Why Diverse Common Property Access Regimes Co-exist and Transform?
Evidence from an Ecologically Fragile Region of the Himalayas.[1]

Rinki Sarkar[2]

Abstract

This paper assesses the outcomes of diverse common property resource regimes which co-exist but transform with changing contextual parameters in the socio-economic and ecological domain. The study is based on 'ground-truthing' evidence gathered through periodic field studies, over the last decade, in villages located above 1900 meters in the Western Himalayas. The locals inhabiting this ecologically fragile belt have always been heavily dependent on natural resources in the surrounding vicinity. They devised immaculate ways of adapting to resource constraints for sustaining livelihood related activities. These production systems have had reverberating implications in the social and cultural arena where a high degree of cooperation and collective action has been observed through effective village level authority structures under the surveillance of 'personified' local deities. However, over the years, the region has become economically buoyant due to improvements in accessibility as well as government policies and programs that have led to a marked improvement in the economic well-being of the local population. New forms of local governance mechanisms have evolved for accessing and using the more commercially viable village common resources in response to changed needs and volatile circumstances. The environmental outcomes of these demand-driven resource regimes have not always been desirable. Meanwhile, these trends have also enhanced preference for sedentary living which seems to be exerting anthropogenic pressure on open-access common property resources.

The study reveals that in all cases, in the past and in the present, and wherever evident, the locals have been formulating resource-use norms essentially for allocating benefits from resource use across the community by focusing on immediate needs and short-term gains. They seem to be oblivious of the long-term ecological implications of their actions. This empirical exercise therefore concludes that common property resource regimes have invariably been framed to resolve "allocation" problems or have evolved in response to resource-scarcity and have paid less heed to issues related to "long run resource conservation." Template policies for decentralized management of natural resources need to be re-evaluated under these circumstances.

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[2] Economic anthropologist affiliated to the Centre for Ecology Development and Research, Delhi, India. rinkisarkar@gmail.com

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1. Introduction:

The main objective of this empirical research endeavor was to procure common property resource-regime details for assessing the impact of transformation and change on resource-use arrangements. An important component of the exercise was to make an actual assessment of the condition of these resources, subject to altered resource regimes and socio-economic conditions.

While conducting detailed field surveys for mapping livelihoods and local forest dependence across a wide geographical expanse of the entire Indian Middle-Himalayas[3], Kinnaur district in Himachal Pradesh was found to be one of the regions where indigenously driven institutions of natural resource governance was prevalent. Kinnaur also ranked highest in terms of economic progress and change amongst all the other districts that were surveyed. The temptation to conduct field re-visits in the region heightened because the dynamic scenario could provide a perfect setting for gauging the resilience of such common property resource regimes to changed set of circumstances. This paper is an outcome of assimilated field based knowledge gathered through periodic visits to the district over the last decade. In order to avoid pitfalls of selection-bias, almost the entire forested belt of the district has been covered through this field-oriented study.

The paper is organized into five sections. Section 2 digresses briefly into a selective review of literature on the efficacy and resilience of decentralized governance particularly under conditions of transition and change. Details about the study area, including the trajectory of transition and change the region has witnessed over time, are outlined in section 3. Section 4 provides an interpretative account of diverse common property resource regimes that have co-existed and evolved in response to changed contextual parameters. The status of these village commons is also evaluated. Section 5 summarizes the principal findings of the paper.

2. Efficacy of Decentralized Governance: A Selective Review of Literature

The notion of decentralized governance has generated considerable academic interest for those concerned with the sustainability of natural resources (Wade, 1987; Ostrom, 1990; Balland and Platteau, 1996). Proponents of decentralized governance claim that the devolution of power to local communities will ensure judicious use of the resource base under certain favorable conditions that are specifically associated with the nature of the resource and characteristics of the user-group. Some even go on to claim that local institutions of governance can act as a strong mediating force mitigating the effect of factors such as population growth, poverty, market integration and changes in government policy thought to be driving forces behind resource depletion. (Bromley and

[3] See Bardhan, P., Baland, J.M., Das, S, Mookherjee, D. and Sarkar, R. (2004): *'Mapping Livelihoods and Local Forests in the Middle-Himalayas', Digital Library of the Commons*

Cernea, 1989; Gibson, Mckean and Ostrom, 2000). Implicit in their arguments is a case being made against Hardin's (1962) 'tragedy of the commons'. Much in the spirit of a 'Malthusian', Hardin warned that the burgeoning imbalance between population growth and the natural resource base along with the user-group's pervasive behavior to 'free-ride', would inevitably lead to progressive diminution of the resource.

Balland & Platteau (1996) are more skeptical about these claims. Based on their comprehensive analysis of case studies pertaining to local resource management, across a host of natural resources and countries, they conclude that rural communities are not 'inherently conservationists' as they are often made out to be in many popular accounts. They stress that local inhabitants tend to perceive natural resources as being infinite or limitless, endowed on them by the benevolence of some supernatural power. Therefore, they are liable to be less concerned about the way current levels of harvesting affect the resource stock over time. Das (2000a) reinforces their findings through his field studies in a mid-Himalayan village by asserting that locals have never been 'historically' conservationists. Rather, in pre-modern societies, resource-use regimes simply depicted ways of adapting to constraints imposed by the hilly terrain in order to overcome limited labor supply.

Baland and Platteau (1996) go on to add that villagers may have been fairly deft at solving distribution or allocation related problems. Commenting on Wades work (1987) related to irrigation collectives in South India, they stress that irrigation raises an allocation and not a conservation problem. Rule violation in the case of water distribution is more easily detectable than in the case of resources such as forests where mismanagement produces only long term consequences. Their findings are extremely relevant for resources such as forests, open-seas and ground water wherein they argue that deforestation and over exploitation of fish stocks by locals can be a slow and largely unnoticed process with unanticipated consequences. What makes things worse is the sheer extensiveness of these kinds of natural resources that makes all forms of formal or informal vigilance measures extremely difficult to implement.

