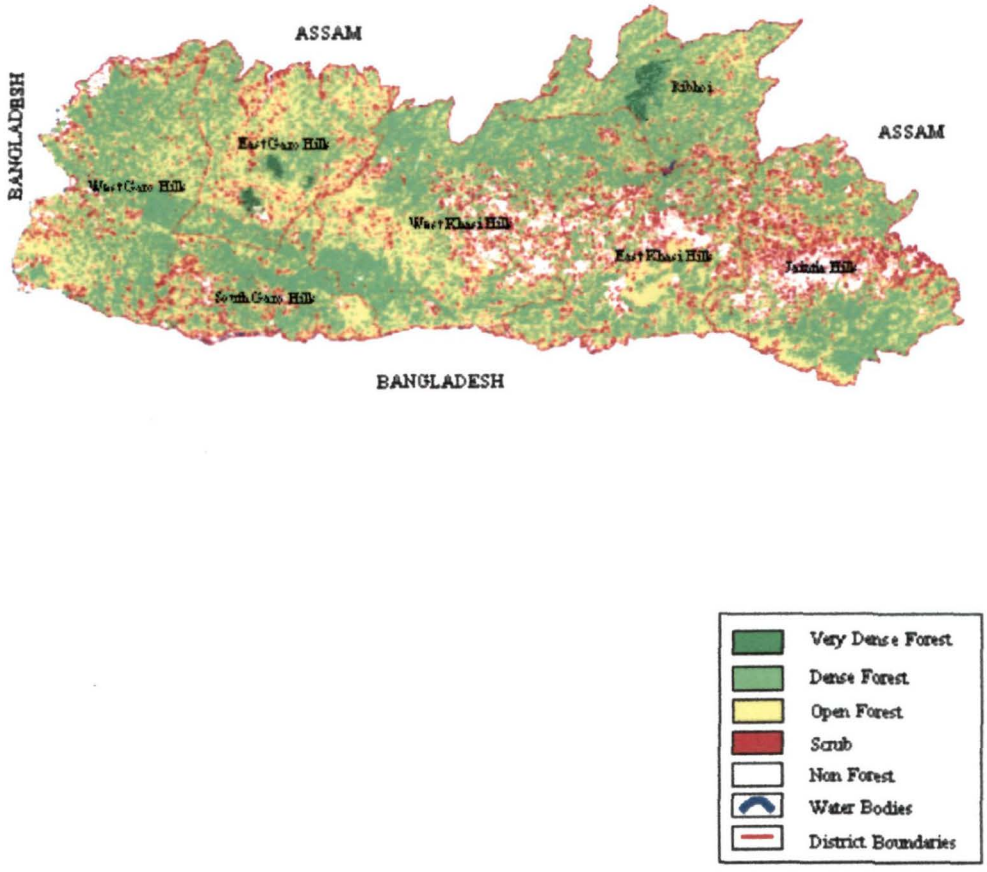
The recorded forest area in the State is only 9,496 sq. kms, which is 42.34 per cent of the geographic area. It is divided into four categories *viz.*, Reserve Forest, Protected Forest and Unclassed Forest (Table 4.1). The Unclassed Forest constitutes the highest percentage with nearly 88.16 per cent of the total recorded forest area.

Table 4.1 Recorded Forest Area in Meghalaya

Forest Types	Area (Sq. Km.)	Percentage
Reserved Forest	712.7	11.71
Protected Forest	12.4	0.13
Unclassed Forests	8,503	88.16
Total	9,496	100

Source: *Statistical Handbook, Meghalaya, 2005.*

Figure 4.1 Map showing forest cover in Meghalaya



Source: *State of Forest Report, 2003.*

Table 4.2 District-wise Forest Cover of Meghalaya (Area in sq. km)

District	Geographic Area (G.A.)	2005 Assessment				Percent of G.A.	Change	Scrub
		Very Dense Forest	Moderate Dense Forest	Open Forest	Total Forest			
East Garo Hills	2,603	46	668	1,535	2,249	86.40	-8	14
East Khasi Hills	2,820	0	817	1,019	1,836	65.11	-2	80
Jaintia Hills	3,819	101	973	1,152	2,226	58.29	42	11
Ri-Bhoi	2,376	128	773	1,098	1,999	84.13	30	1
South Garo Hills	1,849	25	731	919	1,675	90.59	20	0
West Garo Hills	3,715	0	884	2,090	2,974	80.05	-20	23
West Khasi Hills	5,247	38	1,962	2,029	4,029	76.79	1	52
Total	22,429	338	6,808	9,842	16,988	75.74	63	181

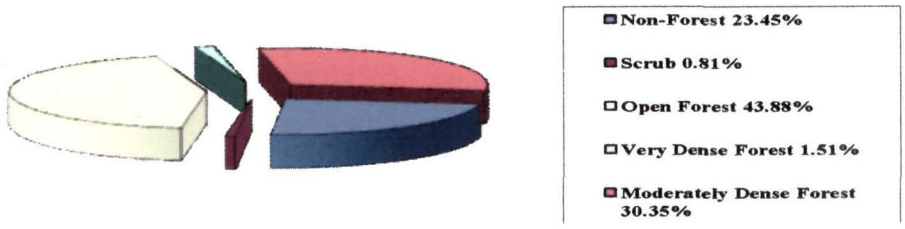
Source: *FSI-State Forest Report 2005.*

Table 4.3 Forest Cover Within and Outside Forest Area in Meghalaya (Area in sq. km)

Forest Cover	VDF	MDF	OF	Total	Scrub
Within Recorded Forest Area	203	494	349	1,046	2
Outside Recorded Forest Area	135	6,314	9,493	15,942	179
Total	338	6,808	9,842	16,988	181

Source: *FSI-State Forest Report 2005.*

Figure 4.2-Percentage of Forest Cover in Meghalaya



Source: *FSI-State of Forest Report, 2005.*

The forest of Meghalaya is classified into three groups viz., (1) Tropical forests (2) Sub-Tropical forests, and (3) Temperate forests on the basis of altitude, rainfall and species composition (Table 4.4).

Table 4.4 Forest Types of Meghalaya and Their Species Composition

Types of Forest	**Altitude (m)**	**Dominant Species**
Tropical Forest	Up to 1000	*Acrocarpus froxinifolius, Bischofia javanica, Dillenia indica, D. pentagyna,* *Dysoxylum binectariferum, Elaecarpus floribunda, E. robusta, E. rugosus,* *Gynocardis odorata, Lannea coromandelica, Lithocarpus fenestratus, Mesua* *ferrae, Sapium baccatum, Terminalia spp., Vitex penduncularis.* *Antidesma acuminate, Aoprusa dioica, Dalbergia assamica, Ficus racemosa,* *Garcinia spp., Heritiera macrophylla, Mangifera sylvatica, Pterospermum* *lancifolius, Sterculia spp.* *Alchornea tiliaefolia, Antidesma buniuis, Gregia disperma, Premna barabata*
Sub-Tropical Forest	Between 1000 and 1350	*Alcimandra cathcartii, Betula alnoides, Castanopsis sp., Lithocarpus elegans,* *Manglietia insignis, Talauma phellocarpa, Vitex spp.* *Adina cordifolia, Daphne involucrata, Ehretia acuminata, Garuga pinnata,* *Milletia prainii, Symplocos ferrunginea, Syzygium macrocarpus* etc. *Pinus kesiya, Acacia dealbata, Elaeocarpus lancifolius, Erythrina* *arborescens, Quercus griffithii, Schima wallichii, S. khasiana*
Temperate Forest	Above 1350	*Castanopsis kurzii, C. armata, Elaeocarpus prunifolius, Ficus nemorlis,* *Lithocarpus fenestratus, Myrica esculenta, Manglietia insignis, Eurya* *japonica, Schima wallichi.*

Source: Chauhan and Singh 1992.

In Meghalaya, unlike in many other parts of India, majority of the forests is owned by the community, which is legally recognized under special provisions of the Constitution of India. The use and management of forests is mostly governed by customary laws of different communities. The existence of numerous traditionally managed community forests reflects the democratic and egalitarian systems of social organization of the Khasi people. Most of these community forests are known as *Law Kyntang* or *Law Adong* or *Law Lyngdoh, Law Shnong, Law Raij, Law Sumar, Law Kur,* etc. especially in the Khasi and Jaiñtia Hill districts. There are three major institutions responsible for forest management in the State of Meghalaya. These are: a) the State Forest and Environment Department, b) the Autonomous District Councils, and c) the community. Meghalaya has an estimated forest area of 9,496 sq. kms of which only 722.96 sq. kms are under the control of the State Forest Department. The remaining areas are under direct/indirect control of the district councils of the State. The reserved forests are managed under the 'Working Plans' prepared by the State Forest Department and the Protected Forests are managed for the preservation of the catchment areas of water resources (Sengupta and Paul 2007). According to the other project report titled "Forest Management Systems in Meghalaya" prepared by National Afforestation and Eco-Development Board, North-Eastern Hill University: "Sacred Groves (*Law Lyngdoh/Law Kyntang*) with a total area of about 10,511.7 ha are found scattered at different places of the Khasi and Jaintia Hills and are generally found below the hill brows. These groves are considered to be the store house of a variety of plant genetic resources". The figures are debatable and the exact area is yet to be clarified through proper survey (Syiemlieh 2003).

The administration of all forests other than reserved forests was transferred by the State government to district councils for management and control from 16 January 1956 (Bhattacharya 1980). Due to the pattern and type of landownership existing in the State the scenario of forest management and control is somewhat different from other states. State owned forest lands accounts for 12 percent of the total forest area and contains some of the best forests (Dasgupta and Syiemlieh 2006: 47). The changing status of forest in the State is mostly due to the socio-economic conditions prevailing there and the type of agriculture practised there. Control of *Ri Raij* or community forests lies with the community and *Ri Kynti* or private land with private individuals. About 768 km^2 of *Raij* forest located in different parts of Khasi and Jaiñtia Hills are controlled by community concerned (Dasgupta and Syiemlieh 2006).

There are pockets of forest area in the State which have been maintained as 'Sacred Groves' by the local tribes due to their various religious beliefs, as mentioned earlier. In the Khasi and Jaintia hills, the presence of sacred groves and village forest is an integral part of tribal belief and culture, which gives divine connotations to the forests and groves where the village's spirit and god protectors (U Ryngkew U Basa) reside. Recent tenure and management systems recognize the sanctity and status of such forests (Dasgupta and Syiemlieh 2006). There are 79 sacred forests covering approximately 9000 ha. area with average size varying from 0.01 ha to 1200 ha (Tiwari *et. al.* 1999). At times a stand of 5-8 trees is also given the status of a sacred grove. These patches of forests belong to clan/community or individuals and are under the direct control of the clan councils or local village *dorbars/Syiem*ships/*Doloi*ships/*Nokma*ships. They represent the unique forest

ecosystem of the region and are very rich in flora and fauna, testifying the efficacy of traditional forest management systems in the State. These forests also harbour a large number of endemic, rare and endangered plant as well as animal species. At least 50 rare and endangered plant species of Meghalaya are confined to these groves (Tiwari *et. al.* 1999: 54).

The forests to which the United Khasi-Jaiñtia Hills Autonomous District (Management and Control of Forests) Act 1958 applies are classified under the following categories:

Ia. *Private Forest*

These forests belong to a clan or a group of clans who believe that they are descendents from the same ancestress. To further explain what I mean, let me illustrate it with the example of Dkhar clan. 'Dkhar' is an umbrella name for four clans belonging to Sawian, Phanbuh, Kharwanlang and Ngapkynta, who are believed to be descendents of a common ancestress.

Ib. *Law Ri Sumar*

These forests belong to an individual clan or a group of clans as explained under Ia above.

II. *Law Lyngdoh, Law Kyntang, Law niam* (Sacred Groves)

These are forests set aside for religious purposes and are hitherto managed or controlled by the *Lyngdoh* (religious head) or other persons to whom the religious ceremonies for the particular locality or village are entrusted.

III. *Law Adong* and *Law Shnong*

These are village forests hitherto reserved by the villagers for conserving water and other forest resources for their use and managed by *Sordar*s, or headman with the help of the village *dorbar*.

IV. *Protected Forest*

These are forests already declared protected for the growth of trees for the benefit of local inhabitants and also forests that may be so declared by rules under the above mentioned Act.

V. *Green Block*

These are forests belonging to an individual family or clan or group of clans and *Raij* lands already declared as "Green Block" by the State government for aesthetic beauty and water supply for Shillong town and its suburbs and also forests that may be so declared under the above mentioned Act.

VI. *Raij Forests*

These are forests looked after by the heads of the *raij* (Community) and are under the management of the local administrative head.

VII. *District Council Reserved Forests*

These are forests that may be so declared by the Executive Committee of the District Council under the above mentioned Act.

VIII. Unclassed Forests

They were known as Unclassed State Forests before the commencement of the Constitution of India. They were directly managed and controlled by the State Government and included any other forest(s) not falling under any of the above classification.

The United Khasi-Jaintia Hills Autonomous District (Management and Control of forests) Act, 1958 received the assent of the Governor on 22nd January 1959. This Act can be considered as a pioneer Act for forest administration within the district council areas in

Northeast India because most district councils of the region followed this Act with minor modifications. The Act was subsequently appended with the United Khasi-Jaiñtia Hills Autonomous District Rules (herein after referred to as Rules 1960). According to the Rules 1960, all the private forests including sacred groves (*Law Lyngdoh, Law Kyntang* and *Law Niam*) in the area of district council are to be registered (Chapter I, Section II) with the Chief Forest Officer mentioning the home addresses of persons owning such forests together with the boundaries and such other particulars of the forest as may be required.

According to the Principal Act (Act I of 1989), *Law Lyngdoh, Law Kyntang* and *Law Niam* shall be managed by the *Lyngdoh* or person/persons to whom the religious ceremonies for the particular locality or village/villages are entrusted in accordance with the customary practice in vogue subject to the rules that may be framed by the executive committee of the district council from time to time (Section 4 b). *Lyngdoh* in this particular respect is a religious and not an administrative head.

Rule 21 of Chapter II, Section 4 (a) of Rules 1960 states that no owner of, or any person having any valid interest or right over, any private forest or *Law-Ri-Sumar* shall dispose of by sale, mortgage, lease, gift, barter or otherwise any reserved trees or any other forest produce except with the previous approval of the Chief Forest Officer who may be authorised in this behalf.

Rule 31 (a) of Section 4 (b) states that no timber or forest produce from *Law Lyngdoh, Law Kyntang* and *Law Niam* shall be removed for sale, trade or business. But if any timber or forest produce is required for religious purposes, a free permit for the purpose shall be obtained from the Chief Forest Officer or any Forest Officer authorised by the executive

committee of the district council on his behalf on application by the *Lyngdoh* or other person or persons to whom their religious ceremonies for the particular locality or village or villages are entrusted, with the recommendation of the *Lyngdoh* through local administrative head.

Rule 32, Section 4 (c) deals with the management of *Law Adong* and *Law Shnong*. No trees in *Law Adong and Law Shnong* forest shall be felled or removed except with prior permission of the Chief Forest Officer provided that such timber is required for any *bona fide* public purpose undertaken by the villagers.

The Chief Forest Officer in granting such permission shall specify the quantity of timber to be removed and have the required number of such trees marked for the purpose. Such permission may be granted in the form prescribed in Appendix IV.

Local Communities and Forests, Trees and Common Property Resources (CPRs)

Local communities have historical ties with their local forests, trees and CPRs which provide both direct and indirect benefits to them. The benefits provided by such natural resources are basic to such communities and amongst direct benefits, the following are included:

- Food such as nuts, wild fruits, vegetables, leaves, flowers, roots, stems, honey, wild animals, insects, etc.
- Habitat and shelter
- Raw materials like bamboo, canes, fibres, oils, grass, waxes, resins, gums, dyes and wood for furniture and capital equipment for agriculture, artisanship, etc.
- Wood for building, fencing, tool making, etc.

- Fuelwood
- Medicines and drugs
- Fodder such as grass, branches, twigs and leaves
- Grazing sites
- Means of livelihood, both seasonal and annual
- Shade
- Ornaments, religious items and cultural symbols.

Apart from direct benefits, forests, trees and CPRs also provide indirect benefits, such as:

- Preventing erosion
- Conserving moisture
- Conserving water
- Re-cycling nutrient
- Providing habitat for wildlife
- Providing leaf manure
- Fixing nitrogen by leguminous trees
- Regulating climate and rainfall
- Providing greenery
- Making for prestige and beauty
- Reducing pollution

Thad Village

Ownership of forest areas in the village is of the following types:

Khlaw Forest

This forest originally belonged to the village but in due course of time there was rampant abuse of its genetic resources and deforestation took place. This led the forest department of the government of Meghalaya to look into the matter. An agreement was reached whereby the department took over the forest from the village on lease so that tree plantation and other necessary steps could be taken to revive and regenerate it once again. The agreement was that the department would look after the forests for a period of about 10 years and at the end of the period it would be handed over to the village with the condition that the village would take care of it and preserve it to avoid deforestation. In the interim period felling of trees is strictly prohibited but the extraction of other forest products is allowed.

Khlaw Shnong

The entire area of the village and its lands including forests are directly under the management and control of the village through the village council. The village forest is the biggest forest of the village. It is very dense and thick as compared to the village forests of the surrounding villages. This is because the customary laws pertaining to the *Khlaw Shnong* of this village is still intact and very rigid as compared with others. The elders and villagers have a deep sense of awareness about preserving and conserving it. They feel that a sustainable use of the forest products will result in economic gain not only for them but also for the future generations. This forest is managed by the village *dorbar* headed by the village

headman. The forest has contributed a lot to the needs of the village. All the villagers have access to the forest and usually collect fuel-wood, vegetables, mushroom etc. for their daily use. The medicinemen of the village collect medicinal plants and herbs from it, which are used for the treatment of various ailments like stomach problems, cold, cough, and burns. A simple access rule has it that only village residents are allowed to use the resources.

