

Traditional Forest Knowledge (TFK), Commons and Forest landscape Management: an Indian Perspective

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Abstract

Forests in the mountain societies is a part of a cultural landscape linked to livelihood concerns for those living close to nature and natural resources, whilst for Forest Department it means management for timber extraction. In the present day context, where forest resources are rapidly being degraded, the issues involved are about sustainable forestry for economic benefits (timber and non –timber forest products – NTFPs) to the society, and conservation of biodiversity in the given landscape. Traditional Forest Knowledge (TFK) operating at the ecological/social process levels is a more recent development, and is a powerful tool for sustainable forestry at a cultural landscape level, with tangible and intangible being derived through what is sculptured by traditional societies around them .Very often, intangible elements have tangible implications at all scalar dimensions – species, and ecosystem, and landscape levels. The emerging view point that socio-culturally valued species often are ecologically valuable keystone species and that community centered sacred groves and sacred landscapes which are held as commons too have implications for sustainable forest management, conservation and rehabilitation. Economic evaluation of NTFPs, their sustainable harvest and management, linked with sustainable timber extraction are linked with TFK available with forest communities. The way traditional societies manipulate and in the process also conserve biodiversity linked with sustainable use determine ecological processes at the biophysical level, with implication for participatory sustainable management of natural resources with development concerns of traditional societies. The case studies in Indian Himalayas provide that how the altitude zones and dependent communities utilize plant diversity by utilizing different spaces at given landscape, selective collection and preserving NTFPs resources. The historical interaction between geography, culture and polity of evolution of deity institutions and managing village and sacred commons has been attempted. Tradition knowledge systems remain deeply influenced by religious-cultural customs and religious commons that continuous to have bearing on the secular processes of decision- making both at the personal and the community level. Development planning and administration must therefore take into account the belief systems and community created commons, traditional management systems and historically created community consciousness that still remain powerful motivators for sustainable forest landscape management.

Keywords: *Sacred Commons, Traditional Forest Knowledge (TFK), Cultural Landscape, Sustainable Forest Management, Non-timber Forest management (NTFP), Indian Himalayas*

1. Introduction

Forests in Indian context are a part of cultural landscape linked to livelihood concern of rural and traditional societies, whilst state Forest Department manages primarily for timber production. In the present day context, where forest resources are rapidly being degraded and depleted, the issues involved are about sustainable forestry for economic benefits (timber and non timber forest products- NTFPs) to the society, and conservation of biodiversity through a protected area network. A historical perspective of the perceived linkage between forest dwellers and forest managers is critically for designing strategies towards understanding and evaluating Traditional forest Knowledge (TFK) that has now been seen to be important for involving all stakeholders in forestry management strategies, to ensure sustainability.

TFK operating at the ecological/ social process levels is a more recent development, and is a powerful tool for sustainable forestry at a cultural landscape level, with tangible and intangible being derived through what is as cultured by traditional societies around them. Very often, intangible elements have tangible implications at all scalar dimensions- species, ecosystem, and landscape levels. The emerging viewpoint that socio-culturally valued species often are ecologically valuable keystone species and that community centered sacred groves and sacred groves and sacred landscapes too have implications for sustainable forest management, conservation and rehabilitation (Ramakrishnan, 1991).

Innovative forest management practices, based on traditional knowledge and developed by rural communities over the centuries, have contributed significantly to the world's natural and cultural heritage by creating and maintaining landscapes of outstanding beauty while helping to sustain production of multiple goods and services that enhance livelihood security and quality of life. Therefore, for sustainable forest management there is a need to understand how human cultures interact with landscapes and shape them into cultural landscapes. The traditional management systems and indigenous use of non-timber forest products (NTFPs) in forest management can be studied in cultural landscapes (Berkes and Davidson-Hunt, 2006; ICSU, 2002). This is due to the fact that forests are increasingly viewed as providing range of values and benefits instead of merely as a source of timber.

1.1 Role of Traditional Forest Knowledge in Forest Management

Traditional forest knowledge (TFK) is an integral component of a network of linkages and relations, supported by an overall framework of signs and meanings. It is often based on long historical experiences and deep insight into the dynamics of forest ecosystems and the behavior and characteristics of animal and plant species that are of special economic, social, cultural and spiritual significance to communities. Strongly rooted in the past this collective knowledge is critical to the survival and future well being of local well-being of local communities, and especially, of indigenous people as they try to maintain their distinctive culture identities of their livelihoods and the integrity and health of the forests ecosystem on which they depend. For many developed societies, the conservation of traditional knowledge and their relative landscapes supports the economic development of rural areas, tourism, promotion of local products,

and the conservation of biodiversity generated by human influence on the landscape, and quality of life of the population (Preface 2007).

Rural areas with a long history of activities that integrate forestry into farming activities have also created a biodiversity that is closely connected to landscape patterns. Cultural landscape fashioned by traditional practices often shown a high level of habitat diversity due to many different management form and species introduced over the years to develop scientific and social functions.

1.2 TFK and Scientific Forestry

Since the early 19th century, the development of modern forestry promoted commercial/ industrial plantations favoring species suited for timber production, as occurred in Europe with large-scale a forestation of conifers through artificial regeneration and producing even-aged forests. These ideas of scientific forestry were spread throughout the world during the 19th century, largely through the colonial administrations of the European imperial powers. This process changed the features of many cultural forest landscapes created by traditional pre- industrial societies, both in developed and developing countries. Scientific forest management was introduced in India during 1864 by the British administration. In the 1970s, forestry passed from a phase favoring almost exclusively economic aims, to one paying greater attention to the ecological roles of forests, the value of biodiversity and peoples participation (Gupta 2006). However, due to depletion of forest cover and forest degradation in developing countries, the need for decision-makers and forest managers to consider all relevant knowledge about forest ecosystems and the impacts of forest management options in the development of forest policies and operational practices is being increasingly recognized (Gupta 2006; Dove, 2002). While there is a significant and growing body of knowledge and scientific literature in the biophysical sciences and economics that is relevant to the development and application of ecological and economic criteria and indicators of sustainable forest management (SFM), relatively little attention has been paid by the forest science community to the social dimensions of SFM, which include cultural and spiritual considerations as well as historical management practices (Preface, 2007; Ramakrishnan, 2006).