The efficacy of local governance mechanisms needs to be evaluated under a dynamic context as well. Baland & Platteau (1996) defend this notion by highlighting that even where collective institutions are found to function well under one or more favorable condition,[4] at some point in time, rules of governance rather than having a mediating effect are liable to collapse in a scenario characterized either by mounting population pressure, market integration, technological change or by some combination of these factors. In similar vein, Bardhan (1993) affirms that traditional authority structures can

[4] They are extremely critical of successful outcomes and indicate that '…. local management of common property resources may work adequately under a limited range of conditions' (pp. 289). In agreement with Wade (1987) and Ostrom (1990), the seemingly favorable conditions they enumerate are small size of the user-group, homogenous ethnic or cultural characteristics and homogenous interests towards the resource, high level of resource dependence, clearly defined resource boundaries, simple and fair rules of access & use, effective formal as well as informal monitoring mechanisms, the power of social ostracism, low monitoring costs, ease of detecting rule violators, graduated sanctions, democratic decision-making, deep-rooted tradition of co-operation in many fields, history of co-operative success, effective, charismatic local leadership and education.

be undermined through modernization which improves exit options leading to the crumbling down of old cooperative institutions. In his study of nature-society interactions across arid and semi-arid regions of India and Africa as well mountainous regions of the Hindukush-Himalayas, Jodha (2003), confirms these trends. His studies, based on prolonged residence in a number of villages, gave him exposure to the dynamics of change that invariably led to a gradual decline of traditional resource management systems severing ecosystem-social system links because of population growth, decline in the culture of group action following the penetration of market forces, increasing economic and socio-political differentiation of communities leading to indifference, over-extraction and depletion of the resources.

To summarize, most researchers appear to be unanimous about the notion that successful outcomes are not an inevitable consequence of decentralized governance. However, few acknowledge that changing contextual parameters may well jeopardize existing co-operative endeavors. What is also less recognized is that locals may be deft at sustaining rules of allocation and distribution but they may not have the capacity to grasp the long term ecological repercussions of their actions. Thus, they may be oblivious of the depleting resource base on which they are dependent. Successful resource management does require an in depth understanding of the ecological complexities while devising means that ensure sustainable extraction commensurate to levels of regeneration. In the following sections an attempt is made to ascertain some of these trends in the study area on which this paper focuses.

3. Study Area:

The study area essentially covers wooded parts of 'Kinnaur' district, which is located at the north-east end of the mountainous State of Himachal Pradesh, adjacent to Tibet.[5] The terrain is steep and rugged, being inherently prone to natural hazards such as landslides (Gupta, 2005). The harsh topographical conditions, that characterize the region, constraints cultivation to merely 2-3% of the entire geographical area of the district while forests account for about 7% of this area[6] (Sharma and Minhas, 1993). There is some climatic variation across the three administrative divisions the study area encompasses, namely Nichar, Sangla and Kalpa 'tahsils'[7]. This provided an opportunity to comprehend whether bio-physical factors can affect common property resource regimes. The sub-humid temperate zones of Nichar and Sangla receive more monsoon rains as compared to the semi-arid temperate zones of Kalpa. Towards Nichar, which is also known as the lower Sutlej valley, the inhabitants practice Hinduism and the power of a hierarchical set of deities has had a tremendous sway in nurturing social cohesion.[8] Towards Sangla and Kalpa, the inhabitants practice a mix of Hinduism and Buddhism and local governance is known to have been influenced by deities at the village level.

[5] See Figure 1 in the Appendix.
[6] The forests are essentially coniferous and the principal species are deodhar (*Cedrus deodara*) and Kail (*Pinus Exelsa*) and Spruce (*Picea Smithiana*) as well as Birch (*Betula utilis*) at the higher altitudes. Chilgoza pine (*Pinus Gerardiana*) is found towards the more semi-arid zones.
[7] See Figure 2 in the Appendix
[8] The principal deities that influence the three belts of Nichar are '*Sungra-Maheswar*', *'Chagaon-Maheshwar'* and *'Katgaon-Maheshwar'*

The surveyed villages are perched at altitudes between 1900-2700 meters, amidst predominantly coniferous forests, on either side of river 'Sutlej' in Nichar and Kalpa tahsil, and along river Baspa in Sangla tahsil.[9]

Between 2000 and 2003, detailed field surveys based on structured and open-ended questionnaires were conducted in 13 villages for assessing the socio-economic status of the local population as well as the natural resource base on which they depend. Based on the quantitative and qualitative trends deduced from these surveys, field revisits were made during 2006 and again in 2008 for gaining more qualitative information on emerging processes through participatory methods and in depth interactions with the local community. Two themes were covered in course of these field revisits. Firstly, the process of transition and change that has been occurring in the region was documented. In the subsequent visit, the focus was on unearthing the nature of common property resource regimes and how these have transformed over time in response to changing socio-economic and ecological conditions. The trajectory of development and change witnessed by the local community is briefly depicted in the following sub-sections as a necessary prelude to the analysis of diverse common property resource regimes that co-exist in the study area and to understand how these institutions have responded to change.

3.1 The Study Area during "pre-modern" times.

An investigation into the nature of production and livelihood strategies practiced by the local inhabitants indicates that they adopted ingenious ways of adapting to environmental and labor resource constraints that had reverberating implications for the social and cultural context as well (Guillet, 1983, Singh, 1998, Das, 2000a) For instance, livelihood was essentially based on agro-pastoral transhumance to ensure optimum utilization of varying vertical agro-climatic zones and natural resources. These diversified strategies were essentially mechanisms for mitigating risk-prone yields from the cultivation of terraced fields on steep slopes susceptible to soil erosion and other natural calamities. Agriculture and livestock rearing depended heavily on village commons such as forests, glacier water melts and pasture land in the vicinity. Intricate rules were therefore formulated for scheduling and allocating access to these resources equitably across households in the village. Resources perceived to be in abundance were open-access for all practical purposes. Some of these practices exist even today (Sarkar, 1999). As per archival records, scarcity of food grains was a common phenomenon due to the weak productive potentials of the soil. Therefore, wheat, maize and barley had to be imported in exchange for wool that pastoralism yielded (Singh, 1998). Field interactions with 85 year old, ex-village school head master in 'Kalpa', confirmed these trends. Prior to the 60s, when accessibility links were weak, existence was really very difficult, he asserted. Adverse ecological conditions meant that there was scarcity of grains needed for subsistence. Therefore, villagers had to walk for three days to Rampur town, once a year, during *'labi ka mela*'[10], to avail and replenish their

[9] See Tables 1 & 2 in the appendix .
[10] A local fair of religious and commercial significance.

stocks of grain such as rice, wheat and jaggery. Goods were transported on the backs of sheep and goats under extremely hazardous accessibility conditions.