Extraction of non-timber forest products (NTFPs) including firewood, vegetable etc. can be carried out on a daily basis and they need no permission. Even cutting of a tree or two for domestic purposes like a beam or a pole for a hedgerow needs no permission provided the timber is sustainably harvested and does not go waste. Such felling should not be large scale and regular. However, if timber is to be extracted in larger quantity for building purposes like a house or a church the permission from the headman and his *dorbar* is vital. Then accordingly the headman allots the number of trees required by the villager. The trees, however, have to be manually felled either by an axe or a scythe because machine is not allowed. They believe that by manually cutting the trees a person will think twice to waste it because of all the energy that goes into its felling and another reason is that by manually cutting the trees, the number of trees to be felled is restricted, whereas, if a machine were to be used, then felling of trees would occur rampantly. Before felling trees a person scans the forest and marks the trees to be cut. Such trees should be big, as the small trees are spared so that they can used in future. Trees are selected not necessarily from one area. A villager has to cut trees selectively so that any area will not lose all its trees. Therefore, if one tree is cut from a particular area then the next tree is felled at a far distance from it. However, this distance is left to the person to decide so as not to bring about any loss to the forest.

After a tree is felled, it cannot be girdled and converted into timber with the help of machines nor can it be taken out of the village at this stage. All the work has to be manually done within the premises of the village until the trees are cleared of all its barks and branches and taken the form of a log, then only can they be taken to a sawmill to convert them into planks and beams. The barks and branches can then be used as fuelwood. All these regulations are enforced by *dorbar* so that not even an inch of the tree is wasted. Permission is granted to fell trees only for utilization purposes within the village, but if the person cuts down a tree for selling it outside the village then this is not allowed and the person, if found guilty, is heavily punished. As per rules of the village administration, the cutting and felling of trees from the forest are allowed only when there is emergency within the village, or if there are events like weddings, funerals, village feasts, etc. The village administration through *Rangbah Shnong* give consent to one of the members who looks after the forest to authorise and identify the place in the forest for the trees to be cut. Outsiders are not allowed to use the timber available from the forest. Villagers stand united in their stand against outsiders intruding in their domain and a heavy fine is imposed if they are found to do so. Mass destruction of trees or clearing of entire forest area is prohibited. Reckless release of forest land for non-agricultural uses has been greatly curtailed with such measures.

A separate section of the forest is generally kept aside for coal production. Charcoal is produced by the villagers and sold in the market, which brings a lot of money to the villagers. Lum Symmui is the name of a hill deep in the forest and is in the outskirts of the village and is nearer to the next village called Bambudai than the residential settlement of Thad village.

The village relies on self-monitoring of the forest and does not employ any guards. They say that a person has to have a sense of obligation and responsibility towards the forest that supports him in his survival. Each member of the village is a guardian of the forest and any untoward incident is reported to the *dorbar*. Violations are often punished with fines and these can go up to rupees five hundred. The amount of the fine is usually directly proportionate to the crime committed.

There is a fund constituted by the *dorbar*, which has direct links with the forest. The trees from this forest are cut and after girdling and converting them to logs they are then sold to the local market. The money from this transaction is then used to pay the four teachers of the Upper Primary School of the village teaching classes V to VII. The Lower Primary School is a government deficit school up to class IV and the salary of the teachers there is paid by the government.

Khlaw Balang

This forest belongs to the Presbyterian Church of the village. Collection of minor forest products like fuel-wood, mushrooms and wild vegetables is allowed but tree felling is prohibited. The concerned authorities sell the trees to add to the church fund so as to support the church. Here too there is no guard and everyone in the village is responsible for its maintenance.

Khlaw Volunteer

This forest belongs to 20 volunteers who fought the Hill State Movement. These people of the village suffered and were even put behind bars for their activities. Therefore, when they returned home the village deemed it fit to allot them with an area of forest, previously belonging to the village, in honour of their courage and bravery and bringing prestige to the village. These men belong to different clans of the village like *Shadap* and *Rangtong*. The non-timber forest products can be collected by all and sundry but timber rights belong to the 20 men and their immediate families only.

Khlaw Shimet

These forests either belong to an individual or his family. Even these forests follow the same rules as the other forests do. Collection of only non-timber forest products is allowed to other villagers, but timber rights remain in the hands of individual owners. The main conservation rules of the forests are summed up as follows:

1. Not to fell trees excessively, and if at all trees are to be felled they should seek the permission of the headman and his *dorbar*.
2. To avoid excessive lopping of tree branches.
3. Selected cultivation of silviculture which leaves the diversity and productivity of forests almost unchanged if they are carried out with the necessary safeguards. Here, selected mature trees are marked and felled and particular care is taken during this operation so as not to damage the younger ones left standing.
4. To regulate grazing.

5. To stop encroachment either for agricultural or for residential purposes.
6. To demarcate the land/forest owned by the village.
7. To control the extent of shifting cultivation.
8. Bamboo is not cut during full-moon days. They say, if it is cut on such days and used for fencing or basket making, the products usually do not last due to a particular insect invading it and causing the materials to rot, or get destroyed.
9. A certain species of tree locally known as *Dieng Kain*, *Rhus succedanea* is preserved and people usually keep out of its way. This is because if anyone comes in contact with it one develops body sores. Therefore, villagers are quite reluctant to touch or use it. This may also account for nature's own way of preserving its species.
10. Some villagers narrate that they do not cut a tree species locally known as *Dieng Thit-tiah* because in doing so the tree secretes a milky fluid which is red in colour. The villagers believe that this secretion is its blood and anyone who cuts it will have to face the wrath of the spirit who dwells in the tree.
11. In cutting down a tree the villagers do not uproot it completely, but cut it at about a metre or two from the ground. This way the tree can regenerate itself fast.
12. In checking forest fires, the villagers are not allowed to burn anything inside the forest especially during dry seasons.
13. When collecting forest products the ground vegetation should not be cleared and wood for fuel should be dry or dead wood.

Species of Trees Found

Some of the species of trees found in the forest of the village are as follows:

Table 4.5: Tree Species of Thad village

SCIENTIFIC NAME	TRADE NAME	LOCAL NAME
Shorea robusta	*Sal*	*Sal*
Mechelia champaca	*Tita sopa*	*Dieng Rai*
Phoebe goalparensis	*Bonsum*	*Dieng Ngan Blei*
Pinus khasiana	Red Pine	*Dieng Kseh Saw*
Setula alnoides	Birch	*Dieng Lieng*
Albizzia edoratissima	*Kalasiris*	*Dieng Kreit Saw*
Duabanga sonneraticides	*Khokan*	*Dieng Sai*
Schima species	*Makri Sal*	*Dieng Ngan*
Magnifera indica	*Am*	*Dieng Sohpieng*
Anthacephalus cadamba	*Kadam*	*Dieng Sohklong*
Arthocarpus integrafelia	*Kathal*	*Dieng Sohphan*
Cynometra polyandra	*Ping*	*Dieng Rai Heh*
Zanthoxylum budrunga	*Bajrang*	*Dieng Jaiur Khlaw*
Prunus species	-------	*Dieng Sohiong*
Rhus succedanea	-------	*Dieng Kain*
Erithrina species	*Madar*	*Dieng Song*

Source: Fieldwork 2003-2005.

Nongkrem Village

There has been, of late, enormous interest in the study of nature conservation by traditional societies. The protection of patches of forest as sacred groves and of several tree species as sacred trees belongs to the religion-based conservation ethos of ancient people all over the world. Although such practices have become extinct in most parts of the world, basically due to changes in religion, and during recent times due to changes in resource use patterns, sacred groves and sacred trees continue to be of much importance in religion, culture and resource use systems in many parts of India.

India has a long tradition of prudent use and wise conservation of all resources that are useful to people. Forests have been the lifelines for forest-dwelling communities since ancient times. One method for conservation of this green resource was the creation of sacred groves, usually dedicated to a local deity. A traditional means of biodiversity conservation, these groves can be considered the ancient equivalent of natural sanctuaries where all forms of living creatures are given protection by a deity. No one is permitted to cut any tree or plant, kill animals or birds, or harm any form of life in this area.

It is mainly in the hilly and mountainous areas of India like the Himalayas, the Western Ghats and central India that some such ancient practices survive, sometimes in their pristine form. Studies on sacred groves reveal that they are priceless treasures of great ecological, biological, cultural and historical value. Today, there are only about 1000 square kilometres of undisturbed sacred groves, scattered in patches all over the country. Only the groves in the remote and inaccessible areas remain untouched. While religious taboo protected the groves near towns earlier, today they are protected with the means of barbed

wire fencing or hedges. Sacred groves in Meghalaya are now increasingly coming under threat as the tribal way of life is changing. The area under sacred groves is shrinking and quite a few have been turned into degraded forests already. The erosion of traditional values and deterioration of sacred groves in recent times is, however, a matter for concern (Singh *et.al.* 2008: 87). This can perhaps safely be attributed to changes in social values and religious beliefs as a result of modernization and urbanization. The expansion of the market economy, which places heavy demand on resources such as timber, is another major cause.

Sacred groves vary in size from a few trees to dense forests covering vast tracts of land. These groves are important today as they are banks of genetic and plant diversity that have to be preserved and sustained. These areas often contain species that have disappeared from the region. The extant groves are perhaps indications of the fact that the forests exist not only because there are regulations but also because there are traditions. Some of the richest groves in the country are found in the Khasi Hills of Meghalaya, where almost every village is said to have had a grove, known locally as *law kyntang*. The largest of them are in Mawphlang and Mawsmai in East-Khasi Hills District and West-Khasi Hills District respectively. These groves are a storehouse of a large number of rare plant species. The local people believe that the forest spirit will kill anyone who damages the plants and other life forms in the groves. This has contributed greatly to the preservation of these forests.

The Nongkrem village also has a sacred grove, which is known as *Law Lyngdoh Nongkrem*. It covers an area of 6 ha. and is under the control of the *Khyrim Syiem*ship. This forest belongs to the Lyngdoh or priestly clan of the village. It is set aside for religious purposes and is managed by the clan and the *Lyngdoh* (a religious head). He performs the

rituals and sacrifices to appease and honour the forest deity, locally known as *U Ryngkew U Basa.* Due to the rituals and sacrifices the sanctity and sacredness of the forest is still in tact. Till this day, within this forest there are areas where there are slabs of stones, which look like altar for rituals and some megaliths, menhirs and dolmens are found inside the forest where a sacrificial feast is usually laid out in offering to the departed souls.

The people believe that *U Ryngkew U Basa* or "the guardian spirit" has been living in this grove since time immemorial. This "guardian spirit" takes care of them and protects them from sickness, pain, invasion by enemy etc. Destroying or cutting of trees from this grove is considered to be against the wishes of the deity and therefore people abstain from doing so for fear of invoking the anger of the spirit. Anyone guilty of sacrilege is believed to fall under the curse of the deity and faces dire consequences such as premature death, sickness and poverty. This illness is not relieved until he/she confesses what he/she has done and asks for forgiveness from the deity of the forest through the *Lyngdoh.*

According to the *Lyngdoh,* the deity *U Ryngkew U Basa resides* in certain spots or places in the forest and not in the entire forest area. Once in a year, the *Lyngdoh* performs rituals and sacrifices in honour of him for his response and continued guidance in any matters related to the welfare of the village and its inhabitants. The sacrificial animal is usually a hen or a cock, but the animal is not killed. After all the rituals are performed, it is set free. Whosoever catches it or kills it invokes the wrath of the deity and falls ill. Illness can be subsided only when the *Lyngdoh* intervenes through prayer and incantation.

Most of the forest, especially the interior of it, is covered with dense and thick vegetation. There are plenty of creepers, too. The predominant tree species of the forest are

those with broad-leave Cynometra polyandra (*Dieng Rai*), Duabanga sonneraticides (*Dieng Sai*), Schima species (*Dieng Ngan*) etc. Felling of timber is a taboo in the grove. However, the community can use twigs, leaf litter, fruits and herbs that grow in the forest without endangering the ecology of the grove.

The maintenance of substantial patches of forests as sacred played an important role in watershed protection. A number of perennial streams originate from the forest. It serves as a water reservoir and the village, especially the Nongkyndong hamlet, which lies directly below the grove, hardly faces any water scarcity.

A thatched house known as *Iing Lyngdoh* is situated in the village. It is used during ceremonial acts and dances. According to the *Lyngdoh*, the original *Syiems* of *Hima Khyrim* belonged to the village. The rituals, dances and festivities were held here. However, the *Khyrim* headquarters was shifted to Smit in due course of time.

The other type of forests found in the village is private forest locally known as *Khlaw Shimet*. These forests belong to a clan or group of clans or an individual family and are recognized as private lands (*Ri Kynti*). Collection of NTFPs by the villagers is usually allowed but the valuable timber belongs to the owners and no one is allowed to fell trees from such forests.

Forest Products

Access to forests and forest products is regulated by customary laws, which recognize the rights of the owners, but also provide for certain common rights. Forest management's primary object is public welfare. For this conservation of forests is of paramount importance

in order to provide, perennially and without bankruptcy, the forest dwellers with their basic needs of forest products as previously enjoyed by their forefathers.

Wild plant resources provide for a variety of basic needs for the rural and urban communities. Building materials, fuel, food supplements, materials for crafts, medicines are all acquired from the forests, and they all are a source of income, too. There are many varieties of non-timber or minor forest products, which are used for domestic consumption and are sold in the local market. Selective collection of useful species of plants from forests for consumption and for sale in the local markets is one of the indigenous approaches. Plants collected from the forest include secondary staple foods like vegetables, fruits, seeds, tubers, mushrooms, bamboo shoots, flowers, medicinal plants and fibres.

A large number of plants, animals and insects are collected from the wilderness as dietary supplements. The villagers eat almost all wild animals, birds and insects. There are usually two types of forest products - timber and non-timber forests products (NTFPs).

Timber

Timber is the most important forest product. It has multiple uses and many forests are cleared and degraded due to the collection of timber. It is also the cause of many conflicts and claims among people. The ban on felling of trees imposed by the Supreme Court of India on December 12, 1996 has affected the merchants and businessmen of the village, who have had to switch over to alternative modes of employment like agriculture or daily labourer. This ban affected the privately owned forests as well. There was earlier no restriction on tree-felling.

Non-Timber Forest Products (NTFPs)

A forest is the store house of a large number of organisms. The forest biomass represents the maximum richness and complexity in terms of numerous forest products. All forest products other than timber are called non-timber forest products or NTFPs. NTFPs include fuel wood, bamboo, cane, broomsticks, mushrooms, thatch grass, fodder, orchids, honey, wild vegetables, wild potato and tubers, as well as leaves of many wild plants.

Fuel wood. The women and young girls collect fuel wood for cooking from the forest. It is the primary source of domestic energy requirement. The principle is that one collects timber and firewood only for one's needs and not for sale. Everyone collects according to his needs, and the practice of selling it to outsiders does not exist. Even now no permission is required to collect dry leaves, twigs or branches, provided they are dead. However, collection of green trees or lopping of live branches for the purpose of fuel-wood is strictly prohibited and anyone found to do so is punished by *dorbar* in the form of fines imposed which can go up to five hundred rupees.

Bamboo. Bamboo is a very important NTFP in the village. It is abundant and widely used by the villagers. They are tall grasses belonging to the family *Poaceae*. They play an important role in the economy of the village and are vital for the livelihood of the rural people. The association of the people of the village with bamboo begins at birth, when a bamboo splinter is used as a knife to cut the umbilical cord after a child is born. Much of the construction work for dwelling houses and domestic applications are bamboo based. Bamboos with a greater wall thickness and having closer nodes are considered good for structural use in columns,

beams, rafters, purlins and trusses. Another use of bamboo is in the making of walls for huts or partition walls inside the house or floor in the bathroom and used as screens. Locally known as *Trypait*, this is made by slicing the bamboo into fibre-like structures connected at the nodes so that it gives a fan like appearance. For wall-making it is very commonly used in the village especially by the poorer section of the village who cannot afford timber houses. These are erected and then pasted with red soil. The substance consists of red soil and cow dung, and sometimes pine leaves or husk are also mixed. This substance is very sturdy and can withstand rain, wind and storm. The only catch is that it has to be pasted at least once a month to about thrice in two months.

The leaves and young shoots are used as cattle feed. Young succulent shoots of bamboo locally known as *Lung-Siej* is eaten as a delicacy and can be processed into a variety of items. It is preserved indigenously. It is also used as medicine by the medicine men of the village. Bamboo is also used as hedge because it does not require annual pruning. Further its rooting system does not extend beyond the area of visible growth. Therefore, it may not impoverish nearby beds by exhausting the soil nutrient. It is used in rural water supply system using bamboo pipes and bamboo conduits especially in the paddy fields. It is also used for making storing vessels, handicrafts, water conduits, hunting and trapping appliances, farm implements, fences, baskets, mats, utensils, weapons, cutlery, winnowing and drying implements, etc.

Canes. Canes are spiny climbing palms or stragglers that grow in the forest. They are largely used for furniture making. They are used in basket making and rope substation and in handicrafts.

Medicinal Plants. Medicines made from herbs and shrubs collected by the medicine man have been helpful in treating all kinds of ailments ranging from cough, cold, burns, stomach aches, sores, skin diseases, etc. Urinary Tract Infection problems are also given medicines by these medicine men. Some of the plants used for medicinal purposes are: *Bahuhinia variegata*, *Mucuna species*, *Centella asiatica* (L: *khlieng syiar*), *Artemesia* spp (L: *kynbat jaiaw*), and *Azadirachta indica.*

Mushrooms. Mushroom is a very popular food and is present in the village forest in abundance. It is a seasonal food supplement with a lot of variety. It is collected from the forest by women and young girls and treated as a delicacy. But expertise is required in the art of mushroom picking because some varieties like *Agaricus species* and *Volvariella species* are poisonous.