Indigenous knowledge on forest is a revolutionary way to recast our conventional approach to development. People's knowledge stands at the center of developmental action. People throughout the world have interesting traditional resource management systems- including protection, production and conservation practices that they have validated over time. There is a wide recognition throughout the globe and across disciplines that regions of ecological prudence exhibit a symbiotic relationship between habitats and culture (Arizpe, 1996). Traditional societies have co-evolved with their environment, modifying nature but actively maintaining it in a diverse and productive state based on their indigenous knowledge, socio-cultural practices and/or religious beliefs since antiquity (Gadgil and Berkes, 1991; Ramakrishnan, 1998). Integration of indigenous knowledge and ethno-scientific approaches into contemporary frameworks for conservation and sustainable management of natural resources are now increasingly recognized and are important in polices for achieving the goal of sustainable forest management and poverty alleviation (Kley Meyer, 1995). This explicates that culture and environment are complementary in various stages of evolution. India

stands at the end of a very long and illustrious tradition in which the importance of nature is recognized, celebrated and valued. In the cultural history of India nature has been admitted, respected, feared and loved both for its instrumental and for its intrinsic value (James, 2000).

Traditional knowledge is a combination of ancient ingenious practices and techniques, locally adapted and distinctive to a community and has long been known to have important implications for forest conservation and management. The mountain societies are linked to natural forest ecosystem and the human managed ecosystem through biodiversity driven traditional ecological knowledge and dependent on land use activities for their livelihood concerns. Traditional societies living in the forested areas view the forested landscape (inclusive of natural and human –managed ecosystem) around them as an integrated whole, and therefore, as indicative of their own cultural identity, with implication for sustainable forest conservation and management (Ramakrishnan, 2007).

Traditional ecological and technical knowledge is rooted in the past and intricately connected to the culture and values of a community of people in the present. As culture is dynamic, the traditional ecological and technical knowledge evolves over time and encompasses the new and innovative. It is for the reason that it is important to distinguish between ancient and modern traditional knowledge, which so blend as to make a unified whole and genuine, practical knowledge. The main issue is simply whether or not the traditional knowledge is still relevant or useful in the current local or regional context (Rist and Dahdouh-Guebas, 2006; Gadgil and Berkes, 1991; Gadgil, Berkes and Folke, 1993).

Current scientific management aims to obtain a single dominant value from a given landscape. For example protected area are managed to maximize conservation, while forest lands are managed to maximize timber production. In other words, the principles of scientific forestry tend to view forests as a resource managed primarily for its timber value based on commercially oriented silviculture and conservation through protected areas. Thus the role of 'knowledge systems' (the text-book based 'formal forest knowledge' to be appropriately integrated into the 'traditional forest knowledge' becomes important for sustainable forestry. This is due to the fact that Traditional Forest knowledge' is "a cumulative body of knowledge, practice and belief handed down through generations by cultural transmission and evolving by adaptive processes, about the relationship between living beings (including humans) with one another and with forest environment (UNFF, 2004). However, traditional knowledge have been described using variety of terms for example Traditional Ecological Knowledge (TEK) encompasses the total ecological knowledge of both indigenous and other traditional peoples and attempts to consider the formative influence of local environmental perception on the nature and development of local knowledge, Integrated knowledge system (IKS) represents a synergistic integration of indigenous agricultural knowledge and western science, and defined here as any synergistic integration of traditional and western knowledge. Rural people knowledge (RPK) include both indigenous and other traditional peoples and to consider the influence of social structure and institutional organization and on the generation and distribution of knowledge within a given community whereas Ethno-forestry has been defined as a continued practice of creation, conservation, management and use of forest resources, through customary

ways, by local communities (Cotton 1997; Pandey 1996). Indigenous knowledge is the inter-generational wisdom of local inhabitants to perform livelihood operations using traditional method of resource use and farming refers existing within and developed around the specific conditions of men and women indigenous to a particular geographic area. Indigenous technical knowledge (ITK) refers largely to the technical knowledge held by traditional knowledge held by traditional farmers, includes knowledge about practices such as use of beneficial crop combinations, water management, conservation of biodiversity, agronomic practices etc. (Verma, 1998; Verma and Aghnihotri 2000, Biswas et al. 2002).

1.3 TFK and Cultural Landscape

In the Indian context, three broad categorization of socio-ecological system are identified i.e. one extreme approximately 25% of the population are urban (ii) on the extreme are another 25% approximately of traditional societies confined to hilly and mountainous terrain; and (iii) are the rest falling in rural plains of the country with little tree cover (Ramakrishnan, 2001). The mountain societies are linked to natural forest ecosystem and the human managed ecosystem through biodiversity driven traditional ecological knowledge and dependent on land use activities for their livelihood concerns. Natural resource management systems in the Himalayan region are strongly linked to the indigenous knowledge systems. The cultural landscapes provides a mechanism to understand how multiple objectives (timber production, non-timber forest products, protected areas, tourism) are central to sustainable forest management in landscapes that conserve heritage values and support the livelihood needs of local people (Ramakrishnan, 2002; Berkes and Davidson-Hunt 2006).