The social outcome of these contextual parameters in the economic sphere exhibited a high degree of cooperation and collective-action in various chores of day to day existence both within the household and across the public domain. For instance, scholars have reiterated that the mid-Himalayas lacked strong division of labor by sex and age in order to cater to livelihood related needs of a household. For similar reasons mutual interdependence in many spheres of economic life necessitated greater flexibility in social arrangements across caste groups which was in sharp contrast to their 'Hindu' counterparts in the plains (Berreman, 1963; Gillet, 1983). These trends are evident even in the study area, where there are only two caste groups the 'rajputs' and 'the schedule castes' with very few restrictions as regards social interaction and exchange. Another classic example which reinforces the idea that cooperation was inevitable under harsh environmental and labor resource constraints was the existence of fraternal-polyandry which prevailed in most parts of Kinnaur. Although the reasons behind the origin of this institution is much debated, there is unanimous consensus that polyandry fostered unique forms of division of labor between the brothers involved in common matrimony for coping with economic hardships propagated by the harsh terrain. (Berreman, 1962, Singh, 2006a). Co-operative labor arrangements across households in a village such as *'jwar'* or *'scoll',* in local parlance, evolved from the need to cater to arduous labor intensive activities such as sowing and harvesting operations, pre-winter fire wood stocking, repair of field terraces and construction of dwelling units. At the village level, locals were always willing to participate in activities that required the investment of voluntary-labor or *'shramdan'* for repair and maintenance of frequently damaged irrigation channels, village paths and during village festivities or village calamities. These tasks required community management and control which was usually vested in informally constituted but effective village councils consisting of the experienced, elderly strata of society or *'buzurg',* under the powerful surveillance of a personified local deity, or *'devta.* Local deities were known to exercise influence over a fairly well-defined territory within which a village evolved as a cohesive social unit with strong bondage ties amongst the inhabitants and with the local deity in particular (Singh, 2006b). More importantly, religion was an institution of governance in itself. Social sanctions had religious overtones. Fear of religious spirits, believed to cause harm and anguish, drove people to abide by customary codes of social behavior which included adherence to communal norms of resource use. Relative geographical isolation strengthened these socio-cultural mechanisms.

The pre-modern society, in essence, portrayed a scenario intensively characterized by adaptation and collective strategies for coping with an inhospitable terrain and resource constraints both in the sphere of agro-pastoral production systems and also while accessing village commons. Analytically speaking, the ecological outcomes as regards common property resources, during this period, are fairly predictable. Due to a predominantly subsistence based economy, low population density and limited labor supply, the natural resource base of the region must have been much in excess of levels of extraction and use.

3.2 The Post-sixties: A Period of Development and Change:

Kinnaur district remained comparatively isolated until the coming up of National Highway 22 which meanders through the entire district.[11] The Highway, which came up more for strategic reasons after the 1962 Chinese aggression, has transformed the socio-economic façade of the region. An intricate system of rural link roads has also been constructed, over the years, for connecting villages to the Highway. Interactions with the local community revealed that improvements in accessibility has been a potent force for boosting horticulture development and the cultivation of off-season vegetables such as peas. Roads facilitate the transporation of the apple produce to major whole sale market centres all over India. The area under apple cultivation which was around 300 hectares in 1961 has expanded to 6,907 hectares in 2003.[12] Annual production has also increased from a mere 300 tonnes in 1961 to 24, 820 tonnes in 2003. Kinnaur has also exploited its favoured administrative status as a "Tribal" area,[13] which provides for job reservations in government departments and easy access to social and physical infrastructure facilities that have come up through special tribal-development funds invested in the region. These occupation-shifts have had a tremendous impact on the economic condition of the local population. The mean monthly per-capita consumption expenditure of 919 rupees, documented in course of household surveys conducted in 2000, is well over the National average of rupees 565 for rural areas in India[14]. The poverty gap ratio is insignificant. Only one household, out of 260 households covered by the survey, was found to be marginally below the poverty line. The 'Gini-coefficient' for consumption expenditure at 0.28 indicates that changes in economic condition of the local population has not resulted in high levels of inequality but has permeated to all factions. Improvement in economic levels and expansion of the road network has also led to a marked improvement in literacy levels and access to basic services (Sarkar, 2008)

Development and change of this nature has however led to a decline in cooperative spirit in social spheres and at the household level as well. The powerful role of the local deity which served as a binding force for maintaining social integrity by influencing all aspects of village existence has narrowed down to the more 'ritualistic' spheres of life. Field evidence revealed that the local deity is now more a custodian of local culture and rituals which seem to be threatened due to modernization and change. Monetary fines and penalties have been formulated for violation of ritualistic norms related to attire or customs in the temple precinct or for absence from collective activities related to religious events and festivities. Though villagers asserted that they have not reduced their belief and faith in the local deity, they confided that they prefer to approach more

[11] See figure 2 in the Appendix.
[12] See figure 3 in the Appendix
[13] Article 46 of the Indian constitution provides for special financial and other priviledges for the upliftment of 'schedule tribes' The region was declared as a 'tribal-belt' more to overcome the obstacles to development imposed by remoteness.

[14] See Table 3 in the Appendix.

legal means for resolving disputes. Similarly, the institution of cooperative labor no longer exists as people are constrained for time or are absent from the village in connection with their time-bound jobs elsewhere. Tasks that earlier got done through collective institutions of cooperative labor are increasingly being taken care of by elected village 'panchayats' that mobilize funds from government sources for upkeep and development of physical and social infrastructure, the community needs. The demise of polyandry and the decline in the 'joint-family' system has affected cooperation at the household level. The problem of labor shortage that led to cooperative arrangements has also been overcome as there is easy access to a growing pool of migrant labor that has flooded the region for tending to household or village level activities.

Although improvements in accessibility have fostered economic development and change, a host of environmental externalities have arisen (Sarkar, 2008). Reckless and unscientific road construction activities has caused deforestation and made the landscape more susceptible to landslides. Changes in accessibility and expansion of economic opportunities have encouraged sedentary patterns of living. The mean village population has increased by 41% over the last 25 years.[15] As roads provide potentials for generating more cash sources of income both in the farm as well as in the non-farm sectors within the region and as roads attract more infrastructural facilities, the local communities prefer to be based in their villages for catering to their livelihood needs. A large fraction of migrant laborers have also swamped into the region and are hired for wages to cater to a host of economic and livelihood related activities which households would themselves pursue in the past. With rising income levels, there is a greater preference for leisure and an aversion to engage in erstwhile arduous traditional livelihood related occupations. Therefore, hiring of migrant labor is quite a common phenomenon. These laborers are permitted to access village commons such as forests for their firewood and other domestic needs. Demographic changes of this nature have therefore started exerting pressure on the fragile natural resource base of the region. The coming up of massive run-of-the river based, 1000-300 MW hydro-electric projects in the study area, for catering to national development goals, has also appropriated village common forests and water resources with unforeseeable consequences for the overall environment of the region (Sarkar, 2007b).

Thus, the contemporary context is characterized by increase in demographic pressures, progressive market integration, greater reliance on non-farm avenues of employment, an all-pervasive rise in incomes and land use changes due to the coming up of a hierarchy of roads and hydro-electric projects. The impact of this nature of transition and change on different categories of village commons is specifically analyzed in the next section.