Other NTFPs. They include wild vegetables, leaves, fruits, seeds, honey, tubers and roots for human consumption as well as animal feed. They can be collected from the forest by everyone. But the general principle is that they should not be wasted and should be collected in a sustainable manner. Any destructive method invites censure or even punishment in the form of fines. Most of these items are collected on daily, weekly or seasonal basis and consumed by the villagers without taking them to the market for sale. However, in particular seasons, some items are available in a quantity that is higher than the consumption level of the household, and then they are taken to the local market and sold. Because of the perishable

nature of these items and their profuse availability, market transactions do not bring much profit to the collectors.

Forest Fires

Forest fires are another cause of destruction of trees, vegetation, thick layer of humus, birds and animals. Fire has been one of the biggest menaces to the forest. Possibility of fire is high during dry conditions of winter when the surface grasses become highly susceptible to fire. Two major causes of forest fires are:

(1) **Intentional Fire**: The forest is often set on fire by the villagers to get a good growth of grass when it begins to rain. The fire burns the debris that is lying on the forest floor and hence the grass is able to grow well in the rainy season. Sometimes it spreads and destroys vast tract of valuable trees. The forest is also set on fire to clear it of dry vegetation in order to avoid the risk of catching a marauding fire. Fire is started from top to bottom by cutting fire lines at regular intervals to control the fire. But fire-line is often cut only on the outskirts of the forest since forest area is very large and it would not be conducive to manually complete the task if fire line is cut at regular intervals. Villagers also set fire to pine leaves falling on the ground as they inhibit the undergrowth. The pine needles are collected and used as stuffing material in mattresses and pillows. Fire is also set for shifting cultivation.

(2) **Accidental Fires**: Fire is also caused by carelessness of the villagers. Unextinguished campfires of trekkers and picnickers, forest labourers throwing away cigarette butts, *bidi*s and matchsticks, cowherds leaving open fires especially during winter season to keep themselves warm, villagers burning the unwanted materials in their fields, throwing

away of kerosene torches used by travelers to see their way in the forest during the night, etc. can be potential sources of accidental fires in the forest.

There are several ways of controlling fires – by beating the green branches of trees on the fire, by throwing soil and water on it and by cutting a fire-line to prevent the fire from spreading to residential areas. However, fires are not allowed to be set on areas or forest adjoining residential areas and cultivated lands and if anyone is found to do so they are punished by *dorbar*. Punishment can be in the form of fines, and the amount fined depends on the severity of the situation and the damage incurred. The villagers have learnt that by controlling fire on the border of the forest, they can control forest expansion and at the same time lessen the intensity of the fire.

Tree Plantation

Farmers grow trees of economic value and suited to their requirements. There is no collective effort of the villagers to plant or grow trees but they cut trees two or three feet above the ground. In this manner, the tree can regenerate itself fast. This way, they prevent the forests from being completely wiped. There are some villagers who plant trees on their land every year. Examples of trees usually planted are *Schima species*, *Cynometra polyandra*, *Delonix regia* and *Pinus khasiana*. However, the Soil Conservation Department of the Government of Meghalaya, under its Watershed Management Programme, has carried out a successful campaign of tree plantation programmes by giving free tree saplings to the villagers. The saplings include pine, Assam lemon, orange and guava. With the increasing demand for

timber in the market, people are provoked to plant more pine trees on their own private lands with a motive to sell them as and when they attain a suitable size and height.

The Forest Department of the Government of Meghalaya has taken on lease a patch of forest belonging to the village for a period of ten years. This was because of degrading conditions of the forests and the alarming decrease of forest cover over a decade ago. It has planted trees especially of the *Pinus species*, so as to regenerate the forest quickly, since pine grows at an alarming speed. At the end of the period it will then hand over the forest area to the village to manage it sustainably. The Soil Conservation Department of the Government of Meghalaya has also distributed saplings especially of pine to individual forest owners to once again revive their degrading forests, since these types of forests are very susceptible to over-exploitation of timber as there is no rule to govern or control the owners.

The Social Forestry Scheme implemented in the village by the Government has actually raised a few concerns. In this scheme, pine tree saplings are distributed and grown in abundance because of their commercial use. The pine species is a valuable forestry product. They are generally fast growing, and, once established, require little attention. However, the pine needles contain toxins which tend to stop other vegetation growing under these trees. This is an advantage in that weed control is relatively easy, but a disadvantage in that it reduces the biodiversity of areas where pines are planted. It is often very difficult to establish other crops in an area that has been used for pine plantations (Mason 2003). Growth of pine trees in abundance also affects the underground water table as pointed out in the studies conducted by Pant and Khanduri (1998), Sinha (2005) and van Noordwijk (2006).

Role of Traditional Institutions in Forest Management

According to the information provided by the elders of *Thad* village the administration of the village is conducted by local customs and traditions. However, since it was not written down, interpretation of the customs varied, sometimes resulting in uncertainty and confusion about the regulations of community. The outcome led to indiscriminate use of forests. The danger of forest depletion led to the *dorbar* convening several meetings to dwell upon the cause and consequences of such actions and the implication it has on the people and their livelihood. It was then that the *dorbar* in January of 2004 decided to convene a meeting with natural resource management issues as one of the main important agenda. The discussion resulted in clarity on the conditions of access and use of the community forest. The terms and conditions deal specifically with the community forest. Normally the penalty for violators depends on the nature and gravity of actions committed. In a recent incident a fine of Rs 250 was imposed on a couple because someone reported to the *dorbar* that they were cutting trees that surrounded their paddy fields. These trees belonged to the village forest and therefore after stringent warning and imposition of the fine they were let off. The woman said that after what happened she would never again commit the same mistake not only because of the fine involved but also because of the embarrassment that was caused by the incident and a warning that next time things would not be as easy as the first time.

There is an interesting incident involving this forest (*Khlaw Shnong* or village forest) indicating the power of the villagers. A few decades ago there was a battle between the Syiem of Mylliem under whose jurisdiction the village falls and the people of the village. The *Syiem* had an eye for this forest because of its thickness and dense vegetation. The trees were all

huge and massive which according to him were ripe for harvest. So he ordered his *Myntris* (ministers) to fell the trees and sell them in the market. But when they arrived in the village the entire village stood up against them and they were very outraged with the idea of cutting the trees and clearing the forest, which was a life support system for them. They did not allow the *Syiem*'s men to cut even a single tree and the *Myntris* had to return empty-handed. The villagers with the help of the local Member of Legislative Assembly went to meet the *Syiem* and persuaded him to leave the forest alone. After much argument and deliberation an agreement was reached whereby the forest was left as it was and the villagers returned home overjoyed.

The *dorbar* of Nongkrem village has yet to assert itself in the management of forests. Due to bulk of the forests belonging to the private category, it becomes difficult to monitor and regulate the wanton destruction of forest. The implication of this is that due to no proper rules and regulations laid down by the *dorbar*, forests are destroyed which takes a toll on the soil as well as water resources. Top soil run-off will lead to loss of biodiversity eventually leading to drying of springs.

Wildlife

Wildlife involves animals and plants, or fauna and flora, living in a natural, undomesticated state. It includes biological communities with their own natural energy and population dynamics. It contributes towards maintaining biodiversity. The colourful birds, animals and other life forms in the forests are important in maintaining the eco-balance. Disappearance of

forests or its reduction in area will cause disappearance of wildlife. Thus, conservation of forests and wildlife go side by side.

Wildlife in Meghalaya has played a vital role in its economy and culture as a source of protein, as item of trade as well as invoking religious thoughts. Even today the people depend heavily on wild meat as a source of protein, mostly hunting deer, hare, elephants, wild pig, peafowl, jungle fowl, quails and partridges, ducks, rodents, snakes and so on. Products of wild animals are much sought after from time to time by the people, especially articles like ivory, peacock feathers, precious skins and musk, and the flora include dense and lofty trees with much species diversity. Mosses, ferns, epiphytes, orchids, lianas and vines, herbs and shrubs make up the diversity of the forests. Many species of plants are extinct and some are facing dangers of extinctions. The basic reasons for extinction of wildlife are as follows:

- Destruction of their natural habitats due to expanding agriculture and urbanization.
- Over grazing by domestic animals.
- Poaching for meat, skin, fur, ivory etc.
- Forest fires.

In Meghalaya different types of forest have different impact on people's livelihoods. Reserved and protected forests have very little direct influence on livelihoods, as they are managed almost entirely by the State Forest Department and local people cannot legally extract anything from them – especially from reserved forests. Unclassified forests provide the backbone for livelihood generation, as these are the areas where most shifting cultivation

takes place. Village, community and private forests are used mainly for meeting the subsistence needs of communities in terms of fodder and fuel wood.

As far as privately owned forest is concerned neither traditional nor modern institutions have any control over them. The owners enjoy absolute authority over the trees and NTFPs. Since such forestlands are not under any control, in the last few decades owners and timber merchants have exploited and used the forests for commercial purposes. The only form of control came by way of timber ban logging by the Supreme Court of India about which mention has been made already. This ban has also brought into direct conflict the State on one hand and forest owners and timber merchants on the other, and subsequently this has led to the contentious debates on the issues of the rights of the people residing in the Sixth Schedule areas as per the Constitution of India. The subject matter is still debated and remains inconclusive. Another important issue is the sale and lease of privately owned forest lands. Even customary beliefs and practices are silent on these issues because these issues are recent, emerged as they are only after privatization of forests and lands began in Meghalaya. It seems the absolute authority of the owners give them absolute power to do what they want and therefore they can lease or sell to the highest bidder and get maximum profit out of it. It is observed that many such forests in the rural areas of Khasi-Jaintia hills have been bought by rich timber merchants or local business persons belonging to the local community.

The entry of rich absentee owners into the rural areas is resulting in a kind of privatisation of forests. The impact of it has been rather negative for the poor villagers. It has been a tradition in the society where villagers can collect dead or dried trees and branches for domestic fuel wood even from private forests. The absentee owners are not too keen to

continue with the practice. The traditional institutions are not able to handle the changes since they have no authority over privately owned forests. The absentee owners are carrying and implementing the idea of a private property in its literal meaning in the villages. One may even argue that the process of privatization of forests is gradually changing the customary beliefs and practices. With regard to forests controlled and managed by a village or cluster of villages it is observed that some of the traditional institutions have taken pre-emptive steps by re-defining rules and regulations on the protection, conservation, and use of forests. This is strengthening the customary practices whereby the forests are used for both domestic and commercial purposes more judiciously. The common property resources are protected and thereby providing sustainable resources for the community. But there are villages where the danger of depletion of forests is real and common property resources are fast dwindling. This is because the traditional institutions in such villages are yet to take any pre-emptive steps. The customary practices are unable to control privatization of forests, and the traditional institutions do not have the authority to protect and conserve community based properties by evolving judicious rules of management and use of community-owned forests. Due to this the poor are badly affected.

Traditional institutions in the colonial and pre-colonial periods were reasonably successful as forest managers, but difficulties started when district councils were introduced as managers. The situation was exacerbated by the emergence of a lucrative timber market, which encouraged landowners to extract timber rather than manage their forests. The new actors are not properly equipped to carry out the new responsibilities thrust upon them. The need of the hour is to build district councils' capacity to work with local communities in

promoting better notions of forestry. Although the district councils may be the new *de jure* owners, it is the local leadership that controls forests, and policy prescriptions need to take this into account by creating incentive systems for different stakeholders so that they begin to think beyond timber. Today's forest ownership and institutional framework need to adopt a stewardship paradigm that takes a more long-term view of the returns from forestry and forest.

This chapter is based on the prevalent methodologies in the two villages with regard to the way management and conservation of forest resources is carried out. Major findings include:

Ownership of forest: The categorization of ownership of forest in Thad village is as follows: (a) *Khlaw Forest,* (b) *Khlaw Shnong,* (c) *Khlaw Balang* (d) *Khlaw Volunteer.* and (e) *Khlaw Shimet.* Ownership pattern in Nongkrem village is basically private ownership of forests, which is either individually owned or clan owned which also includes the *Law Lyngdoh Nongkrem.*

Forest Products: (a) Timber is the most important forest product which has multiple uses and many forests are cleared and degraded due to the collection of timber.

(b) Non-Timber Forest Products (NTFPs) include fuelwood, bamboo, cane, broomsticks, mushrooms, thatch grass, fodder, orchids, honey, wild vegetables, wild potato and tubers, as well as leaves of many wild plants.

Forest Fires: Forest fires are another cause of destruction of trees, vegetation, thick layer of humus, birds and animals. Two major causes of forest fires are:

(a) Intentional Fire: The forest is often set on fire by the villagers to get a good growth of grass when it begins to rain.

(b) Accidental Fires: Fire is also caused by carelessness of the villagers.

There are several ways of controlling fires used by people such as beating the green branches of trees on the fire, throwing soil and water on it and cutting a fire-line to prevent the fire from spreading to residential areas.

CHAPTER V

WATER RESOURCE MANAGEMENT PRACTICES

Water is one of the most important and vital of all natural resources in the world. It is vital for all living organisms and major ecosystems, as well as for human health, food production, and economic development. Since the first civilizations arose in the Nile, Tigris, and Euphrates river basins, population growth and distribution have been intimately linked to the availability of fresh water. Today, nearly 40 per cent of the world's food supply is grown under irrigation, and a wide variety of industrial processes depend on water (Sherbinin 1998). It sustains all dimensions of our life. It is the basis of agricultural, industrial and all kinds of economic activities. Agriculture can be sustained only by the supply of sufficient amount of non-saline water for agricultural purposes. This chapter deals with issues of water management and conservation in the two villages under study, its use for various purposes as well as rain water harvesting which is becoming a very important facet of water management as well as gender issues in water management.

The source of water has always been either from rain or surface flow from river, streams, lakes, etc. or from underground storage. Potable water today is scarce in urban and rural habitations. Assured supply of water is essential for drainage, public health and sanitation. Water has always been envisaged as a free gift of nature but essential to human life. It is a symbol of life, a commodity essential for life and crucial to developmental plans of socio-economic change. Its abundance in the form of heavy rain causes natural hazards such as floods and cyclones, which lead to loss of life and property. Its paucity creates drought

condition with adverse effects on agricultural production and other purposeful activities, resulting in scarcity even in drinking water.

More than 97 per cent of water in this earth is in the form of ocean and seas, 2 per cent is locked up in ice-caps and glaciers and a large portion of remaining 1 per cent lies far too deep in the ground to exploit (Bansil 2004). It is a fact of nature that water cannot always be found where it is needed, when it is needed, and in the amounts that are needed. Yet the ironic truth is that where it is found in abundance, this asset is either unused or misused. Rapid and unplanned urbanization causes a real threat to surface and ground water resources. The increase in run-off means a loss in potential ground water recharge (Sharma and Sharma 1999).

Lack of water to meet daily needs is a reality for many people around the world and has serious health consequences (WHO 2007). The lack of water is a tragedy for many poor people and also causes problems to the natural environment. Globally, water scarcity already affects four out of every 10 people and more than 30 countries face water stress and scarcity. It appears further that one of the main factors limiting future food production will be water (Rosegrant 2002). The World Health Organization estimates that 80 per cent of all sickness in the world is attributable to unsafe water and sanitation. The UN states that for humanity, the poverty of a large percentage of the world's population is both a symptom and a cause of the water crisis and that giving the poor better access to better managed water can make a big contribution towards poverty eradication (WWDR 2003). More than a billion people in the developing world lack safe drinking water that those in the developed world take for granted. Nearly three billion people live without access to adequate sanitation systems necessary to

reduce exposure to water-related diseases. An estimated 14 to 30 thousand people, mostly young children and the elderly, die every day from water-related diseases. At any given moment, approximately one-half of the people in the developing world suffer from disease caused by drinking contaminated water or eating contaminated food (Gleick 1999).

Gleick (1999) claims that the failure of the international aid community, nations, and local organizations to satisfy the basic human need of safe drinking water and adequate sanitation has led to substantial, unnecessary and preventable human suffering. Gleick argues further that access to basic water is a fundamental human right implicitly supported by international law and declarations. He argues that the State governments, international aid agencies, non-governmental organizations and local communities should all work to provide all people with basic water and to guarantee that water is a human right. The water crisis will continue to worsen due to population growth, urbanization and increased domestic and industrial water use (Rosegrant 2002, WHO 2007). Water withdrawal is increasing with time. In 1995 the world withdrew 4,000 cubic kilometres of water for domestic, industrial and livestock purposes, and by 2025 water withdrawal for most uses is projected to increase by at least 50 per cent (Rosegrant 2002). Hardest hit by the water crises will be the world's poorest people (WWDR 2003). The severe water_crisis will also lead in turn to a food crisis (Rosegrant 2002). A commitment to the sustainable use of water through appropriate policies and investments will lead to a more water- and food- secure world (Rosegrant 2002) taking into consideration that solving the water crisis in its many aspects is but one of the several challenges facing humankind (WWDR 2003). Thus, we have to fit the water crisis into an overall scenario of problem-solving and conflict resolution. The decade 2005-2015 has been

declared "The International Decade for Action: Water for Life 2005-2015" to promote efforts to fulfill international commitments made on water and water-related issues by 2015 (WHO 2007). Achieving these targets will directly affect the lives and prospects of billions of people around the globe (Oman and Edward 2007).

