

MAPPING LIVELIHOODS AND LOCAL FORESTS IN THE INDIAN MIDDLE-HIMALAYAS: Evidence from Field Surveys

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Abstract:

This paper summarises preliminary evidence on livelihood patterns and the nature of forest dependence in the Indian middle-Himalayas. The findings are based on extensive field-work and ‘ground-truthing’ in 165 villages located amidst broad-leaf or coniferous forests. The ecology of the middle-Himalayas appeared to be in a phase of transition and change. Accessibility-shifts, improvement in literacy levels and changes in the occupation-structure have been ushered in. However, oral histories recorded in course of field-work clearly indicated that concomitant to these changes, the local forest resource base has started degrading. While there was ample evidence of awareness as regards the depleting forest stock, there was meager evidence of local or ‘state’ action worthy enough to reverse these trends.

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1. INTRODUCTION

The zone between 1800 and 3000 meters in the Indian middle-Himalayas houses 800 odd villages traditionally based on agriculture and livestock rearing. The livelihood systems of local inhabitants are intricately linked to forests in the village surrounds. Firewood for cooking, heating and boiling water, fodder collection for livestock rearing, leaf-litter accumulation for generation of organic manure on which agriculture yields still depend as well as timber for house construction is all acquired from local forests. Open canopy forest zones as well as canopied areas serve as vital grazing areas for bovine and other kinds of village livestock. Thus the sustainability of the forest stock is crucial as livelihoods are at stake. In this process, the overall ecological balance of the region would also be promoted. This study based on intensive field work seeks to assess the status of local forests in this region. Field based findings are presented in this paper. Section 2 briefly outlines the survey methodology and the survey tools that were used. Comprehensive details related to village and household characteristics in this region are presented in section 3. Quantitative as well as qualitative evidence on the nature of forest degradation that characterises this region, is presented in section 4. Anthropological surveys were independently commissioned to corroborate trends emerging from the principal survey. Section 5 puts together the main findings. Sections 6 to 8 examine the role of the 'individual', the 'state' and the 'community' in relation to local forests. The concluding section highlights the main findings. An exhaustive set of tables, entirely based on field-work is appended at the end of the paper along with a special note on transition and change that is occurring in the Himalayas and a note on the status of community managed 'van panchayats' in this region.

2. SURVEY DETAILS

Field surveys were conducted in the Middle-Himalayan belt of Northern India across the states of Uttarakhand and Himachal Pradesh. The intension was to study a large number of villages within a fairly common agro-climatic region with similar ecological characteristics but with disparate socio-economic structure, market access and governance patterns with enough independent variation in each of these factors. Preceded by pilot surveys in representative villages, final surveys were done in 165 villages over a period of three years (Figures 1,2 & 3). Topographical maps published by the Survey of India were scrutinised for demarcating the required altitude-zone between 1800 and 3000 meters by tracking 'contour lines'. An attempt was then made to identify the census-villages by referring to village location maps published by the 'Census of India'. The exercise yielded 829 villages in all. On the basis of this census data villages with less than 20 households were dropped and the remaining set of villages were stratified on the basis of independent criteria namely altitude, households in a village and distance to the nearest town. Villages were selected randomly from each strata was done to reflect the population marginal distribution. The entire exercise was conducted separately for Himachal Pradesh and Uttarakhand to ensure that the final sample consisted of 82 villages in Himachal Pradesh and 83 villages in Uttarakhand.

A sample of 20 households was surveyed in each village. The households were selected on the basis of a stratification procedure where the strata were formed by combining the landholding and caste-distribution in the village. The first step was to acquire the 'parivar register' from the 'panchayat office records', which contains the exhaustive list of households in the village and a detailed list of all household members therein. A well informed village inhabitant was identified in every village to acquire information on landholding, caste, gender profile, literacy and occupation structure for all households in the village. The landholding and caste distribution of the village was then derived on the basis of which the household sample was selected.

An important dimension to be empirically verified was to ascertain factors affecting household choice behaviour when confronted by firewood and firewood substitutes such as kerosene and LPG. However, in course of fieldwork, it was found that most households were entirely dependent on firewood. In order to overcome this problem, a proxy method was resorted to. Corresponding to every village, 5 households were surveyed in two road-head settlements located in close proximity to the village. More specifically, three household surveys were conducted in the nearest road-head location which was most often a village or a small commercial hub and two households were surveyed in the nearest accessible big town. These 5 households were selected on the basis of the income structure of the village.

Prior to the final survey, draft questionnaires were prepared and pilot surveys were first conducted in scattered locations in Himachal Pradesh and Uttaranchal until the final versions of each questionnaire was formulated on the basis of field observations. Three sets of questionnaires were used to conduct surveys in each village. The household questionnaire deals with the socio-economic structure of the household and its dependence on forests. The village questionnaire is designed to secure information on a host of village level characteristics such as demographic size, access to physical and social infrastructure and the market environment. The village questionnaire also seeks to document institutions of governance at the local level. The ecology questionnaire was framed essentially to gather quantitative and qualitative evidence on the condition of the forest stock the villagers usually access. For conducting the ecology surveys based on this questionnaire, local forest zones accessed were first identified and mapped by interacting with the villagers. Random transects (100 meters in length) were then laid in the forest and measurements were recorded at three equidistant plots (of 5.63 meters radius) on the transect to record the species composition, canopy cover, basal area, heights and girths of trees above 3 meters in height as well as regeneration characteristics. Qualitative assessment of grazing, lopping, leaf-litter accumulation, timber extraction and evidence of natural calamities such as fire and snowfall damage to trees was also recorded at each plot in predetermined qualitative scales. The second part of the ecology report attempts to unearth change in the condition of the forest stock over the last 25 years and principal reasons for the same, by interacting with village inhabitants. An analysis of the data trends pertaining to household and village characteristics is presented in the next section

3. VILLAGE AND HOUSEHOLD CHARACTERISTICS

The village characteristics and household characteristics pertaining to the Indian data set is best portrayed by comparing these characteristics with the same in the Nepal Himalayas where studies on issues related to forests and local livelihoods has just been concluded. The Nepal data-set is based on the “Living Standard Measurement Survey” 1995-96. Tables 1 and 2 summarise these trends.

To begin with, there is considerable altitudinal variation in the case of the Nepal data set. The Indian villages are however located within a much closer altitudinal band between 1800 and 3000 meters. Villages (wards) in Nepal extend from 58 meters in the foot-hills of the Himalayas known as the ‘terai’ region to as high as 5920 meters giving a mean village altitude of 940 meters. The mean village altitude in the Indian sample is 2065 meters. The Indian villages are located within the confines of what is conventionally known as the “Middle-Himalayas”.

What is most striking from these data sets is that the hill-population in India is better-off than their Nepalese counterparts. The mean annual consumption expenditure for a household in India is rupees 39,849 while in the case of Nepal the figure stands at rupees 23,662. Even if we compare the per capita consumption expenditure the difference is significant. The Indian figure for per capita consumption expenditure is rupees 3000 higher than the Nepal average. Within India the status of Uttaranchal is somewhat better than Himachal in both respects. The picture is quite the same with respect to the poverty gap ratio. In Nepal for instance, the average poverty gap ratio in relation to 1 dollar per capita per day is 13% while in the case

of India it is merely 0.13%. In fact the problem of a “poverty-gap” is prevalent in only 58 out of 165 villages that were surveyed in India. The Indian population is also better endowed as regards education status. For example, the average years of schooling of the household head, is 4.49 years in India. In Nepal the household head on an average has only 1.88 years of schooling. Further, inhabitants in India have more opportunities to explore and exploit because accessibility conditions are much better. In India it takes only 1 hour to reach the nearest dirt road and 1.5 whereas in Nepal it takes as long as 6 hours. Improvements in accessibility, is due to concerted efforts of the government. A large fraction of the state budgets in these hill states are assigned to expansion of roads and road maintenance in these states and is a useful pre-election stance to win over the active support of the local population.

The occupational structure in Nepal (Table 2) is predominantly agrarian with 66% of the labor force engaged in agriculture. The fraction of wage labor in agriculture is higher than the fraction of wage labor engaged in the non-agricultural sector. These trends are consistent with the observation that 89% of the migration into villages is for economic reasons. It is likely that there is migration for casual employment in farms. Agriculture is also the most important occupation in the Indian middle-Himalayas with 27% of the potential work time being devoted to the primary sector. However, the data base indicates that wage labor in agriculture is insignificant. That is why migration to villages is mainly for non-economic reasons. However, wage labor is relatively higher in the non-agriculture sector. Details relating to the sources of wage employment are summarized in Tables 3, 4, 5 and 6. The private non-agricultural sector accounts for 52% of casual employment which is mainly in construction related activities. The government sector generates 35% of the casual employment in villages that centers around road construction activities, civil works and plantation activities in the forest department and civil works linked to ‘panchayat’ activities. 67% of the permanent employment is in the government sector. The importance of the non-agricultural sector in India is also revealed through the value of non-farm business assets per household which is rupees 16,816. The figure for Nepal, in comparison, is only rupees 5,274 per household.

The demographic size of a village in Nepal is nearly double of that in India. The mean number of people residing in a Nepali village is 800 whereas in India the only 400 people on an average inhabit the village. In the case of both Nepal and Indian villages, there is more ethnic than religious fragmentation. In terms of religion, in both the regions households are essentially ‘hindus’. In India there was scattered evidence of ‘buddhist’ population in villages located close to the Tibetan border. While the ‘muslim’ population, also meager, consisted of the ‘gujjar’ community that rears and herds buffaloes. There is a subtle difference in the caste structure across Nepal and India in this area. The upper caste ‘brahmin’ community predominates in the villages of Nepal. While in the case of India the middle caste ‘rajput’ community forms the majority followed by the ‘schedule castes’. ‘Brahmins’ are actually the minority caste in the Indian middle-Himalayas.

As regards inequality measures, there is not much difference in the gini-consumption expenditure which is 0.3 for Nepal and 0.2 for India. Inequality in landownership is however much higher in Nepal, even though the mean land ownership per household is more or less the same at 0.55 hectares per household. The land ownership gini in Nepal is 0.64 which is fairly high whereas in India it is only 0.39. Landlessness in India is virtually non-existent. Only 7 households out of 3291 households surveyed, had no land.

Since the focus of analysis is on livelihoods and local forests, it is worthwhile to investigate the effect of the above characteristics on a household’s forest dependence mainly in terms of firewood collection for which comparable data exists. Firewood collection in terms of bundles collected is much lower in Nepal assuming that the weight of a bundle is the same across the two regions and is equivalent to about 30 kgs. In the ‘terai’ region, which is essentially located in the foot-hills of the Himalayas only 0.59 bundles per week suffice to cater to needs whereas in the non-terai region which is higher up, collection levels amount to 2 bundles per week. In India, the mean collections per week stand at 4 bundles per week per

household on an average. There is not much censoring with regards to firewood collection in the Indian villages. Only 5 households do not collect firewood at all. Nearly one third of the households, mostly in the terai region of Nepal, are non-collectors.

The time to collect firewood is much higher in Nepal. It takes nearly 5.5 hours to collect a bundle of firewood. The estimate is uniform for the ‘terai’ and the ‘non-terai’ region. In India it takes about 4 hours to collect a bundle of firewood. The time taken is somewhat higher in Uttarnchal than in Himachal perhaps because the forest stock is more degraded. A comparison of forest characteristics across Himachal and Uttaranchal is drawn in Table 7¹. Besides variations in degradation measures, the statistics reveals that there is not much difference in the distance to the forest or the slope. Therefore, the main difference in collection time across the two states is not in the ‘walking time’ but the ‘gathering time’. As the forests are more degraded in Uttaranchal it takes a longer time to look for firewood especially in broad-leaf forests.

The access to kerosene or LPG stove dummy in table 1 indicates that access to firewood substitutes is weak in Nepal. Remoteness is perhaps an important explanation for this. Further, lower economic well-being, in comparison to the population residing in the Indian Himalayas, imposes other kinds of hurdles that restricts access to such substitutes. With better accessibility levels and higher income status, the Indian villages are better-off as regards access to LPG and kerosene which the table reflects.

Besides capturing the household and village characteristics, the survey also tried to unearth oral histories on the nature of change that is occurring in the region. An analysis of the data base indicates that the middle-Himalayas are a crucial zone undergoing transformation in important dimensions. Improvements in accessibility conditions, literacy-shifts, commercialisation of agriculture, accompanied by changes in the occupation structure are essential elements of this process of transformation and change which was observed over the last 25 years. Interactions revealed that these changes have particularly intensified over the last 15 years. Concomitant to these changes, the number of households residing in a village has also steadily increased. Unfortunately, our surveys also go on to indicate that the condition of the local forest stock in the vicinity of villages has degraded, over this time period. A quantitative and qualitative assessment of these trends is presented in Appendix 1. Most of these trends were found to be statistically significant. As compared to 25 years ago, on an average, the road head is 5 kilometers nearer, the middle-school is 5 kilometers nearer and the high school is 9 kilometers nearer. Accessibility changes of this sort open up vast opportunities for the rural population. Agriculture continues to be the primary occupation though there has been a progressive shift towards cultivation of cash crops such as potatoes, garlic, peas, apples cabbages, garlic, pulses, and walnuts. Earlier, only 23% of population engaged in non-farm avenues of employment to supplement income from agriculture. However today, 52% of the population pursues non-farm avenues of employment as a secondary source of income. Concomitant to these changes, there are about 30 more households residing in every village exerting pressure on all kinds of resources such as forests. These pressures are degrading the local forest stock. For instance oral histories captured through our ecology questionnaire clearly indicate that over the last 25 years, time to collect firewood has nearly doubled. But the distance to the forest has marginally increased (Appendix 1, table 1m & 1n). This implies that the problem in this region is not one of large scale ‘deforestation’ but ‘degradation’ or a progressive thinning of the forest. A deeper analysis of this finding follows in the next section.

¹ See section 4.1 for definitions of canopy cover, basal area and lopping grades.

4. ASSESSMENT OF THE FOREST STOCK

In order to assess the condition of the forest stock, local forest patches were identified by interacting with the villagers. A schematic map of the village and the accessed forest zone was conceptualized as indicated in Figure 4. Random transects (100 meters in length) were then laid in the forest and measurements were recorded at three equidistant plots which were 5.63 meters in radius. The species composition, canopy cover, basal area, heights and girths of trees above 3 meters in the plot was recorded. Qualitative assessment of grazing, lopping, leaf-litter accumulation, timber extraction pressures and evidence of natural calamities such as fire and snowfall damage to trees was also recorded at each plot on the basis of a predetermined qualitative scale.

4.1 Measures of degradation: Canopy cover, lopping intensity and basal area.

The canopy cover is an important index of sustainability of the forest in the long run. It 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 so as to record the proportion of grids covered by tree canopies within each plot (Figure 5). As per forestry science convention if the recorded canopy cover is below 50%, it can be inferred that degradation has set in². An estimate below 40% depicts a very badly degraded forest. Mean canopy cover estimates for the study area are summarized in the table, part of Figure 8.

When coupled with a measure of the extent of lopping, the canopy cover estimate can provide a more refined measure of the long run sustainability of the tree-stock in a forest. Excessive lopping beyond 50%³ of the tree height is 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 sample plots was classified into grade-1 if the extent of lopping was below 30% of the tree height, grade-2 if the tree was 30-70% lopped and grade-3 if the tree height was over 70% lopped. The scale is different for oaks and coniferous varieties. The visual scale used to determine lopping grades is illustrated in Figure 6. Results related to the extent of lopping in local forests of the region based on field surveys are presented in table, part of Figure 8. Variation in the extent of lopping by type of species is summarized in Table 9 and 10. The estimates indicate that broad leaf species such as oaks (ban & mohru) are some what more degraded than conifers in terms of the extent of tree height that is lopped. Oaks are lopped both for firewood and leaf-fodder. Hardwood characteristics devoid of resin content, implies that oaks burn longer. Ever green properties indicate that it is an important of fodder even in winter. For all these reasons oaks are preferred by villagers. Oak endowments are significantly higher in Uttaranchal than in Himachal (Table 11). This is partly why Uttaranchal forests appear to be more degraded than forests in Himachal as indicated in the table, part of Figure 8.