[15] See Table 4 in the Appendix.

4. The Status of Village Commons amidst Transition and Change:

4.1 Irrigation Water

In the more arid zones towards Kalpa and Sangla tahsils, agriculture is critically dependent on 'gravity irrigation' systems, known as *'kuhls'.* These irrigation systems are organized at the village level. Snow-melt from glaciers is tapped by constructing channels that divert water across cultivable plots in a village. Irrigation water distribution is scheduled across households in a rotational manner to ensure equitable access and use. Interactions confirmed that water distribution norms, prevalent since traditional times, must have emerged to combat the possibility of potential 'social conflicts' (Wade, 1987) over resource use and the possibility of free-riding by 'head-end' users under open-access conditions. While the need to tap water in this manner has always been crucial for cultivation under arid conditions, the demand for water has increased due to crop-shifts towards more commercially viable options. Collective mechanisms for water distribution have become more formal, under these changed set of circumstances. Less is based on mutual understanding and trust.

While comparing response to change across the study area, field studies revealed that scarcity of the resource base is an important determinant of how stringent the rules of distribution are. For instance, towards the interiors of Sangla tahsil, where water resources are comparatively abundant, irrigation water is mostly open-access. Rotational methods of distribution, known as *'pala',* are introduced only when there is water scarcity or untimely rainfall. At such times, a lottery system is relied upon for deciding water distribution schedules across households. Water is made available for a whole day, turn by turn, irrespective of the size of land holding or its location. The village *'met'* or informer organizes these proceedings. In other villages of Sangla valley such as Shong, Sangla and Kamroo, informally managed irrigation systems have started becoming more formal in organizational structure due to the erratic nature of rainfall and water scarcity on account of climate change.[16] These villages are hard-pressed for water not only because they are less endowed with glacier reserves but also because there are many more households to address, due to progressive partition of landholding across adult male siblings and a near total shift towards cash crops. On a stipulated day before the sowing season, the villagers congregate in the temple complex for deciding irrigation schedules. This day corresponds to the first day of the 'Hindu' calendar locally referred to as *'bishu'*. Some villagers believe that village meetings have always been held in the temple complex for enhancing the sanctity of the proceedings. The tenure of irrigation is directly linked to the size of the land holding and self monitoring is necessary to prevent water thefts, which do occur if one is callous. Such formal structures have also evolved towards Kalpa, where water resources are even scarcer. Irrigation distribution is organized by indigenously constituted committees such as '*Vikas*' (development) Commitees' or '*Nahar*' (irrigation) Committees' that have come up after the 70s which roughly corresponds to the period when the 'apple-boom' started being experienced in the region. Local interaction revealed that these committees have

[16] See Appendix, figures 4 and 5. There is a clear declining trend as regards snowfall in the region while rainfall has become more erratic particularly since the late 1990s.

been set up not only to ensure more rigorous implementation of rules but also because local participation levels in village level activities and meetings have declined due to time constraints. Therefore the group of committee office bearers, appointed through common consensus, have been delegated the responsibility of taking decisions that earlier required the involvement and participation of all households in the village. Self - monitoring is absolutely necessary. High penalties are imposed if water thefts are detected. In the past, investment of voluntary labor for repair of irrigation channels was obligatory for all households. However, in the current context, repairs are undertaken either by engaging migrant wage labor or by relying on government funds mobilized by the elected village 'panchayats'.

In the case of irrigation water resources, field evidence indicates that the resource use norms have entirely been linked to the formulation of "allocation" rules. Further, with changing contextual parameters such as high reliance on production of cash crops and scarcity of water resource due to climate change, and rising population pressure, the rules of water allocation have become somewhat more stringent. More formal structures of resource governance have emerged for implementing these rules. Water conservation on the other hand, did not seem to be on the agenda of such collectives. The locals did express concern about depleting water resources which they invariably attributed to climate change or 'global warming'. However, there did not seem to be any reaction that pointed towards use of techniques for conserving water use or for curtailing wastage. In course of field interactions when the villagers were questioned about why such management rules were not framed when it came to their wood based forest resources, the usual response was that water is scarcer and therefore more valuable than forests.

4.2 Forests

The local inhabitants have usufruct customary rights on surrounding forests for extracting firewood, fodder, leaf-litter and timber as well as a host of non-timber forest products. These forests are, *'de jure',* under the care and control of the State Forest department, a legacy since British colonial times. Due to local perception of abundance, forests have always been open-access in this region and continue to be so, today. Field studies indicated that there was virtually no evidence of local conservation or management practices with regard forests, but for the existence of stray and scattered 'sacred groves' which have been in existence since ancient times. These forest preserves account for a very small fraction of the total area of forests that the local population accesses.[17] Based on forest surveys and satellite imagery, the mean area of a village forest was found to be around 360 hectares while the area of sacred forests found in this region, ranged from a mere 0.2 hectares to 1.2 hectares. Only 6 out of 13 villages that were surveyed had sacred forests. Unlike proposals made by some researchers (Vasan 2002, Gupta 2006) there is no local evidence to indicate that these sacred forests have been extended in area or replicated elsewhere (Das, 2000a, Sarkar 2007c).

[17] See Figure 6 in the Appendix.

The rising population pressure on account of sedentary living has enhanced pressure on forests particularly for firewood and timber. Over the last 25 years the population in a village has increased by nearly 40%, on an average. Household surveys indicated that nearly 5-6 tons of firewood is extracted per household per annum to cater to cooking and heating needs. Though there has been some shift towards the use of LPG for cooking during summer months, with improvements in accessibility and affordability, firewood continues to be the primary source of fuel. In winter the population is entirely dependent on firewood for cooking and heating.[18] Transects laid in the forests for assessing the condition of the forest stock indicate that these levels of firewood extraction has led to a progressive thinning and degradation of the forest stock.[19] Canopy cover estimates were on the lower side and the level of lopping was high. Due to the depleting resource base, the locals themselves indicated that it takes much longer to collect a bundle of firewood as compared to 25 years ago[20]

While locals are entitled to have limited access to timber for construction of dwelling units, [21] they extract beyond genuine needs (Sharma & Minhas, 1993). This is also related to important dimensions of social change. The break down of the 'joint-family' system has led to increase in demand for timber for construction of separate dwelling units by each nuclear family. Even a single household today, has multiple dwelling units: one close to the road to facilitate the packing and transportation of the apple crop, others close to orchards which are cultivated at varying heights to mitigate risks to crop-yield on account of climate change. Weak monitoring of forests by the State forest department is another reason why there are meager curbs on extraction levels. Although there are formal rules of access and use that have been imposed by the forest department,[22] the monitoring costs of these vast tracts of forests amidst difficult and inhospitable terrain is extremely high. While conducting field studies on village commons in a similarly located village in the Garhwal Himalayas, Das (2000b) succinctly reiterates that while illegal 'commercialization' activities pertaining to forests have been curtailed by the Forest department through Forest monitoring posts along roads, illegal 'survival' activities by the locals have been mostly overlooked in far flung areas across hostile mountain terrain. These observations apply to the study area under investigation.

