Deforestation, Property Rights and Incentives in Central Himalaya

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This paper analyses the problem of deforestation and ecological degradation in a central Himalayan region and outlines a policy for combating it. It is shown that the fundamental reason for deforestation is the prevailing system of property rights, which denies the local people certainty about future benefits from forests. This has destroyed the incentive to use forests sustainably. It is therefore suggested that the present structure of rights of use and control over forest lands be changed. Specifically, joint management of all but the inaccessible forests by van (i e, forest) panchayats and the forest department is proposed, with a division of powers between them that is designed to resolve the incentive problem.

I
Introduction

THIS paper is concerned with why deforestation and ecological degradation has occurred so extensively in the central Himalaya and proposes a policy designed to reverse it. The analysis concerns the UP Himalaya, a region comprising the Kumaun and Garhwal divisions except for those portions of Nainital district in the former, and Dehra Dun district in the latter, which are in the plains. This is the 'region' referred to in the paper. All figures, however, refer only to the four districts of Almora, Pithoragarh, Chamoli and Pauri-Garhwal—a contiguous unit with a shared administrative and political history since 1815.[1]

The economic effects of deforestation are very large and not confined to the hills. Apart from the lower annual output of the different kinds of forest produce which include timber, wood fuel, pulpwood, resin, animal fodder, etc, the thinning of hill forests also causes soil erosion and reduces the humus content of the remaining soil. This means that less of the rainfall that is concentrated in monsoon months can be absorbed into the rock to be released later during dry seasons. More water runs off during the monsoon itself. This greatly aggravates the cycles of flood and drought that afflict the Gangetic plains. The average area affected by flooding each year in Uttar Pradesh alone has more than doubled from 17,000 sq km in the period 1953-65 to 41,000 sq km in 1976-78 [Government of India (GOI), 1980: 62]. Ecological deterioration, even without deforestation, may have the same effects. This has happened, for example, where pines have replaced oak forest, resulting in a poorer soil cover.

So much for the effects. Turning to causes, it is observed that deforestation and ecological impoverishment have come about in two ways: Firstly, forest land has been put to a different use, such as agriculture, roads, etc. Secondly, existing forests have degraded with dense, full-canopy forests becoming sparse, often mere scrub or totally bare land. The forest area affected by degradation is larger, perhaps several times as large, as the area of forest converted to other uses, (mainly cultivation).[2] In this paper I shall focus mainly on the problem of degradation of forest, rather than its replacement by other forms of land use.

Degradation has come about due to overuse beyond the capacity of the forest to regenerate, through too much felling, lopping and grazing. The users who have brought this about include the rural population of the hills who live in the vicinity of forests, as well as the timber, pulp, resin and other forest-based industries. I argue in this paper that they have done so because of the existing structure of property rights in forests.

I shall use the term 'property rights' to mean both rights of user and rights of control. The right to use an asset such as forest land means the right to appropriate at least a part of the produce or returns from it. The right of control means the right to take actions affecting the productivity of the asset, as well as the right to regulate the behaviour of others, including the option of excluding them completely from using the asset. In the case of privately owned assets, all these rights are concentrated in a single individual or entity, but in the case of public or common lands they may be distributed among several individuals, organisations, or a government. The prevailing structure of property rights has created uncertainty among the users about their being able to get future benefits from the forests. This has destroyed the incentive to conserve for the future. I refer to such a problem as an incentive problem.

Nearly all the forest-land in the hills has always been non-private and so open to several people to use. In a situation in which each person has the right of user but no one has the right of control, one kind of incentive problem, the commons problem, is particularly important. It arises because, in the absence of any mechanism to control use, each individual is afraid to leave anything for the future in case his share of it is appropriated by someone else. This paper explains why and how such problems became significant in the region. The dependence of the hill population on forests is described in Section 2. Section 3 describes the variety of means traditionally used to resolve the commons problem. Section 4 describes how the traditional institutions were undermined by the new property rights in forest lands that were created with the coming of state-sponsored commercial forestry. Section 5 analyses the resulting incentive problems. Section 6 suggests a reform of the existing structure of property rights that would minimise these problems.

II
Forests and People in UP Himalaya

A wide variety of forest types are found in the UP Himalaya ranging from tropical forest to alpine meadows. The vegetational regimes are distributed roughly as follows—starting from the plains at 300m, there is sal-dominated (Shorea robusta) forest up to 900m and a chir pine (Pinus roxburghii) zone from 900m to 1,800m. The main species from 1,800m to 2,400m is banj oak (Quercus leucotrichophora) giving way to other oaks from 2,400 to 3,000 m. The main tree species above 3,000 m, are the Himalayan spruce (Abies smithiana) and the Himalayan silver fir (Abies pindrow), which occur along with alpine meadows. There are considerable overlaps between the zones with, for example, oak going down to as low as 1,200m in certain places.[3]

The bulk of the cultivated land lies between 900 and 1,800 m. The principal crops grown are rice, wheat, several kinds of millets, and pulses. Even today, agriculture is mainly for home consumption though a small proportion of the cultivated area is used to grow potatoes, a cash crop. Commercial horticulture is important in localised areas. Irrigated land, known as talaon land is mostly confined to valleys and forms less than 10 per cent of the total cultivated area [Government of Uttar Pradesh (GOUP), 1988a: 39]. Most cultivation is carried out on terraced fields rising from the valley floors and is entirely rain-fed. Such lands are known as upraon. The upraon soils are, by and large, light, shallow, and low in humus content. In order to get a reasonable yield, it is necessary to raise their humus content so that their moisture retaining capacity is increased. This can only be done by using organic fertiliser. Chemical or inorganic fertilisers are not cost-effective in the absence of irrigation. This is why their con-

sumption is less than 5 kg/hectare in each of the districts of Almora, Pithoragarh, Pauri, and Chamoli as opposed to an average of 65kg/ hectare for Uttar Pradesh as a whole (GOUP 1988a: 38). Two kinds of organic fertilisers are used all over the hills. One is leaf mould gathered from the forest floor in broadleaved forests like oak. The other is made by using dry leaves or pine needles as bedding for cattle. This, mixed with dung and urine and fermented, serves as manure.

A vital function of hill cattle is the production of manure. Hill cows give very little milk, perhaps half a litre per day on average. Buffaloes are better milch animals. Bullocks are used for ploughing and goats kept for meat. The animals are grazed in common lands and forests. The herbiage on the forest floor provides grazing in oak forests. In chir forests the forest floor is burnt by the villagers in the spring of every year to remove the heavy litter of pine needles that tends to choke grass growth. The rains that follow promote the growth of grass on which livestock graze. (Pine trees are ordinarily fire resistant.) Livestock are also stall-fed but cattle-feed is rarely purchased. The only fodder crop is *jaun* (barley) and due to the scarcity of cultivable land, does not form a major part of animal diet. The main feeds are straw from the kharif and rabi crops, hay made from grass cut from the margins of fields, private plots, common lands, and pine forests, and leaves lopped from several broadleaved species of trees. Of the latter, the most important is oak, found mostly in the forests though also in privately-owned groves. It is of special importance as the main source of green fodder in the winter months. So common lands and forests are an important source of food for livestock. A survey of villages in Dwarahat block, Almora district, in 1982 showed that on average about 57 per cent (by weight) of the fodder needs of livestock were met from common land and forests [Jackson 1985: 137-38]. Thus hill agriculture is crucially dependent on forests and commons for fertiliser, directly in the form of leaf mould and indirectly via livestock.