The basal area per hectare is a logical expression of the standing tree-stock density of a forest. It is usually used to express the overall biomass of a forest. Mathematically, it is the sectional area at breast height of all trees put together per unit area⁴. The only data gathered to estimate the basal area

² Discussions with forestry experts and practitioners indicated that a canopy cover estimate above 80% is indicative of a well stocked forest, a canopy cover estimate between 50% and 80% is indicative of mild degradation while if the canopy cover is less than 50%, degradation is a serious.

³ This benchmark is based on discussions with forestry experts.

⁴ Area at breast height of a single tree = $\pi r^2 = \pi (\text{circumference}/2\pi)^2 = \pi (\text{girth}/2\pi)^2 = \text{girth}^2/4\pi$
Basal area per plot of 100 mts² = $\sum_i (\text{girth}_i^2/4\pi)$ i= number of trees encountered in the plot.
Basal area per hectare = $\sum_i (\text{girth}_i^2/4\pi) \times 100$

during field work was to measure the girth at breast height of all trees above three meters in height encountered in every survey plot. Basal area estimate above 40 mts² / ha is considered to be indicative of good bio-mass potential of a forest. An estimate below 35 mts² / ha is however cause for alarm⁵. Mean basal area estimates for the forests surveyed in the region are presented in Figure 8.

Figure 8 provides the aggregate picture on canopy cover, extent of lopping and the basal area for local forests in the Indian middle-Himalayas. The results indicate that most local forests are poorly canopied as a large fraction of the village forests were assessed to have canopy cover estimates well below the 50% yardstick prescribed by conventional forestry science practices. Trees in such forest were found to be nearly 45% lopped. However the basal area results appear to be somewhat better. On the whole, therefore, the interpretation of the overall trends points to the fact that there is standing tree stock but these trees are badly lopped. This was a recurring characteristic of most local forests where transects were laid in this region.

4.2 Anthropogenic versus Natural pressures:

In course of conducting the forest surveys, an attempt was made to qualitatively assess the extent of anthropogenic and natural pressures in a forest. For this purpose a pre-determined scale was designed. The investigator was trained to visually determine the extent of pressure perceived in every transect “plot”, on the basis of criteria already laid down separately for grazing, firewood collection, timber removal and natural causes such as fire and snowfall damage. Details are presented in Figure 9. The intention was to determine the principal causes of degradation particularly whether anthropogenic pressures were higher or lower than natural pressures on the local forest stock. The findings are presented in Table 12. It is quite clear that human pressures on local forests are more severe than natural pressures. As regards human pressures, excessive lopping for firewood and fodder seems to be the main problem. Grazing and timber pressures seem to be less in comparison. 90% of the firewood needs of a household are met from local forests (Table 13). The rest comes from village commons and own-fields. Timber needs are met almost entirely from forests while 62% of leaf fodder requirements are catered to by forests. Grass fodder and grazing activities are mostly concentrated in village commons and own-fields. It is interesting to note that as per responses given by local inhabitants across the study are, most of the encroachments have occurred in village commons and not in forests. This result is consistent with oral histories which seemed to indicate that the distance to forests has not changed much over the last 25 years.

The quantitative magnitude of firewood, leaf-fodder and timber pressures in local forests is presented in Table 14. Nearly 450 tons of firewood and 170 tons of leaf-fodder are extracted by a village each year. Timber extraction is not that high. For one thing timber is occasionally required for construction or repair of dwellings and for another there is some fear of prosecution. However, lopping activities happen on a much more regular basis.

Firewood continues to be the primary source of cooking and heating as Tables 17 and 18 bring out. Nearly 90% of households depend on firewood as the main source of fuel during summer months. In winter, with mounting heating needs nearly all households rely entirely on firewood. Affordability and accessibility appeared to be important pre-conditions for access to firewood substitutes such as LPG and kerosene. This is brought out quite cogently in Table 8. In Himachal Pradesh, Kinnaur has a high per capita income and accessibility conditions are also better as compared to Kullu and particularly in comparison to Chamba. Every household in the sample uses LPG or kerosene. In Uttaranchal, the districts of Nainital, Champawat and Chamoli are better off in terms of per capita consumption expenditure and are better connected by roads. Therefore access to substitutes is somewhat

⁵ Based on discussions with forestry experts.

higher. Remoteness imposes hurdles for Bageshwar and Pithoragarh districts. This is the main reason why use of substitutes is low even though per capita consumption expenditure levels are reasonably good. Utrakashi is remote and income levels are also comparative low. Accordingly use of substitutes is low.

In order to procure corroborative evidence on some of the main findings emerging from the surveys, anthropological studies were independently initiated in some representative villages in the study area. The next section summarises the main findings.

5. ANTHROPOLOGICAL SURVEYS

Members of the anthropology team visited four fairly villages in the study area. Two of these villages, 'Seohli' and 'Madan Salancha' are located in Himachal Pradesh while 'Bhitari' and 'Shama' are located in Uttaranchal. Ethnographic interviews were meticulously planned with different social groups in these villages in order to procure an in depth understanding of the human-forest relationship. Their main finding is that high anthropogenic pressures and weak formal or informal governance mechanisms are principal causes of forest degradation in this region. Periodic damage to the forest stock is caused by forest fires aggravated by low rainfall.

In all four villages the anthropologists found that firewood pressures on local forests, is quite high. Firewood continues to be the primary cooking and heating medium. In 'Seohli' and 'Bhitari' and partly in 'Shama' as well, there is near total dependence on firewood. In 'Madan Salancha', as the forest is really far away, some households who have private-tree holdings or orchards rely on these alternative sources to cater to their firewood needs. The locals reiterated that firewood is available 'free of cost' from the forest and there was no incentive to think or act otherwise when they were questioned about why substitutes such as LPG, kerosene or electricity were not preferred. The common response was that LPG is an expensive proposition for most of the local inhabitants and it would be difficult for them to sustain the expenses of LPG use over time. Even when some households could afford, they stressed that the high transport costs involved in the delivery of cylinders was enough to deter them away from this alternative. Despite these problems some households in 'Seohli', 'Madan Salancha' and more so in 'Shama' do own LPG cylinders. In these villages, LPG use is conserved and restricted to unforeseen emergencies. In 'Shama', where the intensity of use was reported to be somewhat higher, LPG was being utilized during morning hours only, whenever work pressure in the fields was high and there were time constraints. As regards kerosene, there are supply constraints as the villagers are almost entirely dependent on government regulated channels to avail of the same. Very few households, and that too only in 'Shama', were using kerosene as a secondary source of cooking. Local inhabitants of 'Madan Salancha' clarified about the unsuitability of using 'electricity' as an alternative medium in the present context. They indicated that electricity supply was irregular and voltage fluctuations frequent. During winter months, when the weather gets inclement, electricity poles are grounded and electricity wires are damaged due to strong winds and excessive accumulation of snow. Therefore lack of supply for long periods is quite common at such times. Further, the perception of the locals is that electricity is not that cheap.

The anthropologists also observed that timber pressures on the forests have also increased over the years. In 'Seohli' village, respondents pointed out that the increasing pace of family fragmentation was an important reason for this. Every new nuclear family needed a dwelling unit of its own. Timber extraction from the forest, which is permitted only through government scrutinized channels, is inadequate to cater to the needs of the villagers and therefore illegal felling is quite common. In the more accessible villagers such as 'Madan Salancha', some wealthy households have shifted to the use of cement and aggregates in place of timber from the forest. As the forest is far away, only those who can afford, opt for timber-

substitutes. In 'Seohli' and particularly in 'Bhitari' which were fairly remote, grazing pressures in the forest and alpine pastures seemed to be fairly high. Grazing and firewood collection were reported as complementary activities in these villages.

All in all the locals seem to be unaware of the long term consequences of their actions as regards forests in the surrounding vicinity. One of the respondents from 'Seohli' village indicated that increase or decrease of the forest stock depends on nature and divine forces. There was virtually no evidence of collective action to protect and conserve forests in these villages. On the contrary, locals collude for felling of illegal trees and encroachments in the forests. In 'Shama' village, the 'van panchayat', a village level institution set up to govern forest access and use, was found to be moderately effective. Even here, 'van panchayat' rules are not always adhered to. Intrusion by other villages was common and vigilance mechanisms were found to be weak. Moderate success of this local level institution could be attributable to some shift towards use of substitutes such as LPG and motivation for forest protection propagated by local visionaries. Investigations by the anthropologists revealed that forest department vigilance was invariably weak and plantation programs were rarely successful. The forest guard had an extensive resource base to protect and liaison between the forest guard and the local inhabitants for mutual benefit was not uncommon. This hindered formal governance mechanisms meant to protect the forest stock. Formal joint ventures between the forest department and the village inmates such as the 'joint forest management' in 'Seohli' and the 'Eco Vikas Committee' in 'Bhitari' village were found to have laudable objectives but a weak implementation framework.

Thus, the findings from the anthropology based studies appear to be fairly consistent with the trends emerging from the principal survey. All this goes on to reinforce that local forests bear the brunt of anthropogenic pressures. In course of field work attempts were made to gauge whether villagers are at all aware that their forest resources are threatened. If so, are they taking any action to revert these trends consciously? The remaining part of this paper is based on their responses.

6. VILLAGER'S PERCEPTION OF THE FOREST RESOURCE BASE

Local inhabitants were urged to provide oral histories of their forests on the basis of a structured questionnaire. Their responses, which are summarized in Table 18, indicate that nearly 42% of the forests surveyed have reduced by half over the last 25 years. Nearly 30% of the local forests have drastically reduced during the same period. What is paradoxical is that the villagers are able to perceive that their forests are degrading (Table 19). But they appeared to be completely nonchalant about trying to alter these unsustainable trends. When queried about what steps they were taking, in the case of most villages, the response was unanimous: "no action is being taken". In a few villages in Uttarakhand some un-demarcated state forests have been closed for regeneration. Village inhabitants of Rogi village in Kinnaur district and Gojra in Kullu district of Himachal, have closed some local forest patches due to severe threat of landslides that has damaged their fields in the past. Community managed van panchayat forests in few villages such as Khani and Umagarh were working well. On the whole there was none or insignificant display of collective action in protecting and managing local forests. These trends are highlighted in section 8 that follows. However, it was consistently stated that villagers do come together to put out forest fires, especially when such fires are sighted close to the village boundary. At such time there is a lot of cooperative spirit amongst the village inmates.

It is not that the villagers are not aware of sustainable practices that might preserve and promote their natural resources. However, these practices were restricted to their own private tree holdings. Extraction practices prescribed by the forest department are rampantly flouted in state forests even

though this is a legal offence. For instance as per the norms only dry wood can be extracted for firewood. But it is a common practice to lop wet wood as the quantum of dry wood available in the forest is not enough to meet needs. Due to weak forest department vigilance mechanisms, even trees are illegally felled when need arises. In 90% of the villages, respondents confided that management and extraction practices laid down by the forest department were not being followed (Table 21).

However, the attitude towards their private trees and sacred trees was quite different. Sacred trees cannot be felled or lopped for fear of religious sanctions, ill-health and even death. Only in the case of a few villages, sacred trees were being occasionally used to cater to temple festivities or for repair and maintenance of the temple. Sacred trees, usually in temple precincts, were invariably found to be well canopied with good foliage. Their attitude to sacred trees appeared to be based on coercive conservation on religious grounds.

As regards their own trees on field margins, sustainable practices such as rotational methods of lopping across trees seemed to be a common practice which they adopt, to ensure quick regeneration. The quantum of lopping is closely linked to the rate of regeneration. For instance, an oak tree is lopped once in three years while ‘ficus’ varieties are lopped every year as these tend to regenerate faster than oaks. Trees are lopped only for leaf-fodder and while so doing only tertiary branches are lopped to ensure minimum damage to the tree. These practices ensure that the tree-growth and metabolic processes are not hindered due to extraction and there is a sustainable supply of fodder and firewood. The locals were very eloquent in narrating these practices which were being practiced very widely in almost all the villages that were surveyed (Table 23). Private trees on field margins were invariably found to have good height, good girth and were usually well-canopied. It was only in villages where horticulture has been adopted in a big way that private trees have been consciously felled to make room for orchards. These were also villages that have reduced livestock rearing and are in less need of fodder from private trees. Thus there is a marked difference in their attitude to trees in the state forests. The next section outlines various characteristics of ‘State’ forests to throw some light on this anomaly.

7. THE ‘STATE’ AND FORESTS

State forests are governed by the forest department. The department has a hierarchical administrative structure. The lowest rung is occupied by the “forest guard” who is responsible for field operations on a day to day basis. A legacy of the colonial past, the department manages and monitors vast expanses of forests that are under its control. The main motive behind the department’s operations is conservation though some commercialization objectives also exist. For instance, while there is a ban on green felling, the forest department can sell timber acquired through salvaging operations where the forest stock has been damaged due to natural calamities or alternatively timber acquired through silviculture operations. In some pine forests, the department can extract and sell resin, an important ingredient in the manufacture of turpentine. Locals have “rights” to access state forests for their livelihood needs. However, they have to abide by rules of extraction and use prescribed by the forest department (Table 25). Violation of such rules is a legal offence. The “forest guard” is the main interface between the locals and the higher authorities in the department. His main role is to watch over the forest for detecting violations and imposing penalties on the accused.

For historical reasons⁶ in the past, state forests have been classified into ‘un-demarcated’ and ‘demarcated’ patches. Un-demarcated forests known as ‘unclassified forests’ in Himachal and ‘civil soyam’ forests in Uttaranchal, are recorded as forests by the forest department but these are not marked by

⁶ Forests were demarcated by the British to facilitate their timber felling operations in order to cater to their imperial needs of ship-building and construction of railways.

boundary pillars. The department cannot impose prohibitions on these patches as regards rights of access and use. In course of field work it was found that these were patches of forests between the village boundary and the demarcated state forest patches. A demarcated forest which is marked by boundary pillars, is an area notified under the Indian Forest Act of 1927. Locals can access such forests unless prohibited. For instance, the forest department can close plantation zones from use or stop the granting of timber rights from a degraded forest to promote regeneration. When a forest is declared as a 'sanctuary area' all rights are completely denied. Demarcated forests are further categorized into 'demarcated protected forests' (DPFs) and 'Reserved Forests' (RFs)⁷. As the name suggests, reserve forests have more restrictions on access and use. However, the forest department can relax these norms. In course of field-work, it was found that mostly high altitude inaccessible patches of 'reserved forest' were being protected with prohibitory orders. However when these forests were in the vicinity of villages there appeared to be no difference in the 'rights' that villagers had to a 'reserved' forest and a 'demarcated protected forest'. In Uttaranchal, most local state forest patches are 'reserved forests'. Conceptually, the forest department has the authority, if it wishes, to exercise maximum control on 'reserved forests' and can hardly impose restrictions as regards use of 'un-demarcated' patches.

While conducting field surveys it was fairly evident that locals were accessing these zones to fulfill their needs in a similar manner. They were aware of the administrative status of the forest but oblivious of the underlying restrictions associated with each type. As a forest official once remarked in course of discussions on different types of forests: "for a villager, a forest is a forest!" Indifference to the administrative status of their local forests is consistent with our field findings. Table 26 indicates that all types of forests are degrading. One would have expected the demarcated patches, especially the 'reserved forests' to have a better forest stock. But the results indicate trends to the contrary. But un-demarcated forests appear to be degrading faster than demarcated forests as Table 27 indicates. These forests are worse off in terms of all the measures: the extent of tree height lopped, the canopy cover and the basal area. This is consistent with discussions conducted with the forest and revenue department officials. The un-demarcated forests appeared to be a "gray area" partly under the jurisdiction of the forest department and partly under the jurisdiction of the revenue department. It was not clear which department was supposed to keep land records and who was officially entrusted with vigilance responsibilities as regards these zones. This is partly one reason why villagers access these patches indiscriminately.