Historically, forest resources in Kinnaur have been exploited by other agents as well (Sharma and Minhas, 1993). For instance, reports indicate that commercial exploitation of timber dates back to pre-colonial times, when traders obtained permits for felling from the local monarchy. This trend continued even during the colonial period when a huge quantum of 'deodhar' trees (*Cedrus deodara*) was lost for meeting imperial needs. During the initial phase of development and change, in the post-independence era, a large number of trees were also felled for making apple-packing boxes (Sarkar, 2007a).

[18] See Table 5 in the Appendix.
[19] See Table 6 in the Appendix.
[20] See Table 7 in the Appendix.
[21] The Forest departments allows each household to fell one tree in 5 years for dwelling repair and construction under what is officially known as 'Timber Distribution'. A nominal fee is charged.
[22] For instance, only dry wood can be lopped or collected.

The National moratorium on 'green' felling initiated by the government during the eighties has certainly stalled these trends. However, much forest cover has been lost due to the construction of roads and hydro-electric projects, in the more contemporary context. The locals are not averse to loss of their forest resources when it comes to road construction as it benefits them directly. However, some resistance to the coming up of hydro-electric projects has started building up as the loss of common forest resources is on a much larger scale. Interactions revealed that most locals who support this movement are more concerned about acquiring a share in compensation grants doled out rather than in defending their cause on environmental conservation grounds. This was confirmed because in some areas where compensation packages have been distributed, the locals have given away common access zones to hydro-electric project companies with little resistance or bargaining.

To summarize, the ground reality is that forests continue to remain open-access for fire wood, leaf-litter and even timber to some extent. Due to mounting anthropogenic pressures, the forests have started degrading. Scarcity does not seem to be a binding constraint. The local perception is that forests are still abundant and there is no need to govern resource use. Based on field-work and satellite imagery it was ascertained that locals are mainly accessing 30-40% of the existing forest area. Easy access to migrant labor overcomes hardships related to time constraints and fatigue as one now needs to trudge deeper into forests for collecting firewood due to degradation of proximate zones. Perception of abundance also indicates why the locals willingly accommodate firewood use by migrant laborers from their access zones or are less resistant to loss of forest cover on account of hydro-electric projects in the region. In all cases, they are concerned about short-term needs and seemed to be myopic and mostly unaware of the long-term ecological implications of their actions. Therefore, there is no incentive to device rules for conservation of the resource. However, some non-timber forest resources were being collectively managed. These details are discussed in the following sub-section.

4.3 Non-Timber Forest Produce:

Edible pine nuts is a valuable non-timber forest produce which locals extract from cones of *'Chigoza'* (*Pinus gerardiana*) pine trees found in the more arid zones of the study area. Earlier, the resource was mainly used either for self consumption or partly bartered for grains, once a year, at the commercial fair in Rampur town. Even at that time, there were rules of access that villagers adhered to. The nuts are usually ready for harvest some time in September. A pre-determined date was announced before which no one could extract the resource. On the stipulated date, two members from each household, one male and one female were allowed to access the forest for collection. While the male was responsible for extracting the cones the female collected the cones from the ground. Households were free to collect as much as they could. For the subsequent period the resource was open-access.

Over the last three decades, the value of edible pine nuts has sky-rocketed from rupees 25 per kilogram to rupees 400 per kilogram in the local market. Therefore, the incentive

to benefit from the price rise has permeated to all factions of the community. Pine cone and thereafter nut extraction can be a fairly arduous and time consuming activity. With occupational shift towards cultivation of cash crops and engagement in non-farm avenues of employment, the locals have started experiencing time constraints for collecting cones. They are also hesitant to engage in these kinds of activities which are tedious. Therefore, most villages in the locality have now started collectively auctioning out the produce to *'thekedars'* or contractors who then engage local or migrant labor to extract the resource. The total amount mopped up through the auctioning process is then equally distributed across the households. The produce is however guarded by the village before the final bid is accepted. In course of field-interactions, the locals revealed that this is the best method of tapping the resource as the opportunity cost of time has increased and they are unable to engage in these ventures, themselves. In any case, they felt that sale of edible pine nuts was not their primary source of income and therefore they preferred to collectively delegate out this function to contractors.

The tremendous rise in commercial value of pine nuts and involvement of 'outside' agents such as contractors who hire laborers for cone collection has led to reckless extraction of the produce. A peculiar characteristic of '*chilgoza'* pine is that the cones which will mature in the following season are also present on the branches. Therefore, if caution is not exercised while harvesting mature cones, there can be damage to the crop yield of the next season. Even though the locals insist that they try to involve someone from the village to ensure sustainable extraction, the incentive to protect the next years harvest is less as the contractor is unsure whether he will participate or win next years bid. The engagement of migrant laborers has also exacerbated these problems as they are less concerned about damage to the resource. Some researchers who have tried to assess the condition of these forests found that excessive extraction for commercial gains and ruthless lopping of branches and twigs while extracting cones have adversely affected the forest stock. If these trends continue there could be irreversible consequences for the regeneration levels of this rare pine species (Sehgal and Sharma, 1989, Sharma & Minhas, 1993).[23] Way back in 1963, while framing the revised working plan for Kinnaur and Koshi forests, the Forest Officer J.C. Tandon had expressed similar kind of concern. He warned that but for 5% of the area under *'chilgoza'* pine that was difficult to access due to steep terrain, the rest of the zones were under potential threat due to anthropogenic pressures.