Water, air and land are the pillars of human civilization and yet till very recently no one seemed to care about the gross misuse of these life-sustaining assets. Their end-use is very essential for every human inhabitant and for wide range of economic and informal sector activities. It is vital for health, agriculture, industry and hydropower. Water is also a vital part of the environment and is home for many forms of life on which human as well as other beings depend. Given the increasing requirements, both in terms of quality and range of use, water issue is more sensitive today than in the past. The demand for water is steadily increasing and will continue to do so because water supply is at best fixed and its availability is at the mercy of the nature over which humans have no control (Hamdy *et. al.* 1995). It is, therefore, obvious that unless we co-operate and plan for development, conservation and use of water will soon be a serious constraint to the development of many nations.

Thus, time has come to give serious thoughts and policy geared up to economic development for this precious commodity for the benefit of the human race. It is time to shed our indifferent attitude towards the use of water and wake up to some stark realities of the growing water crisis. In fact, even in the international arena there is a growing feeling that within the next decade or so water crisis may lead to a situation somewhat akin to the oil crisis of 1973. Hence, judicious management with proper planning of the available water resources is one of the most vital natural assets and its development, management and

conservation hold the key to a nation's prosperity. An effective utilization of land for food production depends upon irrigation practices, which in turn have socio-cultural ramifications (Devarapalli 2006).

Over the past decades a significant body of knowledge has been created on natural resource management in general and water resource management in particular, based on experiences worldwide with successful and unsuccessful approaches. Efficient development and optimum utilization of water resources, therefore, is of great significance to the overall development of any country. Water resource management in India is going to be vitally important to sustain the needs of one billion population of India. Water management is a heterogeneous area with linkages to different sectors of Indian economy including the agricultural, industrial, domestic and household, power, environment, fisheries and transportation arenas. There are various key issues related to conservation of depleting ground water resources, soil conservation, flood control and availability of drinking water (Rao 2008). Because water is shared as a resource, it has often led to disputes between different states and also with the neighbouring countries and that adds to the problems of water resource management in India.

The National Water Policy of 2002 envisages that the water resources of the country should be developed and managed in an integrated manner. Water is a scarce and precious national resource to be planned, developed, conserved and managed as such, and on an integrated and environmentally sound basis, keeping in view the socio-economic aspects and needs of the States. It is one of the most crucial elements in development planning. As the country has entered

the 21st century, efforts to develop, conserve, utilize and manage this important resource in a sustainable manner have to be guided by national perspective (Government of India 2002).

The Northeastern region of India is endowed with rich water resources but their mismanagement has rendered the region deficit in water supply. The government of India introduced two major water policies – in 1987 and 2002 – to streamline the development, management and utilization of water resources. The former recognized the drainage basin as the basic unit of planning water resources and to optimize their utilization. The National Water Policy of 2002 stressed on rain water harvesting, ground water recharge and prevention of over-exploitation of water resources, water allocation priorities, flood control management and involvement of beneficiaries and stake-holders in the development works undertaken (Sharma and Sharma 1999).

In Northeastern region of India, the social sanctions and belief systems maintained a balance between resource potential and their utilization for a long time but due to increase in demographic pressure and indiscriminate use of natural resources, imbalance has been created (Sharma and Sharma 1999). The fast growing population in the region has pressurized food production base and to satisfy their needs people have misused water resources. The gross misuse and mismanagement of water have resulted in soil erosion and land degradation in the hills and silting of river beds and frequent floods in the plains. The ecosystem has been seriously disrupted by rapid population growth and uncontrolled development resulting in increased flood risk.

Role of Traditional Institutions in Water Management

Water management in the villages under study is generally carried out by the traditional institution viz., village *dorbar* rather than the government. The *dorbar* in Thad village is very conscious of management and conservation of water sources which is why it has laid down rules to properly manage and conserve it. Anyone found breaking them would be dealt with according to the rules laid down by the *dorbar*. Water catchment areas have always been a major concern due to its direct bearing on agricultural production, hence the *dorbar* is particularly very firm about punishments meted out to people who pollute and destroy them. In one such incident that took place in the village in the year 2000, a family was fined five hundred rupees because its cattle had strayed into the surrounding of the source of the *Wah Um-ka-Pok* which is the source of the government water supply. Since the number of animals was huge, the river became polluted resulting in impure quality of drinking water. This was an eye-opener to many villagers and also a lesson to the family concerned that the *dorbar* does not take lightly the erosion of natural resources due to man's activity.

As stated earlier, Nongkrem village has not been able to steer itself towards a proper codified set of rules for the management of water resources, yet while speaking to the village elders, it was found out that the people in general do have an innate sense to conserve, preserve and manage water sources. However, the *dorbar* as such do not have a very strong decree on issues relating to water resource management.

Thad Village

The village has a number of streams and rivers that run through it. They include *Wah Umsiang, Wah Umsohsai, Wah Mawlein, Um Myrsiang, Um Khangiang, and Wah Um-ka-Pok.* The last river is the source of the government water supply for the entire village. According to most of the respondents, the quantity of water has decreased as compared to a few decades ago. This may be due to a number of reasons such as the destruction of catchment areas, deforestation and Social Forestry Schemes. Regarding these schemes, it may be pointed out that pine trees are grown in abundance because of their commercial use, which requires a lot of water to grow, thus draining the ground water table. The pine trees do not have the capacity to retain water, which has resulted in the drying up of springs and creating a scarcity of drinking water. It has no canopy and no undergrowth, thus leaving the mountain slopes fully exposed to erosion by rain and wind. Its leaves are not used as fodder and they are inflammable and acidic, which makes the land infertile. But in order to extract resin from the trees the planting of pines is still going on (Pant and Khanduri 1998, Sinha 2005, van Noordwijk 2006). In the rainy season, water for domestic and agricultural purposes is found in abundance but once winter sets in water problem becomes acute, especially water for consumption.

Traditional Water Management

In order to achieve the objective of development in villages, people's participation is essential. It is required to involve them actively in project activities by respecting their traditional knowledge. Traditional knowledge has a sound base as it has been tested over

several years. It is appropriate technology in particular climatic conditions and in the living conditions of people (Mishra 1998).

The body of knowledge acquired by a group or society to harness natural resources in its habitat is termed variously as native knowledge, folk knowledge, traditional knowledge, etc. Traditional knowledge systems are built on arrangements, juxtapositions and interactions between one form of life or life-giving elements and another including plants, animals, water, earth and others among themselves and with human beings (Mathur 1996). The inherent inadequacies and limitations of this system of knowledge are overcome by belief systems and propitiation of the supernatural. Whenever an innovation is introduced either from within or from outside it has a significant impact on the existing system effecting change in the society and altering the body of knowledge (Devarapalli 2006). Traditionally, wherever there were streams, especially in the hill and mountain regions of India, people diverted water using simple engineering structures into artificial channels that would take it to the fields (Agarwal *et. al.*1999). The indigenous people of Northeastern India continue to build bamboo pipelines to carry water from natural springs to a convenient point where it can be used for drinking.

The available water is used for the following purposes by the Bhois of Thad village. This will also give an idea of the traditional water resource management systems practised by them.

Domestic Use

The first and foremost use of water is for domestic purposes (drinking, cooking, washing, bathing, etc.). Water is carried through hollowed bamboos or pipes or channel the spring to a

point near the hamlets, from where people collect it. Hamlets are often situated near springs. Nowadays water is supplied through pipes in various hamlets of the village as the PHE Department of the Government of Meghalaya in recent times has tapped streams in upper slopes for it. The department has constructed taps to assist the people in their daily need for water. These taps are situated in all the hamlets of the village. But the water supply is irregular and the people have to resort to alternate means of water collection like rain water harvesting and drawing stream water for their daily use. The water is collected in pots and dried gourd vessels and carried in conical bamboo baskets.

Agriculture

The people practise two types of cultivation: (i) Rainfed agriculture in hill slopes, and (ii) irrigated agriculture in the flat valley lands and terraces. Management of water in the second type of agriculture is the most noteworthy example of traditional water resource management by the farmers of this village and is carried out in two fashions:

(i) Water from the streams is diverted to irrigate rice fields on flat valley land and terraces during cultivation of paddy. The method for preparing land for wet terrace cultivation is to dig the hill into terraces of 2 to 20 feet in breadth. The stones taken out of the soil are used to bank up the walls of the terraces. The terraces are not rain-fed but irrigated using local skills. Terraces are carefully flooded, using bamboo and other local material as water conduits. These conduits are used as prefabricated water management structures. Hollowed bamboos are tied together, end-to-end, so that they take the form of pipes and water is run through

them. These channels carry water from some stream or torrent for a distance that may sometimes be measured in miles, some fields being fed on the way. Each terrace, of course, cannot have its own channel, but usually obtains water either from the next terrace above it or from one of the terraces in the same row, the terraces being so carefully graduated that the water flows from terrace to terrace round a whole spur. Water is channelized to irrigate a series of terraces in such a manner that water continuously flows from the upper terraces to the lower ones without soil erosion and maintaining a desired level of water in the terraces. Water from the natural streams located at a higher elevation is conveyed with the use of bamboo channels, supported on ground surface by wooden or bamboo supports, to the site of plantation through gravity flow. Ponds are also dug in the upper regions of the paddy fields which act as water reserviours. These ponds are lined with stones to prevent it from drying and a trench like structure is dug round it to prevent top soil run-off to accumulate in the pond which may lead to siltation of the pond. Water distribution is done with the use of bamboo channels, bamboo supports and water diversion pipes.

(ii) The *Nur* system is traditionally prevalent among the Khasi people in Meghalaya, which ensures provision of water for mainly wet paddy cultivation where rainwater is not sufficient due to low water retention capacity of the soil. The main features of the *Nur* system are sustainable use of available natural water resources, community involvement in management and largely traditional community-based governance. As mentioned earlier, water resources of a *Nur* is mainly used for wet paddy cultivation and there is no other use of water from this source, except for occasional fishing by individuals, wherever that is possible. This system

has been in practice predominantly among the Bhois of Ri-Bhoi District situated in the northern part of the state.

*Nur*s are man-made structures akin to canals, to route water from available water sources, which are usually perennial, to the paddy cultivating fields. The water sources are small rivers, perennial swamps, streams, etc. The outlet of the *Nur* is usually dug and curved out from the water source and a bund or check dam made of locally available materials is constructed at the mouth. This ensures that the main course of the river does not change and start flowing through the *Nur*, especially during the rainy season. A *Nur* can have a breadth of half a feet to two feet on average or even more. Usually it dries out at the end of its course naturally or meets other large water bodies like river or stream. The length of most *Nur*s is between 2 and 5 kms.

*Nur*s are relatively large water carrying canals sourced from a natural water body. *Nala* are small canals of various breadths, which channel water from one level of terraced field to the next. These water outlets are micro water distribution canals sourced from a *Nur*. *Nur* and *Nala* are inseparable part of the same water management system. *Nala* is dug along the embankments on the paddy fields forming the common site of rectangular plots of lands called *Hali* in Khasi, which are built to retain water for cultivation. A *Nala* is always placed at alternating positions of *Hali*s.

Prior permission is required for constructing a *Nur*. If the water source is in a private property, then permission is sought from the concerned owner. However, if the water source is in a community land, then the permission of the village headman is required. The decision

on when and how the construction and renovation of a *Nur* is to be carried out rests solely with the individual farmer.

Traditionally a bund made of earth, leaves and bamboo, where bamboo sticks are placed and interwoven with earth debri, leaves and twigs to take the form of a mesh, is put at the source of a *Nur* and at different intervals across the length of the river to maintain the water level at desired level in relation to the level of the cultivated lands and the age and maturity of the crops. This ensures continuity of flow at the required speed and quantity across the whole course of a *Nur*. During the initial stage and just after the transplanting stage, the flow of water is controlled. However, for proper and healthy growth of the crop, water is then let loose to flood each *Hali*, which in turn floods the next *Hali* through the *Nala*. During rainy season the bund at the source or upstream are cut open bit by bit at regular intervals to control the flow of water, depending on intensity of the flow. Usually at the juncture, where the frontiers of cultivating tracts of one village ends and that for the next village begin, a bund is constructed.

Changes have taken place in different water flow controlling mechanisms installed along the course of a *Nur*. One major development has been the use of jute and plastic gunny bags, instead of the earth debris, twigs, and leaves, at different junctures to maintain the desired water level and to prevent inundation of cultivating fields by overflowing water, which had been a recurrent phenomenon in most places in the past. The new technique has considerably reduced the damage caused by intense flow of water during the rainy season, which used to break the embankments resulting in inundation of cultivable land. Embankment reinforcement by laying boulders in vulnerable position has also been done. Traditionally

earth has been used for embankments of *Nur* which give in to rapid water flow at times and inundates the cultivating areas.

To keep a *Nur* flowing is one of the greatest challenges a farmer faces every agricultural season. It can turn dry due to changes in the water source upstream and depletion of forest cover at the catchment areas. Farmers cannot depend on rain water alone for paddy cultivation. Moreover rain water availability varies from year to year. The *Nur* system has provided water resources security for sustainable livelihood of the people of the area for very long. The *Nur* system is based on sustainable use of available water resources. That this system is in operation in the district for hundreds of years without hampering the water resource base is itself an indicator of its sustainability.

Irrigation of vegetables in the hill slopes is usually done manually. Water is carried by hand in tins or water vessels like pots and in the dried gourd vessels in conical bamboo baskets. The supply of water in the paddy fields is a problem due to abundance of crab- and rat- holes. *Bun* cultivation, which has been described already, is solely dependent on rainfall. Usually a place is chosen for cultivation keeping in mind the availability of water. Farmers carry water to their fields through small irrigation channels. These go from the source of water along the slopes to the fields. In order to avoid seepage of water farmers use bamboo pipes. By means of gravitational force they transport irrigation water from its source to the plot they wish to irrigate.

Recreation

Though the scope for fishing in the village is meagre the villagers go to fish in the nearby rivers and streams. Fishing is almost absent during winters for the fishes migrate down-stream due to cold. Fishing with the fishing rod is allowed but use of explosives and poisonous substances is not allowed. However, nowadays, fishing is being limited and curtailed by *dorbar*. Fishery is practised by the villagers where stream water can be stored in dry seasons as well. One typical practice in vogue is cultivation of paddy and fish together in terraces. For this, fingerlings are released into the terraced fields, which are submerged in water enabling the fingerlings to survive and grow. It serves two purposes: it not only provides paddy for consumption but also provides the farmers with an alternate food resource, which is both tasty and nutritious.

There is also tremendous potential to develop horticulture in the hill ranges because of undulating topography and climatic conditions. Farmers are well aware of this but due to poor economic conditions and infrastructure it is not possible for all of them to go ahead with alternative and more profitable land uses.

Conservation of Water

Scholars have defined the term "conservation" as a method of preservation against loss or waste. Water conservation basically aims at matching the demand and supply and bridging the gap between the two in time and space. Plantation of trees is the main method of conserving water. Trees are planted in the surrounding areas of rivers and streams. Felling of trees is not allowed in the catchment areas. If anyone is found doing so, one is heavily punished by

imposing fines that may run upto a few hundred rupees. The monetary fine depends on the severity of the offence. In places where forest cover is thick water is found in abundance, but in places where forest covers are depleted water is a rare commodity.

Rearing of banana grooves has also been found to be one traditional way of preserving the water source. *Bun* cultivation is prohibited in places close to the water sources. Bunds or dams are constructed in the streams for agricultural purposes, especially for paddy cultivation. These act as water reserviour and are especially helpful during the dry season. The sources of water are usually kept clean and activities like throwing of waste materials and washing of clothes and dishes or bathing are not allowed. The same rule applies for the vicinity of the PHE (Public Health Engineering) taps as well and if anyone is found guilty one is punished as deemed fit by the village *dorbar*. A committee comprising of members of the village has been set up by the village *dorbar* to look after the welfare of the village especially in areas of cleanliness and conservation of water. These people bring the apprehended culprits to *dorbar* where the case is presented and appropriate punishments are meted out.

Nongkrem Village

Streams are the source of water in this village. Farmers pay regard to these water resources. They use the water for drinking and make efforts to keep streams clean and unpolluted. They maintain vegetation on the banks to have a clean flow of water for human consumption. They do not permit their cattle at the places from where they collect drinking water. They have their own traditional system for the management of drinking water. They do not allow anyone to throw garbage nearby such sources of water to avoid pollution and infection. Trees and

vegetation are not allowed to be cut down from the water sources. If anyone is found guilty of such a deed, he/she is brought to the *dorbar*. Nowadays, people depend on the PHE water supply for domestic use especially in the Nongkyndong hamlet of this village.

Farmers carry water to their fields manually or wait for the monsoon rains. Agriculture is predominantly rain-fed in the hills with a few exceptions here and there. Farmers of the hill region have their traditional technology for making small dug-out ponds to harvest rainwater. They construct such ponds at several places and use the water for drinking or irrigation.

Rain Water Harvesting

Water harvesting in its broadest sense can be defined as the collection of run-off rainwater for domestic supply, agriculture and environment. Water harvesting systems, which harvest run-off from roofs or ground surfaces fall under the term rainwater harvesting. Water harvesting means making optimum use of rainwater where it falls. In scientific terms, water harvesting broadly refers to collection and storage of rainwater and also other activities such as harvesting surface water, extracting ground water, prevention of losses through evaporation and seepage. In general, water harvesting is the activity of direct collection of rainwater. The rainwater collected can be stored for direct use or can be recharged into the ground water. Rainwater harvesting is defined as a method for inducing, collecting, storing and conserving local surface runoff for recharging surface water bodies and ground water, irrigation and reducing soil moisture deficit. Rainwater harvesting, simply put, is putting water back into the soil where it is stored in underground rivers and reservoirs so that it can be drawn when

needed. In cities, rain water harvesting is merely collecting rainwater in large tanks constructed on rooftops to be used when required.