The quality of vigilance and monitoring in the forest department controlled forests was consistently poor. As table 28 indicates, 78% of the villages reported that vigilance was poor in state forests. As regards monitoring of firewood use (Table 29), it was stated to be poor in 98% of the villages. For timber extraction the scenario was somewhat better. Monitoring and vigilance was reported to be fair in 32% of the villages but poor in the rest. The main agent entrusted with the responsibility of vigilance is the "forest guard" who is a permanent employee of the forest department. He is accountable for a vast expanse of forest area, known as a "forest-beat". It was quite obvious, while conducting field surveys that the geographical expanse of the forest area under his charge, made it physically impossible for the forest guard to monitor the forest efficiently. In most cases, the forest guard was found to be residing in his guard quarters, in one of the villages, alone, unaccompanied by the rest of his household members. Therefore he is absent from his field-position quite frequently as he needs to report either to headquarters or visit his household elsewhere. On such occasions there are no replacements. In course of field work there was evidence that the villagers try to maintain congenial ties with the forest guard (often appealing him with gifts in kind) which is to their benefit. This severely weakens efforts on the guard's part to condemn and impose penalties on violators. The forest guard is supposed to maintain an 'offence register' in a systematic manner. These registers were scrutinized by the field team

⁷ When the Indian Forest Act of 1927 was promulgated, the basic objective was first to establish control over forests by notifying them as "protected". Thereafter settlement operations were carried out that defined people's rights on forests. Boundary pillars were put up and these were classified as 'demarcated protected forests'. Thereafter, well stocked forests with least human interference were identified and were classified as 'reserved' (discussions with additional principal conservator of forests, Himachal)

in every village. In the case of most villages, there were very few cases of recorded violations and in most of such cases there was no imposition of penalties.

Collective plantation programs initiated by the forest department for rejuvenating degraded patches of forests have not been much of a success. This is evident from Table 31. Such programs have failed due to weak efforts on the part of the forest department in mobilizing the local community. In course of field work, it was often found that the villagers are careless about plantation zones. Fencing was poorly done by the forest department and in many cases, damaged by the locals as it interfered with their grazing zones and cattle-paths. In other instances, it was observed that post plantation care was poor, drastically reducing the survival rates of young saplings. Some plantation programs were severely thwarted due to natural disasters such as fire and unforeseen drought conditions. Thus it appears that State governance in protecting the forests is weak and ineffective. The next section probes into alternative governance mechanisms at the community level, that were encountered in course of field work.

8. COLLECTIVE ACTION

8.1 Forest Committees

There are more community based forest protection committees in Uttarnchal and in Himachal (Table. 1) In Himachal few villages had ‘joint forest management’ programs meant to foster healthy and active partnership between the forest department and the local community in protecting the forests. In Uttaranchal, 45 villages out of a sample of 83 villages had van panchayats. Eco-vikas committees have come up in areas declared as sanctuaries. There was scattered evidence of ‘joint forest management’ committees in Uttaranchal as well. These details are summarized in Table 32.

Van panchayats in Uttaranchal are fairly old institutions of forest governance. The other forest protection committees have come up only in the late nineties and early parts of 2000 in keeping with the “global drive” towards promotion of community participation in forest management as an alternative to the conventional role played by the ‘state’ (Table 33). As revealed in Table 34, most of the committees have been initiated by the forest department. One committee has been driven by a local NGO and few van panchayats have come up entirely through local initiative. Field assessments based on interactions with local inhabitants indicated that most of the committees initiated by the forest department were not very effective with respect to its stated objectives. Even the one initiated by an NGO was only fairly effective. Table 35 summarises this dismal picture. Problem associated with van panchayat governance is discussed in the next section and Appendix 2. The other forest department propelled committees, such as the ‘joint forest management’ committees, have mainly come up to meet departmental ‘targets’ within a stipulated period. Villagers are keen to participate only because such programs involve construction of civil works, plantation programs and ‘entry point activities’ that are a source of casual employment for them. The more qualitative objectives of forest protection get undermined in the process. Rather than bringing the community together for a common cause, such programs breed factionalism in the village as every household seeks to have access to the short-term employment benefits that these programs entail. Similarly, the ‘eco vikas committees’ have been designed without paying much heed to the abilities and needs of the local population. The committees have been initiated in ‘sanctuary’ areas so that the local population reduces its dependence on forests by offering them subsidized LPG connections and hybrid varieties of livestock that need to be stall-fed. This program initiated in the poor backward parts of Uttarkashi district appeared to be a complete failure. Most villagers complained that not only could they not afford the subsidized LPG connections, they did not know how they could sustain the ongoing re-filling expenses if at all LPG cylinders were procured by them. As a consequence, they continue to venture into the neighboring forests. Responses summarized in Tables 36 to 41, indicate that there is

nothing wrong with the formal structure of such committees. Meetings are regular, expenses are discussed, the committees are fairly democratic but somehow the main objectives are not achieved. The next section and Appendix 2 is entirely devoted to 'van panchayats' as this institution has been in existence for a long period of time.

8.2 Van Panchayats

Van panchayat forests were first formed under the Van Panchayat act of 1931. The British had started intruding into local forest patches in large parts of 'Kumaon' and parts of 'Garhwal' areas of Uttaranchal, to cater to their imperial needs of 'timber' and 'charcoal' during colonial times. They started demarcating forests for their own use. This spurred off a series of agitations by the local inhabitants in the region who set forests on fire to protest against this move. In a bid to pacify the villagers, the British set up a 'Grievance Committee' which passed the Van panchayat act in 1931. Under the act, villagers can create community managed forests from forests controlled by the revenue department. The act entitles the villagers to demarcate the boundary of their panchayat forests, protect it from illegal tree felling, fires, encroachments and cultivation. As for daily operations, it is chiefly governed by rules that village forest council have themselves crafted, often aided by government officials. In course of field work, it was found that rules are essentially designed to ensure sustainable use of forest resources. In the case of firewood, extraction is restricted to 'dry-wood' only and in the case of timber only 'dried-trees' can be felled that too after the payment of a stipulated fee. There are quantitative restrictions on the extraction of firewood, fodder and leaf-litter. In some cases, the forest is divided into compartments and extraction is permitted on a rotational basis across these compartments after the declaration of a pre-determined date so as to ensure sufficient time for regeneration of closed-compartments. Penalties are imposed in case of rule violation which mainly takes the form of monetary fines. A vigilance mechanism is usually required to make these rules fool-proof. For this purpose, either a guard is hired or there is informal monitoring by villagers. The local guard is usually hired through contributions made by local inhabitants or resources diverted from van-panchayat earnings. Some of these details, captured during field-work, are summarized in Tables 42 to 46.

Van panchayats' were randomly encountered in forty-five villages, while conducting village surveys in Uttaranchal. As per Table 48, these van panchayats are located between 1800 and 2800 meters and essentially consist of broad leaf forests such as 'oaks'. Most of the van panchayats are fairly old and have been in existence for nearly 35 years (Tables 47 & 46). Interactions with the local inhabitants revealed that these 'van panchayats' have been initiated through government directives and local initiative for rejuvenating and managing patches of civil-soyam forests for local use. An important objective is to prevent neighbouring villages from intruding into this zone, once the forest has been formally demarcated as a 'van panchayat' forest. Other specific reasons for 'van-panchayat' formation vary from village to village. The more recent 'van panchayats' have been driven by the government's target-achieving exercise of compulsively converting degraded 'civil soyam' patches to 'van panchayat' forests within a stipulated period of time. This policy reflects a fervent bid to better the condition of the forest stock as the government believes that the institution of 'van-panchayats' based on community management principles can improve governance and prevent degradation of the forest stock. Ground evidence was however to the contrary as local initiative in these cases seemed to be particularly weak.

Field investigations revealed that most of the 'van panchayat' forests were degraded and subject to high anthropogenic pressures. Our forest surveys reveal that van panchayats were as degraded as State forests in the study area. Table 49 brings this out clearly. The table indicates that while the intensity of lopping is more or less the same, canopy cover and bio-mass estimates are actually lower for van panchayat forests than for State forests. There was not much difference in the condition of the forest stock across old and new van panchayats (Table 50). Therefore both State forests and van panchayats are degrading. An assessment of various types of forests in the vicinity of van panchayat villages confirms these trends. As we scrutinize Tables 51 through 52 it is clear that these forests are degrading. Un-demarcated forests are in the worst state followed by van panchayat

forests and demarcated state forests are better in comparison. Tables 53 and 54 provide evidence on the fact that there is not much variation in the condition of the forests stock across van panchayats and state forests in the surrounding vicinity. Appendix 2 provides detailed ethnographic accounts about why van panchayats are not fairing well. It appears that degradation of van panchayats is attributable to weak vigilance and mounting anthropogenic pressures especially for firewood and leaf fodder. Intrusion by neighbouring villages is common while boundary disputes and encroachment pressures in some areas has made matters worse. Rules of governance and vigilance mechanisms were notional or non-existent. Only 29 out of 45 villages had a formal vigilance mechanism (Table 43) and in more than half the cases these were not effective or only moderately so (Table 56). Queries made about the effectiveness of formal and informal monitoring mechanisms by types of activities the villagers engaged themselves in the van panchayat, revealed weak monitoring in most cases (Table 57 & 58). A common complaint was that the 'chowkidar's fees was a pittance undermining vigilance efforts. Extensiveness of the van panchayat in some cases made vigilance very difficult.

Out of 18 'van-panchayats' surveyed in the Garhwal region, only five were found to be moderately effective and one was found to be successful. Even in the case of this village, the locals were intruding into neighbouring village 'van-panchayats' and state-forest patches while conserving their own forest resource base. The scenario was quite similar in 'Kumaon' as well. Only seven out of twenty-seven 'van-panchayats' were moderately effective in some respects. Only one 'van-panchayat' was working well where the forest was well stocked and anthropogenic pressures had actually declined due to "modernization" (Details in Appendix 2).

All in all, there was none or little evidence of collective action exhibited by the local community in protecting their forests. However, this was not true in other spheres. Irrigation collectives encountered in a few villages were working fairly well. Most of these collectives have been in existence since traditional times. These systems are collectively managed to ensure equitable distribution of water especially in times of water scarcity. Resource sharing arrangements are based on rotational methods of distribution. Though water thefts and feuds that follow are not uncommon, these are informally resolved through mutual consent. Most of these collectives were found to be moderately effective (Tables 60-62). A host of other committees were encountered in course of field work (Table 63). Our surveys indicate that some of the traditional committees such as 'temple committees' and 'village committees' were working fairly well (Table 65). The power of religion appeared to be an important force governing the activities of the committee and an important factor for successful operations. In the case of village committees the power of tradition appeared to be the reason for success. None of these committees had protection of forests in their agenda of activities and actions.

9. CONCLUSIONS

Livelihood conditions are closely connected to forests in the Indian middle-Himalayas. The objective of this study based on field work was to assess the condition of local forests and to determine whether the resource was being managed for the long run. The main findings indicate that the forests are degrading on account of indiscriminate anthropogenic pressures. Nearly 450 tons of firewood and 180 tons of leaf-fodder are being extracted from local forests by a village per year. The mean canopy cover estimate hovered around 45%. On an average nearly 45% of the tree height is already lopped. The mean basal area estimates was found to be 57 mt²/hectare, which is not that bad as per norms of forestry science. The overall picture that emerges is that there is standing tree-stock but the trees are badly lopped. This was found to be a common feature throughout the region. There was virtually no evidence of collective action of one sort or another for altering these unsustainable trends.

SURVEY AREA:



Figure 1. Study Area: Western Himalayas: **Himachal Pradesh** Central Himalayas: **Uttarakhand** **Specific Zone:** Middle-Himalayas **Altitude range:** 1800-3000metres



Figure 2. Study area: Upper reaches of Himachal Pradesh: Chamba, Kullu & Kinnaur districts.

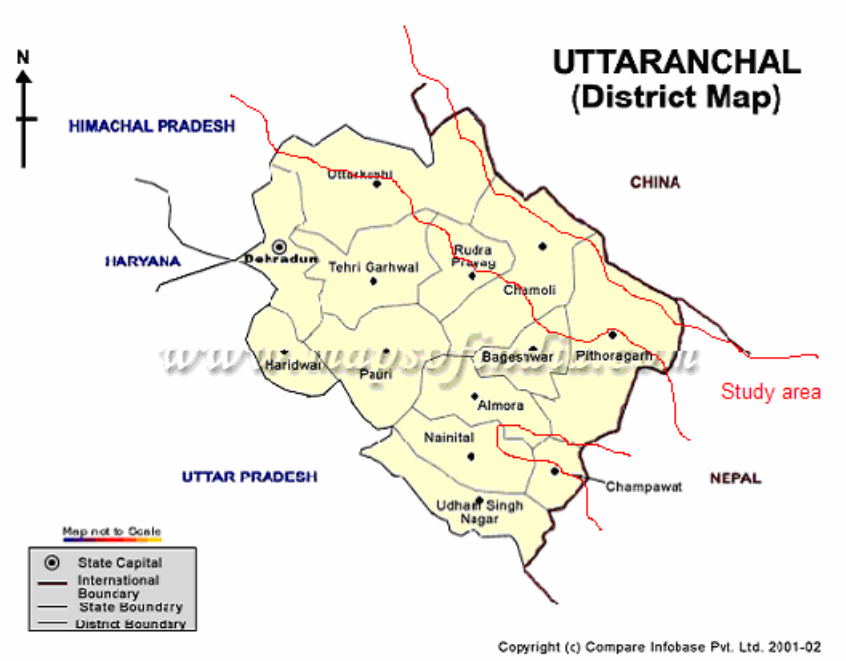


Figure 3 Study area: Upper reaches of Uttarakhand
 Districts covered: Uttarkashi, Chamoli, Rudrapur, Bageswar, Nainital, Champawat & Pithoragarh

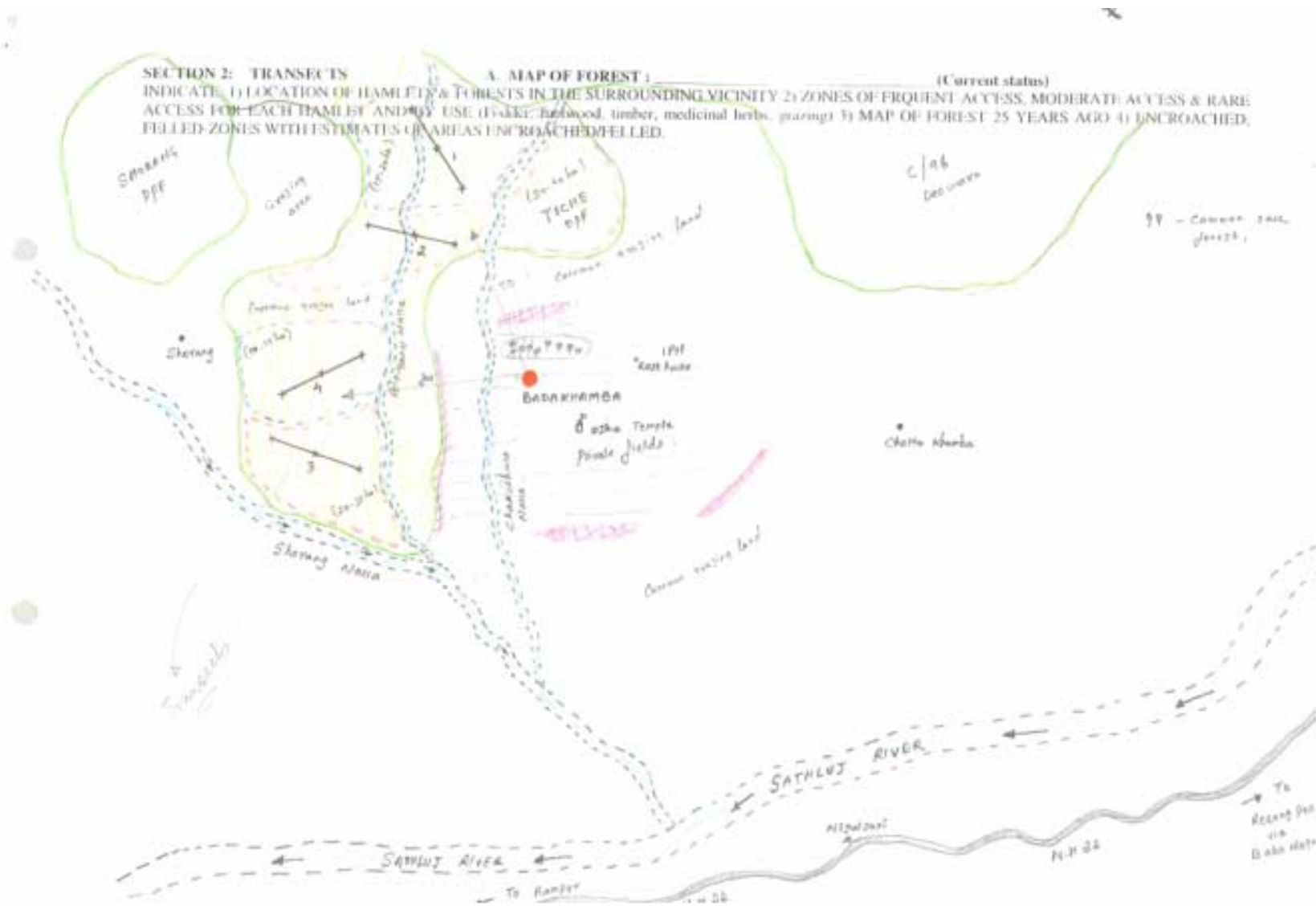
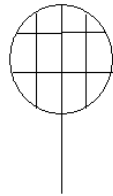


Figure 4. Conceptual map of village Barakhamba and surrounding forests. The straight lines indicate transects laid in the local forest patch

Canopy cover: Measure of density of the forest stock



Grid-mirror used to measure canopy cover.