In addition to this, the villagers obtain firewood and building timber from forests. Most cooking fuel in the rural areas of the hills is still firewood though the use of kerosene and, on a much smaller scale, LPG and biogas is on the increase [Joshi 1987]. Firewood gathered by villagers is mostly deadwood or branches lopped from trees. Felling for this purpose is rare and usually illicit. But trees are felled for timber for houses, cowsheds, and agricultural implements. Small poles are cut for miscellaneous uses. In these various ways, rural life in the hills is very closely tied up with the forests. Villagers' awareness of the importance of their forests and their concern for them is reflected in the region's folk songs [Joshi 1988].

Hill villages are generally much smaller and far less economically stratified than villages in the plains. Holdings are small and relatively equal. Land ownership of more than two hectares seems uncommon and of more than four hectares almost unheard of. There are very few landless agricultural labourers. In each of the districts under consideration less than 2 per cent of the workforce were agricultural labourers while over 70 per cent were cultivators [GOI 1981]. While agriculture is by far the biggest sector of the economy, hill farmers cannot any more feed themselves. The hill population now depends on grain from the plains for a substantial portion of its requirements. This is financed very largely by migrant workers who send back remittances.

III
Traditional Forest Management

Before the British conquest of Kumaun and Garhwal in 1815, the forests were used and managed by the peasantry. As "the waste and forest lands never attracted the attention of former governments" [Pauw 1896: 53], the people had unrestricted use of their produce. Products like medicinal herbs were taxed lightly when exported but local consumption was not taken into account. Since forests and pastures were an important component of the village economy's natural resource base, boundaries between villages had evolved to regulate their use. Forests within the boundaries were considered the common property of the inhabitants, who had the exclusive right to use them [GOUP 1960: 16]. "Almost the whole country, cultivated and waste, exclusive of the largest forests, came to be regarded as within the boundary of one or another village" [Pauw 1896: 36]. These boundaries were the premier institution in traditional forest management, a necessary condition for enabling the inhabitants of a village to evolve a mutually acceptable and sustainable pattern of forest use. They entered government land records with the first British settlement of land revenue in 1823 (Samvat 1880 by the Hindu calendar) and thenceforth came to be known as the *assi sal* (i e, eighty-year) boundaries.

The areas within boundaries were not small. According to J H Batten, settlement officer for Garhwal in 1842, "large portions of wasteland, including whole ranges and their vast forests, have been included from olden time in the boundaries of adjacent villages". Batten goes on to remark that "such a division has been found useful in giving separate tracts for pasture for the cattle of different villages. . ." [Batten 1851: 124]. Through the 19th and 20th centuries, population grew rapidly and with it the area under cultivation. Due to the very low density of population in the early years of British rule, it may be imagined that no regulation of grazing, lopping and other forest use would be needed. But the logic of settled communities making extensive use of forest and grasslands dictates otherwise. In the absence of any co-ordination or control mechanism, the commons problem would come into play. Each household would fell the nearest timber trees, lop the nearest oak trees for fodder, graze cattle on the nearest pastures, in the fear that if they did not, others would finish them. The forests and pastures nearest a village would degrade, with the resultant difficulties of having to go farther afield for fuel, grazing, etc.

Early accounts indicate that one of the means used to prevent exhaustion of nearby forests was transhumance. In all the Kumaun villages nearer the plains, there was an annual winter migration of almost the entire community with their livestock to the jungles of the Terai and Bhabar below the foothills. In upper Garhwal and the interior of Kumaun, summer migration of the menfolk with their livestock to high level oak forests and the adjoining *bugyals* (alpine meadows) was common. Across the hills patterns of forest use and regulation varied with local conditions. To get an idea of some of the traditional ways of management of forest use, consider the lopping of oaks for leaf fodder, recently studied in detail by Marcus Moench in an isolated village in Tehri-Garhwal [Moench 1986, Moench and Bandyopadhyay 1986]. Due to its isolation, the village, Munglori, is typical not of

TABLE 1: AREA UNDER FOREST AND OTHER LAND USES IN FOUR HILL DISTRICTS OF UP, 1972

Land-use	Almora	Pithoragarh	Pauri	Chamoli	Total
	(in sq km Approximated to last 100 sq km)				
Snow and high-altitude meadows	600	3100	0	4200	8000
Cultivated area	1600	700	1100	500	3900
Other non-forest	1400	2600	2400	2300	8800
Total forest*					
of which	1800	2400	1900	2000	8000
'Poor forest'	400	500	800	700	2400
'Medium forest'	1100	1300	1000	1300	4700
'Good forest'	200	500	200	100	1000
Total land area	1500	8800	5400	9000	28600

Note: * This includes all land with standing trees having a crown cover of more than 10 per cent. 'Poor forest' is land with a crown cover of 10-30 per cent, 'medium forest' is land with 30-60 per cent crown cover, while land with greater than 60 per cent crown cover is classified 'good forest'.

Source: Figures for cultivated area are from GOI (1978). All other figures are from Tiwari, Saxena, and Singh (1985) who use 1972 satellite data.

today's villages but of much earlier times. Two hours walk from the nearest roadhead, it is medium sized (47 households) with production directed primarily towards subsistence needs rather than external markets. The total number of livestock was 352 of which buffaloes were 89, cattle 148, sheep and goats 106 and mules and horses nine. Munglori is surrounded by extensive oak forests and grasslands. Its traditional boundaries contain within them 485 hectares of oak forest of which only 98 hectares were lopped for fodder. These were the parts of the forest nearer the village. Persons from other villages explicitly recognised the boundaries and generally did not intrude. When they did, fights occurred.

Within the village, there were hazily defined areas of individual or group use. These were implicit in patterns of use which occurred but were not explictly recognised by village society. Trees close to *chhans* (temporary huts) were saved for times when labour demand was high. People generally cut branches that were easy to collect and which supplied a large amount of leaf fodder relative to wood, in order to reduce the number of headloads they had to carry. Larger branches were therefore not cut, neither were very small twigs. They also tried to avoid damaging trees in order to ensure a sustained fodder supply. This was achieved by not cutting all of the branches, particularly small ones, of any tree and by selecting trees with 'a good crop' of branches on them. Fuelwood was obtained as a by-product of lopping for fodder, from deadwood collected in the forest, and by lopping bigger branches from parts of the forest not usually lopped for fodder. Social norms, custom, and courtesy, were enough to restrain people from over-lopping any tree and from lopping trees near other people's *chhans*. There was an absence of formal controls.

This system seemed to work fairly well but not perfectly. There was no rapid degradation occurring but the forest margin appeared to be gradually retreating in some places. This occurred on the lower south-facing slopes where lopping and browsing pressure was heaviest. The demand for leaf fodder was heaviest from April to June. This was also the season when flowering and pollination of the oaks took place on young shoots (which made the best fodder). Seeding was therefore affected. Moreover, the opening of the canopy due to lopping encouraged the growth of grass and tended to dry up the soil. As a result grazing and the risk of fire increased. Seedlings did not survive to maturity and so regeneration ceased. As the older trees died or were felled for timber they would not be replaced. In areas where lopping pressure was only moderately heavy or on east or west facing slopes where the soil was more moist, regeneration did not cease but oaks were found as bushes since regular lopping prevented their growing into trees. However the percentage cover given by these bushes was found to be the same as that of unlopped forest of the same aspect, and so was the quantity of leaf litter present. The hydrologic cycle and soil conservation are therefore unlikely to have been affected in these areas.