Rainwater harvesting is a traditional practice that dates back hundreds of years. Archeological evidence attests to the capture of rainwater as far as 4,000 years ago. Rainwater has been the main source of water supply for potable and non-potable uses in the old days because the water supply systems were not developed yet. The method of rainwater harvesting was very simple in olden days. Usage of the collected water from rainwater harvesting was direct and without any treatment. Usually, the rainwater was collected from roofs or directly collected (Chie-Ani *et. al.* 2009). India has had a tradition of water harvesting which is more than two millennia old. Evidence of this tradition can be found in ancient texts, inscriptions, local traditions and archaeological remains. There is some evidence of the existence of advanced water harvesting systems even from pre-historic times. Hindu texts like the *Puranas*, *Mahabharata* and *Ramayana* and various Vedic, Buddhist and Jain works contain several references to canals, tanks, embankments and wells (Agarwal and Narain 1999). Rainwater harvesting is necessary in areas having significant rainfall but lacking any kind of conventional, centralized government supply system, and also in areas where good quality fresh surface water or groundwater is lacking. A major portion of rainwater that falls on the earth's surface, runs off from streams to rivers and finally to the sea. An average of 8 per cent of the total rainfall recharges the ground water aquifers[4]. Therefore, most of the rainfall goes waste in the form of surface run-off.

[4] www.chennaimetrowater.tn.nic.in. Retrieved on 11/05/08

Rain is the first form of water that we know in the hydrological cycle. Hence it is a primary source of water for us (Bansil 2004). Rivers, lakes and ground water are all secondary sources of water. In present times we depend mainly on such secondary sources of water. In the process it is forgotten that rain is the ultimate source that feeds all these secondary sources. Water crisis situation occurs only because effective collection and storage of rainwater has been ignored. The potential of rain to meet water demand is tremendous. Unless people are involved in conserving rainwater from individual households to big industries/institutions, it would be very difficult to meet the looming water crisis. We get a lot of rain, yet we do not have water. This is because we have not realized the value of rain. Spatially there is a wide range in precipitation - from 100mm in Rajasthan to 11000 mm in Cherrapunji. Incidentally, it must be noted that despite the very heavy precipitation, Cherrapunji, known as among the wettest places on earth, suffers from an acute shortage of water in some parts of the year, because all the rain that falls quickly runs off the area (Iyer 2001). This is because the rainwater is not conserved but allowed to drain away. Thus, it does not matter how much rain we get, if we do not capture or harvest it. Rainwater conservation has four phases. They are:

(i) Rainfall induces surface flow on the run-off area.

(ii) At the lower end of the slope, run-off collects in the basin area.

(iii) The major portion of water collected infiltrates and is stored in the root zone of the soil.

(iv) After infiltration has ceased follows the conservation of the stored soil water.

Rainwater harvesting provides an essential reserve in times of emergency and/or breakdown of public water supply systems, particularly during natural disasters. The construction of a rooftop rainwater catchment system is simple, and local people can easily be trained to build one without much cost. The technology is flexible. The systems can be built to meet almost any requirements. Poor households can start with a single small tank and add more when they can afford them. The physical and chemical properties of rainwater may be superior to those of groundwater or surface waters that may have been subjected to pollution, sometimes from unknown sources (Vamvakidou 2004). Running costs are low. Construction, operation, and maintenance are not labour-intensive.

The success of rainfall harvesting depends partly upon the frequency and amount of rainfall. Therefore, it is not a dependable water source in times of dry weather or prolonged drought. Low storage capacities will limit rainwater harvesting so that the system may not be able to provide water in a low rainfall period. Increased storage capacities add to construction and operating costs and may make the technology economically unfeasible, unless it is subsidized by government. Leakage from cisterns can cause deterioration of the load bearing slopes. Cisterns and storage tanks can be unsafe for small children if proper access protection is not provided. Possible contamination of water may result from animal wastes and vegetable matter. Where treatment of the water prior to potable use is infrequent, due to lack of adequate resources or knowledge, health risks may result. Further, cisterns can be a breeding ground for mosquitoes. Rainfall harvesting systems increase construction costs and may have an adverse effect on home ownership.

Rainwater harvesting has an important role to play for the sustainability of ground and surface water supplies, environmental protection and crop production (Smet 2001). Rainwater is in many cases the easiest to access, most reliable and least polluted source. In addition, because it can be collected and controlled by an individual household or community, it is not open to abuse by other users. There are a number of tried and tested approaches and methodologies for rainwater harvesting (Smet 2001). Costs are known and predictable, although they vary from place to place. Technologies are generally simple and rely on widely available local materials and skills. While initial capital costs can be higher than some other approaches, maintenance costs are lower and households with no specialised skills can carry out maintenance activities. Successful implementation of large scale rainwater harvesting relies on a number of key factors including climate, perception, planning, technical skills, funds and gender awareness (Oman and Edward 2007).

According to data collected from both the villages, it was found that the rainwater harvesting system consisted of three basic elements: a collection area, a conveyance system, and storage facilities. The collection area in most cases is the roof of a house or a building. The effective roof area and the material used in constructing the roof influence the efficiency of collection and the water quality.

A conveyance system usually consists of gutters or pipes that deliver rainwater falling on the rooftop to cisterns or other storage vessels. The drain pipes are constructed of materials such as wood and bamboo in order to avoid adverse effects on water quality. However, some people use drains made of tin as water conveyance devices. The water ultimately is stored in a storage tank or cistern, which includes buckets, washbasins, pots, etc.

Some people, who depend on rainwater as their only source of supply, use it for all household purposes, from drinking and cooking to washing and other domestic uses. Other people, who have access to both rainwater and public health water supply, use rainwater selectively, for irrigation, gardening or flushing toilets, and use the public water supply for other purposes. These varying attitudes are related to the level of education of the users as well as to their traditional preferences. Different sectors of the society need to be informed about the advantages of harvesting rainwater and the related safety aspects of its use, including the threat of mosquito problems and other public health concerns.

Though the rainwater that falls on the roof is likely to be least polluted, it gradually gathers dirt and dust particles and gets carried away with it on its way down to the ground. Therefore, the people need to filter this water and boil it before using the same for cooking and drinking.

Rainwater collection for lawn and garden use is the most cost-effective since little or no treatment is required. Rainwater can also be useful for washing and bathing when underground water supplies are low. In the agricultural fields, people dig up ponds and allow rainwater collection to take place during the monsoon season to provide water for their crops. Therefore, the people have developed this technique which is very indigenous in nature and it assists them in their daily activities.

The villages have plenty of water resource but their mismanagement and misuse have resulted in resource degradation, loss of soil and soil fertility, deforestation and environmental degradation. More *in-situ* retention of rain-water and harvesting of run-off water are necessary to check soil erosion and land degradation in the villages. Alternate land use systems have to

be introduced to replace age-old practices of cultivation (Sharma and Sharma 1999). Rather than large irrigation projects, development of small irrigation units are cost-effective as well as environment-friendly under the prevailing topographical situations.

For achieving the goal of sustainable water resources management, establishing appropriate linkages with gender has to be globally recommended. Traditional knowledge and resources management systems are found to be gendered, with differences between women and men with respect to needs, roles and interests (Singh 2008). This is very much noticed in the two villages under study that women have control over the household, which is in fact the key sphere of her activities. Men may occupy public and prestigious positions of authority in public sphere, but these activities do not always impact on daily household activities. While women are generally responsible for all decisions regarding domestic water management, men are concerned with water management issues outside the domestic sphere. More specifically, men are traditionally expected to shoulder the responsibility of formal decision-making with respect to creation, maintenance and management of water resources. Women are expected to participate by conveying their needs through informal channels within households and through women's groups. The empirical evidence shows that despite the efforts at achieving equal participation of the two genders in decision-making regarding water management in local communities, these continue to be visibly male-dominated. A consequence of this is the lack of effectiveness in reaching the intended goals. Women, who are believed to be 'unreached' and 'socially excluded' from exercise of power and decision-making privileges do not find sufficient grounds to participate in the desired manner because, most generally speaking, the criteria, the processes as well as intended outcomes continue to

be regarded as external to their perceptions, roles and realistic needs (Singh 2008). Therefore, due recognition should be given to gender roles and participation at all levels of management, decision-making and organizational set-up.

However, the absence of women in most decision making bodies and their lack of visible participation in water resource management groups cannot be misconstrued as their lack of interest in the use and management of the resource, nor does it imply that they do not influence the decision-making at all. It may probably be due to the fact that they prefer to communicate their wants and needs through their men, which is generally the practice in Khasi *dorbars*, and therefore their physical presence is really not felt required. But whatever be the reason, it is important to take them into confidence while taking up issues concerning the management of water or for that matter any natural resources because it is evident that they form a major chunk of the population and that they are equal actors in the society. Due to their distinctive engagements with the natural environment, women's experience and knowledge are critical for environmental management (UNEP 2004). Their involvement is vital for sustenance of the existing traditional knowledge of water resource management in the villages of the Khasi hills of Meghalaya.

Some of the major findings on water resource management practices can be summarized as follows:

Traditional Water Management Systems: The *Nur* system is traditionally prevalent among the Bhois of Thad village, which ensures provision of water for mainly wet paddy cultivation. *Nurs* are man-made structures akin to canals to route water from available water sources, which are usually perennial, to the paddy cultivating fields. Agriculture is predominantly rain-

fed in Nongkrem village, with a few exceptions here and there. Farmers of the hill region have their traditional technology for making small dug-out ponds to harvest rainwater. They construct such ponds at several places and use the water for drinking or irrigation.

Rain Water Harvesting: According to data collected from both the villages, it was found that the rainwater harvesting system consisted of three basic elements: a collection area, a conveyance system, the drain pipes of which are constructed of materials such as wood and bamboo in order to avoid adverse effects on water quality, and storage facilities which usually consists of storage tank or cistern, which includes buckets, washbasins, pots, etc. The collection area in most cases is the roof of a house or a building. The effective roof area and the material used in constructing the roof influence the efficiency of collection and the water quality.

CHAPTER VI

CONCLUSION

Natural resource management systems are localized systems, which form the basis for decision-making by rural people. Most of the land-based productions in the villages are based on indigenous knowledge system. These systems are not only of value to cultures from which they have evolved but also to scientists and planners striving to improve conditions in other rural societies (Aier and Changkija 2003). The traditional utilization by the people of the biologically diverse resources in the village not only reflects a diverse resource-pattern but also a 'wise' way of maintaining the village's biological diversity. The conservation of resources over a long time depends on community management. Indigenous knowledge is often considered to be informal knowledge that exists in local societies, as against formal knowledge developed by the universities and research institutions of modern society (Aier and Changkija 2003). Indigenous knowledge systems of local society need preservation lest they fade away gradually. Discovery of an indigenous practice in one region may prove its applicability in another region, sometimes with a slight modification. Therefore, it would be worthwhile examining and encouraging efforts to build upon the existing indigenous knowledge in planning for the sustainable resource management in the region.

From the fieldwork conducted in the two villages, i.e., Thad of Ri-Bhoi District and Nongkrem of East Khasi Hills District some assumptions and inferences can be made. Thad village being in a low-lying area is very productive and majority of the villagers (86 percent) are engaged in agriculture (see Appendix for details). The village has a strong and efficient

village *dorbar*. It involves itself not only in the administrative affairs of the village but also in aspects of natural resource management.

A decade ago, people were not much aware of conservation and management facts of natural resources. However, with the passage of time, they have realized that with the deterioration and depletion of their natural resources, life has become difficult. Various problems arose out of which there was much disharmony and discontent in the village. On realizing this, the *dorbar* took a resolution to look into the matter and came up with rules and regulations to harness and conserve their natural resources. They viewed the problem from the people's perspective and involved them in assorted activities, which benefited the people in numerous ways. In course of time, the implementation of the policies yielded excellent results. As a result of the forest protection by the villagers, the ecology of the forest has improved, the non-timber forest products (NTFPs) have begun to regenerate, and the biological diversity has increased.

Nongkrem may be termed as a semi-urban village due to its close proximity with Shillong city. It has developed in leaps and bounds, especially the hamlets in and around the main commercial market. This, however, is not the case with the far-flung hamlets. Taking this into consideration, fieldwork was conducted in two different and diverse localities - Nongkyndong and Mawmuthoh. As per the information assembled from the fieldwork, it is found that the two hamlets have significant differences, although they belong to the same village. Nongkyndong hamlet is more advanced than Mawmuthoh where most of the people are employed in government offices (5.6 percent) and various private sectors (47.2 percent). If at all they own land (57.1 percent), they either hire people to cultivate them or lease out their

land because only 6.2 percent of them are cultivators. The people of Mawmuthoh hamlet are mostly farmers (69.7 percent) with a few exceptions. They have a strong agricultural base, yet most of them are landless farmers (41 percent). They lease land and cultivate them. Theirs is a hard life and if natural calamity befalls then it becomes next to impossible for them to repay the leased amount which results in great loss and debts. Agriculture is characterized by limited use of modern techniques and low productivity. As a result, despite the vast majority of population engaged in agriculture, its contribution to total income is low and most of the population engaged in agriculture remains poor.

The *dorbar* has yet to develop some kind of strategies and policies for the management of natural resources. Proper and successful implementation of these policies may be possible only if done at the grass-root level, involving the local people. Till date there are no general rules and norms laid down by the *dorbar* to pursue conservation and management of natural resources. One reason for this is probably the absence of any community property, be it forest or land. Most of the land and forested areas fall under private ownership either as individual or clan holdings. Therefore, it is very difficult to impose any set of laws to regulate and manage the available resources. Hence we see a large area of land depleted and its forest cover vanished. Inspite of the absence of rules outlined by the *dorbar* people do have an innate wisdom to conserve their resources, especially their water sources and catchment areas. They do not allow anyone to litter or destroy the places built for such purposes. They usually allow trees or foliage to grow in the vicinity to help in water retention. On the other hand, as stated earlier, due to the fact that most of the landholdings in the village falls under the private ownership category, there is a lackadaisical attitude towards conservation efforts by the

people as well as by the government. So, many things can be done on private land or forest; what is required is the political will to do so, which is apparently lacking.

Land Management Practices

Land use and land management practices have a significant impact on how we achieve natural resource targets, work towards sustainable use of natural resources, maintain agricultural productivity and foster prosperous regional communities. The pattern of land ownership plays an important role in land use and agricultural planning. By studying the land ownership and related laws in the villages under study an insight into the problems faced by the society in implementing agricultural development, resource management and land use planning may be achieved. The land ownership pattern in Thad village is of two kinds, viz., private land and community land whereas in Nongkrem it is private ownership type only. It is observed that most of the landless farmers depend on the community land and land taken on lease for agriculture where security issues are a major concern. There is no certainty that the farmers will be given the same plot of land for cultivation for the next agricultural season. This view is mirrored by farmers in both the villages. They express their concern over the matter and their unwillingness to invest more on the land stems from this problem. Hence, secure access to land is fundamental to the livelihoods of the majority of the cultivators and is also likely to increase productivity and promote sustainable land use.

An owner creates tenancy by leasing out his land. Though lease is a form of transfer it has a special significance of its own. Lease is a partial transfer, because only the usufructory right is made over to the lessee. Another major problem that needs to be addressed here is the

relationship between the lessee and lessor. Rent and the period of lease, which are important features of the system of tenancy, are ascertained by the lessor and is usually very high. Cash-rent as well as crop-rent are prevalent, but the latter is more prevalent and popular. The crop-rent is paid in fixed amount of crop or paid as a share of the gross-yield of the crop. In case of sharecropping, in the villages under study, it is observed that 1/3 rd share goes to the landlord and 2/3rd share to the tenant. The landlord supplies neither bullock, nor plough nor seeds. It is thus seen that the custom in matters of tenancy leans in favour of the landlord rather than the tenant. It can be seen that the security of the tenant is variable and dependent on the relationship with the landlord, who is under no compulsion to continue the arrangement. Rent must be paid periodically and if he fails to do so, the lessor may not renew the lease, regardless of the fact that the lessee may have had to forego the payment of rent due to some calamity that may have befallen upon him.

This arrangement has an important impact on soil conservation measures. Tenants are apt to mine out the soil fertility because their interest is in the immediate rather than long-term production of the land, which may cause a decline in the output and value of the property. It is absentee ownership and tenancy in Nongkrem village which can be explained as the reason behind agricultural backwardness of the cultivators especially in Nongkyndong hamlet. It is essential that the lease system be standardized and improved because a better lease system will lengthen the time of cultivation and increase the input value in the land which may in turn encourage the lessee to make improvements in the way they manage the resources at hand.

It may be pointed out that land ownership patterns in the two villages are similar, although there is marked difference in land utilization, land tenure, terms of share, pricing and

market value. Forest forms a major chunk of the land. The forests of Thad village are both privately and group owned. The only group ownership of forest in Nongkrem is that of *Law-Adong* belonging to the *Lyngdoh* clan whereas in Thad village most of the forests come under group ownership. Since farmers in this village engage in wet paddy cultivation it is of vital importance that the adjoining forest areas especially in catchment areas and those surrounding the agricultural fields are left intact. By doing so, they not only protect their forest but also ensure a steady agricultural output. Perhaps it is due to this reason that most of the forest patches in the village are under maximum tree cover. On the other hand, most forests of Nongkrem are either degraded or wiped out.