The mirror was held in four directions for every plot in a transect

• **Canopy cover= $\frac{\text{(Sqaes covered by image of tree canopy)}}{12} \times 100$**

Figure 5 Canopy Cover Measurement

Degradation by lopping grades:

Oaks



Conifers



Grades 1
<30%

Grade 2
30-70%

Grade 3
>70 %

Figure 6 Visual scale for assessing the extent of lopping.

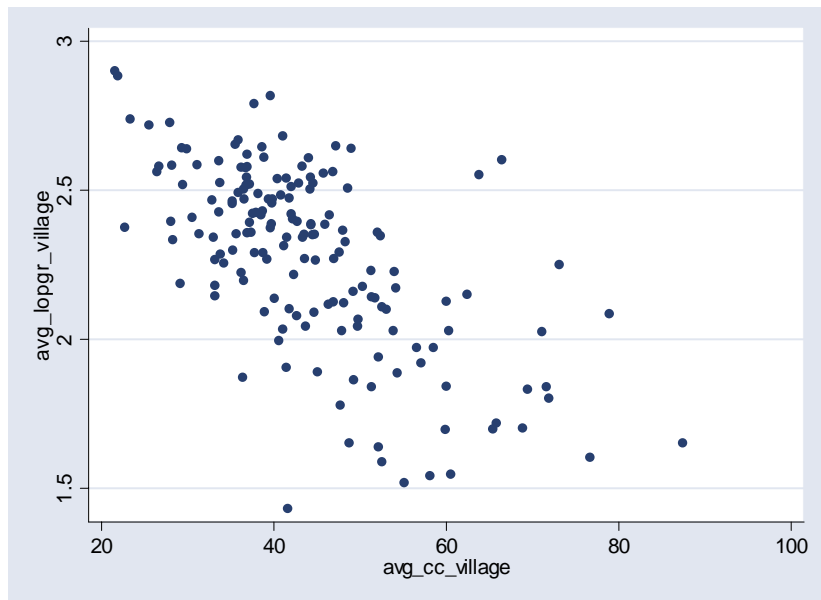
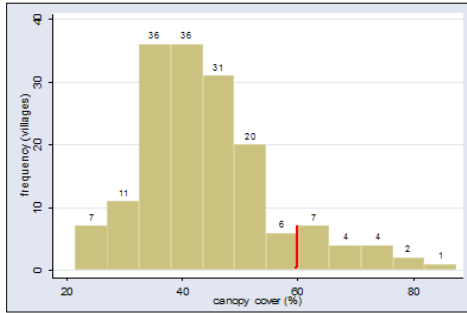
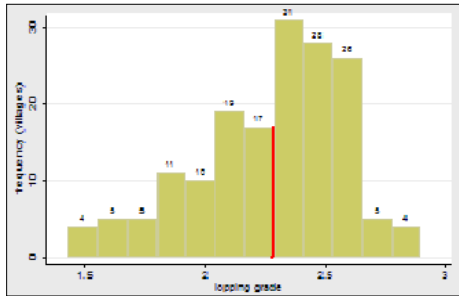


Figure 7 Correlation between canopy cover and lopping grades=-0.63

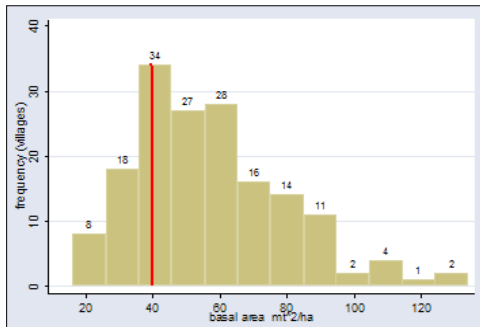
Figure 8 Condition of the local forest stock



1. Canopy Cover



2. % Tree Height Lopped
(1: <30% 2: 30-70% 3: >70%)



3. Basal Area.

Measures of the forest stock	ALL VILLAGES	HIMACHAL	UTTARANCHAL
1. % Canopy Cover	44.20 (11.74)	50.31 11.88)	38.16 (7.88)
2. % of Tree Height Lopped	45 (0.31)	35 (0.33)	50 (0.19)
3. Basal Area (mts ² /hectare)	56.90 (22.95)	66.58 (25.11)	47.34 (15.62)

...there is standing tree-stock but the trees are badly lopped



Village Bahu.

Decoding the qualitative degradation scale:

Level	Grazing	Leaf Litter	Lopping	Timber Removal	Natural Calamity			Regeneration			
					Stumps	Fire		Stumps	0 - 0.5 m	0.5- 1.5m	> 1.5 m
						Stumps	Area				
Low	Only trail mark	<30%	<30% Grade I	1-2	1-2	<35%	1-2	3-10	2-3	1-2	
Med	Trail + Cow dung	30-60%	30-70% Grade II	3-4	3-4	35-60%	3-4	10-15	3-7	2-3	
High	Trail + Cow dung + Direct evidence	>60%	>70% Grade III	4+	4+	>60%	4+	15-20	7-10	3-5	
None.											

Codes: 1=None 2=Low 3=Medium 4=High

Figure 9 Anthropogenic versus natural pressures.

Table 1 Village Characteristics: Nepal & Indian Himalayas

	NEPAL		INDIA				
	Terai & Non-Terai		Village		Village		INDIA
			Himachal		Uttaranchal		
VARIABLE	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean (All)
Mean Consumption**** (Rs.)	23662	13783	37488	14362	42211	7094	39849
Gini Consumption	0.3	0.09	0.22	0.07	0.21	0.05	0.21
Average Poverty Gap* (\$1 per day percapita) (1\$=Rs.12.7NR & 1\$=8.8IR)	0.13	0.11	0.0023	0.0044	0.0003	0.0009	0.0013
Population	797	889	545	476	334	150	439
Mean household size (adult equivalent)	4.39	0.72	4.77	1.77	4.48	1.64	4.62
Fraction in Forest User Group/India: Whether forest com. Exists*	0.11	0.19	0.16	0.37	0.61	0.49	0.39
Gini Landownership	0.64	0.14	0.36	0.08	0.30	0.07	0.33
Ethnic fragmentation**	0.33	0.24	0.36	0.22	0.28	0.21	0.32
Religious fragmentation	0.14	0.19	0.06	0.13	0	0	0.03
Mean Collection time (hrs/bhari)	5.27	2.44	3.39	0.68	4.21	0.67	3.80
Standard deviation collection time	1.78	0.88	1.19	0.50	1.00	0.34	1.09
Average cows owned	3.62	1.67	3.13	1.04	4.21	1.22	3.67
Years Schooling Household Head	1.88	1.46	3.92	1.43	5.05	1.76	4.49
Proportion Female-Headed household	0.13	0.12	0.11	0.08	0.14	0.11	0.13
Distance to dirt road (kms.)	na	na	3.39	4.00	4.24	5.52	3.81
Time to dirt road (hrs)	6.2	12.99	1.02	1.17	1.09	1.34	1.05
Time to market centre (hrs)	4.21	7.43	na	na	na	na	na
India: Time to local market (hrs)	na	na	0.38	0.61	0.55	0.82	0.47
India: Time to wholesale market (hrs)	na	na	9.42	11.66	4.47	7.91	6.94
India: Mean time to market			4.90		2.51		3.71
Time to shop (hrs.)	in household characteristics		2.30	2.70	2.43	2.13	2.37
Time to Krishi centre (hrs.) (India: Block Office)***	3.21	4.23	2.19	1.60	2.57	1.64	2.38
Distance to paved road (kms.)	na	na	5.52	5.38	8.71	10.07	7.12
Time to paved road (hrs.)	8.03	13.05	1.24	1.21	1.46	1.61	1.35
Kerosene/ Gas stove access dummy (Nepal)	0.13	0.34	0.44	0.50	0.55	0.50	0.50
Kerosene stove access dummy (India)			0.13	0.34	0.04	0.19	0.09
LPG/gas stove access dummy (India)			0.43	0.50	0.54	0.50	0.48
Elevation above sea level (mts)	940	0.94	2106	249.04	2024	250.68	2065
Latitude (deg)	27.69	0.84	na	na	na	na	na
Longitude (deg)	84.68	2.13	na	na	na	na	na
Natural Disaster Dummy (in the last 5 years)	0.56	0.5	0.26	0.44	0.49	0.50	0.38
* Poverty gap ratio (Ray. D, 1999 'Development Economics') Pp 255. PPP for India 1\$=Rs. 8.8 (2002) Source: WDI , 2004 World Bank . Poverty gap is a problem only in the case of 58 villages in the sample.							
Nepal pgr is comparable as the PPP for Nepal has remained stable at 12.7Rs=1\$							
** Ethnic fragmentation (fra_eth)=1-{(r_upeth)^2+(r_mideth)^2+(r_loweth)^2+(r_otheth)^2}.							
*** Time to Block office could include partly walking time and partly time by a motorised mode							
**** All figures expressed in Indian rupees. 1 Nepalese rupee=0.66425 Indian rupee							

Table 2 Household Characteristics: Nepal & Indian Himalayas

VARIABLE	NEPAL		INDIA		Village		Town		Town		India All
	Terai & Non-Terai		Village		Uttaranchal		Himachal		Uttaranchal		
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	
Firewood collected (bhojhas/ bharis) per week	1.44	5.76	4.01	1.58	3.72	1.21	1.79	1.54	1.30	1.51	2.70
Collection time (hrs. per bhari)	5.04	2.74	3.39	1.42	4.21	1.23	2.20	1.86	1.70	1.94	2.88
Annual Consumption Expenditure (Rs.)***	23454	27630	37523.12	28712.23	42222.47	20399.85	52794.72	36750.11	46209.35	23319.24	44687.42
Amount of land cultivated (hectares)	0.55	1.14	0.57	0.54	0.59	0.44	0.27	0.36	0.15	0.26	0.40
Value of non-farm business assets (Rs.)	5274.15	73167	11497.07	76557.92	22135.26	96633.24	94808.78	297225.20	129469.60	280325.10	64477.68
Fraction labor (time)non-agriculture (self employed)*	0.08	0.21	0.03	5.55	0.04	6.04	0.10	13.10	0.14	13.37	0.08
Fraction wage labor(time) agriculture	0.15	0.25	0.003	1.45	0.003	1.53	0.001	1.041	0.001	0.91	0.002
Fraction wage labor(time) non-agriculture	0.11	0.2	0.06	7.39	0.04	5.81	0.11	12.16	0.07	10.30	0.07
Fractoin labor (time)agriculture self			0.28	9.34	0.33	9.27	0.12	13.04	0.10	13.07	0.21
Fraction labor(time)domestic work			0.31	7.88	0.29	4.33	0.24	7.06	0.24	6.00	0.27
Fraction labor(time) school			0.03	5.38	0.02	4.26	0.03	5.53	0.03	6.03	0.03
Fraction labor(time) leisure			0.29	8.99	0.28	9.39	0.38	12.31	0.41	13.16	0.34
Number of cows owned	3.72	3.12	3.13	2.02	4.21	2.43	1.29	1.60	1.04	1.66	2.42
Number of goats owned	na	na	7.06	21.74	5.92	18.17	0.43	2.57	0.27	2.97	3.42
Household size (adult equiv)	4.41	2.06	4.77	1.77	4.48	1.64	3.82	1.04	3.88	1.13	4.24
Years schooling household head	1.87	3.39	3.93	3.56	5.05	3.88	8.60	4.13	9.54	3.95	6.78
Female-headed household	0.13	0.34	0.11	0.31	0.14	0.35	0.02	0.14	0.005	0.07	0.07
Fraction Children	0.26	0.2	0.35	0.22	0.37	0.22	0.42	0.18	0.44	0.18	0.39
Fraction Prime age males	0.35	0.18	0.35	0.17	0.31	0.17	0.35	0.13	0.35	0.13	0.34
Fraction Prime age females	0.35	0.17	0.36	0.14	0.38	0.16	0.35	0.11	0.34	0.10	0.36
Fraction old men	0.02	0.08	0.04	0.09	0.033	0.092	0.005	0.031	0.007	0.041	0.02
Upper Caste (Nepal: Brahmin-Chetry) (India: Brahmins)	0.35	0.48	0.08	0.28	0.08	0.28	0.18	0.38	0.17	0.37	0.13
Middle caste (Nepal: Magar-Lumbu) (India: Rajputs)	0.28	0.45	0.63	0.48	0.68	0.47	0.57	0.50	0.60	0.49	0.62
Low caste (India: SCs)	0.09	0.28	0.23	0.42	0.19	0.39	0.17	0.38	0.16	0.37	0.19
Hindu	0.87	0.34	0.95	0.21	1.00	0	0.94	0.24	0.97	0.17	0.97
Buddhist	0.06	0.25	0.01	0.10	0	0	0.01	0.11	0.00	0.00	0.01
Muslim	0.04	0.18	0.04	0.19	0	0	0.041	0.200	0.027	0.161	0.03
Other Non-Hindu Religion	0.01	0.1	0.01	0	0	0	0.005	0.070	0.005	0.069	0.005
Migration into village for non-economic reasons	0.11	0.31	0.65	0.48	0.90	0.30	0.03	0.18	0.02	0.13	0.40
Time to market**	6.4	18.07	na	na	na	na	na	na	na	na	
Time to shop**	0.93	4.45	na	na	na	na	na	na	na	na	
* Indian data is in fraction labor hours as fraction of total endowment of labor hours in a household which is taken as 16 hrs. per household member per day.											
Domestic work includes firewood and fodder collection											
** See village level data for India.											
***All figures expressed in Indian rupees. 1 Nepalese rupee=0.66425 Indian rupee											

Table 3 Sources of Casual Employment: Village

CASUAL EMPLOYMENT VILLAGE			
Sources	Freq.	Percent	Cum.
2 (Agriculture)	86	4.19	4.19
5(Horticulture)	118	5.75	9.94
8(Livestock rearing)	16	0.78	10.72
11(Forestry)	28	1.36	12.09
13(Non-agriculture government)	728	35.48	47.56
16(Non-agriculture private)	1,073	52.29	99.85
18 (other)	3	0.15	100
Total	2,052	100	

Table 4 Sources of Permanent Employment: Village

PERMANENT EMPLOYMENT VILLAGE			
Sources	Freq.	Percent	Cum.
3(Agriculture)	1	0.2	0.2
6(Horticulture)	4	0.8	0.99
9(Live-stock rearing)	1	0.2	1.19
12(Forestry)	31	6.16	7.36
14(Non-agriculture government)	337	67	74.35
17(Non-agriculture private)	123	24.45	98.81
18(other)	6	1.19	100
Total	503	100	

Table 5 Sources of Casual Employment: Town

CASUAL EMPLOYMENT TOWN			
Sources	Freq.	Percent	Cum.
2(Agriculture)	5	3.68	3.68
5(Horticulture)	6	4.41	8.09
13(Non-agriculture government)	35	25.74	33.82
16(Non-agriculture private)	90	66.18	100
Total	136	100	

Table 6 Sources of Permanent Employment: Town

PERMANENT EMPLOYMENT TOWN			
Sources	Freq.	Percent	Cum.
12(Forestry)	4	1.16	1.16
14(Non-agriculture government)	315	91.3	92.46
17(Non-agriculture private)	26	7.54	100
Total	345	100	

Table 7 Variations in forest characteristics: Himachal vs Uttaranchal

Variable	HIMACHAL		UTTARANCHAL	
	Mean	Std. Dev.	Mean	Std. Dev.
% lopped	2.13	0.43	2.44	0.37
% canopy cover	50.59	15.33	37.04	12.21
basal area (mts2/ha)	69.26	31.68	47.97	25.21
distance to the forest(kms.)	2.18	1.68	2.16	0.9
forest slope (degrees)	35	8.9	32	4.95
% broad-leaf	0.19	0.31	0.64	0.41