As was remarked earlier, Munglori is hardly representative of villages in the region today. With its ability to feed itself, extensive forests, absence of both government controls and commercial felling, and no easy access to markets in which surpluses could be sold, it is really typical of much earlier times. It shows that loose controls maintained only by norms of behaviour could, in such circumstances, be all that was needed for a village to maintain its forests in a reasonably good condition. For early periods only fragmentary references to traditional methods of regulating the use of forests and pastures are available. In Kumaun in the 1930s, raising grass for hay-making on village common land was apparently common. Pastures near villages were "carefully fenced, either with stone walls or with thorny bushes, and the grass . . . allowed to grow for hay. This . . . (was) cut in October and stored for the winter". In the high pastures where cattle were taken in the summer, a village would raise "a hay crop, leaving a particular area ungrazed by mutual agreement during the pasture season". In the autumn the villagers would jointly mow the hay [Pant 1935: 171].

In places where the population became dense, such as in the fertile valleys, and consequently forest resources became scarce, regulation of use tended to be stricter.

> The villagers, pressed by hard necessity, often deliberately let a few pathces of arable ground lie waste for grazing. A measured plot of land, subscribed by the entire village community, is also kept as a grass preserve and constantly watched. Here the hay is cut at fixed periods by mutual agreement. This means considerable self-denial and forethought on the part of the village community [Pant 1935: 172].

Or,

> here may occasionally be seen a carefully preserved oak forest lying close to the village like an oasis surrounded by a desert of bare land and cultivation . . . or perhaps a strip of bare hill side will have been annually protected for the sake of its grass alone [Osmaston 1932: 605].

In the 1920s a government official, J K Pearson, remarked on how customary restrictions on the use of forests operated 'over large areas'. Conservation was achieved by customary limitations on users rather than formal management. However, in many oak forests rules prohibited lopping of leaves in the hot weather, and the grass cut by each family was strictly regulated. The penalty for infringement of these rules included boycott and/or exclusion of the offender from the forest. Pearson was struck by villages' fuel and fodder reserves, walled in and well looked after. The planting of timber trees was reported to be fairly common in Tehri Garhwal and village forests carefully guarded. In one of the parganas of British Garhwal branches of trees were cut from *banjanis* (villages' oak forests) only at specified times with the permission of the entire village community [Guha 1989: 31-32]. In Kumaun, unofficial *lath panchayats*, composed of village elders whose authority was respected, protected village forests by regulating their use.

Thus villagers had developed a variety of social arrangements suited to the prevailing conditions to ensure that they did not suffer from a scarcity of the forest resources on which they were so dependent. The absence of any reports of shortages of forest produce in the period preceding the advent of commercial forestry suggests that these methods were generally successful in resolving the commons problem.

IV
Commercial Forestry and Changes in Property Rights

With the coming of commercial forestry new demands were placed on forests. In order to meet the demand for sleepers and fuel from the railways that began to be built in India in the second half of the nineteenth century, the colonial government set up a forest department and passed the Indian Forest Act in 1878. This empowered the government to reserve for the state's use all forests not on privately owned land. In fact, the British government simply refused to recognise traditional notions of community ownership and declared all non-private land to be state property. Around 1911, antiseptic treatment of the softer Himalayan pines, (chir, kail) enabling their use as railway sleepers was perfected. About the same time, methods of distillation were evolved which allowed Indian rosin and turpentine made from the resin of the chir tree to compete with foreign varieties. Following these developments came the forest settlements of 1911-17 which reserved for state use 7,500 sq km of (mainly chir) forest land in the Kumaun division (more than a fifth of the total land area). Most of these new reserved forests, now under the forest department's control, were in the middle hills, the most densely populated parts of Kumaun and British Garhwal, containing the most productive land.

Given the new commercial demand on the forests, restrictions on villagers' use had to be imposed to ensure regeneration in felled areas. The forest settlements allotted 'rights and concessions' to villagers in reserved forests. These were limited to the amounts traditionally used by each village, as given by the population at the time of the settlements. Villagers were allotted specified quantities of timber for which applications had to be made to the divisional forest officer. The numbers of cattle grazed were limited, and restrictions were placed on lopping trees for fodder or fuelwood. The annual practice of burning the forest floor was

banned within one mile of reserved forests. Since this excluded few habitations in the more populous areas, it meant the practice became virtually illegal. (Fires were a threat to regeneration in felled areas since young chir saplings are quite vulnerable to fire. Resin tapping makes even mature trees vulnerable since the inflammable resin in the exposed channels can catch fire and damage the trees.) The remaining non-private land within the *assi-sal* boundaries of villages was designated civil forest and placed under the control of the revenue department headed by the deputy commissioner in each district. Rather less onerous restrictions were placed on the use of forests in this category. Since the revenue department did not really have the staff to enforce them, they were also more a statement of intent than an actual change of the kind that happened in reserved forests. Moreover, since there was no commercial exploitation, the village community's ability to control use was not so drastically affected.

Naturally, these developments played havoc with the villagers' customary patterns of use. Apart from very many petty violations of the forest laws, there were massive popular protests and huge incendiary fires in the commercially valuable chir forests in 1921. With the trees being tapped for (inflammable) resin, the open channels caught fire and the trees, otherwise fire-resistant, were destroyed.[4] Following these protests, an alarmed government changed its policy essentially from one of allowing the villagers to take only the minimum of forest produce necessary for their sustenance to one of restricting the villagers' use of forests only to the extent considered necessary for the efficient continuance of commercial forestry. Nearly all the restrictions in civil forests were removed. The same was done with most oak forests and small areas of non-exploitable chir forests within the reserves. These were now designated Class I reserves and handed over to the nominal control of the revenue department. In fact, the government order in this connection (dated October 22, 1925) stated explicitly that "all bona fide residents of Kumaun are permitted to graze cattle without limit or restriction, fell and lop trees, cut grass and exercise all other rights of user in Class I reserves..." [GOUP 1960: 87-88]. Fire protection was also withdrawn from these forests. The bulk of the chir forests, and a few oak forests were, however, retained by the forest department to be commercially exploited and many of the old restrictions in them remained in force. They were now called Class II reserves. Finally, a fourth category of forest, panchayat forest, was created in 1930. The government issued the Kumaun Panchayat Forest Rules under which villagers could apply to form a panchayat to manage, for their own benefit, civil, Class I, or Class II reserved forests within their *assi-sal* boundaries. Many such officially sanctioned forest panchayats (or van panchayats—thereafter VPs) were formed in the early 1930s, and their formation continues to the present day, but even now the area under their control, about 2,200 sq km, amounts to less than 13 per cent of the 17,000 sq km area legally classified as forest in the four districts of Almora, Pithoragarh, Chamoli and Pauri. 9,000 sq km (53 per cent) is legally reserved forest while 5,900 sq km (35 per cent) is civil forest.[5]

In 1964, all the Class I forests were returned to forest department (FD) control since it had become profitable to exploit the higher oak forests for charcoal and firewood and other broad-leaved species for making sports goods. What happened to the forests under these different modes of control is described below.

Class I Reserved Forests

These were broadleaved, mainly oak forests in which there was no exploitation by the state. But the restrictions imposed on the villagers by the government following reservation no doubt weakened the former's sense of ownership. And even when restrictions were removed in 1925, the legal sanction accorded the village boundaries was gone. Villagers could not legally prevent outsiders from having access to reserved forests within their *assi-sal* boundaries. As a result, those for whom it was expedient to violate custom could now do so with the law on their side. The following note by the deputy commissioner of Garhwal in 1930 brings this out very clearly.