Methods of Cultivation

The most striking feature of agricultural systems practised by the farmers of the village is wet paddy cultivation. Paddy (*Kba* in local parlance) is cultivated in terrace fields or *hali*s. Paddy agriculture can be a very efficient use of land and water resources. In upland farming, crop rotation is a necessity to avoid a decline in yield due to diseases and pests that arise from a monoculture situation. In paddy fields, on the other hand, rice can be grown year after year without any clear sign of yield decline. The high level of resistance of paddy soils to erosive forces is important from the viewpoint of sustainability. Upland soils tend to be eroded easily unless they are properly protected. This is particularly true in the villages where rainfall is very high and the soils have poor resistance to erosion. Paddy soils are most resistant to erosion when they are terraced and there are ridges around the field, as measures to retain surface water. In addition, paddy fields in the lowlands receive new sediments deposited from

run-off that carries eroded topsoil down from the uplands, thus perpetuating soil fertility and productivity. Paddy fields in the village, which remained barren after harvesting of winter paddy during 1990s, are now filled with green vegetables and tomatoes. This indicates a significant change in the cropping pattern in the village within a span of two decades. Now more and more farmers are taking up multi-cropping in the village. The motivation of farmers to adopt multi-cropping for better production and economy is seen as a positive step towards development. Therefore, emphasis is given on fast income generating vegetables like tomato and capsicum to enable the farmers to increase their income. The farmers are becoming aware of the importance of conservation of the soil where plantation of permanent crops such as tea may be taken to check soil erosion and rehabilitation of shifting cultivators.

Agricultural crops that can withstand the cold climatic conditions thrive well in Nongkrem. Mawmuthoh hamlet consists of about 69.7 percent farmers and daily activities revolve around agriculture. In Nongkyndong hamlet, however, people are more literate and a majority of them are government employees and business people who are mostly absentee landlords and lease their lands to poor landless farmers. Only 6.2 percent of the total population are farmers. However, it is noticed that they have a tendency to keep kitchen gardens and grow crops for consumption purposes only. Tenancy varies from person to person. Lease is usually valid for a period of three years.

The only commercial crops in the village are potato and cabbage of which the former is more important than the latter. This is part of the potato-growing belt of the district. Potato (*Solanum tuberosum*; *Phan* in Khasi language) is grown twice a year. Cabbage and maize occupy the second place. These crops are grown only once in a year. The mode of cultivation

in the village is known as *Syllei* or *bun*, which involves planting the crops in *nur*. This is a modified form of *jhum* or shifting cultivation, which is commonly referred to as the slash and burn method (Dubey and Sah 2009). *Bun* is basically a type of ridge and furrow cultivation, which has been modified to suit the difficult mountainous hilly terrain and high rainfall conditions during the potato growing season and to cope with decreasing availability of land for cultivation due to increase in population.

Bun cultivation in Meghalaya continues to attract diverse opinions. Its critics consider it as an inefficient and wasteful form of agriculture, while others see this as diversified livelihood system that ensures sustenance along with conservation of associated rich cultural heritage about plants. The shortening *jhum* cycle (the intervening period between fallowing and returning to the same spot for cultivation) from traditional 30 years or more to 3 years on an average now is indeed a matter of concern. This is seriously impacting local livelihoods and environmental security of the village. However, given the farmers' knowledge and continuing adaptive innovations this system of farming with appropriate cycle provides the best options for sustainable use of land due to its inherent strengths and the institutions governing the practice. Farmers perceive that cultivation of potato and other vegetables on raised beds along the slope help them in preventing the washing off of the entire crop during heavy rains and storms. Besides, due to burning of the soil, there is low disease incidence and less infestation by pests and weeds (Dubey and Sah 2009).

The arguments against *jhum* project it as an unsustainable practice that depletes the soil of nutrients, reduces forest cover, causes landslides, etc. Utilizing these arguments some government departments and agencies try to push the state to wean away local villagers from

jhum. Studies conducted by organisations like the Indian Institute of Science, Tata Energy Research Institute and UNESCO have, however, indicated that *jhum* is indeed a sustainable form of agriculture best suited to the rainy hill regions of Northeast India. Contrary to arguments of soil infertility, this practice ensures that fallowness in the soil is not compromised on and often rapid regeneration of the vegetation takes place once a tract of land is abandoned after cultivation.

There are numerous other factors at play behind forest loss and *jhum* cultivation, which include areas where it is practised, the type of vegetal re-growth and fallowness of the land. Soil erosion would happen with any cultivation along hill tracts, and the argument that soil erosion is the result of *jhum* activities does not hold its ground due to strong roots left undisturbed while cultivating the land. This is not to completely discount all arguments being made against *jhum*. There has indeed been a small reduction in the forest cover, and certainly the food pressures have increased in the region due to unabated population growth. However, there is no guarantee that if *jhum* were to be stopped, there would be an increase in forest cover and soil fertility or a decrease in soil erosion. If anything, all these problems are likely to continue with even more intensity along with the added food insecurity of the local population due to the wrenching away of their primary mode of sustenance. Furthermore, it would be prudent to ensure the continuance of the basic level of food sustenance that the people in these regions have created for themselves through cooperative cultivation without any feudal fetters, rather than force the capital market upon them via land leases and cash crops, placing them in the precarious position many farmers in other parts of India often find themselves in. The analysis made from the data collected is that it is basically a form of

natural resource management. The ecology of the area is such that no other system of cultivation will be viable and it represents the community's adjustment to the ecosystem in which they have been placed.

Replacing shifting cultivation with sedentary agricultural practices undermines equity and promotes unequal distributions of productive assets (particularly land) and wealth. This results in the gradual destruction of the social fabric, particularly the traditional institutions and social cohesion among the communities, thus completely eroding the social capital characteristic of upland communities of Northeast India. Among the Northeastern upland communities, it deprives the poor from an assured access to productive land and forest resources and results in creating class distinctions in hitherto classless communities (Choudhury 2005). The most fundamental change that such transformations bring about is the conversion of Common Property Regimes (CPRs) into Private Property Regimes (PPRs). This basic implication remains misunderstood or deliberately ignored by governments, planners, and the communities themselves. The ramifications of ignoring the implications of this conversion has tremendous consequence, particularly in regard to poverty, for conversion of CPRs to PPRs will result in landlessness – an impact already visible in Meghalaya. The most profound implication, however, is the gradual erosion of the influence and control of the traditional institutions over common property resources, such as forests. Agricultural transformations, therefore, can have tremendously adverse impacts not only on shifting cultivation and shifting cultivators, but also on community forestry in Northeast India. Such transformations need to be introduced in a complementary and appropriate manner,

compatible with the traditional practices of land-ownership, tenure, and landuse, particularly in regard to shifting cultivation areas.

The major flaw in the argument to marginalize *jhum* practices lies in failing to recognize that shifting cultivation is much more than just an agricultural practice. Rather, shifting cultivation is an institutionalized agriculture and resource management practice with inherent dimensions fostering equity, tenurial security, risk aversion (and, therefore, livelihood security) as well as a mechanism that ensures a strong social cohesion and societal security. With agricultural transformations introduced, promoted, and fueled within a context of such ignorance and misconception, adverse impacts are inevitable (Choudhury 2005). Therefore, *bun* plays an important role in local customs, besides ensuring agro-biodiversity conservation and offering livelihood security to agricultural poor. It would be unfortunate if developmental programmes based on misjudged opinions about *bun* suppress this unique form of agriculture. A balanced approach to development which also recognizes the merits of this form of cultivation is needed so that this remarkable form of organic farming persists into the 21st century. Recent studies from the Eastern Himalayas show that the practice represents enormous diversity of cultivation systems with farmers' ingenuity about local resource management (Darlong 2008).

Forest Management Practices

There is much variation in management and ownership of forest between Thad and Nongkrem villages. While most of the forested areas in Thad are under the control of either the community or a group where the right to use the forest for collection of fuelwood is reserved

only to *Trai Shnong* (permanent residents), forest area in Nongkrem village falls under private ownership where the owner or owners of the forest enjoy absolute authority, and it is upto the owner(s) to use it for any purposes. The owner or owners may or may not allow the population of the village to collect dead trees, branches and twigs without any fee or may also put restriction on entry into the forest. Extraction for commercialization by the owners of private forests has not only led to large-scale depletion but has also impacted on majority of poor users of the forest. The poor are not able to collect enough wood from such forests because most of the trees are felled and sold off as timber by owners who get the most out of the large-scale commercialization of timber. This has led the poor of the village to forfeit an extra amount of money for purchasing fuelwood which would have otherwise gone for other beneficial purposes. This was not, however, the scenario even three decades ago when the lucrative timber trade started. The only exception here is *Law Lyngdoh* which is under the control of the Lyngdoh clan. The institution of "sacred groves" is a prominent feature of community forests of Meghalaya. In the past, no explicit social sanction was needed to be imposed on the community because it was believed that the grove's resident deity protected the grove from encroachers and punished the offenders. Even after the advent of modernization, there are many places where people are reluctant to fell any trees in the grove (Tiwari *et al.* 1999). While the conservation of forests in Thad has stringent rules imposed by the village *dorbar*, it is yet to be initiated in Nongkrem. The *law Lyngdoh,* because of the sacro-religious importance attached to it, is undoubtedly left untouched. This forest acts as the water catchment area of Nongkyndong hamlet. Traditional sanctions against destruction of sacred groves are considerably strong.

Traditional management practices of forests in the state are in vogue since time immemorial and are closely associated with the land tenure system. The villagers invariably allocate a portion of the land for forest growth while they use the rest of the land for various other purposes. The traditional management practices of the above forests, as mentioned, are not guided by mythological beliefs only, as in the case of sacred groves. Most of these practices are based on sound scientific principles. The villagers are well aware of the importance of conserving the forest patches in the vicinity of their village that supply vast quantities of NTFP for diverse end uses for subsistence and cottage industries.

In Meghalaya, unlike many other parts of India, majority of the forests are owned by the community, which is legally recognized under special provisions of the Constitution of India. The use and management of forests is mostly governed under a customary system by different community-institutions. The multiplicity of institutions viz., *Dorbar Kur, Dorbar Shnong, Raid Dorbar, the Syiemship,* Autonomous District Councils and the State Forest Department, vested with varying degree of powers and overlapping and sometimes-conflicting authority has been ascribed by various scholars as one of the main reasons for lack of clarity over land tenure and forest management issues in the state. The main emphasis is usually on revenue collection rather than supporting sustainable management of forests. Hence, most of the rules and regulations of the district councils, following the state forest department, are oriented to generate revenue for themselves from trade of forest products rather than based on any traditional practices of the communities. The councils impose heavy royalty on timber extracted and traded outside the village boundary without providing any management or trade support to the people. In fact the autonomous district councils were

created to regulate and oversee the traditional tribal political institutions and development activities, which affect the interest of the tribal population. They consist of elected representatives and are empowered to make laws about land and management of forests (except those owned by forest department). Hence, the councils are a constitutional body to provide a formal set-up of administration over the traditional institutions.

Another important aspect that needs mentioning is the power play between the various institutions involved in the protection of the rights of the tribals. There is no coordination of various activities of the district councils and the state government. The district councils often function independently of the state. Similarly, the district councils have often been reported to take decisions without consultations with traditional chiefs. In fact, the district councils have been often reported to be in conflict with the local chiefs (Nongbri 1997). The traditional authorities still retain a strong influence and in many cases still administer and distribute land despite what should have been done through autonomous district councils (Nongkynrih 2002). Some commentators even point out that the district councils have mainly been ratifying authorities as in majority of areas the traditional leaders still influence the use of land and forests (Tiwari, et. al. 1999).

Hence, this tug-of-war between these institutions has made the common people suffer due to lack of any long-term development initiatives by them. The common man is always at the receiving end of such a power struggle between institutions that are supposedly constituted to govern and manage their land and forest. Due to this very reason and several others like lack of a cadastral survey of land and forest most of the precious natural resources are being depleted by elements in society whose main interest is not the sustainable

management of the resources for public use but rather for a much narrower monetary interest. This is exactly the present scenario especially in Nongkrem village. With most of the forest under private ownership being depleted for timber, it has put a lot of pressure on the poor villagers who mainly depend on forest for NTFP and fuelwood. Hence people have to search for other alternatives, like purchasing from the local market, in order to meet their demands. They can no longer depend only on the collection made from the nearby forests since biomass fuel provides the only and the most important of the total energy supply of the villages for household cooking purposes and is being derived from woody biomass, crop residue and dung. Only a negligible percent of the population is connected to modern grid and are mostly concentrated in Nongkyndong hamlet of Nongkrem village. The entire population of Thad village as well as Mawmuthoh hamlet of Nongkrem village depends on biomass fuel for their energy supply.

Deforestation also increases surface run-off and reduces infiltration and water storage in the soils for human use for an extended period. It often leads to flooding which is damaging to the irrigation schemes. Deforestation is also associated with the loss of flora and fauna and loss of biological diversity. Thus, arresting deforestation and enhancing the source of rural energy (particularly for cooking and lighting) is vital to addressing food security, rural poverty and natural resources management.

Renewable energy sources, particularly in the form of biomass energy, are untapped in the villages. The conservation strategy makes very brief reference to the need for development of alternative energy sources namely, solar, wind, biogas, agricultural biofuel for small towns and villages. However, little investment has been made in this regard, particularly

biomass energy as it is widely available in most rural areas. Urgent attention and priority is required to examine the feasibility of converting agricultural and crop residue, dung and other wastes into an efficient form of energy. As indicated earlier, forest and biomass resources are the most indispensable source used in meeting the energy needs of the rural households in villages under study. They are also used for farm implements, construction and as a source of cash income. The use of forest resources by the industrial sector is not significant in the said villages. The focus is on management of forest, woodlands and tree resources close to the farming, homestead, village and community levels as well as finding alternative biomass energy sources that is simple and affordable to farmers.

Community forestry, if managed in a participatory manner, has the potential to contribute meaningfully to increase forest products and meet the needs of rural households. Recent experience in Thad village has shown that collective action in managing forests has worked well if they were managed at the lowest administrative level, involve villagers in decision-making and benefits were shared fairly among participants. As of today, they have a very well-managed community forest, which benefits the entire village. However, Nongkrem village due to majority of the forested land either belonging to particular clans or individuals, the forests are generally poorly managed.

Soil Conservation Methods

Soil degradation is one of the foremost problems faced by the farmers that impinge on their crops and economic conditions greatly. In view of the fact that there is less available land to cultivate because of growing population, cultivation of crops has to be done on the same piece

of land year after year. This causes the soil to degenerate affecting the productivity of crops. The soil is also gravely affected by the over-use of chemical fertilizers to enhance crop growth. Another factor that significantly affects the soil is top-soil run-off during the heavy monsoon season. The people are gradually becoming aware of the adverse effect this has on soil conditions and are slowly realizing the value of soil conservation practices. However, this trend has yet to catch up with the majority of the farmers. The farmers of Thad village are more conscious than those of Nongkrem village of the fact that in order to save their land from further degradation they need to resort to soil conservation practices like contour bunds and bench terraces.

The villages have built check walls to arrest the run-off soil. Earthen walls are also built in order to protect the soil. Crop rotation is also known to decrease soil loss and preserve the productivity of the land because the same crop year after year depletes the soil minerals. Plantation of trees and permanent vegetative cover in non-agricultural areas is one other effective way of protecting these lands and increasing their productivity. In doing so, these lands can be suitably developed for fodder, fuel, fibre, fruit, and timber areas, which will make them reasonably remunerative. At convenient places, farm ponds are constructed in watershed areas and excess runoff water is stored. These farm ponds not only serve as silt detention mechanisms but also as flood moderation structures. The people follow these soil protective methods in order to check soil erosion and surface runoff, which may hamper the productivity of the soil and in turn affect agriculture. The farmers of Nongkrem village, as stated earlier, are mostly landless farmers who acquire land on lease for cultivation. They find it unsuitable and time-consuming to indulge in soil conservation practices since they are not

guaranteed of the same plot of land for cultivation for the next agricultural season. This is having adverse effect on the soil's productivity as surface run-off is not checked.

This research provides evidence that the farmers have some of the observation skills and knowledge of erosion control techniques to aid them in managing soil erosion to a certain extent. This being said, it does appear that some knowledge-based support as well as capital investment may be warranted as farmers do not have the means and technological know-how in this area. The biggest constraints to soil erosion control in the watershed appear to be socio-cultural and socio-economic. There apparently exists a positive relationship between erosion control measures and the kind of tenure prevalent. It should be noted that the farmers who obtain land through lease for commercial production not only destroy vegetation, but do not engage in planting any. In fact, their primary erosion control method is making water diversion ditches in order to redirect the water flow so their standing crops are not damaged. As per the interviews conducted for the purpose of present study, there appeared to be additional factors with regard to renting out/mortgaging land in relation to soil erosion control. This first is that farmers rent/mortgage out land in order to earn funds to invest in the land they own and are actually actively farming. There is thus a need for cash as well as access to reasonable farm credit. Credit emerges as an important factor conditioning investments in natural capital, but incentives for soil conservation investments are generally stronger on small farms than large (Price 2007).

Problems Faced by Cultivators

Irrigation holds an important place in agriculture. The irrigation facilities in Thad village like the bamboo pipes and conduits used for bringing water to the fields develop holes, rot or break after much use, which causes great difficulties to the farmers as well as the crops. Therefore, synthetic pipes are the need of the hour which the poor farmers can ill-afford. Maintenance of drinking water pipes is also a major problem in both the villages. If the pipes leak or rupture it takes days to get them repaired and the people are left with no alternative but to manually carry drinking water from the adjoining streams, which causes a lot of inconvenience.

Agriculture is an area where a farmer invests everything. He pools in all his resources yet when it is time to reap the harvest he is always at a disadvantage because the economy depends on a handful of businessmen who monopolize the market. Uncertainty of markets is also an added cause that affects the farmers. The market value of the crops has reached an all time low. After a lot of money is invested, the outcome is often much less than what is expected and sometimes the poor farmers have to remain in debt. A basket of ginger weighing about 40 kgs fetched about Rs. 1200-1300 earlier, but now the same quantity of ginger fetches only about Rs. 400-500. This may be attributed to the abundance of the commodity and monopoly of the businessmen.