Table 8 Some Important District Level Characteristics

Regional variations															
HIMACHAL		Mean percapita cons.exp		Mean education-adult		Mean dist. to the road		Mean dist to the forest		Mean % lopped		Mean basal area		Access to lpg/kerosene	
District:	Obs	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Kinnaur	13	10764.12	2272.10	5.60	0.90	2.65	4.31	2.14	1.84	2.00	0.32	54.75	10.60	1	0
Chamba	44	5744.97	1440.82	3.93	1.30	3.60	3.91	2.62	1.80	2.17	0.34	68.49	27.57	0.30	0.46
Kullu	25	7114.30	2194.01	5.42	1.29	3.39	4.11	1.46	1.04	2.13	0.32	69.40	24.70	0.40	0.50
	82	7874.46		4.99		3.21		2.07		2.10		64.21		0.57	
UTTARANCHAL															
District:	Obs	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Uttarkashi	26	6689.69	1485.98	4.22	1.71	2.92	3.96	2.61	1.25	2.39	0.17	55.94	13.41	0.46	0.51
Chamoli	26	8977.02	1425.47	5.77	1.20	4.33	5.36	2.31	0.69	2.43	0.21	47.44	17.98	0.69	0.47
Bageshwar	9	7758.08	1277.66	4.96	1.05	11.17	9.19	1.97	0.76	2.43	0.14	47.87	8.50	0.25	0.46
Nainital	8	10420.73	2102.61	6.73	2.07	1.13	0.83	1.58	0.64	2.38	0.16	37.16	5.38	0.88	0.35
Champawat	3	8244.47	608.42	6.13	0.92	1.33	2.31	1.58	0.46	2.81	0.14	24.41	1.99	1.00	0.00
Pithoragarh	11	9440.29	2752.05	4.50	1.13	4.55	3.45	2.03	1.04	2.41	0.17	38.38	12.03	0.27	0.47
	83	8588.38		5.39		4.24		2.01		2.47		41.87		0.59	

Table 9 Extent of tree height lopped: Type of Species

species	Trees_grade1	Trees_grade2	Trees_grade3	Total trees	Lopping grade
BROAD LEAF					
Alnus	46	179	83	308	2.12
Ayar	58	216	199	473	2.30
Ban	207	712	1940	2859	2.61
Belaru	3	14	6	23	2.13
Betula	3	1	3	7	2.00
Bird Cherry	7	16	12	35	2.14
Busang	0	8	9	17	2.53
Chirindi	25	79	53	157	2.18
Horsechestnut	37	54	18	109	1.83
Kainth	12	27	20	59	2.14
Kanjai	1	8	9	18	2.44
Kaphal	24	20	7	51	1.67
Kharshu	60	187	286	533	2.42
Khira	0	9	7	16	2.44
Killar	9	29	65	103	2.54
Lodh	2	7	10	19	2.42
Maple	11	3	1	15	1.33
Mohru	70	283	710	1063	2.60
Mulberry	2	0	0	2	1.00
Other broad leaf list	26	69	34	129	2.06
Otish	0	3	0	3	2.00
Poplar	2	1	1	4	1.75
Rhododendron	160	475	393	1028	2.23
Saur	4	11	2	17	1.88
Shrubs	5	15	7	27	2.07
Siris	1	1	0	2	1.50
Siroi	1	3	1	5	2.00
Walnut	36	33	10	79	1.67
Willow	0	1	3	4	2.75
CONIFERS					
Chir	90	501	480	1071	2.36
Deodhar	336	891	566	1793	2.13
Kail	261	717	538	1516	2.18
Neoja	13	12	0	25	1.48
Rai	103	205	152	460	2.11
Surai	13	26	15	54	2.04
Tansing	3	13	0	16	1.81
Taxus	16	26	10	52	1.88
Tosh	253	373	214	840	1.95

Table 10 Lopping: Broad leaf versus Conifers

Weighted Average Lopping:		
Species	Mean	Std Dev.
Broad-leaf	2.095016	0.4064082
Conifers	1.994376	0.2539444

Table 11 Proportion of broadleaf species in a forest
Himachal & Uttarakhand

Variable	Mean	Std. Dev.
prop_bleaf: Himachal	0.1950378	0.3099335
prop_bleaf: Uttarakhand	0.6450147	0.4135585

Table 12 Anthropogenic versus Natural pressures

	Total plots	1 (None)	2(low)	3(Medium)	4(High)	Wtd Average
Anthropogenic pressures						
Grazing	3512	275	770	1623	844	2.86
Lopping	3512	169	547	1207	1589	3.2
Timber	3512	975	1013	838	686	2.35
Natural pressures						
Fire	3512	2102	860	407	143	1.59
Snowfall	3512	1588	1250	576	98	1.76

Table 13 Anthropogenic pressures: Extraction zones

	Extraction Zones	
	Local forests	Other zones (mainly own fields & village commons)
Activities		
Firewood	90%	10%
Leaf fodder	62%	38%
Timber	96%	4%
Grass fodder	28%	62%
Grazing	30%	60%
Encroachment	22%	78%**
**entirely in village commons.		

Table 14 Anthropogenic pressures: Quantum of extraction

	Obs	Unit	Collections from local forests Mean	Std. Dev
Firewood	165	tons per year per village	456.78	458.15
Leaf-fodder	165	tons per year per village	172	223.03
Timber	83**	trees over the last 25 years per household per village	5	3.46

**only 83 out of 165 villages were extraction timber from their local forests .The rest of the villages had to procure timber from elsewhere as timber-specieswere not available in their local forests.

Table 17 Fuel Sources: India: Uttaranchal (Village Sample)

INDIA	% Households using as Primary source			% Households using as Secondary source		
	Summer	Winter		Summer	Winter	
Uttarnchal (Village)	Cooking	Cooking	Heating	Cooking	Cooking	Heating
Fuels type	%	%	%	%	%	%
Wood	88.64	96.56	99.94	41.65	13.75	0
Leaves/rubbish/etc	0	0.06	0.06	0	0	0
Pine-cones	0	0	0	0	0.27	0
Coal/ charcoal	0	0	0	0	0.27	36.36
Cowdung	0	0	0	0	0.00	0
Kerosine	0.18	0.06	0	19.02	14.02	0
LPG	11.18	3.32	0	38.30	71.16	9.09
Bio-gas	0	0	0	0	0	0
Electricity	0	0	0	1.03	0.54	54.5
Total	100.00	100.00	100.00	100.00	100.00	100

Table 18 Villagers Perception: Reduction in the forest stock.

Reduction level over the last 25 years.	Frequency	Percent	Cum.	
0	24	3.88	3.88	
1	183	29.56	33.44	
2	263	42.49	75.93	
3	130	21	96.93	
4	17	2.75	99.68	
5	2	0.32	100	
Total	619	100		
redu_level	CODES			
0	na			
1	drastic			
2	reduced by half			
3	marginal			
4	static			
5	stock has increased			

Table 19 Villagers Perception: Sense of depleting forest stock.

Is there a sense of depleting forest stock?						
ALL VILLAGES			HIMACHAL			
Response	Frequency	Percent	Response	Freq.	Percent	
1	538	91.03	1	233	85.35	
2	15	2.54	2	10	3.66	
3	38	6.43	3	30	10.99	
Total	591	100	Total	273	100	
Codes:						
1	Yes					
2	No					
3	Somewhat Evident					

Table 20 Villagers Perception: Cause for alarm

If yes, does there seem to be a cause for alarm/concern in the village.				
Codes	Frequency	Percent	Cum.	
1	259	44.89	44.89	
2	55	9.53	54.42	
3	263	45.58	100	
Total	538	100		
Codes:				
1	Yes			
2	No			
3	Somewhat Evident			

Table 21 Management and extraction practices in State forests

Do management & extraction practices exist as regards 'state forests'?					
mgmt_state	Frequency	Percent	Cum.		
1 (yes)	20	12.12	12.12		
2 (no)	145	87.88	100		
Total	165	100			

Table 22 Private tree-holding.

Average private tree holding on field margins					
Variable	Obs	Mean	Std. Dev.	Min	Max
private_trees	165	16.95758	34.0549	1	391

Table 23 Management and extraction practices as regards private tree holdings.

Do management & extraction practices exist as regards 'private tree holdings'?			
	Frequency	%	Cum
pvt_mge			
1 (yes)	158	95.76	95.76
2 (no)	7	4.24	100
Total	165	100	
How widely are these practices adopted in the village?			
	Frequency	Percent	Cum.
m_widely			
1 (Very widely)	152	92.12	92.12
2 (Marginally)	11	6.67	98.77
4 (Given up)	2	1.21	100
Total	165	100	

Table 24 Sacred Trees.

Does the village have a sacred tree/sacred grove?			
sg_exist	Frequency	Percent	Cum.
1 (yes)	133	80.61	80.61
2 (no)	32	19.39	100
Total	165	100	

Table 25 State Forests: Rules of Use

ACTIVITY	RULES OF USE
Grazing	Open access unless specified for instance when a plantation zone has been created by the forest deptt when access is closed
Grazing (migratory patoralism)	Permits are required from the forest department which is a pittance per livestock usually sheep and goats reared by "gaddis" or buffaloes reared by "gujjars". These permits enable access to vast alpine pastures which are the main summer grazing grounds for such migratory pastoralists
Firewood collection	Only dry wood can be lopped or collected.
Fodder collection(leaf)	Only tertiary branches can be lopped without hampering the tree
Fodder collection(grass)	Open access
Leaf-litter accumulation	Open access
Timber	There is a ban on "green" felling. However, limited extractions are permitted. *In Himachal the rules of timber extraction allow a household to acquire one tree every five years after seeking approval from the forest department *In Uttaranchal, the "panchayat" approaches the forest department usually every year or when need arises and the forest department grants approvals at the village level. Once approvals are received, the "panchayat" has the authority to distribute the trees after scrutinising needs expressed by approached households.
Medicinal Herb Collection	Permits are required from the forest department for collecting medicinal herbs usually found in alpine pastures or in the vicinity of high altitude villages.

Table 26 State Forests: Status of Forest Stock

	Demarcated State Forests				Un-demarcated State forests					
	D.P.F.		R.F.		Sanctuary		Un-classed	Civil Soyam		
Measure of assessment	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
% tree height lopped	2.17	0.43	2.47	0.37	2.36	0.31	2.36	0.30	2.53	0.39
% canopy cover	48.89	15.04	37.56	13.58	39.53	7.30	42.14	9.11	32.67	11.60
basal area	62.88	30.64	54.08	31.75	68.99	28.54	59.38	25.07	36.60	21.29
Obs:	251		116		26		35		67	

Table 27 State Forests: Demarcated versus Un-demarcated patches

Measure of assessment	Demarcated State Forests		Un-demarcated State forests	
	Mean	Std. Dev.	Mean	Std. Dev.
% tree height lopped	2.273013	0.4289804	2.467963	0.3668803
% canopy cover	44.92449	15.15924	35.92048	11.67144
basal area	60.68841	31.09449	44.41722	25.02196
Obs:	393		102	

Table 28 State Forests: Nature of Monitoring

Monitoring	Freq.	Percent	Cum.
2 (Good)	1	0.61	0.61
3(Fair)	35	21.21	21.82
4(Poor)	129	78.18	100
Total	165	100	

Table 29 State Forests: Nature of Monitoring by Activity type

Nature of monitoring:			
	Freq.	Percent	Cum.
Firewood			
3 (Fair)	4	2.42	2.42
4(Poor)	161	97.58	100
Total	165	100	
Timber			
3 (Fair)	52	31.52	31.52
4(Poor)	113	68.48	100
Total	165	100	
Medicinal Herbs			
3 (Fair)	37	22.42	22.42
4(Poor)	128	77.58	100
Total	165	100	

Table 30 State Forests: Plantation programs

Are there any collective plantation programs in the forest?			
Response	Freq.	Percent	Cum.
1 (Yes)	169	27.61	27.61
2 (No)	443	72.39	100
Total	612	100	

Table 31 State Forests: Plantation programs

How effective are these programs?			
Codes:	Frequency	Percent	Cum.
1	16	10.06	10.06
2	110	69.18	79.25
3	32	20.13	99.37
4	1	0.63	100
Total	159	100	
Codes:			
1	Very effective		
2	Marginally effective		
3	Not at all effective		
4	Other		

Table 32 Community based Forest Protection Committees

1. Forest Committees encountered in Himachal:	
name	Freq.
JFM Committee	10
Sahara Committee	1
Sanjhi Van Yojana	1
Van Samiti	1
Total	13
2. Forest Committees encountered in Uttaranchal:	
name	Freq.
Eco Vikas Committee	5
JFM Committee	7
Van Panchayats	45
Total	57

Table 33 Community based Forest Protection Committees: Origin

When was the committee set up?										
					when					
name	1933	1937	1944	1947	1950	1953	1954	1955	1957	1958
Eco Vikas Committee	0	0	0	0	0	0	0	0	0	0
JFM Committee	0	0	0	0	0	0	0	0	0	0
Sahara Committee	0	0	0	0	0	0	0	0	0	0
Sanjhi Van Yojana	0	0	0	0	0	0	0	0	0	0
Van Panchayat	1	1	1	3	1	2	1	1	3	2
Van Samiti	0	0	0	0	0	0	0	0	0	0
Total	1	1	1	3	1	2	1	1	3	2
					when					
name	1970	1972	1975	1977	1978	1979	1982	1983	1984	1988
Eco Vikas Committee	0	0	0	0	0	0	0	0	0	0
JFM Committee	0	0	0	0	0	0	0	0	0	0
Sahara Committee	0	0	0	0	0	0	0	0	0	0
Sanjhi Van Yojana	0	0	0	0	0	0	0	0	0	0
Van Panchayat	1	3	1	2	1	1	1	1	1	1
Van Samiti	0	0	0	0	0	0	0	0	1	0
Total	1	3	1	2	1	1	1	1	2	1
name	1991	1994	1995	1997	1998	1999	2000	2001	Total	
Eco Vikas Committee	0	0	0	0	0	3	0	2	5	
JFM Committee	0	0	0	2	3	3	9	0	17	
Sahara Committee	0	0	0	0	0	0	0	1	1	
Sanjhi Van Yojana	0	0	0	1	0	0	0	0	1	
Van Panchayat	1	1	1	0	0	2	4	1	45	
Van Samiti	0	0	0	0	0	0	0	0	1	
Total	1	1	1	3	3	8	13	4	70	

Table 34 Community based Forest Protection Committees: Driving force

Who took the initiative to set up the committee?					
name	2(Forest Deptt.)	3(NGO)	4(Village Elders)	7(Unanimously by villagers)	Total
Eco Vikas Committee		5	0	0	5
JFM Committee		17	0	0	17
Sahara Committee		0	1	0	1
Sanjhi Van Yojana		1	0	0	1
Van Panchayat		39	0	2	45
Van Samiti		1	0	0	1
Total		63	1	2	70

Table 35 Community based Forest Protection Committees: Effectiveness

How do you assess the performance of the committee with respect to its stated objectives?					
i)Committees initiated by the Forest Department					
name	1(Very effective)	2(Fairly effective)	3(Not very effective)	4(Ineffective)	Total
Eco Vikas Committee	0	0	4	1	5
JFM Committee	0	0	16	1	17
Sanjhi Van Yojana	0	0	1	0	1
Van Panchayat	2	19	15	3	39
Van Samiti	0	0	1	0	1
Total	2	19	37	5	63
ii)Committees initiated by an NGO					
Sahara Committee	2(Fairly effective)	Total			
	1	1			
	1	1			
iii) Committees initiated by village elders/unanimously by the villagers					
	2(Fairly effective)	3(Not very effective)	Total		
Van Panchayat	3	3	6		
Total	3	3	6		

Table 36 Community based Forest Protection Committees: Frequency of meetings.