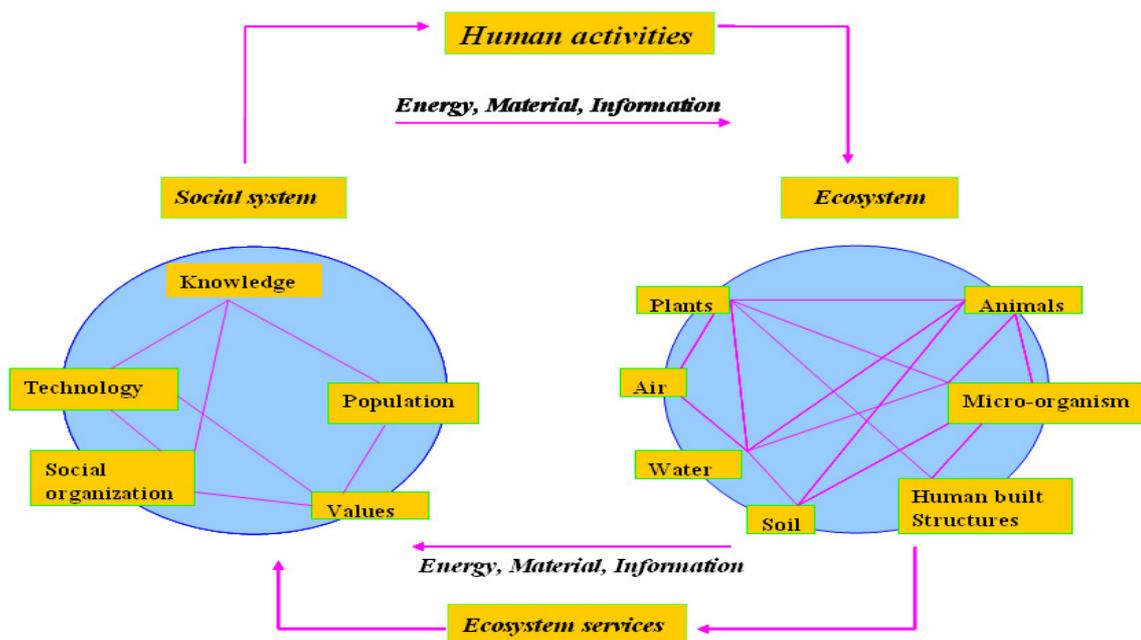
Traditionally some of these mountain societies have many natural resources linked institutions. The concept of 'sacred species, sacred groves and sacred landscapes belongs to this category. However, the guiding principles that regulate the use of natural resources are embedded in the codified and often non-codified institutions that they have evolved. Modern economic and scientific rationality, however, precludes these socio-cultural practices, sometimes even amongst these traditional societies. It, therefore, warrants an integrated approach to natural resource management subsuming cultural, economic and ecological principles to redress developmental issues in a more holistic way. However, these traditional societies are no longer immune to the changes occurring in the world with time. The predominant culture of over-consumption of natural resources is making a dent into these societies resulting in erosion of their time-tested and valued institutions. At present, when the social fragmentation reaches to the family level and individual interests get priority, the community functions take a back seat. Gadgil and Guha, 1992 argue that the emergence of sacred institutions were intended more to boost social solidarity rather than promoting environmental consciousness per se, in contrary to arguments supportive of ecological prudence as traditional societies in the past have always operated from a resource-rich environment. However, while these religious norms explicitly foster social solidarity, the conservation values and ipso-facto are fulfilled.

The social institutions linked to biological resource management are often linked to religious myths and socio-cultural belief system. Such a concept of 'the sacred' often has spatial dimensions and specificities. One could conceptualize a broader hierarchy of social

institutions or sacred entities, i.e., spatially diffused sacred landscape, and spatially defined sacred landscape or sacred groves and sacred species. The top most in this hierarchy has institutions that have least specificity but has the greatest zone of influence. Least specificity means lower number of prescriptions and prohibitions in terms of practicing cultural norms. Next in this hierarchy would be spatially defined landscapes with well-defined institutional norms. The concept of sacred groves also falls in this category. Sacred species stand, as a class apart, though there may be restrictions on their usage (Sinha B., et. al. 2000; Ramakrishanan 1996).

2. Linking Scientific Forest Management and Traditional Forest Knowledge

Scientific forest management practices have neglected the role of social systems (Pirta 2005, Gadgil and Guha 2000). In Martin's (2001) human ecology approach, the emphasis is to understand the social systems as parallel to the eco-systems and



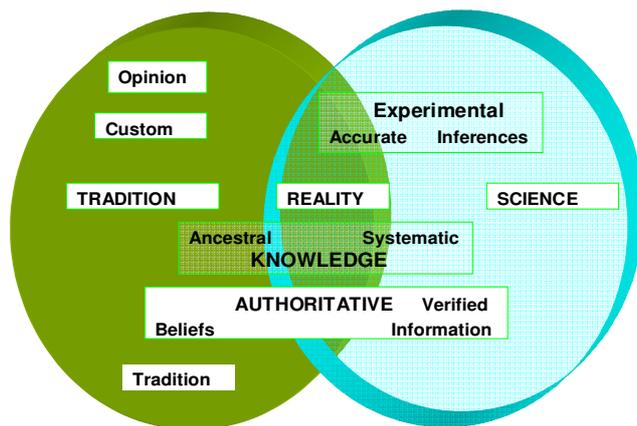
provides framework for the interaction between ecosystem (forest landscape) and social system forming cultural landscape. This interaction generates knowledge i.e. traditional and dynamic in nature (Jain, 2005) and has been attempted in this paper through a case study in Indian Himalayas for forest landscape management.