Due to weed infestation, incidence of diseases and pests, and lack of proper and sufficient fertilizers, the crops wither away and die causing great loss to the farmers. Owing to their poor economic conditions, farmers cannot afford to buy sufficient fertilizers, pesticides and insecticides and this affects their crops, both in terms of quality and quantity. They resort

to organic manure for fertilizing the soil and often times use lime to kill the pests and insects. This, however, does not guarantee high yield as most of the crops wither and die due to the invasion of crop pests. With changing times, the farmers express the desire to produce crops in higher volume and quality for better income but due to financial constraints they are not able to do so. The government, through its agricultural and soil conservation departments do offer subsidized rates for the manures, fertilizers, pesticides and insecticides, but even the subsidized rates are usually very high. Ironically the poor farmers are yet to receive such benefits. Usually the government's aids do not reach the farmers as intended and disappear midway during transaction. This may be attributed to the way transactions are carried out in the government offices giving much preference to known and influential people.

The role of fertilizer in improving the nutritional status and productivity of soil condition is widely recognized and its use has increased enormously in recent years. This is partly due to the subsidized rates offered by the government. Heavy emphasis on accelerating production using external inputs has also contributed to such a dramatic increase. Production has more than doubled. But the unpredictable fluctuating market prices for agricultural goods cause many farmers to face serious difficulty in paying back the credit they take to buy fertilizer, which is a major disincentive for them to use the same. As a result, farmers do not often follow the recommended practices but follow practices they can afford. It is now widely recognized among experts and policymakers that the increasing application of fertilizer at the current price will not be affordable to many farmers. Thus, extension and research should accord a high priority to find an economically viable option that uses fertilizer in combination with other local available organic sources. The findings underline that the most desirable and

effective option in increasing yields significantly is the combination of using both fertilizer and agronomic practices. It also underscores the critical role of good agronomic practices since the application of fertilizer alone (without good agronomic practice) has resulted in lower yields than plots using good agronomic practices without fertilizer.

Water Management Practices

The importance of rainwater harvesting in attaining food security and broad-based rural development cannot be emphasized enough. Rainwater harvesting is usually carried out by the villagers for domestic, agriculture, livestock, and environmental management reasons (i.e., flooding, water recharge). Rainwater harvesting techniques and approaches are closely linked to improved natural resources management (soil, water, and forest management) at the community level and are aimed at reducing the vulnerability to climatic variability that is so prevalent in smallholder agriculture in the villages. The Ministry of Agriculture is now actively trying to promote rainwater harvesting at the national and local levels. However, people are very much aware of this technique and are implementing it, which probably speaks volumes about their traditional knowledge. It is very significant to recognize the importance of rainwater control and utilization around the farmers' plot and the work to be done by the farmer himself through labour-intensive technologies. The major argument proposed is that rainwater harvesting for both domestic and non-domestic purposes (agriculture, livestock, etc.) should be seen as an integral part of the natural resources management, which requires collective action for its success and sustainability. Rainwater harvesting, particularly for agricultural and natural resources management (which is the focus here) is closely linked to

agronomic practices, farming system and livelihood activities of the communities. The aim is to make rainwater harvesting a collective effort for those who live in close proximity to each other in a village or community.

Livestock populations in the villages include cattle, sheep and goats, chickens, etc. Livestock is also an integral part of the farming system and has major economic and social functions in the rural sector. Cattle provide traction power for 95 percent of grain production and also provide milk, meat, manure, cash income and serve as a hedge in times of drought and risks. The livestock sector, however, faces very low productivity. The major constraints are the serious shortage of feed and widespread diseases. The increasing livestock density and the associated overgrazing on both arable and grazing lands have serious impact on the land and vegetative cover resulting in widespread overgrazing and land degradation. Policy issues and strategies to reduce livestock impact on natural resources degradation and enhance its role in broadening the livelihood base of the people will have to be looked into if we have to come to a consensus regarding them. Livestock and overgrazing have adverse impact on soil degradation, compaction and reduction on vegetative and biomass cover. The people of Thad village realizing the impact that livestock has on the vegetative cover and agricultural produce of the village have come up with a policy to punish the owners of the cattle concerned if found grazing on agricultural produce. However, it is yet to be seen how the actual implementation of the policy will take place and if it does, what are the consequences of such actions. It is certain that a policy limiting the number of livestock is not likely to be popular or may be difficult to implement since they are the most significant means of capital accumulation and quickly disposable assets in time of famine and other emergencies. Even

farmers having serious land shortage do not like their livestock size to be reduced. There is a need to identify livestock feed improvement and grazing land management as an important component of integrated natural resources management. It will examine the integration of crops and livestock, which can be the main vehicle for intensification and diversification of the production system in smallholder agriculture as well as mitigating the degradation of natural resources.

Education

Education is widely recognized as one of the key dimensions of development. Being educated improves rural people's capacity to diversify assets and activities, increase productivity and income, foster resilience and competitiveness, access information on health and sanitation, and strengthen social cohesion and participation (Burchi and De Muro 2007). These are all essential elements to ensure food security in the long run. Education has had a very effective impact on the mindset of the people regarding their environment and natural resources. The children and youths have a sense of management and conservation of natural resources because they are given environmental education and awareness in schools under the subject SUPW. They are taught the value of the environment and the need to conserve and preserve it for sustainable development. Secondly, because of the restrictions of the *dorbar*, they have become aware of the significance of conservation rules and the violation of which may lead to punishments and imposition of fines.

With 32.2 and 21.9 percent of farmers in Thad village having formal education of Class I to V and Class VI to X as compared to farmers in Mawmuthoh with 26.2 and 17.7

percent (see Appendix) it can be rightly concluded that the amount of exposure to education the farmers have has a relation with the way they practise their agriculture and manage their natural resources, which in turn has a direct bearing on food security issues. According to a study by Burchi and De Muro in 2007 under the banner of the FAO, the association between food insecurity and primary education is very high, while it decreases progressively with basic, secondary, and tertiary education. Primary education is a crucial element to reduce food insecurity in rural areas, as compared to other factors such as access to water, health, and sanitation. It can be concluded that education for rural people is a relevant tool for promoting overall food security. There are unfortunately low levels of access to primary education and high levels of food insecurity accompanied by a high level of school drop-outs, which may be attributed to the prevailing socio-economic conditions. With education comes the awareness on how to sustainably manage the resources.

IFAD and Natural Resource Management

The International Fund for Agricultural Development (IFAD) has funded and supported the North Eastern Region Community Resource Management Project (NERCORMP) since 1999 concentrating in West Khasi Hills and West Garo Hills and the Meghalaya Rural Development Society (MRDS) since 2004 concentrating in East Khasi Hills, South Garo Hills, East Garo Hills, Jaintia Hills and Ri-Bhoi in Meghalaya.

The NERCORMP project has sought to improve the livelihood of vulnerable groups in a sustainable manner through improved management of their natural resource base that would restore and protect the environment. To achieve this goal, IFAD and its community partners

have created community-based organizations and engaged them in income generating activities, supported the development of transportation, market and health/sanitation infrastructure, and promoted environmental protection.

The main focus of MRDS is the preparation of micro-plans on a participatory mode in order to yield meaningful results. Thus, micro-planning involves extensive considerations of local needs, resources available, natural, human, financial, and opportunities (market) against constraints (relating to communication, investment, technology, skills, cultural inhibitions etc).

This can be achieved by using the participatory 3 dimensional model (P3DM) which can go a long way to increase the understanding of the community about the sustainable way of approaching the planning process. The P3DM merges conventional spatial information with people's mental maps, making information tangible and meaningful to all and visualizes scaled and geo-coded indigenous spatial knowledge. The process basically involves the mobilization of the community for the construction of a 3D relief map of their immediate environment of which information generated by the community is captured and used for various applications. The process has been used for variety of activity and application, ranging from collaborative research, protective area management, participatory land use planning, ancestral domain mapping to conflict resolution and empowerment.

The focal point of both of these projects is community based action plan. The method is an efficient community organizing tool, as it helps congregate the community members to share information in a highly interactive and participatory manner. Examples of the projects would include community fish reserves in Bansamgre village of Garo hills, community

managed turtle reserves in Aruakgre village of Garo hills and the village SHG clustering concept of Samatan village situated in Laskein Block of Jaintia hills. It was after the intervention of MRDS, IFAD project, which sensitized the people about the concept of conservation and discussed the ways and means to control the illegal means of fishing that led the entire villages to conserve breeding spots as fish sanctuaries and formulated their own rules and regulations for management. This resulted in increase of the fish and turtle population along the shores of the rivers much to the relief of the poor people. The initiative of the projects with active participation of the community has shown that there could be a synergy to work together to improve the lives of rural farmers through the convergence of efforts of various stakeholders having the same vision. It can be safely concluded that if local communities are entrusted with the protection of biodiversity in an appropriate facilitating environment and with the fulfillment of certain conditions the results are likely to be favourable. Nevertheless, it cannot be stated that the goals of biodiversity conservation would be best met if local communities were entrusted with absolute, unmediated, entirely unregulated control over biodiversity. It has been observed that such responsible community behaviour in relation to biodiversity is neither uniform nor universal. However it is now an acknowledged truth that if local communities are empowered, they can act collectively as responsible custodians of biodiversity.

Gender and Biodiversity Management

Considering gender as an institution with different rules for women and men that shape their resource management, it is important to focus our attention on how the complex biodiversity

ecosystems influence gender as a social category. Women play a central role in the conservation, management and use of biodiversity. Their contribution, however, is often overlooked. They are "invisible" partners from grassroots to policy level. If biodiversity is to survive, women and men must play an equal part in its management. There is, therefore, an urgent need to consider gender - who does or uses what, how and why - in development efforts, to promote true partnership and ensure sustainable conservation and use of biodiversity. A landmark World Bank study on gender equality (2001) also puts priority on the need to reform institutions to establish equal rights and opportunities for women and men.

In areas of traditional agriculture among the Khasis who do not practise gender seclusion Khasi women's participation in biomass-related activities was high and their knowledge and interest in conservation apparent. Women shared joint responsibility except in times of pregnancy or lactation.

The contributions of women and men to agricultural production are often divided along gender lines, with important implications for sustainable agricultural practices and biodiversity conservation. In the villages under study, men are generally responsible for land preparation, such as clearing and soil tilling, while women are responsible for sowing, hoeing, crop maintenance, harvesting, food processing, storage and seed selection for future planting.

Men and women jointly carry out post-harvest activities and make bundles of harvested crops, and carry them to the threshing yard. Women work alongside men cleaning and drying the grains and are involved in seed storage. Women and men are equally involved in collecting, processing and marketing forest products such as grass, bamboo and broomstick. Seed storage is mainly the job of women but the storage structures are made by

men. Women collect firewood and water. Young and middle-aged women are not particularly involved in paddy seed selection and storage but are responsible for selecting and storing vegetable seed and tending vegetable gardens.

Vegetables are sown during the month of August-September. Women have a say in choosing which varieties of paddy are to be cultivated and in which fields. Women take care to grow medicinal plants in their household premises. Both women and men have maintained the habitat for several species of medicinal plants through the preservation of sacred groves. They use different plant species to make winnowing fans, baskets, grain storage units, umbrellas, mats, bows and arrows. These activities are carried out by men, since they are considered too strenuous for women. However a few instances of women involving themselves in such activities were also observed during my fieldwork.

Women use traditional wisdom and knowledge acquired from their mothers, older siblings and elders to preserve part of the harvested grains as seed material for future use, thereby contributing to conservation and maintenance of crop genetic diversity. Women are also partners in deciding which crops to plant during the year. Harvesting different fruits on household premises is done by either women or men, and sometimes jointly. Women are more familiar with plant species useful for health care, such as edible greens and tubers. Women and men collect tubers together. Women, children and old men are involved in gathering firewood and grazing cattle.

An understanding of the different roles and responsibilities of men and women farmers in plant genetic resource conservation and management and the intrinsic value of their knowledge are crucial to initiatives about sustainable, effective and equitable plant genetic

resource conservation and use. During the interviews conducted for the purpose of the present study it is found that men and women have different kinds of knowledge and information about plants and animals, in part because they have different tasks in farming and providing income and goods for their households. Both men and women preserve their native plant and animal species. The motivating factors, however, differ. Men tend to be more interested in the market value of the species while women seem more interested in their cooking and nutritional value.

Through their economic and household work, women depend upon the agro-ecological system for meeting the livelihood needs of their household. By such a sustained interaction with the ecological system, they have a profound impact on it, and in turn, are deeply affected by changes in it, specially the degradation and depletion of natural resources. They have to travel further distances for collection of water, fuelwood, etc. This has implications in terms of time for completion of domestic chores, child-care, etc. and often snowballs in terms of violence within the home. As a woman's day becomes even longer than before, with women spending upto 7-8 hours per day only to gather fuel, water and fodder it leaves her little time for education, leisure or any other community based activities. As women can no longer gather NTFPs from forests, it reduces the availability of these items for household consumption. Extra hours spent on gathering items from the forests cut into crop production time, and affect crop incomes. This is especially in situations when men migrate in search of occupations outside the village and women have to manage the household economy on their own, including food production, domestic chores, etc.

Carrying water and fuelwood from far distances implies strains on the back, and other health problems, especially in times of pregnancy and lactation. As women spend more time on survival tasks, as a result of increasing resource scarcity, there is a reduction in their time for enhancing productivity and income and enabling them to overcome poverty. The degradation of natural resources, increasing numbers of children (justified on economic grounds by the poor), and deterioration of the living and working environment of the poor, together exacerbates this vicious cycle. They have less time for productive activity, on the one hand, and on the other, as men are forced to migrate to cities in search of occupations, women have to bear the burdens of meeting household requirements, childcare and income. Issues of safety and security also come to the fore, because women and young children travel far away from home.

Gender roles in biodiversity management are socially constructed rather than biologically determined. Social institutions can also impact on the economic role of women indirectly. It is well known that better education and access to health care and productive resources affect women's chances to participate in the labour market. The determinants of access to such resources are however, less clear. Traditional institutions can hinder women's access to resources (land, credit and capital) and constrain the building of human and social capital (Jutting and Morrison 2005). Data generated from the fieldwork show that that there is a simple division of labour along gender lines and that age and education are increasingly important factors in determining gender roles and knowledge of natural and ecological resources.

Where traditions still largely determine people's behaviour, standard policies to promote gender equality — building more schools, giving micro-credit to women and so on — are important but not sufficient. Building schools where custom or tradition forbids girls to leave the house alone after puberty will not make much difference. Giving micro-credit to women in rural villages where they are denied access to land, technology and information will not deliver the desired effects (Jutting and Morrison 2005). Finding options to address unfavourable institutional frameworks presents a tremendous challenge. Inadequate planning and implementation as well as culture resistance give rise to more gender disparities. The association between cultures, economic organizations and different patterns of women's labour force participation ought to be implicit. Though efforts have been made in almost all countries to improve the status of women, it is still an unequal world. Therefore, the voice of nascent women's groups in the biodiversity-rich areas such as Meghalaya needs to be recognized and strengthened and their organizational units need to be extended. Modernization brought by outside agencies is set in a malebiased ideology, women are seen as inherently 'incapable' and the new techniques are aimed at men by men. Male values are also reflected in the view that development is solely dependent on technological and economic advances. Such values exploit both the environment and vulnerable groups such as women (Bhasin 2004).

Women often play an active role in the protection and conservation efforts of natural resources, but their presence in management groups is often nominal which are predominantly 'men's groups' with, at best, marginal female presence. This can be best addressed by involving women in effective participation which includes attending meetings, speaking out

and having influence on decision making. Since the impact of depletion of natural resources has a direct bearing on the lives of the women an attempt has to be made for integrating women into the developmental process and making the schemes and welfare programmes more women-centric, keeping in mind the important economic role they play.

Impact of Degradation of Natural Resources

Trends towards privatization, sedentarization of agriculture, and commercialization have driven activities that foster deforestation, while community traditions supportive of forest conservation and sustainable use have generally eroded. Due to decreasing forests, forest-based livelihoods of the people are declining. Earlier almost half of the population was dependent on forest. Fodder, fuel and timber are no longer available from the forest. The cutting of trees has not been in proportion to their planting. This is the main reason for depletion. People have to now travel long distances in search of water, fuelwood and fodder which is time consuming and affects health. They now have to keep aside a small portion of their money for acquiring these commodities which would have an adverse affect on their economy. Due to destruction of catchment area springs, which were once perennial, dry up leaving cultivators to depend on rain for agriculture. This leads to great uncertainty as rain is unreliable and sometimes insufficient in the present scenario. The backbone of traditional agriculture and forestry has always been community institutions. Community forests are managed and controlled by the traditional institutions and therefore any erosion in authority of such institutions has direct bearing on the community forests. There is a need to manage the transition in agriculture, so as to mitigate its impacts on community forests and traditional

institutions. Any degradation or conversion of agricultural land to permanent non-agricultural land use puts pressure on community forestry. Unsustainable agriculture promotes unsustainable forest management.

The emerging issues, particularly the continued weak linkages between the various stakeholders of forests viz., traditional institutions, district councils and state government could have various implications for the community forestry systems. These issues could seriously undermine the effectiveness of the community forestry systems, in turn affecting the communities and their social foundations. The implication resulting from the weak linkage could be constrained or irregular flow of financial and technical assistance from the local government, forest department, or external agencies to the communities or traditional institutions, which in turn could have serious implications for the sustainable management of forests under control of the community. Sustainable management of forests requires sustainable funding flows and technical assistance from the government or external agencies. Most communities depend on government assistance, as most of them are weak in financial assets or technical know-how with regard to the scientific management of forests. Weak linkages between the traditional institutions and government have implications on the investment policies and attitudes of the financial institutions or banks for community forestry development programmes. Such a stance by the banks seriously undermines the opportunities for the growth of community forestry which in turn affects the development aspirations of the communities, depriving them of access to financial capital.