What is the frequency of meetings of the committee									
i)Committees initiated by the Forest Department									
name	1(Annually)	2(Monthly)	3(Bi-monthly)	4(Weekly)	5(When need arises)	6(Twice a year)	7(Thrice a year)	8(Other)	Total
Eco Vikas Committee	0	3	0	0	0	0	0	2	5
JFM Committee	3	8	0	0	5	0	0	1	17
Sanjhi Van Yojana	0	0	0	0	1	0	0	0	1
Van Panchayat	0	7	1	0	24	1	2	4	39
Van Samiti	0	0	0	0	1	0	0	0	1
Total	3	18	1	0	31	1	2	7	63
ii)Committees initiated by an NGO									
name	2(Monthly)	Total							
Sahara Committee	1	1							
Total	1	1							
iii) Committees initiated by village elders/unanimously by the villagers									
	2(Monthly)	5(When need arises)	Total						
Van Panchayat	1	5	6						
Total	1	5	6						

Table 37 Community based Forest Protection Committees: Governing body

Is there a formal governing body in charge of managing the committee?		
i)Committees initiated by the Forest Department		
name	1(Yes)	Total
Eco Vikas Committee	5	5
JFM Committee	17	17
Sanjhi Van Yojana	1	1
Van Panchayat	39	39
Van Samiti	1	1
Total	63	63
ii)Committees initiated by an NGO		
name	1(Yes)	Total
Sahara Committee	1	1
Total	1	1
iii) Committees initiated by village elders/unanimously by the villagers		
name	1(Yes)	Total
Van Panchayat	6	
Total	6	

Table 38 Community based Forest Protection Committees: Selection of Governing body

How are members of the governing body/committee selected?		
i)Committees initiated by the Forest Department		
name	Code 1	Total
Eco Vikas Committee	5	5
JFM Committee	17	17
Sanjhi Van Yojana	1	1
Van Panchayat	39	39
Van Samiti	1	1
Total	63	63
Code1: Not formally elected but unanimously proposed in an informal manner.		
ii)Committees initiated by an NGO		
name	Code 1	Total
Sahara Committee	1	1
Total	1	1
Code1: Not formally elected but unanimously proposed in an informal manner.		
iii) Committees initiated by village elders/unanimously by the villagers		
name	Code 1	Total
Van Panchayat	6	6
Total	6	6
Code1: Not formally elected but unanimously proposed in an informal manner.		

Table 39 Community based Forest Protection Committees: Written records

Does the committee maintain written records of the meetings and the decisions made?			
i)Committees initiated by the Forest Department			
name	1(Yes)	2(No)	Total
Eco Vikas Committee	5	0	5
JFM Committee	15	2	17
Sanjhi Van Yojana	1	0	1
Van Panchayat	37	2	39
Van Samiti	1	0	1
Total	59	4	63
ii)Committees initiated by an NGO			
name	1(Yes)	Total	
Sahara Committee	1	1	
Total	1	1	
iii) Committees initiated by village elders/unanimously by the villagers			
name	1(Yes)	2(No)	Total
Van Panchayat	5	1	6
Total	5	1	6

Table 40 Community based Forest Protection Committees: Expenditures

Are accounts and expenditures discussed at committee meetings?			
i)Committees initiated by the Forest Department			
name	1(Yes)	2(No)	Total
Eco Vikas Committee	4	1	5
JFM Committee	16	1	17
Sanjhi Van Yojana	1	0	1
Van Panchayat	37	2	39
Van Samiti	1	0	1
Total	59	4	63
ii)Committees initiated by an NGO			
name	1(Yes)	Total	
Sahara Committee	1	1	
Total	1	1	
iii) Committees initiated by village elders/unanimously by the villagers			
name	1(Yes)	2(No)	Total
Van Panchayat	5	1	6
Total	5	1	6

Table 41 Community based Forest Protection Committees: Decision-making

When the committee has to take an important decision how is the decision made?				
name	Code1	Code2	Code3	Total
Eco Vikas Committee	2	0	3	5
JFM Committee	11	4	2	17
Sanjhi Van Yojana	0	0	1	1
Van Panchayat	25	11	3	39
Van Samiti	1	0	0	1
Total	39	15	9	63

Code1: Member's unanimous consensus 2: Member's majority consensus 3: Governing body decides 4: Villagers consent

Table 42 Van Panchayats: Rules of Use

Activity	Rules	8	9	10	11	12	16	17	Total			
	7a											
Firewood	0	1	1	0	1	37	1	2	43			
Grass fodder	0	0	3	2	1	0	27	1	34			
Grazing	0	0	0	1	2	0	40	1	44			
Leaf-fodder	1	0	2	1	5	1	6	0	16			
Leaf-litter	0	0	2	1	0	0	11	0	14			
Medicinal herbs	0	0	0	0	0	0	20	1	21			
Ringal	0	0	0	0	0	0	1	5	6			
Stone Extraction	0	0	0	0	0	0	0	3	3			
Timber	0	1	4	0	0	4	2	31	42			
Total	1	2	12	5	9	42	108	44	223			

7a: access closed/ 8: Restrictions on the use of certain species/ 9: Quantitative restrictions/10: Restrictions on certain periods of harvest/ 11: Rotational methods of use by time and place
12: Explicit restrictions on the methods of extraction/ 16: Open access/ 17: Use linked to payment of monetary fees

Table 43 Van Panchayats: Monitoring mechanism

Does the village have a vigilance system for protecting its Van Panchayat?			
Formal vigilance mechanism	Frequency	Percent	Cum.
1(Yes)	23	51.11	51.11
2(No)	16	35.56	86.67
3(Yes, seasonally)	5	11.11	97.78
4(Guard appointed only when there are salvaging operations by the forest department)	1	2.22	100
Total (Villages)	45	100	

Table 44 Van Panchayats: Monitoring mechanism details

Does the Van panchayat appoint a chowkidar/ 'local guard'?			
Response	Frequency	Percent	Cum.
1(Yes)	18	42.22	42.22
2(No)	16	33.33	75.56
3(Yes, only seasonally)	4	8.89	84.44
4(Yes, only during forest deptt salvaging operations)	3	6.67	91.11
5(Yes to protect plantation zones under JFM)	3	6.67	97.78
6(Yes to protect plantations pioneered by local NGO)	1	2.22	100
Total (Villages)	45	100	

Table 45 Van Panchayats: Sources of Funds for Funding the Van Panchayat local guard

What is the source of finance for hiring the 'chowkidar'/ local guard?			
Who pays the chowkidar	Frequency	Percent	Cum.
1(Endowments from JFM,watershed or other donor-related programs)	9	33.33	33.33
2(Contributions from locals)	10	33.33	66.67
3(Contributions in cash or kind from locals)	3	10	76.67
4(Van Panchayat earnings)	6	20	96.67
5(NGO funding)	1	3.33	100
Total	29	100	

Table 46 Van Panchayats: Penalties for Violation of Rules

Describe the nature of penalties that are imposed in case of violation of van panchayat rules			
Penalties	Frequency	Percent	Cum.
1(Monetary fines)	26	57.78	57.78
3(Social opprobrium)	1	2.22	60
4(Rules under formulation)	1	2.22	62.22
5(No rules & no penalties)	17	37.78	100
Total	45	100	

Table 47 Van Panchayats: Age Profile

When did the Van Panchayat come up?		
Year	Van Panchayats	Percentage
After 2000	4	9%
1990s	6	13%
1980s	3	7%
1970s	7	16%
Before 1970	25	56%
TOTAL	45	100%

Table 48 Van Panchayats: Mean Years of Existence and Altitude of forests

1. Age Profile & Altitude					
	Obs	Mean	Std. Dev	Min	Max
vp_altitude (meters)	45	2174.06	242.17	1800	2852.5
vp_age (years)	45	36.38	19.96	4	73

Table 49 Van Panchayts: Degraded Status

Measure of assessment	State forests		Van Panchayats	
	Mean	Std. Dev.	Mean	Std. Dev.
% tree height lopped	2.313185	0.4240014	2.377149	0.3873428
% canopy cover	43.06912	14.94974	36.36453	13.11568
basal area	57.33556	30.63723	40.80372	21.33251
Obs: (Forests)	495		124	

Table 50 Van Panchayts: Old & New Degraded Status

Ecology: Van Panchayat Grouped by Age Profile											
Year	Mean altitude	std dev	% Broad leaf	std dev	Mean % lopped	std dev	Mean canopy cover	std dev	Mean basal area	std dev	
2000 & After	2153.33	119.16	0.53	0.36	2.44	0.18	37.56	10.13	49.46	16.86	
1990s	1952.78	118.52	0.76	0.40	2.46	0.43	34.12	19.14	28.97	3.63	
1980s	2195.00	274.18	1.00	0.00	2.40	0.15	36.47	1.92	31.34	6.80	
1970s	2240.00	237.03	0.83	0.23	2.47	0.14	32.82	12.07	45.20	21.30	
Before 1970	2209.50	259.92	0.78	0.26	2.32	0.31	38.07	10.52	44.70	19.47	
MEAN	2150.12		0.78		2.42		35.81		39.93		

Table 51 Condition of Demarcated State Forests in the Vicinity of Van Panchayats

Ecology: Adjacent Demarcated State Forests											
Year	Mean altitude	std dev	% Broad leaf	std dev	Mean % lopped	std dev	Mean canopy cover	std dev	Mean basal area	std dev	
2000 & After	2398.67	250.89	0.64	0.21	2.45	0.18	41.82	7.96	76.42	57.65	
1990s	2109.61	231.04	0.58	0.33	2.41	0.28	37.10	9.81	51.80	26.23	
1980s	2255.00	21.21	0.94	0.08	2.44	0.15	48.96	10.31	54.85	12.07	
1970s	2334.17	219.73	0.79	0.22	2.30	0.35	42.83	18.47	61.01	11.24	
Before 1970	2138.03	197.40	0.65	0.32	2.54	0.30	32.55	13.27	36.15	12.66	
MEAN	2247.10		0.72		2.43		40.65		56.05		

Table 52 Condition of Un-demarcated State Forests in the Vicinity of Van Panchayats

Ecology: Adjacent Un-demarcated State Forests											
Year	Mean altitude	std dev	% Broad leaf	std dev	Mean % lopped	std dev	Mean canopy cover	std dev	Mean basal area	std dev	
2000 & After	na	na	na	na	na	na	na	na	na	na	
1990s	2198.33	478.08	0.77	0.17	2.48	0.45	35.19	13.95	35.35	22.73	
1980s	2030	na	1	na	3	na	21.53	na	14.48	na	
1970s	2121.46	316.29	0.72	0.34	2.47	0.22	35.68	5.57	45.11	16.94	
Before 1970	2100.71	198.12	0.82	0.33	2.36	0.88	25.25	12.72	27.64	20.64	
MEAN	2112.62		0.83		2.58		29.41		30.64		

Table 53 Van Panchayat villages: Variation in the Condition of the Forest Stock by Forest Type

Within village standard deviation across forest types: Van Panchayat Vs State Forest						
Variable	Obs*	Mean	Std. Dev.	Min	Max	
Std_dev altitude	36	119.1855	100.137	7.0711	367.6955	
Std_dev % lopped	36	0.269377	0.2801412	0.0052	1.618171	
Std_dev canopy cover	36	8.42377	6.618603	0.1023	27.14395	
Std_dev basal area	36	15.74352	14.40232	0.0094	70.16458	
Std_dev % broad leaf	36	0.150669	0.1603321	0	0.6016787	

*Note v_ids 120,122,125,147,152,155,156, 157 & 161 had only van panchayat forests in the village surrounds.

Table 54 Van Panchayat Villages: Variation in the Condition of the Forest Stock by Forest Type
By Van Panchayat Age Profile

Within village standard deviation across forest types: Van Panchayat Vs State Forest : By Age of Van Panchayat											
			1990s		1980s		1970s		Before 1970		
2000 & After	Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	Std_dev altitude	173.48	136.01	113.12	107.12	129.31	72.87	125.50	99.33	104.76	99.23
	Std_dev% lopped	0.05	0.05	0.20	0.09	0.26	0.11	0.18	0.15	0.38	0.36
	Std_dev canopy cover	4.88	3.63	6.97	5.45	9.81	10.87	7.86	6.13	9.84	7.49
	Std_dev basal area	22.41	31.94	13.90	13.61	19.05	3.82	18.15	6.55	13.45	12.87
	Std_dev % broad leaf	0.11	0.16	0.19	0.13	0.03	0.05	0.07	0.10	0.19	0.19
	Observations	4		6		2		7		17	

Table 55 Van Panchayat Effectiveness: Local Response & Field Observations

How effectiveness has the Van Panchayat been since it came into existence?			
Effectiveness	Frequency	Percent	Cum.
1 (Degradation has declined)	3*	6.67	6.67
2 (Degradation has increased)	21	46.67	53.33
3 (Only grass patches are protected)	2	4.44	57.78
4(Too early to gauge but effective so far)	1	2.22	60
5 (Rules were not there)	1	2.22	62.22
6(degradation has somewhat declined)	1	2.22	64.44
7(Moderately effective)	12	26.67	91.11
8(Too early to assess)	4	8.89	100
Total	45	100	
*Villages: Khanni, Kuwari, Umagarh			
Reasons for effectiveness:			
Khanni: Strict vigilance			
Kuwari : Ample alternative forest types in close proximity to the village			
Umagarh: " modernisation"			

Table 56 Van Panchayats Effectiveness of Vigilance Mechanism
Local Response & Field Observations

How effective is this vigilance system?			
Level of effectiveness			
1 (Very effective)	3	10.34	10.34
2 (Moderately effective)	11	37.93	48.28
3 (Not effective)	15	51.72	100
Total	29	100	

Table 57 Van Panchayats: Monitoring by Activity-type

Actual monitoring done by			
activity	2(local guard)	4(Informal monitoring by villagers)	Total
Burial wood	1	1	2
Firewood	27	18	45
Grazing	28	17	45
Leaf-fodder	6	16	22
Leaf-litter	16	19	35
Medicinal Herbs	19	5	24
Ringal	1	5	6
Stone Extraction	3	1	4
Timber	27	18	45
Total	128	100	228

Table 58 Van Panchayats: Nature of Monitoring by Activity-type

Nature of monitoring					
activity	1(Very good)	2(Good)	3(Fair)	4(Poor)	Total
Burial wood	1	0	0	1	2
Firewood	1	5	9	30	45
Grazing	1	6	8	30	45
Leaf-fodder	0	3	4	15	22
Leaf-litter	1	6	5	23	35
Medicinal Herbs	1	1	2	20	24
Ringal	0	1	0	5	6
Stone Extraction	0	2	1	1	4
Timber	1	6	8	30	45
Total	6	30	37	155	228

Table 59 Irrigation collectives

Does the village use irrigation water?			
use	Freq.	Percent	Cum.
1(yes)	35	21.21	21.21
2(no)	130	78.79	100
Total	165	100	

Table 60 Irrigation collectives : Organisation

Is the irrigation system collectively organised?			
org	Freq.	Percent	Cum.
1(Yes)	31	88.57	88.57
2(No)	4	11.43	100
Total	35	100	

Table 61 Irrigation collectives: Origin

Since when?			
since	Freq.	Percent	Cum.
3 (Traditionally)	25	71.43	71.43
1970	1	2.86	74.29
1972	1	2.86	77.14
1975	1	2.86	80
1980	1	2.86	82.86
1985	1	2.86	85.71
1987	1	2.86	88.57
1988	1	2.86	91.43
1990	1	2.86	94.29
1992	1	2.86	97.14
1997	1	2.86	100
Total	35	100	

Table 62 Irrigation collectives: Effectiveness.

How do you assess the overall effectiveness of the water distribution system?				
old_new	assess			Total
	1(Very effective)	2(Moderately effective)	3(poor)	
0 (new)	3	6	1	10
1(traditional)	6	19	0	25
Total	9	25	1	35

Table 63 Other Committees

Committees not directly related to forest management	
name	Freq.
Agriculture Committee	3
Co-op Milk Society	3
DPEP Committee	14
Holi Committee	3
Krishna Janmashtami Committee	1
Lath Panchayat	1
Mahila Mandal	66
Micro Hydel -Power_Committee	4
Purohit Sabha	1
Ram Lila Committee	1
Self-help credit group	15
Swajal Committee	6
Temple Committee	50
Udyan Samiti	1
Village Committee	14
Village Fair Committee	2
Watershed Management Committee	3
Yuvak Mandal	54
Total	242

Table 64 Other Committees : Driving Force

Who took the initiative to start the committee?							
name	1(Govt)	3(NGO)	4(Village Elders)	5(Village Youth)	6(Village Women)	7(Unanimously by villagers)	Total
Agriculture Committee	1	0	2	0	0	0	3
Co-op Milk Society	0	0	0	0	0	3	3
DPEP Committee	14	0	0	0	0	0	14
Holi Committee	0	0	0	0	0	3	3
Krishna Janmashtami C	0	0	1	0	0	0	1
Lath Panchayat	0	0	1	0	0	0	1
Mahila Mandal	59	1	0	0	6	0	66
Micro Hydel -Power_Co	4	0	0	0	0	0	4
Purohit Sabha	0	0	0	0	0	1	1
Ram Lila Committee	0	0	0	1	0	0	1
Self-help credit group	9	6	0	0	0	0	15
Swajal Committee	3	3	0	0	0	0	6
Temple Committee	0	0	27	0	0	23	50
Udyan Samiti	0	0	0	0	0	1	1
Village Committee	0	0	9	0	0	5	14
Village Fair Committe	0	0	2	0	0	0	2
Watershed Management	3	0	0	0	0	0	3
Yuvak Mandal	12	0	0	42	0	0	54
Total	105	10	42	43	6	36	242

Table 65 Performance of Other Committees.