> In going through the top-most parts of the Sol portion of Bindarpur Walla near the edge of Dunga Bugial, I came across the first large manifestation I have seen, and an extremely interesting one, of the use of the privilege given to 'all bona fide inhabitants of Kumaun' of grazing etc in Class I forests.
>
> The people of Ratgaon tell me that in the last three or four years, not only have the people from Pindarwar and elsewhere used Dunga Bugial as was customary, but they have brought their cattle and built *chappars* (temporary huts) in the oak forest class I above the village within the Ratgaon *sal-assi* area.
>
> When the villagers objected the newcomers merely said the area was forest and they had as much right as the Ratgaon people themselves.
>
> Ratgaon naturally wanted to know whether this was true and whether they had any remedy. I told them that the only thing I can think of for them was to apply for a sufficient block of the jungle as communal forest...
>
> The privilege to all bona fide inhabitants is only now becoming known and this, as I have said, is the first big use of it that I have seen. But once it is generally known I am afraid there will be enormous damage even to these big forests in the upper country unless communal forest arrangements get in first and save them.[6]

The conservator of forests, Kumaun Circle wrote that,

> This year, 1931,...it is evident that the serious damage reported by the commissioner nearly five years ago has continued practically unchecked (except for small banis) that the oak is melting away in Kumaun like an iceberg on the equator...Evidence that springs are beginning to dry up here and there is already available...The villagers at Bijepur, who came to see me are very bitter that "all bona fide residents of Kumaun" should come and wipe out their oak forests and thereby cause their water supply to dry up.[7]

With the disempowerment of traditional authority the forests deteriorated, the ones nearer villages being finished first, then others further off, and so on. According to the FD working plans [Lohani 1962: 35, Singh 1967: 19-20, Soundal 1960: 34, Gupta 1971: 15] by the time the Class I reserves were returned to FD control, all the oak forests near villages had either deteriorated into scrub, or been replaced by chir forests. This affected the soil and so the flow of water in springs, the only water sources on the ridges and their slopes. This situation remains substantially unchanged today.

Class II Reserved Forests

With large-scale exploitation by the state in these forests, the hill people comletely lost rights of control and their rights of user were also severely restricted. Restrictions on rights of user directly weakened villagers' incentive to allow regeneration and conserve forests. The loss of control weakened this incentive indirectly by creating uncertainty about whether forest produce might not be appropriated by others. While the people could do nothing about their loss of control, they did not accept their loss of use rights. Exploitation by the state was supposed to be according to 'scientific' working plans that ensured regeneration, but such regeneration very often failed because the plans did not realistically account for the villagers' actions. The forest department's attempts at policing the Class II reserves usually proved to be ineffective.

As an example consider the Chandag fuel and fodder reserve in Pithoragarh district. The entire north facing slope of a ridge about 300 metres high and six or seven km long, covered with dense oak forest, was included in this reserve since 1911. At the bottom of the slope is a line of six villages. From 1938 to 1957, the forest was worked commercially for firewood and charcoal by contractors for the forest department. There were periodic closures to grazing and lopping in areas where fellings had taken place, to permit regeneration. This evoked protests in the surrounding villages. The closures were clearly not effective since in 1956 the working plans officer termed the process of regeneration 'unsatisfactory'. Of the areas that had been enclosed, 40 hectares were transferred to van panchayats, while of the remaining 108 hectares, 68 hectares were grass and scrub and only 40 hectares were successfully regenerated, and that too, partly by conifers rather than oak [Soundal 1960: 70-3].

Mathura Dutt Patni, who was the first sarpanch of the van panchayat of Majhera village when it was founded in 1935, told me that all the big oaks in the reserve were felled in the 1950s for charcoal and fuelwood for sale in nearby Pithoragarh town. After this, villagers from the Pithoragarh valley a few miles away started felling trees to sell as firewood by bribing the guards. Seeing this, the residents of the six villages also did the same in order not to lose out. After 1960 no more contracts for felling were given as 'there was nothing left to give'. At the end of the working plan period in 1968, the working plans officer reported a total failure of regeneration due to 'ruthless and repeated lopping' and 'inadequate protection from the villagers and their cattle'. Barbed wire fencing had proved ineffective since it was cut by the villagers and stone walls were broken down. The entire area had become scrub forest [Gupta 1971: 108]. It remains so today making a poor grazing ground for the villages' cattle. In striking contrast, providing a reminder of the past, are the dense oak woods forming a belt between the villages and the scrub of the reserve. This belt consists of the villages' panchayat forests. This pattern of felling followed by failed regeneration has been repeated across the hills. "Numerous instances are seen of panchayat and civil forests being closed to grazing by common consent, where copious regeneration presents a striking contrast to the heavily browsed and inadequately regenerated reserved forests in the vicinity." [Singh 1967: 109-10].

The bulk of the Class II reserves however, consisted of chir forests. Being coniferous, chir could not be browsed, nor used as fodder and so regenerated more easily. This was one reason why chir replaced oak in the lower parts of the latter's range. The other reason was the deliberate policy that the FD followed for several decades of replacing oaks by the more profitable pines [Guha 1989: 50-51]. The same factors have led to ecological deterioration in the chir forests with a reduction in the admixture with broad-leaved species and a depletion in the understorey. Apart from active intervention that removed oaks and other broad-leaved species in mixed broadleaved-pine areas, the FD's policy also provided selective protection to chir. The adverse consequences of this for soil and water conservation have already been noted. In many areas, chir forests have become very sparse though they have not suffered deforestation of the kind that oaks have.[8] The greatest source of damage to chir has been fire. Before commercial exploitation began, the annual fires set by villagers to promote grass growth would normally do more good than harm (by removing the combustible material on the forest floor and so reducing the risk of larger destructive fires). The risk of these fires becoming destructive greatly increased with the concentrated regeneration and resin tapping operations characteristic of commercial forestry. Now, greater care and selectivity in lighting fires (e g choosing a time when the weather is not too dry, when the wind is blowing downhill rather than uphill, etc.) and willingness to fight fires which threaten to get out of control is needed. But with the benefits of exploitation for timber and resin not going to the villagers (except for individuals employed in the industry) such care may not be taken. So it is not surprising that destructive fires are a recurring feature in chir forests. According to one divisional forest officer, [9] the annual fires prove to be large and destructive once every four or five years, the last year (1989) being an example. Since enforcing the ban on fires in reserved forests is even harder than controlling lopping and grazing, this occurs despite the forest department's efforts at fire protection which include 'control burning'.

It needs to be emphasised that better protection of the reserves by the FD is not just a matter of administrative improvement. Given the villagers' dependence on the forests, it would result in considerable hardship for them, and so, apart from being inhumane, is politically impossible. It is, in fact, even administratively impossible since forest guards have to live among the people and so cannot enforce harsh restrictions. Another serious problem in the reserves was the flouting of rules and over-felling and over-tapping by contractors engaged by the department. A walk through almost any chir reserved forest in the hills reveals that the grooves cut in the bark to expose the resin channels are invariably deeper than the FD's norms allow. This weakens the trees and narrows them near the base; many suffer further damage from fire and then fall in storms, the trunks breaking at the weakened spot. Over-felling beyond working plan prescriptions has also been an increasingly frequent occurrence after independence. This is well known, although of course impossible to quantify. Since the 1950s the FD has been under pressure to provide more and more timber, pulpwood, resin and fuelwood [Guha 1989: 138-43]. This probably led to corners being cut even in working plan prescriptions.