Well-developed community forestry systems support gender and social equity in the life of the communities. Women among many communities are the providers or collectors of

firewood, NTFPs and wild vegetables for food and local trade. Community forests are the source of these requirements. Underdeveloped community forestry systems affect the women more seriously, as they need to spend longer hours and travel longer distances to collect these requirements for their families. Effective linkages of the traditional institutions with the government can help support an effective community forestry system, which in turn can contribute to gender equity.

Two of the critical resources which are facing much pressure today are water and soil. Both are vital for man's survival. Productive soil for food supplemented by sufficient water is crucial for the continued existence of the human race. Water degradation has adverse consequence on the people as pollution of the water that drains into reservoirs and rivers is another major problem. The villagers depend on surface water for domestic purposes and irrigation. Polluted water adversely affects both health and crops.

With the cultural ingression brought about because of the electronic media and its penetration even into remote corners, the erosion of cultural values and the rapid acculturation of communities cannot be attributed to resource transformations alone. However, transformations have a definite implication particularly because of the replacement of CPRs with PPRs. The immediate impact is the gradual dilution and ultimate redundancy of the role, control, and significance of traditional institutions. As privatization progresses, the significance of traditional institutions will become redundant, their control over resources will be replaced by other institutions (as is evident in all parts of Northeast India where this has taken place), and the customary laws governing resources, norms, and customs, will hold no value. As this happens, individual interests will override community interests, destroying the

social cohesion and community integration characteristic of tribal societies in Northeast India. Once this occurs, the rapid disintegration of the social fabric is a distinct and predictable possibility. Already, evidence of increasing class distinctions is emerging, and this is becoming more acute as opportunities and resources are being appropriated by the powerful people taking advantage of loop-holes within the traditional frameworks as well as those provided by the State.

Today natural resources are facing a lot of pressure from the community and one of the main reasons is population pressure. It is observed from the fieldwork that the erosion and degradation of natural resources viz., land, forest and water is taking place at an alarming rate in Nongkrem village and rather slower in Thad village. The explanation that can be deduced from this is that once the road reaches, there is increase in the resource depletion. Nongkrem village being near the city of Shillong has many access points, better transport and communication facilities which facilitates this trend, whereas Thad village being in the interior area of the state and not well linked by any modern facility has retained its natural bounty.

Traditional Institutions and Natural Resource Management

Traditional institutions are based on customs and the decision-making process is based on consensus. Therefore, the management of natural resources by traditional institutions is governed by customary laws which, in today's context, may need to be revised to meet the needs of the people and achieve desired results. Flexibility, to a certain degree, and sensitivity are important facets that need to be taken into consideration while governing the masses and

dealing with issues of management of natural resources. Development based organizations and workers, intellectuals, women's organizations and the general public argue that traditions and customs can be changed to adjust to the changes affecting the community at various levels. The changes propagated by this group are: traditional institutions must incorporate in their political system transparency and accountability; women must be active participants in decision-making bodies of traditional institutions; and the right to use forests resources must be complimented with the responsibility to replenish them. The Khasi society is demanding that traditional institutions change and incorporate values of equity, transparency and accountability, and neutrality.

Farmers and Natural Resources

Most natural resources of the world are presently being used by farmers. Therefore, the successful implementation of any programme for sustainable resource management will depend on its acceptance by the farmers. It is believed that an understanding of the farmers' resource management system is indispensable to be able to implement sustainable resource management concepts.

A farming system is a kind of natural resource management system operated by a farm household, and includes the entire range of economic activities of the family members (on-farm, off-farm agricultural as well as off-farm non-agricultural activities) to ensure their physical survival as well as their social and economic well-being. This broad definition is of importance, as the farm family takes decisions considering not only the farming possibilities, but also the 'off-farm' employment opportunities. Within an agro-ecological zone, several

farming systems will typically be found, with variations in resource endowment, preferences and socio-economic position of the respective family.

The natural resources base (land, water and forest) is fundamental to the survival and livelihood of the majority of people in rural areas. As indicated above, these resources are under intense pressure from population growth and inappropriate farming and management practices. Small-scale farmers, who depend on these resources, face severe constraints related to intensive cultivation, overgrazing and deforestation, soil erosion and soil fertility decline, water scarcity, livestock feed, and fuelwood crisis. These factors often interact with one another and bring a downward spiral of declining crop and livestock productivity, a rise in food insecurity, high population growth rate and environmental degradation. The net result is that a cycle is set trapping more and more of the rural population suffering from poverty, food insecurity and degradation of natural resources. Thus, improving the natural resources base is central to any effort to arrest this "vicious cycle" and improve the productivity of small-scale farmers, who constitute the largest group of people below the poverty line. The overlapping and at times conflicting responsibilities among various agencies in the areas of agriculture and rural development, food security, and natural resources management have been the cause of serious constraint on effective coordination and implementation of programmes in these areas (Dejene 2003).

The marginalization of communities as managers of forest land has contributed to deforestation and environmental degradation in many parts of the world. Throughout the 19th and 20th centuries, indigenous institutions have come under growing pressure as new government-sponsored organizations and agencies have been formally empowered to oversee

resource management. Cultural change has also disrupted the values, beliefs, leadership patterns, and institutional mechanisms that guided resource use in the past. Economic transitions have played an important role in altering resource use practices, especially as cultures that were once predominantly subsistence-based move towards more cash-oriented economies. Finally, demographic expansion has contributed to increasing pressure on community-based natural resource management systems, from internal needs for agricultural land as well as migrant competition for resources (Poffenberger and Barik 2005).

Recently, there has been a strong revival of traditional and indigenous institutions to assume a self-help and development role in rural Meghalaya. Khasi rural society has many such institutions that can be strengthened and transformed to assume various development roles. Realizing the potential of these institutions several schemes have been implemented for various development activities including input supply, water harvesting and land rehabilitation. Thus, the government should make concerted efforts to support and strengthen these indigenous organizations as they have the potential to be an important vehicle for facilitating community-based approaches in natural resources management and self-help development activities. They could be scaled-up to take the role of cooperatives (which is encouraged by the current rural development strategy) and be a reliable partner in natural resources and rural development.

Community-based organizations can play a central role in the empowerment of local people as a stakeholder and in providing greater incentive to manage and utilize their natural resources in a sustainable way. The key principle here is that community-based and grassroots institutions must represent and protect local interest. In the past, the emphasis has been on

technical fix and even where local institutions existed, they were used to enforce unpopular government conservation measures such as community forestry and labour demanding conservation measures. This has resulted in non-compliance and further degradation of the landscape and downward spiral. Strong local and community organizations can empower local people (particularly women and the poor), mobilize labour for conservation, rehabilitation and development of land, reduce the burden of rural women on water and forest resources, build infrastructure, provide fertilizer and improved seeds, assist extension and research experts in incorporating indigenous knowledge and practice into technical messages, bring accountability to extension, research and local government officials, create awareness about family planning, and generate positive synergy to address the "vicious cycle" noted earlier. Empowering local community and demand-driven approach to technology generation and dissemination is a prerequisite today. While communal systems of natural resource stewardship are losing their effectiveness, there are no alternative management systems with the field capacity to replace them. For this reason, the only viable strategy to conserve our resources is to strengthen indigenous resource management systems through capacity building, small grants, institutional development, formal recognition, and stronger linkages with state, national, and international organizations. Delaying action will allow further privatization of communal lands, progressive breakdown of indigenous institutions, and increased loss of valuable resources. It will be far less costly and more effective to build upon the present social and ecological capital than to wait until it is eroded to start this task. Therefore, traditional institutions need to realize that de-privatization of resources is next to impossible. The only alternative is equipping itself in such a manner so as to make it more

efficient, well organized and structured, more participatory and democratized and above all include an element of inclusivity in it especially with regard to gender sensitivity, transparency and accountability which would definitely curb depletion and conserve resource.

Steps towards a Community-based System of Natural Resource Management

First, maintain water as a community resource. Water as a common property resource is the crucial link for improving the productivity of private croplands. It is vital to maintain the use of local water as a community resource and not to allow water distribution to follow the inequity in land holdings.

Second, adopt an integrated approach to village resource development. Current rural development efforts are extremely fragmented, focussing mostly on agriculture, and often efforts are contradictory and counterproductive. Yet the 'village ecosystem' usually consists of several integrated components: croplands, grazing lands, forest and tree lands, local water bodies, livestock and various energy sources. What happens in one component invariably impacts on the others, and all is maintained in a delicate ecological balance. Thus development must focus on the holistic enrichment of the ecosystem, whereby attempts are made to increase the productivity of all components, from the grazing lands and forest lands to croplands, water systems and animals.

Three, ensure people's participation in the regeneration of village assets. All new plantations and grasslands have to be protected, but this will only be achieved with the support of the people. Without this support, the survival rates of village assets like check dams and tanks will be extremely poor.

Four, strengthen village institutions to enable people's participation. Rational use and maintenance of village land and water resources need discipline. Villagers have to ensure that animals do not graze in their protected commons, the catchments of their local water bodies are conserved and properly used, and the common produce from these lands is equitably distributed within the village. Villagers can achieve this only if there is an effective village-level institution to energise and involve them in controlling and managing their environment. Deepening democracy at the grassroots is a critical determinant for ecological regeneration and local water management. The village-level institution must work with a high order of democracy and transparency in decision-making in order to engender cooperation and discipline within the group members. In India, village-level institutions have worked best when they are built on the Gandhian concept of a *gram sabha*, in other words, the village institution is one which empowers the assembly of all village adults to take decisions.

Five, promote decision-making forums. Open public forums are more transparent and accountable and promote more confidence in community decision-making than small, elected village councils. Resolution of intra-village conflicts and coordination are invariably easier in open village meetings. Even where inequality is intense, there may be greater chances of obtaining equitable community decisions in open village forums than in those which are closed and secretive.

Six, channel government funds directly to village institutions. In the present system, various functionaries and agencies of the government control finances for village development. Ultimately, only a small proportion reaches the community and is spent on projects over which it has no control and which are not a local priority.

Seven, there is a need for addressing issues related to sustainable management of natural resources keeping in mind the existing systems of land management. The best system of management is to follow the bottom-up planning. There exists a lot of wisdom in the traditional forms of management and customary laws which can be incorporated while framing management strategies. Although most of the land and forests in the region belong to the people, a land use policy should be enunciated to prevent misuse of natural resources for the benefit of only a handful of individuals or the thin upper crust of tribal elite who monopolize the economy and market of natural resources.

Finally, according to Knight and Bates (1995: 381) there is an urgent need for natural resources managers, educators, and policy makers to incorporate social values in resource decisions, to recognize and acknowledge that people are an important landscape and that decisions are more than scientific determinations of what is best. Natural resource management is moving away from simplistic, resource-specific approaches based on scientific, technical "fixes". As natural resources management advances it must recognize the complexities of nature, the powerful and responsible role of human beings, and the moral imperative to seek long-term solutions.

Limitations of the Study

Due to various unavoidable reasons some of the important areas of natural resource management could not be covered by me. The objectives stated by me were very definite and precise. Therefore, due to reasons of impracticability, I focussed my research on the issues discussed at length in the thesis. However, further empirical research is required to evaluate

the future development of collective efforts to manage biodiversity. There is also an urgent need for conducting more studies focussing on the changes that have taken place in the conditions of tribal women under the influence of non-tribal society, under the impact of developmental programmes and as a consequence of governmental policies. Such studies apart from the applied value also help in reexamining some of the theories and concepts. In the face of a governance structure in the making, investigation into new coping strategies and pockets of resistance to disenfranchisement by women are needed.

There is also a need for studying the politics of natural resource management, especially in the context of Meghalaya. The multiplicity of governance in management of the three natural resources viz., forest, land and water by the traditional institutions, the respective District Councils and the State Government with added pressure from the Centre makes an interesting yet crucial case study because it has a very direct impact on the people being governed. It does sometimes lead to a lot of confusion since each is vested with varying degree of powers. Overlapping and sometimes-conflicting authority in Meghalaya has been ascribed by various scholars as one of the main reasons for lack of clarity over land tenure and forest management issues in the state.

Various national and international NGOs are in operation in the state in the field of natural resources management and conservation. These organizations work with the people to help them realize the importance of conservation and the significance and consequences of a suitable and appropriate management mechanism that not only reflects the society's managerial skills in the form of the traditional institutions but also enlighten us on the lacunae that exist in the formal administration. I have tried to bring in an input on the kind of work

that IFAD has been and is continuing to do in this field, yet because of unfeasible circumstances it was impossible to cover this or other such organizations well. An exhaustive study on the importance and relevance of the work done by these organizations and any policy implications that results from their findings can, therefore, go a long way in establishing more concrete strategies, plans and implementations in the field of natural resource management with the aim of benefitting the people.

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APPENDIX

Table 1: Occupation Pattern of Villages under Study

Occupation	***Thad***		***Mawmuthoh***		***Nongkyndong***	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Cultivator	320	86.0	260	69.7	9	6.2
Housewife	-	-	14	3.8	5	3.5
Daily Labourer – Agricultural	22	5.9	21	5.6	8	5.6
Daily Labourer - Non-agricultural	10	2.7	29	7.8	17	11.8
Not Working	5	1.3	18	4.8	1	.7
Household Workers	3	.8	3	.8	5	3.5
Teacher	4	1.1	3	.8	5	3.5
Government Servant	2	.5	5	1.3	8	5.6
Business	4	1.1	11	2.9	10	6.9
Local medicinemen	2	.5	-	-	-	-
Private Enterprise	-	-	9	2.4	68	47.2
Total	372	100	373	100	136	100

Source: Fieldwork 2003-05

Table 2: Land Ownership of Villages under Study

Occupation	*Thad*		*Mawmuthoh*		*Nongkyndong*	
	Does not own Land	Owns Land	Does not own Land	Owns Land	Does not own Land	Owns Land
Cultivator	24 (24.2)	75 (75.8)	34 (41)	49 (59)	2	2
Housewife	-	-	-	-	-	1
Daily Labourer – Agricultural	1	1	3	2	2	2
Daily Labourer – Non-agricultural	-	1	1	4	3	2
Not Working	-	1	-	4	-	-
Household Workers	-	-	-	-	-	-
Teacher	-	2	-	2	-	4
Government Servant	-	2	-	1	1	2
Business	1	1	2	1	1	1
Local medicinemen	-	2	-	-	-	-
Private Enterprise	-	-	-	1	3	2
Total	26 (23.4)	85 (76.6)	40 (38.5)	64 (61.5)	12 (42.9)	16 (57.1)

Source: Fieldwork 2003-05

NB: Figures in brackets are percentages

Table 3: Occupation and Education in Thad Village

Occupation	Education					
	Nil	Pre - school	Std I to Std V	Std VI to Std X	Std XI & Std XII	Under Graduate
Cultivator	136 (42.5)	7 (2.2)	103 (32.2)	70 (21.9)	3	1
Housewife	-	-	-	-	-	-
Daily Labourer – Agricultural	7 (31.8)	2	5 (22.7)	8 (36.4)	-	-
Daily Labourer - Non-agricultural	2	-	-	7 (70)	1	-
Not Working	4 (80)	-	-	1	-	-
Household Workers	2	-	1	-	-	-
Teacher	1	-	-	1	1	1
Government Servant	-	-	-	2	-	-
Business	3 (75)	-	-	1	-	-
Local medicinemen	2	-	-	-	-	-
Private Enterprise	-	-	-	-	-	-
Total	157 (42.2)	9 (2.4)	109 (29.3)	90 (24.2)	5 (1.3)	2

Source: Fieldwork 2003-05.

NB: Figures in brackets are percentages

Table 4: Occupation and Education in Mawmuthoh Hamlet

Occupation	Education						
	Nil	Pre – school	Std I to Std V	Std VI to Std X	Std XI & Std XII	Under Graduate	Post Graduate
Cultivator	126 (48.5)	13 (5)	68 (26.2)	46 (17.7)	6 (2.3)	1	-
Housewife	3 (21.4)	-	2	6 (42.9)	3 (21.4)	-	-
Daily Labourer – Agricultural	6 (28.6)	3 (14.3)	9 (42.9)	3 (14.3)	-	-	-
Daily Labourer - Non-agricultural	7 (24.1)	3 (10.3)	10 (34.5)	8 (27.6)	1	-	-
Not Working	13 (72.2)	1	2	1	1	-	-
Household Workers	1	1	-	1	-	-	-
Teacher	-	-	-	2	-	-	1
Government Servant	-	-	-	1	1	2	1
Business	2	-	2	7 (63.6)	-	-	-
Private Enterprise	1	2	1	4 (44.4)	-	1	-
Total	159 (42.6)	23 (6.2)	94 (25.2)	79 (21.2)	12 (3.2)	4 (1.1)	2

Source: Fieldwork 2003-05.

NB: Figures in brackets are percentages

Table 5: Occupation and Education in Nongkyndong Hamlet

Occupation	Education						
	Nil	Pre – school	Std I to Std V	Std VI to Std X	Std XI & Std XII	Under Graduate	Post Graduate
Cultivator	6 (66.7)	-	3 (33.3)	-	-	-	-
Housewife	-	-	3 (60)	2	-	-	-
Daily Labourer – Agricultural	-	-	4	-	-	-	-
Daily Labourer - Non-agricultural	5 (31.2)	1	4 (25)	5 (31.2)	1	-	-
Not Working	-	-	-	1	-	-	-
Household Workers	2	2	1	-	-	-	-
Teacher	-	-	-	-	1	2	1
Government Servant	-	-	-	2	3 (42.9)	1	1
Business	5 (55.6)	-	-	2	1	1	-
Private Enterprise	-	-	3 (42.9)	2	1	-	1
Total	18 (26.9)	3 (4.5)	18 (26.9)	14 (20.9)	7 (10.4)	4 (6)	3 (4.5)

Source: Fieldwork 2003-05.

NB: Figures in brackets are percentages