The anecdote of edible pine nuts is a classic case which indicates how locals are extremely deft at designing rules for allocation of the more 'productive'[24] common property resources. However, their resource regime strategies are less tuned towards conservation of the resource. The same kind of strategy is being adopted for extraction of medicinal herbs, in some of the villages in the study area. Alarming levels of extraction seems to be endangering the resource base. There is cause for concern

[23] Chilgoza pine *(pinus gerardiana)* is found only in some parts of Afghanisthan, and scattered across Kashmir and parts of Chamba as well as Kinnaur districts of Himachal Pradesh, in India.
[24] Also see Jodha (2006).

because these temperate varieties of medicinal herbs are particularly less tolerant to harvest[25]

4.4 Other areas of Cooperation

The local community has also devised rules for grazing and grass-collection zones. All livestock used for draught operations are supposed to graze in the high-altitude pastures after the sowing season so as to not damage crops. It is mandatory to stall-feed milch-cows, which are retained in the village. These rules are particularly adhered to as damage to orchards because of straying cattle population can cause monetary loss. In fact, livestock rearing is on the decline and most households have shifted to the rearing of mixed breed or *'jarsi'.* Households have also become more self-sufficient as regards grass fodder which grows well below fertilized apple trees. Many have started purchasing cattle-feed from the market to supplement grass from fields. However, whereever there is acute grass scarcity, these fodder areas are closed for access during the monsoons to ensure regeneration and growth. Just before the need to stock grass for winter months arises, the grass-areas or *'ghasnis'* are opened to households for access. The grass area is divided across households and each household is allowed to extract only from the apportioned zones. There are no conflicts and no feuds as grass is no longer a vital resource neither does it have commercial value.

5. Summary and Conclusion:

Change is inevitable. As compared to self-sufficient, semi-isolated and labor scarce traditional societies, in the past, that devised ways of managing production and commons for adapting to environmental constraints, the present day Kinnaur is witnessing transition and change that it needs to cope with. Greater market integration fostered by improvement in the road network has no doubt enhanced income levels. Access to employment opportunities as well as access to other forms of physical and social infrastructure in close proximity to the village has led to a preference for more sedentary patterns of living. State intervention for tapping the vast hydro-electric potential of the region, to replenish its coffers and to meet national directives for achieving development goals, is widely apparent in the region. There was also some evidence of climate change. An attempt has been made in this paper to assess the impact of these processes on village commons and resource use regimes based on field studies through sustained but periodic visits in the region, over the last decade.

The detailed common property resource regime narratives, outlined in this paper, indicate that the local population has found ways of adapting to these changed circumstances. Empirical evidence gathered in course of field studies indicates that collective resource use and collective management of natural resources is largely driven by user-incentives and their perceptions about the natural resource base. This is also

[25] In a comprehensive review of studies conducted to assess the ecological impact of extracting non-timber forest produce, across varying climatic belts, Tiktin (2004) observed that these temperate varieties are particularly less tolerant to harvest.

the reason why diverse common property resource regimes co-exist and cooperation in one sphere does not necessarily imply cooperation and local governance in other spheres of common property resource use. Therefore while irrigation water distribution and edible pine nut extraction is collectively managed, forests are virtually open access.

More generally speaking, if there is high reliance on the resource but there is a sense of scarcity, the community will devise precise and perfect rules of resource distribution so as to ensure equity in access and use. This is clearly the case of irrigation water. But if there is perception of resource abundance and high reliance, the resource is open-access for all practical purposes. Common-access forests fall into this category. Further, locals tend to manage the more productive or the more commercially viable resources. While these outcomes are somewhat predictable the case of non-timber forests resources calls for attention. Rising economic well-being due to commercialization of agriculture and access to other non-farm avenues of employment has led to less reliance on non-timber forest produce such as edible pine-nuts and medicinal herbs. Therefore the local inhabitants have collectively started delegating responsibility to "outside agents" by auctioning out the forests for collection and subsequent sale of the produce in markets outside the region. This has adversely affected sustainable extraction as these agents are more concerned about short-term lucrative gains rather than long-term repercussions on regeneration or the possibility of extinction in some cases. While other studies have indicated how poverty and lack of alternative avenues of employment have caused overexploitation of non-timber forest products such as high value medicinal herbs[26] this study indicates how improvements in economic condition and greater expansion of economic opportunities can lead to similar outcomes.

In all cases, there was no empirical evidence to indicate that locals are 'inherently' or 'historically'[27] conservationists as they are often made out to be in certain academic and policy circles. In fact, most norms of collective resource use seemed to be related to 'allocation' or distribution of the resource with little concern for long-term ecological implications. Thus virtually all common property resources have started degrading. Template policies that have been widely framed for transferring natural resource conservation responsibility to the local community needs to be re-evaluated under these circumstances.

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[26] For instance, see Bishnu and Thapa (2003).
[27] Baland and Platteau, (1996); Das (2000a)

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APPENDIX:

Figure 1: The Study Area.

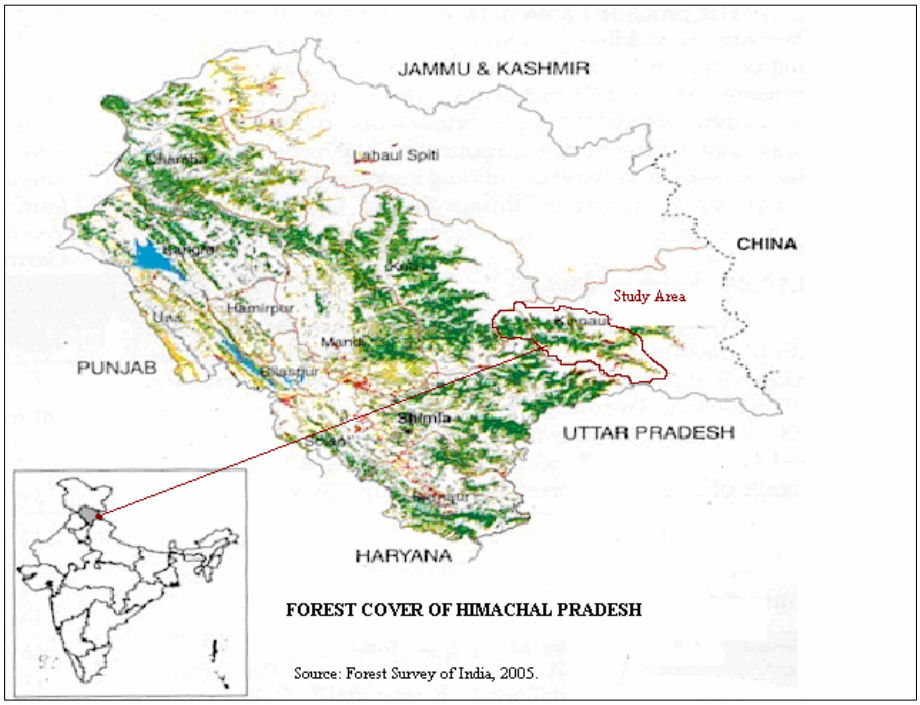


Figure 2: Administrative Divisions of the Study Area.