This is also an incentive problem of a sort. Government control gives politicans and officials the power to disburse access to forest resources. In a corrupt polity, these disbursals are made to businessmen in the forest-based industries for a price. But since the control that businessmen and individuals in the state apparatus have is temporary and partial, there is no incentive to use resources sustainably. Over-exploitation is the natural consequence. Typically, the resulting costs borne by the public are widely dispersed in time and space, cannot be traced back their source, and hence cannot become a political issue.[10] The political-industrial complex has demonstrated its power recently by its evasion of the ban on commercial felling of green trees above a height of 1,000 metres, that was imposed by the UP government in 1981 on the instructions of the central government. One method used is to pay villagers to set fire to forests so that the trees die and can then be legally felled.

Civil Forests

These are the lands within village boundaries that were informally managed by the risidents, although formally under revenue department control. Various sources are agreed that they are now generally in a worse condition than reserved or panchayat forests, with few trees and poor growth of grass.[11] Some exceptions to this rule still exist where village communities have successfully protected oak forests in civil land. Also, not all civil lands were forested to begin with, so the extent of deterioration may by somewhat overstated. Village boundaries were not disturbed in civil lands and exploitation by the state was rare. Yet the reservation of surrounding forests affected their use. The cumbersome procedure for applying for timber from the reserves, to which local residents had a right, led them to concentrate their demand on their civil forests [Pant n d: 61-2, Osmaston 1921: 24]. By the 1930s transhumance was on the decline due to restrictions on grazing in the reserves [Pant 1935: 170-1], leading in turn to more pressure on civil lands. With the growth in human and cattle populations and the extension of cultivation over the years, demographic pressures increased. Villages in which the regulation of forest use was maintained by custom and consent alone may have been unable to adapt to the changing circumstances and so fallen victim to the commons problem. Villages with *lath panchayats* that could modify patterns of use would have done better.

But even *lath panchayats* experienced a decline in their traditional authority and so found it difficult to protect their woods and pastures. (This was why many of them applied for official status as van panchayats.[12]) In the last thirty years, the network of roads in the region has expanded enormously. As transport and communications improved, villages were connected with markets so that surpluses of timber, firewood, hay and milk, all requiring forests for their production, became saleable. This tended to increase the exploitation of forests. As villages lost their insularity, the disciplinary force of custom and social boycott greatly diminished. Moreover, the wielders of traditional authority, have in many cases, themselves become petty contractors and businessmen and can no longer be trusted not to misuse their authority, now that profitable opportunities for such misuse have become available.

Finally, colonial law de-recognised the community's right of control over village common lands, allowing only for individual rights of user. As a British official put it, "the tendency of our system of government has to a considerable extent, been to break up village communities, and now for the most part they are heterogeneous bodies rather than communities".[13] As an illustra-

tion of how this happened consider the following: In 1932 Jeet Lal, a resident of the village of Papdev near Pithoragarh, was prevented by some other villagers from taking his share from a grass preserve on the village's civil land. He went to court and the accused were fined Rs 100. They appealed to the deputy commissioner, Almora, who dismissed their appeal on the ground that, although Jeet Lal was alleged not to have contributed to the cost of walling the preserve, civil land was open to all residents of the village so Jeet Lal nevertheless had a right to a share of the grass.[14] The law thus revoked the community's authority over civil land and sanctioned the taking of 'free-rides' by individuals.

Civil forests, apart from being over-used, have also shrunk in area because most of the extension of cultivation that has taken place in this century has been in this category of land. It may seem that this is no cause for regret since the benefit of putting land to agricultural use is balanced against the loss of forest produce. While this may be true for privately owned land (the owner would weigh benefit against the cost), in the case of civil land, much of the cost is external to the gainer. For while the benefit of cultivation goes entirely to the cultivator, the loss of grazing, firewood, etc, is borne by the entire village. Since it has never been practical for the cultivator to compensate the rest of the village for its loss, extensions of cultivation have always been a conflict generating process. One author wrote of British times that "the policy of making new grants in forest land adjoining the villages has been responsible for the destruction of much valuable forest. The people who actually secure these grants are not the poor and needy, but merely a few grasping individuals who can easily satisfy the lower grades of state officials. Every new grant in a village means a certain curtailment of the common rights of the village community. Such grants have become a fruitful source of dissension, and are weakening the strong clan-spirit of the village." [Pant 1935: 86].

While today's government no longer makes grants, it does not seriously attempt to prevent take-overs of civil land by individuals. The pattern of the more well-to-do and powerful in a village being the most assertive continues, as I saw in more than one place. In today's circumstances it is really doubtful if the land being taken over for cultivation does yield more in the new form of land-use, since such land is generally very poor, and on steep slopes. As a result many of the *maaldaars* (as one encroacher called his fellow encroachers) prefer if they can, to keep such land as their private grass preserve rather than cultivate it.

Panchayat Forests

Van panchayats have, by and large, maintained oak forests very well, especially in contrast to the dismal condition of the reserves (except for those reserves distant from habitation). The position in respect of chir forests is not so clear, but they seem to have done about as badly under van panchayat control as in the reserves. Various studies suggest that over-all, panchayat forests seem to be in as good or better condition than the reserves.[15]

It is not difficult to see how this position was reached. Local farmers can avail of a stream of benefits over time from oaks in VPs—continuance of water supply in springs, fallen oak leaves for bedding for cattle and for manuring, green leaves for fodder at a time when other green fodder is not available, and if the forest is large enough, also fuelwood, and timber for agricultural implements. In fact, just the first two benefits mentioned above seem to be sufficient motivation for panchayat forests to be well protected. At least four of the VPs in the table—Kotuli-Gandhak, Bakarkatya, Majhera, and Singchaura, have too small an area under their control to provide significant amounts of the other benefits to rightholders. But chir forests (especially when the admixture with broad-leaved species is low) do not have a good humus layer in the soil and so tend to be of less use in water conservation. Pine needles are much worse than oak leaves for use as bedding for cattle and manure, and of course, pine needles are no use as fodder. As a result, the main benefits of pine trees, apart from fuelwood, are for timber in house construction or for sale, and resin for sale. Moreover, there is a trade-off between grass production in chir forests and resin production and regeneration of the trees, owing to the need to fire the forests to stimulate the former.

Now in both reserved forests and panchayat forests, villagers cannot directly benefit from commercial sale of timber and resin. Even in panchayat forests, their rights of use and control have been restricted in this respect. In the VPs as presently constituted, only 40 per cent of the proceeds from sales go into panchayat accounts and even these can be spent only with government (i e, the deputy commissioner's permission on 'improving the forest' and 'other development works'. In other words, hard cash is not forthcoming. Moreover, since 1972 van panchayats have had to obtain the prior permission of the divisional forest officer before they can fell trees even for the right-holders' domestic use, although in 1976 this power was returned for use 'in special circumstances' in case of 'urgent need'. But the net effect is still to introduce considerable uncertainty into villagers' minds about future benefits from the trees in the form of timber. It is perfectly natural therefore that villagers when firing the forests or putting out destructive fires give more weight to grass production than tree growth and so exercise less care than they would if some of these benefits were available to them.[16] This illustrates once again how a restriction on villagers' rights of user that is meant to protect trees may have the opposite effect, by adversely affecting the incentive to let them grow and regenerate. This is why chir has fared rather poorly in both panchayat forests and reserves, unlike oak, which has flourished in the former and been decimated in the latter.