3.1 Interaction between science and traditional knowledge: Arunachalam (2001), (Ite 2003) that tradition and science there is a need to develop a productive synergy for

sustainable livelihoods since indigenous knowledge in forest management is complementary as demonstrated (Fig 2)



INTERFACE OF TRADITIONAL PRACTICES AND SCIENTIFIC FORESTRY



Tradition and science

Figure.3 Interaction between science and traditional knowledge:

3. The Study Area and Methodology

Himachal Pradesh is a state of the Indian Union located in mountains of the western Himalayas is one of the 'hot spots' of the oral traditional knowledge. The state is ecologically highly diverse owing to distinct climatic and physiographic factors. It has 12 districts, covering an area of 55,673 km², approximately 1.7 % of the total land area of India and around 10% of total area of the Himalayas. It is situated between 30^o 22 ' and 33^o 12' N and 75^o 6' and 79^o 4' E. The elevation varies from 350 m in the foothills to 6,975 m in the mountains having 10 agro- climatic zones. The state has a population of 6.2 million, 92% of it lives in rural areas and is dependent on agriculture. The legal forest area constitutes 37,591 km² (67.5%) of the total geographical area is classified as Reserved Forests (RFs), Demarcated Protected (DPFs), Un-demarcated PFs (UPFs). With nearly 3,200 identified plant species, forests constitute its most important biological wealth and rich diversity. The village communities utilize village commons, forest, grazing land and forest resources as per recorded rights and religious institutions play important role since each village or complex villages have their own deity. The major events taking place in the life of the individual, the family and the village takes place through the institution of deity.

The Western Himalayan tribes have preserved the age old beliefs which are manifested in the shape of village gods. The institution of village gods is the identity and peculiarity of life in the Himalayas and has a special significance in the lives of mountain people. The practice of Dev Ban (sacred groves) numerous other traditions which help to give specific cultural identity to the region and help in forging a link between man and nature. The religious shrine of the hill deity is the centre of all religious, social and cultural activities. The deity culture has some distinctive feature as it is not caste ridden. These local deities are linked at the regional, state and at the national level Sharma, 2004, Bande 2006, Vasan 2006). Institution of village gods has contributed to maintain the age-old traditions in village societies. The beliefs, myths, folklore, sacred groves, systems and feelings of social security are the manifestation of divine wish among the settlers in the region. These practices have been well preserved by the deities for the benefits of their votaries. The institution is useful to contribute to conservation of cultural values.

This paper explores the Traditional/Indigenous Knowledge and conservation Practices in Indian Himalayas with regard to traditional Forest management approaches and NTFP management, agro-forestry systems and peoples participation in community resources management using methodology for Participatory local appraisal (Mitchel, 2002).

Secondary sources include reports, maps, satellite imagery, survey result, computerized data records, census information, districts' gazetteers, project documents and journals and forest working plans using semi-structured interviews and direct observation. The case study approach was adopted for the purposively selected villages from the study area to analyze Churdhar wildlife sanctuary cultural landscape located in Shimla and Sirmaur districts of HP (Fig 3, 4).

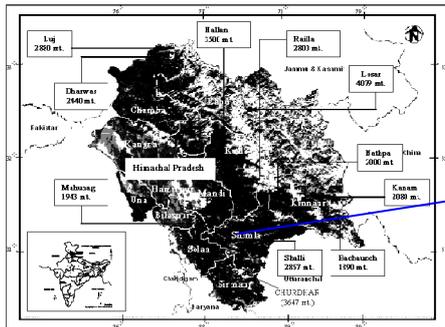


Fig 3 The Study Area

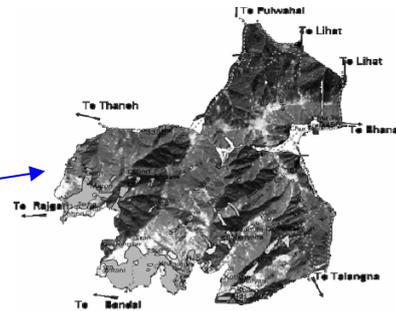


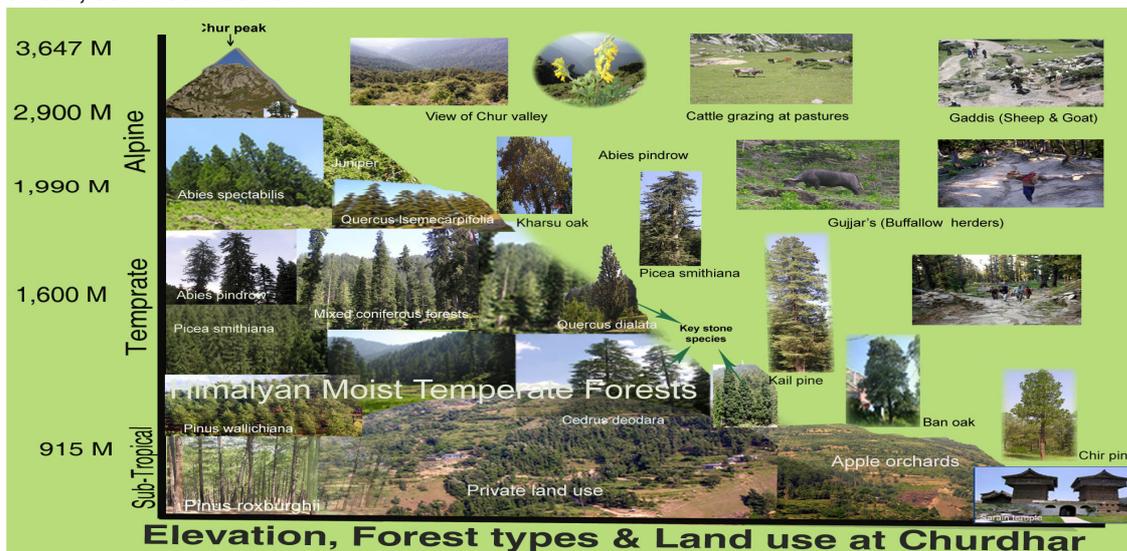
Fig 4 Satellite imagery landscape of Churdhar sanctuary