TABLE 1: Village Geography and Demographic Profile of the Study Area

	Villages	Mean	Std. Dev	Min	Max
Variable					
Village Altitude (meters)	13	2366.9	285.52	1990	2740
Distance to Road (kilometers)	13	1.19	1.3156	0	3
Total population	13	552	256.17	216	977
Total Households	13	109	45.5	51	192
Mean Household size	13	5.71	0.78	4.55	6.7

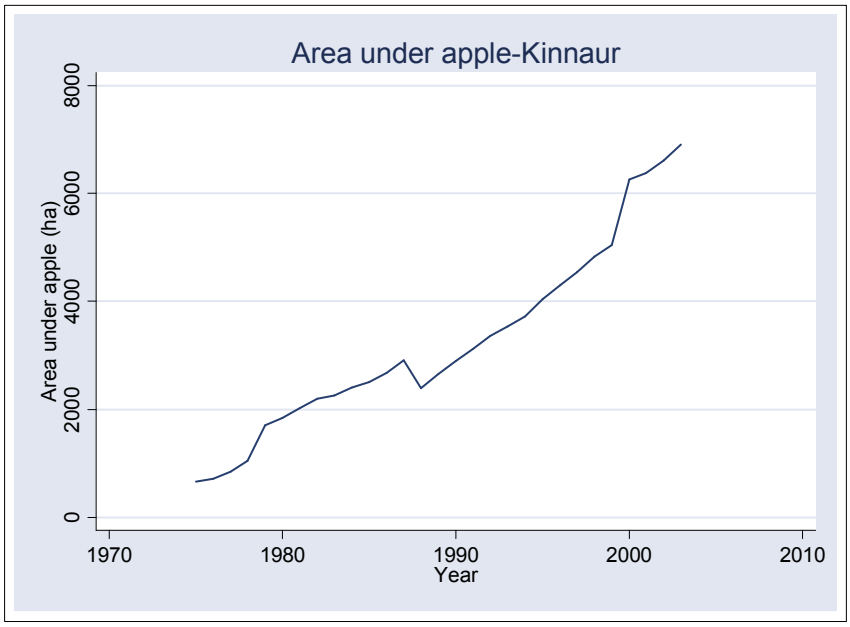
Source: Field Surveys, 2000-2003

TABLE 2: Forest Characteristics across the Study Area

	NICHAR			**SANGLA**			**KALPA**		
Characteristics	Villages	Mean	Std_dev	Villages	Mean	Std_dev	Villages	Mean	Std_dev
% Conifers	5	68	0.27	4	78	0.25	4	98	0.04
Altitude (meters.)	5	2580	246.58	4	2724.17	108.23	4	2728.8	83.70
Slope (degrees)	5	29.75	9.70	4	31.25	4.33	4	26.25	6.29
Distance from village (kilometers.)	5	1.7	0.54	4	1.625	1.31	4	2	2.25

Source: Field Surveys, 2000-2003

Figure 3: Expansion of Area under Horticulture.



Source: Horticulture Department, District Statistical Office, Recong Peo, Kinnaur

TABLE 3: Consumption Expenditure, Inequality levels and Poverty.

	Villages	Mean	Std. Dev	Min	Max
Monthly per capita consumption Expenditure (Rs.)	13	918.66	192.06	624.48	1249.144
Gini coefficient (Consumption expenditure)***	13	0.28	0.0202	0.2553	0.31
Poverty gap ratio**	13	2E-05	8E-05	0	0.0002965
% Land under cash crops	13	29	0.1908	3	70
% of Household members in non-farm employment	13	20	0.0484	0.1481	30

Source: Field Surveys, 2000-2003

Notes: * 12.5 'bighas'=1 hectare.

** The poverty gap ration is defined as the ratio of the average income needed to get all poor people to the poverty line divided by the mean income of the society. The reason for dividing by the average for society as a whole is that this gives an idea of how large the gap is relative to resources that potentially may be used to close the gap. The ratio is given as: $\sum_{yi < p} (p\text{-}y_i) /n.m$ where p=poverty line (1$=8.8 rupees as per PPP or 'purchasing power parity' WDI, World Bank 2004); y_i=per-capita consumption expenditure per day for household 'i'; n=population of the village; m=mean per-capita consumption expenditure per day for the village households. In short the ratio is a measure of resources needed to eradicate poverty.

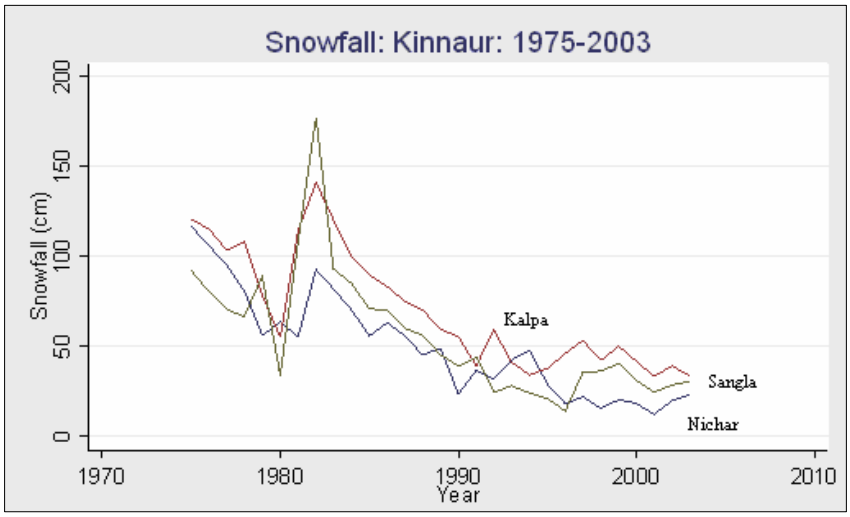
*** The Gini coefficient is a measure of inequality of a distribution of income. It is defined as a ratio with values between '0' and '1', based on the Lorenz curve that depicts the distribution of income in any society. The horizontal axis depicts the cumulative percentages of the population arranged in increasing order of income. The vertical axis indicates the percentage of national income accruing to any particular fraction of the population, thus arranged. The Lorenz curve begins and ends on a 45^0 line that depicts perfect equality. The numerator of the Gini coefficient is the area between the Lorenz curve of the distribution and the 45^0 perfect distribution line. The denominator is the area under the perfect or uniform distribution line. Therefore '0' corresponds to perfect income equality and '1' corresponds to perfect income inequality. Gini coefficient values below 0.25 are considered to reflect very low levels of inequality.