A brief survey of the functioning of the van panchayat system is in order here. The VPs are constituted under the Forest Panchayat Rules 1976, made by the government of UP under the Indian Forest Act, 1927. The original rules were issued in 1930 under another act, were amended from time to time and were replaced by new rules in 1972, which in turn were superseded by the 1976 rules.[17] A VP is formed when a third

Table 2: Condition of a Random Sample of Panchayat Forests, 1989

Sr No	Village	District	Type	Condition
1	Darim	Nainital	Oak	G
2	Simayil	Nainital	Oak	G
3	Baret	Nainital	Oak	G
4	Myora	Nainital	Oak	M
5	Satkhol	Nainital	Chir	P
6	Kunja-Khali-Lasna	Almora	Oak	M
7	Kotuli-Gandhak	Almora	Oak	G
8	Papdev	Pithoragarh	Grass preserve	NF
9	Bajeti	Pithoragarh	Chir	P
10	Digtoli	Pithoragarh	Chir	P
11	Tarigaon	Pithoragarh	Chir	M
12	Chhana	Pithoragarh	Oak	M
13	Halpati-Gonriagaon	Pithoragarh	Oak	G
14	Bakarkatya	Pithoragarh	Oak	G
15	Dhunga	Pithoragarh	Oak	G
16	Kante	Pithoragarh	Oak	G
17	Majhera	Pithoragarh	Oak	G
18	Singchaura	Pithoragarh	Oak	G
19	Singtoli	Pithoragarh	Oak	G
20	Jagtar	Pithoragarh	Oak	G
21	Bhurmuni	Pithoragarh	Oak	G

Note : G = Good, M = Medium, P = Poor, NF = No Forest.
Source: Observations in the field.

or more of the residents of a village apply to the deputy commissioner to form one on any non-private land within the settlement boundary of their village.[18] This excludes reserved forests altogether. Provided that not more than a third of the residents object to the formation, the DC or his representative can give permission for the formation after hearing claims and objections. The villagers then assemble in his presence and by voice vote elect a panchayat of five to nine panches (members) who in turn elect a sarpanch from among themselves. This system seems to successfully avoid the divisiveness that secret ballots lead to and generally ensures that different factions, (e g, castes and *toks* (hamlets) within villages) are represented in the panchayat.[19] The panchayat is empowered to regulate the use of the forest. In chir forests, its main task is to ensure closure to grazing for grass growing during the monsoon and to organise the cutting and distribution. This is usually done by all the women of the village together under the supervision of panches.

Usually a watchman is appointed to see that lopping, felling etc, are not done without the VPs permission. His salary is paid by villagers' contributions to the panchayat. In some villages, each household takes turns to patrol the forest. In oak forests lopping is usually permitted only at certain times of the year and is usually done by the women under the supervision of the watchman. As pointed out earlier, timber cannot be utilised (from all but fallen trees) without the forest department's permission. And since this is usually too troublesome or expensive to obtain, some sarpanches unofficially permit villagers to fell trees occasionally. Even in some of the villages where panchayat forests are in a generally good or excellent condition, the panchayat's rules are not strictly followed and there are a certain number of violations. In oak forests, the one noticed most frequently is the lopping of leaves for fodder by women at times when they are not supposed to, or theft by women of neighbouring villages. The style of functioning of the panchayats, with decisions about regulating lopping etc being taken in closed-door meetings of mostly male panches, is probably in part responsible for this. Although the men of the village may not object to a panchayat decision on closing the forest to lopping, it is the women who feed livestock and do most other agricultural and domestic work. Their lack of participation in decision-making could lead them to break the rules. This authoritarian style of functioning is a carry-over from the *lath panchayats*, and, due to the social changes mentioned earlier, is becoming increasingly unviable.

Violations also occur if some families renege on their commitment to contribute to the watchman's salary, who slackens his patrolling as a result, unless the VP has other income from which to pay him. In most cases, such infringements do not appear to pose a threat to the forest. When caught, offenders are generally fined by the panchayat. But fines are not always recoverable, for if the offender is not willing to pay, the panchayat has to take legal action to recover dues. Since this involves a complaint to the revenue department and possible extortion by revenue officials, sarpanches often hesitate to take a step with possibly drastic consequences due to the bitterness and bad blood thereby created in the village. Moreover, complaints or cases filed with the revenue department involve considerable uncertainty about outcomes in the 'other direction' as well, in the sense that no action may be taken on the complaint at all. It is when this happens that there is a serious threat to the forest for when some people get away with over-use or encroachment, others may follow until no forest is left.

V

Incentives and Control

The preceding history has shown that the prevailing system of property rights and the incentives created by them are central to explaining deforestation in the UP Himalaya. Two main features of the system have contributed to the degradation of forests. The state's control over forest lands allows politicians and bureaucrats to act in collusion with businessmen to exploit forests for private gain. Lacking long-term control, they strive for immediate gains, which results in over-exploitation. Simultaneously, the destruction of community control and restrictions on local people's use have weakened villagers' motivation and ability to use forests sustainably, owing to their uncertainty about whether they would be able to reap benefits in the future.

The oft-repeated view that attributes deforestation mainly to population pressure [e g, Nautiyal and Babor 1985] is misleading. Deforestation would occur even when population density is low if no system of control of forest use by settled communities existed. It did occur, in widening circles around villages, within a few years (hardly enough time for a population explosion!) of traditional controls being disturbed in the 1920s. And deforestation does not occur even when population density is high, provided a control system exists, as is demonstrated by the densely populated valley below the bare Chandag Reserve, with its well-protected panchayat forests. The decisive factor has always been the presence or absence of community control. A high population density is undesirable not because it causes deforestation, but because it results in a lower per capita availability of forest and other resources.

I now proceed to examine the crucial question: What is it that makes for effective 'community' control? How do individuals form a 'community' that can agree on control of forest use? To begin with, consider a hypothetical situation in which the residents of a village have exclusive rights of user in a piece of forest land. For simplicity, assume there is only one kind of product, say leaf fodder. Let 'M' be the maximum quantity of fodder that can be lopped each year if the trees are not to be damaged and their productivity lowered in the next year. Suppose the villagers agree to each confine their lopping to an equal share of M each year, provided everyone else does the same. Suppose further, that any violation of this agreement is easily detectable. Then the agreement is entirely self-enforcing. For each person knows that if they cheat, the others will as well, and so their fodder supply in years to come will be jeopardised. The only implicit assumption necessary for this perhaps surprising conclusion is that the villagers have a long-term stake in the forest.

Of course, this outcome is very fragile. A deviation by a single individual can destroy it. What lent it stability for hundreds of years in villages like Munglori (the Tehri-Garhwal village studied by Moench) was the force of custom and social norms. It was this that easily enabled an (implicit) agreement to be reached in the first place, while fear of social disapproval, boycott, etc, ensured that no one violated it. Good neighbourliness, trust, and people's sense of right and wrong, contributed to the maintenance of the socially desirable outcome. In villages which had lath panchayats, these regulated the level of use and their authority controlled violations. The stricter regulation (walling, patrolling, etc), observed in areas of high population density was because of the increased incentive to cheat in such circumstances.

The fragility of the equilibrium outcome described above makes it easy to understand the disintegration of community control in civil forests. The reduced access to surroun-

ding reserved forests concentrated demand in civil forests and changed prevailing patterns of use, necessitating the reaching of a fresh agreement among the inhabitants of a village. Also, the possibility of selling firewood and timber, once access to roads and markets was obtained, increased the incentive to cheat. In fact, those best placed to take advantage of these opportunities to get rich would have been the well-to-do, usually members of the lath panchayat. Further, the law's derecognition of traditional authority made it harder to punish violators of the agreement.