4. Results and Discussion

Steep altitudinal gradients shape variations in forest characteristics in Himalayas. Beginning with sub-tropical Pine forests in the lower altitude, species composition and biological diversity change with elevation thus affecting the ecological and institutional aspects of forest practices (Agarwal and Chhatre, 2006). The institutional arrangements include self-initiated systems, cooperatives, corporate clan-owned forests, sacred forests, and co-managed forest and through these arrangements, communities govern the full range of different forest types across the forested landscape illustrated through cultural landscape of Churdhar wildlife sanctuary.

4.1 Cultural Landscape, TFK and forest management at Churdhar wildlife sanctuary

Land use in Churdhar sanctuary shows that it has agriculture land (127.12 ha, Barren/wasteland 486.61 ha, pasture 50.17 ha, snowbound area 204.9 ha, rocky area 3.6 ha, Reserved Forests



4866.6 ha (later notified as Protected area 15 Nov, 1985 under the Indian Wildlife (Protection) Act of 1972. 23 villages are located within and outside the protected area having population of 558 permanent inhabitants. The area falls into high hills temperate

wet agro-ecological zones having Himalayan moist temperate forests, sub-alpine and alpine forests. The relationship of altitude with forest types and occurrence of major tree species and institutional arrangements between agriculturist, Gaddis (sheep and goat herders), *Gujjars* (buffalo herders) division of landscape and land use by different ethnic groups have been shown in Fig 3. The villagers have rights to agriculture; extraction of timber, fuelwood, NTFP, grazing and collection of timber defined through legal forest settlements and are individual rightholders, whereas pastoralists are issued grazing permits and paying local tax.



Fig.5 Eco-cultural Landscape of Churdhar

4.2 ECOLOGICAL AND INSTITUTIONAL ASPECTS OF FOREST GOVERNANCE

Steep altitudinal gradients shape variations in forest characteristics. Beginning with sub-tropical scrub forests in the foothills, species composition and biological diversity change with elevation. **Elevation** is an important influence on forest ecology and condition in mountain regions because it affects a host of other variables, including temperature, energy demands, accessibility, and agricultural possibilities. The lower hills (below 900 m) are a mosaic of dry scrub, and dry and moist deciduous forests. They are interspersed with stands of Himalayan Pine (*Pinus roxburghii*), dominant between 1,000 and 2,000 m. Oak (*Quercus* spp.) and deodar (*Cedrus deodara*) make their appearance at 1,800 m, and are present in single or mixed stands with Rhododendron (*Rhododendron* spp.) up to a height of 3,000 m. Beyond 3,000 m, Silver Fir (*Abies pindrow*) and Spruce (*Picea smithiana*) are dominant in single or mixed

stands. Mixed stands of Silver Fir and Birch (*Betula alnoides*) typically characterize the transition from mixed forests to alpine meadows. The tree line ends at approximately 3,700 m.

Table 1 Ecological and Institutional Aspects of Churdhar landscape

Altitude	Forest type	Major species	Users	Property rights
3000 m & above	Alpine Scrub/Pastures	Junipers, Rhododendron	Pastrol (Sheep & Goats) (Gaddis) Gujjar (Buffalo herders)	Commons, Seasonal Permits for Grazing
2400 m	Kharsu-Oak forests Western Mixed coniferous forests	<i>Q. semicarpifolia</i> Spruce, Blue Pine, Fir		Seasonal
2200m	Himalayan Moist Temperate Forests	Cedar, Blue pine, Green Oak	Agriculturist Rightholders	State
1600 m		Blue Pine, Cedar Forest-Ban Oak	Agriculturist Rightholders	Mixture State/Private
900 m	Sub-tropical Pine Forests	<i>Pinus roxburghii</i>		State/ Private

4.3 Traditional Forest Management approaches and systems

The cultural and religious belief system centered on local deities maintaining temple forests, the sacred species, sacred groves and sacred landscape and combination of economical agro-forest system and keystone species in all agro-ecological zones. There exist inter-village and intra-village arrangements related to the imposition of restrictions on grazing in a particular forest or for a particular period, restrictions on cutting and lopping of trees, division of forest or common land for cutting grass. Maintenance of public rights of way, restrictions on cutting of grass and collection of NTFPs before seed fall, bans on the cutting of tree species and climbers with a religious or social value and the customs among the user groups through informal control over forest-use sanctified by reciprocity and consensus arrangements. The practice to conserve and protect an entire forest or a small woodlot in the name of the village deity is prevalent in villages with perennial water source for common use is prevalent in whole HP (Gupta 2006). Community and private wood lots are protected at the community level as the area is divided into small block or compartments and each compartments is allotted to the inhabitant for rotational lopping of fodder particularly oaks during winters. Traditional NTFP management of *Acacia catechu* (*catechin*), *Pinus roxburghii* for resin, *Acacia nilotica* for tannin and gums and *Grewia optiva* for fodder

and fiber and *Pinus gerardiana* cones, morels, black cumin are collected from forest by local inhabitants and are sold in the market for economic remunerations. The state forests of these species are managed by the villagers as commons that are divided into small blocks and each block is allowed to a family for protection management and regulated collection and distribution of produce under the supervision of deity committee (Gupta, 2007).