How do you assess the performance of the committee with respect to its stated objectives?					
i)Committees initiated by the government:					
name	1(Very effective)	2(Fairly effective)	3(Not very effective)	4(Ineffective)	Total
Agriculture Committee	0	0	1	0	1
DPEP Committee	3	0	10	1	14
Mahila Mandal		0	48	8	59
Micro Hydel -Power_Co	1	0	3	0	4
Self-help credit group	0	0	7	2	9
Swajal Committee	0	0	3	0	3
Watershed Management	0	0	3	0	3
Yuvak Mandal	0	0	11	1	12
Total	7	0	86	12	105
ii)Committees initiated by an NGO					
name	1(Very effective)	2(Fairly effective)	3(Not very effective)	4(Ineffective)	Total
Mahila Mandal	0	0	1	0	1
Self-help credit group	1	2	0	3	6
Swajal Committee	0	2	1	0	3
Total	1	4	2	3	10
iii)Committees initiated by an village elders					
name	1(Very effective)	2(Fairly effective)	3(Not very effective)	4(Ineffective)	Total
Agriculture Committee	0	1	1	0	2
Krishna Janmashtami Committee	0	1	0	0	1
Lath Panchayat	1	0	0	0	1
Temple Committee	7	18	1	1	27
Village Committee	3	3	1	2	9
Village Fair Committe	0	1	1	0	2
Total	11	24	4	3	42

APPENDIX 1 EVIDENCE ON TRANSFORMATION AND CHANGE: QUANTIFIABLE DIMENSIONS

Accessibility-shifts:

The most rudimentary determinant of transformation and change, particularly in the context of mountainous terrain, is improvements in accessibility conditions. As compared to 25 years ago, the mean distance to the nearest jeep able road has reduced by nearly 6 kilometers. This is indicated in table 1a below. While only 16 villages in the sample of 165 villages (10% of the sample) were connected by a jeep able road-link in 1975, this figure has gone up to 40 villages today (i.e. 24% of the total sample). Most road linkages have come up due to pressure from local politicians and very often as a pre-election stance. Some villages have been linked to a road network due to incidental reasons such as sudden increase in administrative importance of the region, a need to enhance connectivity for defence strategic purposes or to assist devotees in accessing an important religious shrine in the surrounding vicinity. Local 'panchayat' efforts supported by collective action at the village level have been instrumental in the coming up of roads.

**TABLE 1a ACCESSIBILITY CHANGES
DISTANCE TO THE NEAREST JEEP ABLE ROAD LINK.**

Time Period	Observations (Villages)	Mean	Std. Deviation	Minimum	Maximum
25 years ago (Kilometers)	165	9.37	10.37	0	69
Current scenario (Kilometers)	165	3.81	4.83	0	24

Source: Field-work

Commercialisation and Occupation-shifts:

Traditionally, the occupation structure of the region was essentially characterised by dependence on agriculture and livestock rearing supplemented by trade links with Tibet for basic necessities such as salt. In the contemporary context, occupation-shifts have occurred in most villages in the sample. The broad emerging trend is a progressive shift towards commercialisation of agriculture supplemented by non-farm avenues of employment particularly casual employment in the private or government sector. This is evident from table 1b

**TABLE 1b CHANGE IN OCCUPATION STRUCTURE
(% of Household Members Engaged in the Stated Occupation in the sample)**

Principal Occupations	PRIMARY OCCUPATION		SECONDARY OCCUPATION		TERTIARY OCCUPATION	
	25 years ago	Current status	25 years ago	Current status	25 years ago	Current status
AGRICULTURE	96%	89%	-	-	-	-
LIVESTOCK-REARING	0.03%	0.19%	53%	7%	15%	3%
HORTICULTURE	0.08%	0.14%	20%	37%	2%	7%
PERMANENT EMPLOYMENT	2%	5%	8%	10%	44%	30%
CASUAL EMPLOYMENT	1%	3%	8%	26%	13%	43%
SELF-EMPLOYMENT	0.50%	2%	7%	16%	6%	10%

Source: Field-work

Agriculture continues to be the primary occupation. However, commercialisation of agriculture earlier meant mostly for self-consumption is an all-pervasive trend in the current context. The intensity of production for the market varies from region to region and is no doubt linked to the nature of road-access. Crop-shifts away from traditional grains seemed to have occurred due to cultivation of cash crops. Table 1c reflects some of these trends.

TABLE 1c OCCUPATION-SHIFTS: COMMERCIALISATION TRENDS NOW AS COMPARED TO 25 YEARS AGO

Principal Cash Crops	25 years ago			Current scenario		
	NOT GROWN (No. of villages)	GROWN BUTNOT SOLD (No. of villages)	GROWN AND SOLD (No. of villages)	NOT GROWN (No. of villages)	GROWN BUTNOT SOLD (No. of villages)	GROWN AND SOLD (No. of villages)
Apples/peaches/pears	47	71	47	4	57	104
Potatoes	6	80	79	2	29	134
Peas	118	34	13	40	72	53
Ramdana/ Siur	1	132	32	9	53	103
Rajma	12	93	60	2	32	131
Cabbage	137	23	5	72	54	39
Garlic	31	125	9	34	94	37
Walnuts	28	111	26	21	88	56
	NOT COLLECTED (No. of villages)	COLLECTED BUT NOT SOLD (No. of villages)	COLLECTED AND SOLD (No. of villages)	NOT COLLECTED (No. of villages)	COLLECTED BUT NOT SOLD (No. of villages)	COLLECTED AND SOLD (No. of villages)
Medicinal herbs	2	86	77	10	44	111

Source: Field-work

Livestock-rearing has declined. Rearing of sheep and goats in the mountains, based on transhumance, is an arduous activity disliked by the youth and goes against growing preference for sedentary living conditions. Scarcity of winter pastures in the plains, encroachments into village common grazing-zones and time constraints due to shift towards cash-crop cultivation as well as non-farm avenues of employment has had an adverse effect on livestock rearing. Size of private land holding has fallen over the years mainly due to property divisions restricting sources of crop-residue and grass from own-fields. The magnitude of decline in livestock strength in the study area is reflected in table 1d

TABLE 1d: OCCUPATION-SHIFTS: DECLINE IN LIVESTOCK HOLDING NOW AS COMPARED TO 25 YEARS AGO

LIVESTOCK TYPE	CHANGE IN LIVESTOCK HOLDING
	(% Change)
COWS	-53.84
BULLS	-48.04
BUFFALOES	-46.24
SHEEP	-81.80
GOATS	-79.31

Source: Field-work

There seems a shift towards non-farm avenues of employment to supplement cash sources of income. Most households seem to be diversifying their economic base in this manner in order to overcome uncertainties associated with market prices of cash crops and uncertainties as regards yield from cash crops which has become erratic in the last 7-8 years, particularly due to unpredictable weather conditions. Casual employment mainly in private construction activities or horticulture and in the government sector has become a necessity in the current context. Increasing role of casual employment as a secondary and especially tertiary source of income is evident from table 1b. Permanent employment is comparatively hard to come by. Self-employment which is on the rise is mainly restricted to petty retail activities. With the more well-to-do, the scale of retail activities is somewhat larger and could also include operation of jeep services for both passenger and goods movement. Very often, returns from sale of livestock, sale of cash crops or horticulture are partly siphoned off into self-employment ventures.

The pace of commercialisation has been hastened with accessibility improvements especially better connectivity to towns and retail or wholesale markets therein. As indicated in table 1f, on an average, distance to the nearest town has declined by 12 kilometers over the period of 25 years. Integration into the urban framework can have a whole host of implications for the process of commercialisation in particular and transformation and change in general.

TABLE 1f DISTANCE TO THE NEAREST TOWN

Time Period	Observations (Villages)	Mean	Std. Deviation	Minimum	Maximum
25 years ago (Kilometers)	165	51.18	45.40	1	232
Current scenario (Kilometers)	165	38.96	26.61	1	200

Source: Field work

Another proxy that reflects commercialisation trends and occupation-shifts, described above, is better access to financial infrastructure such as banks. Distance to the nearest bank has reduced by 11 kilometers as indicated in table 1g. These developments are particularly significant where income from horticulture and sale of potatoes has increased and where villages are based on a ‘remittance-cum-postal’ economy scenario.

TABLE 1g DISTANCE TO THE NEAREST BANK

Time Period	Observations (Villages)	Mean	Std. Deviation	Minimum	Maximum
25 years ago (Kilometers)	165	24.25	16.83	0	120
Current scenario (Kilometers)	165	13.32	11.48	0	52

Source: Field work

Literacy-shifts:

Our field-surveys revealed that proximity to school is the most important factor influencing school enrolment and attendance levels. Therefore improvements in accessibility conditions to school-premises can be taken as an important preliminary proxy for literacy achievements over time. As revealed in tables 1h-1j, mean distance to the nearest primary, middle and high school has reduced over the period of 25 years. What is remarkable is that distance to the nearest middle school has reduced by 5 kilometers and distance to the nearest high school has reduced by 9 kilometers, on an average.

TABLE 1h: DISTANCE TO THE NEAREST PRIMARY SCHOOL

Time Period	Observations (Villages)	Mean	Std. Deviation	Minimum	Maximum
25 years ago (Kilometers.)	165	1.05	2.16	0	25
Current scenario (Kilometers)	165	0.39	2.33	0	25

Source: Field work

TABLE 1i : DISTANCE TO THE NEAREST MIDDLE SCHOOL

Time Period	Observations (Villages)	Mean	Std. Deviation	Minimum	Maximum
25 years ago (Kilometers)	165	7.03	6.82	0	35
Current scenario (Kilometers)	165	1.66	2.27	0	14

Source: Field work

TABLE 1j: DISTANCE TO THE NEAREST HIGH SCHOOL

Time Period	Observations (Villages)	Mean	Std. Deviation	Minimum	Maximum
25 years ago (Kilometers)	165	15.01	12.25	0	61
Current scenario (Kilometers)	165	5.87	6.94	0	43

Source: Field work

Only 12 villages, out of the sample of 165 villages, had middle schools 25 years ago. However, in the current context, 67 villages in the sample have middle schools. Similarly, 20 villages in the sample have high schools today as compared to 2 villages, 25 years ago. Easy access to school premises is particularly important for the girl child who has to also attend to domestic chores. Improvement in education status of children in the school going age is brought out in table 1k below.

TABLE 1k : EDUCATION STATUS OF CHILDREN IN THE SCHOOL GOING AGE: (5 YEARS-19 YEARS)

MALES (% of total males in the school-going age group)			FEMALES (% of total females in the school-going age group)		
<i>25 YEARS AGO*</i>			<i>25 YEARS AGO*</i>		
Illiterate	Discontinued	Studying	Illiterate	Discontinued	Studying
25%	75%	-	75%	25%	-
<i>CURRENT SCENARIO</i>			<i>CURRENT SCENARIO</i>		
Illiterate	Discontinued	Studying	Illiterate	Discontinued	Studying
4%	8%	88%	12%	12%	76%

* Refers to the cohort 30-44 years of age in the present study sample.

Source: Field-surveys.

Demographic status:

Commercialisation trends, change in the occupation-structure accessibility changes and literacy-shifts does seem to indicate that a phase of 'modernisation' has been ushered in. In the back-drop, these processes have been accompanied by an increase in the demographic size of villages in this zone. On an average there are now 30 additional households in every village.

TABLE 11 : HOUSEHOLDS PER VILLAGE

Time Period	Villages	Mean	Std. Deviation	Minimum	Maximum
25 years ago (Nos.)	165	53.88	40.54	11	264
Current scenario (Nos.)	165	84.14	72.69	19	548

Source: Field-work

Change in the condition of the forest stock:

Villagers' perception was that their forests have roughly reduced by half over the last 25 years. The only kind of historical evidence we could gather to gauge the nature and extent of degradation that is occurring in local forests over time, was to decipher the time taken to collect a bundle of firewood and distance to the forest now as compared to 25 years ago. An attempt was made to unearth the same by interacting with locals in every village. The results are summarized in the tables below.

TABLE 1m HISTORICAL EVIDENCE ON FOREST DEGRADATION: TIME TO COLLECT FIREWOOD: Now and 25 years ago

	Observations	Mean (Hours)	Std. Deviation	Minimum (Hours)	Maximum (Hours)
Now	165	3.85	1.40	1.19	10.5
25 years ago	165	2.36	1.11	0.5	7.5
CHANGE (%)		+38.70%			

Source: Field-work

TABLE 1n DISTANCE TO THE FOREST : Now and 25 years ago

	Observations	Mean (Kms.)	Std. Deviation	Minimum (Kms.)	Maximum (Kms.)
Now ALL	165	2.08	1.65	0	10
25 years ago ALL	165	1.83	1.62	0	10
CHANGE (%)		+12.02%			

Source: Field-work

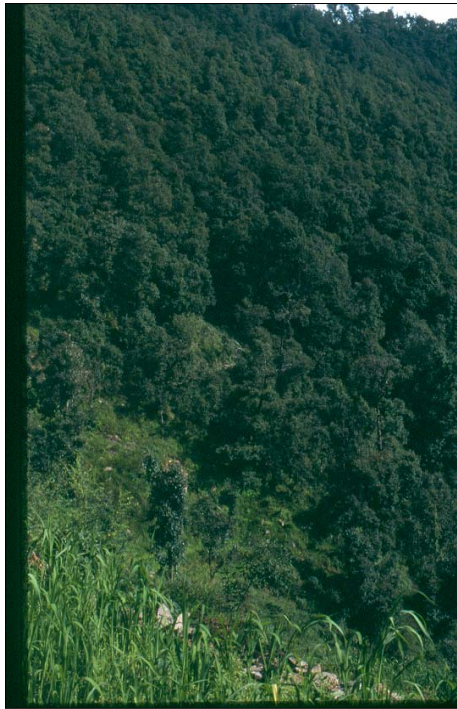
Over the last 25 years time to collect firewood has increased by 40% while distance to the forest over the same period has increased by only 12%. This indicates that the forest boundary has not changed much but the stock within has degraded and so it takes a long time to look for and collect a bundle of firewood. Another interpretation that becomes evident is that the problem is not 'deforestation' and concomitant land use changes but essentially what is occurring is 'degradation' or progressive thinning of the forest stock.