TABLE 4: Village Population (Now and 25 years ago)

Variable	Villages	Mean	Std. Dev.
Population 25 years ago	13	391	200.5004
Current population	13	552	256.1652
% CHANGE		41%	

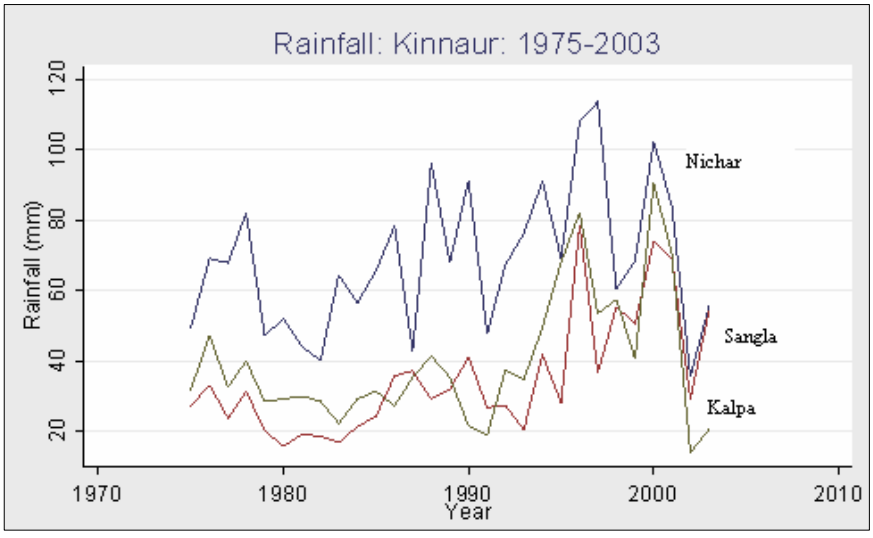
Source: Field Surveys, 2000-2003

Figure 4: Decline in Snow fall.



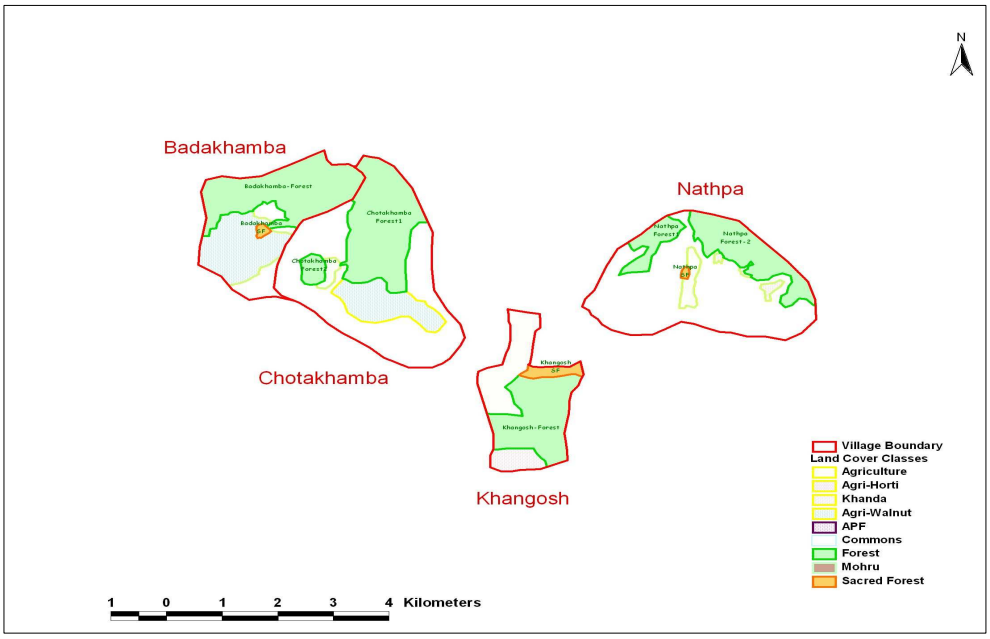
Source: District Statistical Office, Recong Peo, Kinnaur

Figure 5: Rainfall trends in the Study Area.



Source: District Statistical Office, Recong Peo, Kinnaur

Figure 6: Scattered Evidence of Sacred Forests in one part of the Study Area.



Source: Land use map developed on the basis of satellite imagery and field verification.

TABLE 5: Primary Sources of Energy for Cooking & Heating:

Summer Cooking		Winter Cooking		Winter Heating	
Energy Source	Households	Energy Source	Households	Energy Source	Households
Fire wood	63%	Firewood	98%	Firewood	99%
Kerosene	3%	LPG	2%	Charcoal/ Electricity	1%
LPG	34%				

Source: Field Surveys, 2000-2003

TABLE 6: Status of Forests

	Mean	Std_dev
Canopy Cover	47.49	14.37422
Lopping	2.01	0.576382
Basal Area	55.01	28.72886

Source: Forest Surveys, 2000-2003

Notes: Canopy cover is defined as the amount of ground area covered by the spread of tree branches and leaves, as viewed from above. A mirror with grids of equal size was used to determine the canopy cover. The proportion of grids covered by tree canopies was then recorded. A canopy cover estimate below 40% is indicative of a degraded forest as per conventions of forestry science and forestry experts who work in the region. In an undisturbed forest, the canopy cover estimate may be sufficient for assessing the overall condition of the forest stock. However, where ever there is evidence of lopping for firewood or fodder, the canopy cover estimate may provide only a partial picture of biomass loss. This is because only the aerial view of the main tree canopy gets captured through this measure. The condition of the branches below the main canopy is concealed. To overcome these problems, the canopy cover estimate needs to be combined with a measure that can depict the extent of tree-height that is lopped. This can only be attempted through ground surveys. Excessive lopping beyond 50% of the tree height is considered to be a serious threat to the survival of the tree. In order to record the extent of lopping, a visual scale was conceived of and each tree encountered in the 'plots' was classified into code 1 if the extent of lopping was less than 30% of the tree height,

code 2 if the tree was 30-70% lopped and code 3 if the tree height was over 70% lopped. The basal area provides an estimate of the standing tree-stock density in a forest. Mathematically, it is the sectional area at breast height of all trees put together per unit area. The only data gathered to estimate the basal area during field work was to measure the girth at breast height of all trees above three meters in height that was encountered in the survey plots. If there is felling of trees in the forest, the basal area would go down simply because less 'girths' would get recorded in the computation of this measure. Basal area estimates of 40 mts^2 / ha is considered to be a benchmark below which there is cause for alarm as this reflects a depleted bio-mass base of a forest.

TABLE 7: Evidence on Forest Degradation (Local perception)

	Mean (hours)	Std. Dev.
Time to collect a bundle of firewood (now)	4.26	2.73
Time to collect a bundle of firewood (25 years ago)	2.49	2.25
CHANGE	1.77	

Source: Field Surveys, 2000-2003