To sum up, the conditions necessary for effective community control in today's circumstances are:

(i) The existence of an institution that facilitates agreement among the residents of a village on the exploitation and sharing of forest produce.

(ii) Effective monitoring of forest use so that residents know that the agreement is being adhered to, and that they are not going to lose any part of their share of benefits.

(iii) Adequate provision to penalise violators of the agreement.

VI
Conclusion

It is clear from the foregoing analysis that a reform of property rights in forests is needed if ecological deterioration in the UP Himalaya is to be halted. Community control and villagers' rights of user have to be ensured in all forests that are near enough to villages to be used by the local people. Only inaccessible forests should remain under forest department control, to be left unexploited so as to maintain a store of genetic diversity in both flora and fauna. The existing institution of van panchayats can be extended to all villages and modified, so that the conditions necessary for effective community control are satisfied, and incentive problems are resolved. I describe below the features that the van panchayat system should have.

Firstly, the natural principle of an equal share of benefits from the panchayat forest, to each of the residents of a village, can serve as the basis for agreement on forest use. Since hill villages are characterised by an absence of sharp class divisions, agreement on this basis is workable. Since decision-making in the van panchayat system is delegated to the panchayat, it must reflect broad agreement among the villagers. So the current system of elections to the panchayat, that makes for representation of all groups, should continue. To further ensure that VP decisions reflect the villagers' will, residents should be enabled to attend all panchayat meetings, though not vote, of course.

The next condition for maintaining the people's interest in conserving forests, is that they have confidence that the benefits will not be misappropriated. Openness of panchayat meetings is important for this. In order that villagers have every incentive to protect trees, van panchayats must be allowed to engage in commercial exploitation and pay dividends (in equal shares) to right-holders. The current bureaucratic restrictions must be removed. Since there is greater scope for misappropriation here, better control is needed. First, all transactions involving sale of forest produce or large expenditure by the panchayat must receive the prior approval of the general body of the village. Secondly, commercial exploitation—felling and resin tapping—needs some insulation from the pulls of village politics, which might make for too frequent felling and tapping as some individuals try to buy others' support. Panchayats should be obliged to draw up a scheme of management covering a long period, say ten to twenty years, depending on local conditions. The FD should appoint some member of its staff to liaise with each VP and give advice in this regard. The department should have the power to prevent or postpone felling for sale and resin tapping. The panchayat should be permitted to fell and tap for resin, only trees marked by the FD for the purpose. Resin tapping should be carried out according to the FD's norms, which should be made freely available to the people. This system would provide the latter with a benchmark to check that their forests are not over-exploited. It also encourages long-term planning that makes for better use of resources.

Giving the forest department a veto power over commercial exploitation has one possible drawback. Officials may use the power to try and extract concessions from the villagers, which might result in the latter losing interest in sustainable exploitation. To help guard against this, the FD should receive a percentage, say between 25 and 50 per cent, of the proceeds from sales by van panchayats. The department would then be more likely to co-operate with the VPs and prevent its staff from hindering them. In any case, given the influence that forest-based industries have with the state government, there will be pressure against actions that prevent forest produce from being marketed. In fact, such a structure of rights of user and control would encourage the FD to give more attention to the van panchayat's needs.

This is necessary in order to meet the last condition for sustainable community forestry, that violations of the van panchayats' rules be effectively punished. The FD, rather than indifferent revenue officials, can help VPs prosecute offenders who refuse to admit their guilt and pay the penalty.

The removal of state control suggested here is to ensure that public forests are not over-exploited for private gain. Its replacement by community control is to enable villagers to use forests sustainably. Since local communities would use forests for agricultural as well as commercial/industrial purposes, the bias towards pine monocultures would tend to be corrected in favour of the agriculturally more useful broad-leaved species, that are also better for soil and water conservation.

In conclusion one may note that some features of Himalayan deforestation are common to other parts of India. The same reservation of forests for state use, occurred all over the country. Patterns of use by the local people, whether hunter-gatherers, shifting-cultivators, pastoralists, or settled agriculturalists, were disrupted by state forestry. This is likely to have had similar effects. To this extent, the analysis presented here may be relevant. But the policy proposed may not.[20] Where a sharp class division exists in local communities, reaching agreement on forest use may not be possible. Equal sharing would not be acceptable to the powerful, and any other division could be subject to continual dispute as long as the underlying class conflict is not resolved. Conflict resolution is essential for sustainable use of public forests. In fact, the history of deforestation in the UP hills can be read as a history of conflict between the peasantry on one side, and the state and industrial interests on the other. And the policy proposed here would, roughly speaking, resolve this conflict in favour of the peasantry, who would be able to wrest better terms for the resources that were diminished in the course of the struggle.

Notes

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1 Nainital and Dehra Dun districts are excluded because large parts of them are in the plains. Pre-independence figures for the remaining districts, Tehri and Uttarkashi, are not available since they formed the princely state of Tehri Garhwal. For the same reason, the historical narrative in the paper excludes them from its scope, as the details, is though not the general structure, of forest administration, were different.

2 This is worked out as follows: Of a total forest area of 8,000 sq km in 1972, 2,400 sq km (i e 30 per cent) was 'poor' forest. (Table 1). The gazetteers [Walton 1911a, 1911b] indicate that at the turn of the century the forests were in their natural state, which means 'medium' for pine and 'good' for oak and others (Singh and Singh 1987: 104-106). So degradation has affected at least 2,400 km. Add to this the unknown but certainly significant portion of the 8,800 sq km of mostly scrubland that was once forest and is now classified 'other non-forest' in Table 1 and the area affected by degradation may be much larger. The extension in cultivated area between 1902 and 1972 was however, only 1,700 sq km [GOI 1904: 66, and Table 1].

3 For a detailed description see Singh and Singh [1987].

4 See Guha [1989] for this history. Also G B Pant (n d), and P N Gupta [1982].

5 If Tehri and Uttarkashi districts are included, then reserved forests are 66 per cent, civil forests are 26 per cent and panchayat forests are 8 per cent of the area legally classified 'forest'. There are no van panchayats in these two districts [GOUP 1988b: 47].

6 A W Ibbotson to N C Stiffe, commissioner, Kumaun division, dated April 24, 1930, in File No 312 of 1925, List No 64, Uttar Pradesh State Archives (hereafter UPSA).

7 Note by E A Smythies in 'Agenda for the 16th meeting of the Kumaun Forest Committee', File No 312 of 1925, List 64, UPSA.

8 Based on my own impressions during travels in Almora and Pithoragarh districts. Also Gupta [1971: 60, 97]. This picture is only impressionistic of course. A more precise picture can be got only by detailed empirical studies that examine the condition of different legal categories as well as ecological types of forest on the basis of satellite data and ground-level observation. This has so far not been done.

9 Interview with the DFO, West Almora, 21.6.1989.

10 Of course this problem is common to all public-sector industries in India. Nor is it confined to Indian forests. The United States Forest Service, the American equivalent of the FD, has for several decades been over-cutting and selling timber to the timber industry at throwaway prices, sometimes too low to cover even the cost of the roads it builds for extraction. See 'Time for a little perestoika', *The Economist*, 10.3.1990, p 40.

11 My own observations tally with the opinion of the chief conservator of forests (Hills) UP, quoted in Saxena [1987: 2-3].