4.4 Integrating TFK systems for sustainable forest management

There is a strong positive relationship between social capital and forest protection and conservation at local level and the cultural practices regarding land and resource use. The indigenous knowledge/practices and local institutions complement each other however there are instances of local knowledge and associated practices being evolved yet breaking down at the same time. The social capital facilitating collective action and the related aspects can be enhanced to facilitate better forest management by identifying improvements and policies necessary for sustainable forest management lies in understanding of the contextual causes of forest loss from the local perspective (Gupta 2007). Harmony between people and forests requires forest managers to learn from local resource users by collectively challenging the prevailing received wisdom and negative views on the structural dynamism, policy relevance and

scientific validity of local knowledge and institutions in forest resource management.

Traditional Forest Management approaches and systems

Forest settlements clearly define and identify which group of villages has rights and concessions in which particular forests. The Forest laws established a system of reserved and protected forests. Reserved forests were to be managed primarily to protect the natural forests or to produce commercial timber; Protected forests were intended meet nearby villagers' needs as a higher priority, whereas village forests as commons adjacent to villages; there the villages themselves would exercise formal authority. These areas are often further sub-divided by consensus. These informal agreements are generally most successful in resource poor areas. Traditional systems of management are designed to ensure that all right holders are able to obtain the whole range of forest products that they need, in contrast to silvicultural systems that focus on timber, and generally include systems for distribution of products as well as prescriptions for forest management (Gupta, 2005). Traditional forest management approaches include inter-village and intra-village arrangements related to the imposition of restrictions on grazing in a particular forest or for a particular period, restrictions on cutting and lopping of trees, division of forest or common land for cutting of grass. Maintenance of public rights of way, bans on hunting and fishing at times important for reproduction, restrictions on cutting of grass and collection of

Practices	Examples	Institutional /Property Rights
Sacred and sanctified	Temple forests	Commons
Landscape	Sacred corridors, Sacred groves, Sacred trees/taboo trees, <i>Species of religious values</i>	Commons
Family and Village Wood lots	Wooded grazing land. Silvi-horti-gardens, Inhabited village groves	Private
Environment based system:	Utilized by three ethnic groups: Silvi-pasture system, Natural grasslands	Commons

Table. 2 Traditional Forest Management System in Churdhar Landscape:

Agro forests (keystone species)	<p>a) Need based system: Quercus leuco-triora, Populus ciliate, Prunus persica, Quercus dialatata, Juglans regia, Alnus spp. ,Cedrella serrata Prunus armeniaca,</p> <p>*Agri-Silvi-culture Apple –stone fruit trees Wheat /Maize/Potato/Apple</p> <p>b) Economy based system: * Horti-agriculture system *Agri-horticulture system</p>	Private
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NTFPs before seed fall, bans on the cutting of tree species and climbers with a religious or social value. Restriction on Timber distributor rights to defined portions of forests, preservation of temple groves (through ‘Deota Committes’) protection of plantations by persons selected by the community (the *rakha* system), collective collection of firewood for the cremation of the dead, and protection of village forest resources from the people of other villages. In some places, people from the village community take turns in taking all the cattle from the village to the nearby forests. This arrangement is most common amongst *Gaddis*. The way in which forest products are distributed may also be regulated locally after the official forest settlement process is complete. Impromptu committees may be formed to send representatives to meet government officials to discuss problems related to forest protection like forest offences, the need for closure of an area for plantation or for opening of an existing plantation, and the distribution of TD. In cases of dispute, communities often decide who should get TD for how many trees (Gupta, 1999; Gupta, 2000).

Several studies have concluded that forests and trees are of special significance in the subsistence economy of the mountainous regions. Forests in Himachal Pradesh are supporting rural economy by way of providing fodder, fuel-wood, timber, herbs and medicinal plants. The importance of forests lies not only in meeting various basic requirements but also sustaining agriculture production. The forests are regarded as ‘support areas’ for agriculture and have to be regarded as the dominant form of land use in the hilly areas.

Studies have shown a heavy dependence of rural communities on forests and rangelands to provide inputs to households and farms in mountain areas. There is a traditionally close link in mountain areas between private agricultural lands and forests. The forests provide important materials to the total farm enterprise; e.g. to agriculture in the form of green compost, to household energy needs as fuel for cooking and heat and for the construction of houses and stalls from timber and poles. The forest also provides grazing areas and animal fodder for farmers’ livestock including cattle, goats and sheep, which form an important component of the local farming system. These close relations of people-land-livestock and forest within subsistence farming systems have resulted in a variety of local arrangements for common forest management as depicted below.

Also forests have to meet the demands of two major groups of users i.e. the

cultivators and the pastoralists. There were customary arrangements among the user groups through informal control over forest sanctified by reciprocity and consensus forest-use arrangements. These rights to forests by customary institutions were overlaid by customary legislation. The Indian Forest Act of 1878 marked the beginning of a new era of formalised systems of control by institutions of legislation.

The nature and degree of dependence varied depending upon purpose, agro-climatic conditions and income status. Common property resources can avoid the fate of open access via collective action, which imposes rules of access or users of the resource and failure to comply with the rules. Village communities often have evolved methods for regulating access to a wide range of resources, which may include farmland, trees, pastures and water. Communal forests, grazing areas and natural and constructed water resources are managed collectively and individual access is regulated by group rules.