Van Panchayats in the 'Garhwal' Middle-Himalayas:

In 'Kunjo Maikot', a village in 'Chamoli' district, the 'van panchayat' formed in 1970, bears the brunt of firewood, fodder and leaf-litter pressures as it is the only patch of forests in proximity to the village. There is no vigilance of any kind and total lack of concern by the villagers. The 'van panchayat' for all practical purposes is notional. The case of 'Matkot' village and 'Bura' village, located in 'Ghat block' of this district, is quite the same. What has made things worse, in this village, is the rift between different caste groups that deters unanimous consensus when a stand has to be taken on managing the 'van panchayat' better. The 'van panchayat' stretches over nearly 90 hectares making vigilance difficult due to the extensiveness of the resource base. The 'van panchayat' chowkidar's (guard) fees were a pittance and he was found to suffer from a chronic illness. Due to these constraints his vigilance was just restricted to the more proximate patches. Village inhabitants are not interested in attending 'van panchayat' meetings. The predominant 'harijan' caste has less land and cannot meet their fodder requirements from their own fields. They are forced to break norms of fodder extraction. Firewood extraction is indiscriminately done not only by the locals but also intruders from neighboring villages who take advantage of the weak vigilance mechanism. In 'Bura' village the 'van panchayat' chowkidar is 60 years old and he has to watch over the 'van panchayat' of neighboring village 'Jokhna' as well. In fact, he actually resides in 'Jokhna' village which is 2 kilometers away from 'Bura' village. So it is virtually impossible for him to watch over the two forests in earnest. The 'van panchayat' in 'Bairao' village set up in 2001, is a classic case of a 'van panchayat' only on paper to meet government predetermined targets of 'van panchayat' formation. Despite persistent queries, the 'van panchayat' did not seem to have any rules whatsoever and there was no trace of any informal or formal governance mechanism. The villagers were completely nonchalant while discussing the future of their 'van panchayat'. The poor status of 'van panchayat' forests in 'Kyuri' village located in neighbouring 'Agustmuni' block, was evident during field work. Villagers are heavily dependent on their 'van panchayat' to cater to their needs as this is the only forest patch they can access in the vicinity. The laxity in governance was also reflected by the fact that the 'sarpanch' who is a Brahmin is away from the village for six months at a stretch seasonally to perform 'pujari' work elsewhere. Towards Joshimath, the plight of 'Lata', 'Sukhi', 'Kimana' and 'Dumak' 'van panchayats' was quite the same. Proximate patches were badly degraded in the 'van panchayat' of 'Lata'. There did not seem to be any kind of 'demonstration effect' in forest conservation from neighbouring 'Reni' village which was intensively involved in the 'Chipko Movement'. Assessment of the forest stock indicated that the 'van panchayat' was moderately degraded. This was not because of 'van panchayat' governance but more due to the fact that the 'van panchayat' forest area is really vast in comparison to the anthropogenic pressure on the same. In 'Kimana' rising demographic pressures in the nearby state and civil soyam patches have led to such high levels of degradation that the villagers have started accessing the 'van panchayat' very intensively. High livestock rearing villages such as 'Chatoli' in Karnaprayag block and 'Langtai' in Gaisen block formed their 'van panchayats' with the laudable objectives of ensuring adequate leaf-fodder supply to the locals. However, mounting firewood, grazing and encroachment pressures has totally clouded these objectives resulting in degraded 'van panchayat' forests. In 'Choting' village of Deval block, although rules had been formulated for accessing the 'van panchayat', compliance to the same was quite weak. The 'oak' trees in this 'van panchayat' forest were badly lopped and intrusions by neighbouring villages of 'Chorkhatera' and 'Manmati' were quite common.

Thus, field studies revealed that twelve out of the eighteen 'van panchayats' encountered in the 'Garhwal' belt of Uttaranchal, were not working effectively. However, the remaining five villages had a better scenario. The old 'van panchayat' of 'Devsthan' village was being well managed only in the case of grass fodder zones. This village essentially has three scattered patches of 'van panchayat' forests. The grass-fodder zone is well managed because grass has become a vital resource for the village which has progressively shifted towards stall-feeding. Further, the location of this zone permits easy informal vigilance by locals who own shops in the market located in close proximity to the forest. The villagers are less interested in protecting the other two patches as the village inhabitants who are either fixed salaried employees (mostly teachers) or pension-holders have switched to LPG-use over the years. These oak forest patches which are easily accessible are badly degraded due to intrusions by other villages which are regular and frequent occurrences. The recently formed 'Srigarh' 'van-panchayat' was also working well particularly because it was initiated through local effort. Even before the formation of the 'van panchayat' the villagers had unanimously decided to close this forest for green felling and lopping as the civil-soyam patch, which was later designated as the village 'van panchayat' forest, had reduced drastically due to anthropogenic pressures. The 'van panchayat' only institutionalized their goals. Investigations revealed that rules of access and use are being adhered to. However, the locals intensively access the state forest in proximity to meet their needs. These state forest patches were found to be quite degraded. The 'Gaurikund' 'van panchayat' had a vast area of nearly 1040 hectares. Only 30 households depend on this forest. There are no intrusions by the neighbouring village which is also endowed with vast forest patches. The villagers meet nearly a quarter of their firewood needs from private tree holdings on field margins. For all these reasons the 'van panchayat' appeared to be moderately degraded. In 'Mirg' village, green felling has declined somewhat after 'van panchayat' formation and intrusion by neighbouring villages has certainly reduced as compared to when this forest was a civil soyam patch. The all-woman 'van panchayat' of 'Regari' village has started exercising great caution in preventing illegal

felling of green trees in the forest. After the formation of the ‘van panchayat’, anthropogenic pressures have however shifted to the State forests which anyway bear the main brunt of these pressures.



The ‘Khani’ ‘van panchayat’ was working well in all respects. The village has had an impressive patch of locally managed forest that dates back to traditional times. At that time the indigenously formed ‘lath panchayat’ prescribed norms of extraction, mainly for grass and leaf fodder. Since 1982, a group of ex-servicemen who hail from the village, have been intensively involved in devising and implementing more stringent rules for timber, firewood and leaf-fodder extraction as well as improved systems of vigilance. They formed a ‘van suraksha samiti’, in order to monitor these community managed forest patches. Only recently, (in 2001) these community efforts were formally institutionalized as per government directives for converting the ‘van suraksha samiti’ to a ‘van panchayat’ on paper.

Rules of forest access and use have been designed to maintain a balance between regeneration and extraction levels. For instance, as regards firewood, only dry wood can be extracted. There are quantitative restrictions on the amount of firewood and leaf fodder that can be extracted per household. The ‘van panchayat’ forest is divided into compartments and extraction is permitted on a rotational basis across each compartment to ensure enough time for regeneration. Leaf-litter extraction is totally prohibited during certain periods. Timber extraction is permitted only in the case of totally dry trees and only after the payment of a stipulated monetary amount.

Vigilance mechanisms appeared to be fairly effective. Villagers confided that they were extremely cautious while extracting resources from the ‘van panchayat’ for fear of penalties which could extend from monetary fines (ranging between Rs. 50 and Rs. 100, depending on the seriousness of the offence) to even social ostracism. A chowkidar has been appointed to guard these forest patches by paying obligatory contributions from every household in the village. The ‘office-bearers’ namely the ‘sarpanch’ and the ‘chowkidar’ are both ex-servicemen. Their army-roots explain why they are strict disciplinarians. This has been an important reason behind success levels of the ‘Khani’ ‘van panchayat’. Forest transects laid in this forest indicated that the canopy cover estimates were high ranging between 55% and 60% which reinforced these trends.

Figure 2a. The Khani van panchayat.

Thus the ‘Khani’ ‘van panchayat’ is extremely well-managed. There is a certain historicity to the management practice and vigilance mechanisms which dates back to the ‘lath panchayat’ era. The intense and dedicated involvement of ex-army personnel from the village, since 1982, has gone a long way in strengthening these governance mechanisms.

However, an incongruous fall out of this full roof vigilance systems and restrictions is that forest resource needs especially firewood requirements are not fully met by accessing the ‘van panchayat’. Hence the villagers are forced to intrude into other neighboring ‘van panchayats’ such as the ‘Nautha’, ‘Dunagar’ and ‘Tunji’ ‘van panchayats’ and a state forest patch which is not too far away. A rough estimate is that 50% of the firewood requirements are met through this channel. Transects laid in these ‘intrusion’ zones indicated that these patches were badly degraded. It is worthwhile to note that the conservation drive is restricted to the village ‘van-panchayat’ under an authoritarian vigilance system at the cost of other local village ‘van-panchayats’ and state forest patches in close proximity.

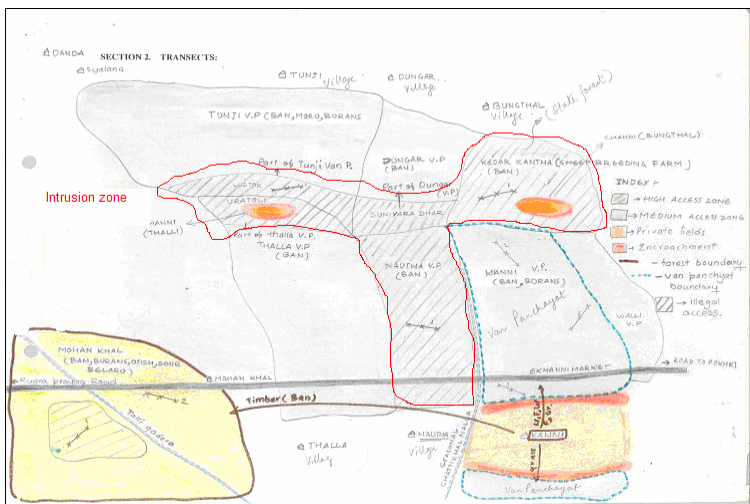


Figure 2b. Intrusion zones: Khani village

Van Panchayats in the 'Kumaon' Middle-Himalayas:

The frequency of 'van-panchayat' occurrence was much higher in the 'Kumaon' belt of Uttaranchal. In all, 'van-panchayats' were prevalent in 27 villages out of a total of 83 villages that were surveyed. In Bageshwar district, the 'van panchayats' of Gogina, Tarsali Patiasar, Mikhila Khalpatta and Toli were poorly governed. Civil soyam and 'van panchayat' patches are the only forest endowments available to the villagers in Gogina village. These forests are degrading. Boundary dispute with neighbouring 'Baicham' village has reduced the efficacy of 'van panchayat' governance in 'Tarsali Patiasar'. These villages simply stray into each others 'van panchayat' zones. The Toli and Mikhila Khalpatta 'van panchayats' were for all purposes reduced to 'open access' zones since formation of the 'van panchayat' nearly five decades ago. Over lopping and high grazing pressures were quite evident in the forest and the villagers and so were intrusions by other villages. The 'Shama' village 'van panchayat', formed in 1954, was found to be working fairly well under the motivated leadership of previous 'sarpanches'. However, the area of the 'van panchayat' which is nearly 800 hectares is too vast. This makes vigilance somewhat difficult. Further, violations as regards extraction of green leaf fodder, during winter months is common since grass fodder is scarce at that time. During winters, green lopping, which is not permitted also occurs to cater to intensive heating requirements. Further, the villagers confessed about the laxity in vigilance mechanisms which allowed villages such as 'Bhanar' to intrude and gather dry leaf-litter and other resources as well. What is more, the 'Shama' inhabitants appeared to be conserving their 'van panchayat' resources while indiscriminately intruding and extracting resources from a nearby state forest which was badly degraded. The 'Sorag' and 'Kuwari' van panchayats appeared to be preserved as the villagers mainly access vast civil soyam patches in close proximity to meet their needs for firewood, fodder grazing and timber. In Kuwari, grazing in the 'van panchayat' has been closed for the last ten years to ensure regeneration of 'ringal' or bamboo which is required for basket-making. However, there was evidence of over lopping in 'oaks' and some intrusion by other villages were reported. The 'chir-pine' predominant Shangar 'van panchayat' has banned extraction of resin, over the last five years. Prior to that, the 'van panchayat' was granting permits to 'thekedars' for extracting resin in order to enhance the resource base of the 'van panchayat'. However, the office bearers realized that this was adversely affecting the 'chir-pine' trees and also enhanced chances of forest fire damage. Only dry and fallen trees are issued for timber on the payment of a prescribed monetary fee. The fire is open for grazing and leaf-litter accumulation but open only once a year, during winter, for leaf-fodder extraction. While these rules were working well, there was evidence of over lopping in the case of broad-leaf species in spite of the fact that only dry wood can be extracted. Moderate effectiveness of the 'van panchayat' is also attributable to the fact that they have alternative civil soyam and state forest patches which are in close proximity and easy to access.

Some 'van panchayats' in Nainital district have been weakened due to encroachment pressures. For instance, in 'Satbunga' village locals have invaded 'van panchayat' forests to expand their orchards. The 'van panchayat' is the only resource base for the local population and it is widely accessed to cater to their needs. Intrusions by 'Supi' village, for firewood, leaf-fodder and leaf-litter, were also reported. Though the success of the 'Gazar' 'van panchayat' has waxed and waned, encroachment for potato-cultivation, which is the main cash crop in this belt, has been the main deterrent thwarting efficient working of the 'van panchayat'. The 'van panchayat' came up in 1957 and has been subjected to anthropogenic pressures since then. In 1989, some local youth attempted to reverse these trends inspired by the successful forest conservation exercises being experimented by a local NGO in the region. They tried to convince the village population that if these 'van panchayat' patches could be protected from over extraction, leaf-litter resources would increase, thereby assuring adequate and increased supply of compost manure so important for enhancing cash crop yield such as that of potatoes and a host of vegetables such as cabbage, peas and tomatoes. They were heard for sometime. Soon, they started facing stiff opposition from factions in the village who wished to encroach for lucrative gains. Thereafter, the frustrated youth lost their enthusiasm and the 'van panchayat' became lax once again. The forest today, gives the appearance of a regenerating forest stock subject to heavy disturbances in the past. However, grazing pressures have definitely declined due to stall feeding and this is a facilitating trend for a regenerating forest-stock. The old 'van panchayat' of Silalekh, bore evidence of excessive extraction for charcoal-making in the past. During the early seventies, thick girth trees were removed from the forest and sold to enhance the financial resource base of the 'van panchayat'. Though these practices have been banned the main reason for degradation of the 'van panchayat' forest is poor governance today and rising anthropogenic pressures. The 'Ghogookham' and 'Agharia' 'van panchayats' resembled "open-access" forests in all respects. Locals do not pay any heed to 'van panchayat' rules. These forests are degrading due to incessant pressures of all sorts. The 'Umagarh' 'van panchayat' in Ramgarh block, was found to be very effective. 'Van panchayat' forests were well stocked. Canopy cover estimates were high at 65%. The village has a population of only 31 households and the 'van panchayat' extends over an area of 100 hectares. Besides, the village has a state forest in close proximity which it accesses to cater to its needs. Some households also acquire firewood from their private tree holdings and orchards. Moreover, LPG use has increased over the last 5-6 years with improvement in economic status due to orchard earnings supplemented with returns from sale of land to urban dwellers. Grazing pressures were hardly there as livestock are stall-fed. Leaf fodder needs are met from own fields and state forests. Some households were actually purchasing fodder to meet their requirements.

All the three 'van panchayat' forests in Champawat district were found to be badly degraded. Two of these 'van panchayats' are very old and have come up in 1958. In 'Tapanipal' the 'van panchayat' is a complete failure. Oak trees were lopped to such an extent that the trees resembled bushes. Deodhar trees in the 'Manartalla' 'van panchayat', which is located close to the road, have become almost extinct due to illegal felling. Evidence of encroachment was also found and intrusion by 'Banj gaon' was a regular feature. The

performance of the more recently formed 'Birgul' 'van panchayat' was also assessed to be quite poor, so far. The villagers did not seem to have any inclination to strengthen their 'van panchayat' machinery.

The scenario was fairly similar in Pithoragarh district. Most of the 'van panchayats' encountered in 'Dharchula' and 'Munshiari' have come up four-five decades ago. Governance mechanisms were consistently found to be weak and the 'van panchayat' forests were being indiscriminately accessed. Very often, the 'van panchayat' forest was the only resource-base available to the villagers to cater to their needs. In 'Sosa', intrusions by 'Rung', 'Sirdong' and 'Jaikot' villages was reported to be quite common. Proximate oak-patches have degraded with rising anthropogenic pressures. Far away 'van panchayat' forest patches were better stocked, not because of 'van panchayat' governance but because of distance and less-useful species-composition. There was no sign of any kind of governance in 'Baungling' village, resulting in unsustainable use and frequent intrusions by neighboring 'Dar' village. Extraction of 'ringal' (bamboo) for the purpose of basket-making was so high that this species is under serious threat in this forest. In 'Jipti' and 'Bung-Bung' the 'van panchayat' forests were also subject to grazing pressures by migrating pastoralists. Towards Munshiari, the 'van panchayats' of 'Sumkote', 'Jarhi', 'Girgaon' and 'Bui' were 'open-access' forests in most respects. However, in 'Polo' village, the 'van panchayat', which is essentially a grass zone, was being well managed. Grass-fodder is a valuable resource for the community not only as the only source of livestock fodder but also a source of income for some families. Therefore, the rules of governance were working well. There is a lottery-system for allocation of grass amongst families to ensure fair distribution. Vigilance was very effective and entirely based on informal methods. In 'Girgaon' village, a small grass fodder patch was being well managed because grass-fodder was scarcity of fodder and high livestock strength.