Diversity of interests

The socio-economic differentiation among the households, caste differences in ownership of resources create differential in dependence on forest lands and its products. Diversity of interests among ethnic groups (agriculture, pastoralists, *Gujjars*) along with dependence for specific forest products such as bamboo for *Bardas* gender division for labor for specific agricultural and forest related works (Berkes et al 1998) suggests that there is a diversity of interest based on caste, gender and ethnicity in forest use, which would affect management of forests and would ultimately affect participation in common property resource management. Singh (2002) hypothesized community cooperation for survival in the hills. *A combination of village level co-operation (for economic reason) and community consciousness (as socio-political phenomenon) was probably the organizing principle of rural life in the mountains. This interestingly, was also the factor that enabled the peasantry to resist unbridled exploitation by those in authority.* (Singh, 2002)

Traditional knowledge and Institutions

The significance of traditional knowledge and local institutions of may be categorized into three kinds (i) economic –traditional crop varieties and lesser known plants and animal of food, medicinal or other value harvested from the wild; (ii) ecological/social – manipulation of above –or below ground bio diversity for coping with uncertainties in the environment and global change, controlling soil water regimes and hydrology, efficient organic residue management, soil fertility management through modified soil biological processes; (iii) ethical –cultural spiritual and religious belief system (Deity system) centered around the concept of the sacred species, sacred groves and sacred landscape.

The case studies of traditionally in vogue successful cases of people's active participation in forest resource management, especially in the regulated collection and

distribution of forest products are examined. Examples of the traditional system of management of commercially important non-timber forest products, forestry and agro-forestry practices are analyzed. Local people have traditionally been using forestry resources to meet their daily needs as an input to farming and livestock systems. Following the constitution of forest department, forest settlements were undertaken to demarcate forest estates and codify with official sanction to the customary and traditional rights of the people to use forestry resources.

The analysis of the traditional systems of management through local institutions shows that there is a strong positive relationship between social capital and natural resource management / protection at local level. There is a relationship between biodiversity conservation and the cultural practices of indigenous and traditional peoples regarding land and resource use. These traditional initiatives and systems and participatory and regulated use of forest through local institutions have implications for policy and sustainable livelihoods to achieve the goal of sustainable forest management. The paper concludes that indigenous knowledge/practices and local institutions complement each other. It shows that local knowledge and associated practices are both evolving yet breaking down at the same time. However contradictory this may seem, the best foundation for identifying improvements to institutions and policies necessary for sustainable forest management lies in further and better understanding of the contextual causes of forest loss from the local perspective. Harmony between people and forests requires global and national forest managers to learn from local resource users by collectively challenging the prevailing received wisdom and negative views on the structural dynamism, policy relevance and scientific validity of local knowledge and local institutions in forest resource management.

NTFP management

Economic botany had developed faster than the ethno-botany as field of enquiry (Tucker 1998). The traditional use of NTFP in Himachal Himalayas the evolution of modern forestry systems is now familiar but social ecology of forest use has been very little studied. In the forestry sector, *per se*, the recognition of NTFPs as a valuable biodiversity resource relevant to societal needs, in addition to timber as a primary resource, has stimulated interest in a more integrated forest management approach, over the last few decades. With over 80 per cent plant species in well maintained forest being of NTFP value, and many thriving under natural conditions alone and not amenable for domestication, sustainable NTFP management and harvest is now being viewed as a route to follow for sustainable management of timber resources and conservation of forest biodiversity itself, with the involvement of all stakeholders. Economic evaluation of NTFPs, their sustainable harvest and management, linked with sustainable timber extraction are linked with TFK available with forest communities. The linkages that could be established between the traditional and the formal knowledge approaches for sustainable extraction and management of NTFPs is an area that needs to be explored, particularly in the context of much of anecdotal information on the spatial/temporal dimensions related to NTFP extraction, that are often socio-cultural in nature, falling into the 'intangible' category (eg., the auspicious period for extraction, etc.).

TFK and forest landscape management

TFK operating at the ecological/social process levels is a more recent development, and is a powerful tool for sustainable forestry at a cultural landscape level, with tangible and intangible being derived through what is sculptured by traditional societies around them. Very often, intangible elements have tangible implications at all scalar dimensions - species, ecosystem, and landscape levels. The emerging viewpoint that socio-culturally valued species often are ecologically valuable keystone species and that community centered sacred groves and sacred landscapes too have implications for sustainable forest management, conservation and rehabilitation.

The way traditional societies manipulate and in the process also conserve biodiversity linked with sustainable use determine ecological processes at the biophysical level, with implications for participatory sustainable management of natural resources with developmental concerns of traditional societies. This knowledge base has implications for determining ecosystem attributes, such as soil water, fertility and nutrient cycling processes within the given socio-ecological system. In turn, linking knowledge systems (traditional and formal) have implications for ecosystem resilience, and our ability to cope with the emerging uncertainties due to 'global change'. Indeed, apart from contributing towards sustainable community participatory conservation measures, such a linkage between cultural diversity with biological diversity also opportunities for overall global human security through an understanding of societal value systems linked to development.

Traditional forest / wild biodiversity management

Traditional, each village had notional territories of forests and alpine meadows and resources uses within these 'common lands' were decided by the consensus of the communities. Even though local people were aware of potential economic benefits from timber, the timber trade was never practiced because they traditionally viewed the utilization of non timber forest product and ecosystem services to be more valuable for sustainable livelihood than timber. In the traditional system, there was no restriction on the collection of wild edibles, deadwood and leaf litter (to be used as a constituent of manure applied to crop field), partly because these resources are abundant. Lopping , grazing and utilization of forest products such as medicinal plants and bamboos (raw material for handicrafts) used to be undertaken in groups during periods fixed by the consensus of the community so as to reduce the risks of over-exploitation by individuals. Traditions such as the social sanction to market forest resource-based handicrafts, medicinal plants and nomadic grazing only by small holders and landless people fostered equity to a significant extent. Villages rich in some resources due to comparative ecological advantages (e.g. villages close to the alpine zone are richer in summer fodder, temperate bamboos and medicinal plants than those in mid-altitude zones and those in foothills which are richer in winter fodder. Allowed other villages to use their resources, more from the point of achieving social integrity than from the point of economic gains (Rao and Saxena 1996; Maikhuri et al. 2000a).Local communities traditionally allowed grazing of livestock from outside the region supervised by nomads

for three reasons. First, nomads used the area not grazed by local livestock and hence did not offer any threat to local livelihood. Second the presence of livestock brought by nomads to the area around the villages reduced the probability of depredation of local livestock. Third, the nomads bartered essential commodities, which were not available locally and brought from the foothills with local products.

Forest/wild biodiversity: impacts of interventions on traditional systems

On a regional scale, the landscape can be differentiated into: i) settled crop-livestock mixed agriculture patches dispersed in the matrix of forest and pastures; ii) almost pristine areas (permanent snow area and adjoining alpine vegetation) practically impossible to access for any consumptive resource use; iii) the remaining areas that are used for summer grazing by transhumance communities, the Gaddis and Bakarwals, who bring livestock from the distant foothill region, and the anwals, tarias and Dogpas who supervise the livestock of local hill communities. Traditional socio-cultural mechanism of fostering systematic and regulated use of wild plant resources seem to have evolved as a necessity to optimize economic outputs from domesticated biodiversity. All across the region, traditional management systems are characterized by practices favoring a balance in utilization and regeneration of natural resources base, equity and social integrity to achieve ultimate goal of sustainable livelihood within small-scale subsistence economies in highly isolated and inaccessible mountain settlement. Conventional approaches to conservation, i.e, the establishment of wild life sanctuaries and national parks, have assumed traditional practices to be detrimental to the conservation of wild biodiversity and the functioning of ecosystems. This assumption is the root cause of people-conservation conflicts. The nature and magnitude of these restriction, their impacts on local livelihood and people's responses to them may vary depending upon the ecological and socio-economic and cultural contexts.

Cultural Landscape & Traditional Forest Knowledge

The institutional arrangements include self-initiated systems, cooperatives, corporate clan-owned forests, sacred forests, and co-managed forest and through these arrangements, communities govern the full range of different forest types across the forested landscape. The local institutions/ deity Committees regulate the functioning in villages. The regulated use sustenance by ethnic group's institutional arrangement in ethnic group by dividing the land use as per livelihood needs. Recorded rights extraction of timber, fuel wood, NTFP for forest use recognized by law. The community and private wood lots are protected at the community level

Maintenance of keystone species in each agro ecological zones e.g. *Quercus leucotricophora*, *Q. dilatata* for livelihood needs is a traditional practice. Thus the contribution of traditional knowledge to sustainable forest management as well as to the broader goals of

sustainable development, including the conservation of biological diversity must be synergized with scientific forestry. The forest principles recognized the importance of traditional uses of forests to sustainable forest management and to the livelihoods and cultural and social values of indigenous people, other forest dwellers and local communities. Resource mapping of landscapes familiar to local people helps to identify areas with outstanding biological and cultural significance from the viewpoint of the local communities.

Integrating Knowledge systems for community participation

Himachal Pradesh is characterized with unique integration of traditional and modern life patterns that appear complementary to each other. If some recent social and economic surveys are taken at its face value, Himachal Pradesh has emerged as a role model for the whole of the Himalayan region in terms of social harmony as well as progress. Although economists, in recent past, have attributed the progress of Himachal Pradesh to a strong tradition of local cooperative action, they did not elaborate upon the institutions that promote it. However, there is convincing evidence that the institution of deity provides the essential context for cooperative action.

Conclusion

Traditional societies in the developing tropics view themselves as an integral component of a 'cultural landscape' that they create around them, based on the socio-ecological conditions in which they operate. If the social dimension complexities in a country such as India are superimposed on the physical template, the issues involved become more complex. All land-use systems within a given landscape, both natural and human managed, should be considered in any integrated management plan. Such a multi-faceted and participatory management plan obviously requires detailed knowledge of local people, their needs and how they interact with their environment. Developmental organizations need to be sensitized to these approaches. Understanding the processes operating within and social and ecological systems from an agricultural plot and family level up to the landscape and community level is highly complex.

Traditional societies living in forested areas still view the landscape around them as a cultural entity, with biological diversity being closely connected with the rich cultural diversity of the mountain societies (Ramakrishnan, 2007). Traditional ecological knowledge links ecological and social processes, catalyses sustainable management and provides a value system that traditional societies understand and appreciate, including participatory species selection.

Since traditional societies living in the forested areas do not see the human-managed agricultural systems apart from the forested ecosystems all around sustainable forestry demands a much more integrative view of forestry management, rather than taking a pure and simple silvi-cultural approaches to management. Silvicultural issues have to be viewed in conjunction with the social and cultural dimensions of the issues for

sustainable management of forests, which in turn has obvious implications for sustainable agriculture too.

Many traditional mountain societies throughout the world have institutionalized in a variety of different ways large or small cultural landscapes/sacred ecosystems as part of their belief system. In the Indian context, too, culture linked ecosystem management is to be found in many of the mountain societies, which have a large number of natural resources-linked institutions. The concepts of 'sacred species', 'sacred groves' and 'sacred landscapes' represent various stages in social selection. The guiding principles regulating the use of natural resources are embedded in the codified and often non codified institutions, which they have evolved. Building on traditional institution, which in the sense is also TEK on the social plane, provides the necessary connectivity between policy planners and the development agencies, on the one hand and local communities, on the other.

While dealing with more developed socio-ecological rural systems, however we may be able to use more modern institutional arrangements based on democratic processes of institution building. In all efforts, natural resources management with community participation should be the bottom line. In this effort, what is required is to determine the right measure of TFK, which is to be integrated in the 'formal' knowledge base. In doing so, institutional arrangement act as a trigger in effectively linking the ecological with the social, economic and cultural dimensions, thus ensuring community participation.

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