12 E g, the VPs of Singtoli in 1966, Singchaura in 1958-59, Kante in 1953, and Kotuli-Gandhak in 1944. From the files on van panchayats of these villages, respectively. Number Mukadma 410, Tareekh Phaisla 23.8.66. NM 273, TP 28.7.59; NM 803, TP 14.8.53 in the record room, collectorate, Pithoragarh; and NM 287, TP 13.12.46 in the record room, collectorate, Almora.

13 J A Voelcker, [1897] *Report on Indian Agriculture*, Calcutta, p 16, quoted in Guha [1983: 1885].

14 From van panchayat file of Mauza Papdev, Number Mukadma 802, Tareekh Phaisla 11.8.53, record room, Pithoragarh.

15 In 1960, the Kumaun Forests Fact Finding Committee found the condition of panchayat forests to be 'generally satisfactory' [GOUP 1960:33]. A study of 11 VPs in five of the eight hill districts in 1983-84 by the evaluation unit of the state planning division found that all of them had prevented illegal felling and damage due to fire, ten had prevented undue damage to the trees, nine had prevented encroachments and eight had exploited forest produce scientifically [GOUP 1984: 28]. Ballabh and Singh [1988] of the Institute of Rural Management at Anand have expressed the opinion that panchayat forests are in at least as good a condition as reserved forests. My own fieldwork confirms this picture (see Table 2). The only contrary view comes from the chief conservator of forests (Hills), UP, who thought that the true cover of panchayat forest was 50 per cent of the potential as opposed to 70 per cent for the reserves and 10 per cent for civil forest, [cited in Saxena 1987: 2-3]. But the evidence does not support his position.

16 I do not mean that villagers always make rational calculations about such decisions or that ethical and social factors do not enter into them. It is merely that with such a structure of benefits, in the long run, a behaviour biased towards grass production comes to be regarded as socially normal and ethically justified. In discussions with villagers on this rather sensitive topic, it usually came out after some hedging (because of the illegalities), that they do fire the forests deliberately and are sometimes called on by the forest department to put out fires. This help is mandatory but often not given or given grudgingly unless the fire is really threatening to be very destructive. Then, as one old man said, it is *'punya ka kaam'* (a good work) for animals and trees are saved.

17 'Kumaun Panchayat Forest Rules' pp 116-21 in GOUP [1960], and Uttar Pradesh Asadharan Gazette, May 20, 1972 and July 19, 1976.

18 During the last settlement of land revenue in Kumaun in 1955-66, the *assi-sal* boundaries were re-drawn to exclude reserved forests lying within them. The modified boundaries are called settlement boundaries. Until 1976 the rules permitted inclusion of reserved forest lying within *assi-sal* boundaries in panchayat forests.

19 This is the impression I got in different villages, and from van panchayat records. Ballabh and Singh [1988] express the same opinion.

20 Joint management by the West Bengal forest department and forest protection committees of local people has been tried in some degraded sal reserved forests in south-western Bengal. The results have been encouraging, with generally much better regeneration being obtained than under the old system. [Malhotra and Poffenberger 1989].

References

A *Archival Sources*

Record Room, Collectorate, Almora. Record Room, Collectorate, Pithoragarh. Uttar Pradesh State Archives, Lucknow.

B *Others*

Ballabh, Vishwa, and Katar Singh (1988), Van (Forest) Panchayats in Uttar Pradesh hills: A Critical Analysis, CPRM Discussion Paper Series, Institute of Rural Management, Anand.

Batten, J H (Ed) (1851), *Official Reports on the province of Kumaun*, Agra.

Government of India (1904), *Agricultural Statistics of India*, 1897-98 to 1901-02, Calcutta.

— (1978), *Indian Agricultural Statistics*, Vol II, 1970-71 to 1973-74, Delhi.

— (1980) *Report of the National Commission on Floods*, Vol 1, Delhi.

— (1981), *Census of India*, Delhi.

Government of Uttar Pradesh (1960), *Report of the Kumaun Forests Fact Finding Committee*, Lucknow.

— (1984), *Van Panchayaton Ki Karya Pranali Ka Mooiyankan Adhyayan*, Lucknow.

— (1988a), *Hill Area Sub-plan, Annual Plan* 1988-89, Hill Development Department, Lucknow.

— (1988b), *Sankhyikeeya Diary*, Lucknow.

Guha, Ramachandra (1983), 'Forestry in British and Post-British India: A Historical Analysis', *Economic and Political Weekly*, 18 (44 and 45).

Guha, Ramachandra (1989), *The Unquiet Woods*, Oxford University Press, Delhi.

Gupta, P N (1982), 'The effects of government policy in forest management in the Himalayan and Siwalik region of Uttar Pradesh, India' in E G Hallsworth (ed), *Socio-economic Effects and Constraints in Tropical Forest Management*, New York.

Gupta R D (1971), *Working Plan for the Pithoragarh Forest Division* (1968-69 to 1977-78), Nainital.

Jackson, M G (1985), 'A Strategy for Improving the Productivity of Livestock in the Hills of Uttar Pradesh' in J S Singh (ed), *Environmental Regeneration in Himalaya*, Nainital, Gyanodaya Prakashan.

Joshi, B K (1987), *Energy Use in Rural Areas of Uttarakhand*, (mimeo) Advisory Board on Energy, Delhi.

Joshi, Dinesh (1988), *Kumauni lok geeton mein paryavaran shiksha*, Himalayan Adhyayan Kendra, Pithoragarh.

Lohani, D N (1962), *Working Plan for the North and South Garhwal Forest Divisions, Kumaon Circle*, 1958-59 to 1972-73, Allahabad.

Malhotra, K C and Mark Poffenberger (ed) (1989), *Forest Regeneration Through Community Protection: The West Bengal Experience*, Calcutta, West Bengal Forest Department.

Moench, M (1986), *Turf and Forest Management in a Garhwal Hill Village*, working paper, Environment and Policy Institute, East-West Centre, Honolulu.

Moench, M and J Bandyopadhyay (1986), 'People-forest Interaction: A Neglected Parameter in Himalayan Forest Management', *Mountain Research and Development*, 6(1).

Nautiyal, Jagdish C and Peter S Babor (1985), 'Forestry in the Himalayas: How to Avert an Environmental Disaster', *Interdisciplinary Science Reviews*, 10(1).

Osmaston, A E (1921), *Working Plan for the North Garhwal Forest Division*, 1921-22 to 1930-31.

— (1932), 'Panchayat Forests in Kumaon', *The Indian Forester*, 58(11).

Pant G B, (nd), *The Forest Problem in Kumaon*, Nainital, (originally published 1922).

Pant, S D (1935), *Social Economy of the Himalayans*, London, Allen and Unwin.

Pauw, E K (1986), *Report on the Tenth Settlement of the Garhwal District*, Allahabad.

Saxena, N C (1987), *Commons, Trees and the Poor in the Uttar Pradesh Hills*, Network paper 5f, Social forestry network, Overseas Development Institute, London.

Singh J S and S P Singh (1987), "Forest Vegetation of the Himalaya", *The Botanical Review*, 53(1).

Singh, V P (1967), *Working Plan for the West Almora Forest Division*, 1966-67 to 1975-76, Nainital.

Soundal, Chain Singh (1960), *Working Plan for the East Almora Forest Division*, 1957-58 to 1971-72, Allahabad.

Tiwari, A K, A K Saxena and J S Singh (1985), 'Inventory of Forest Biomass for Indian Central Himalaya' in J S Singh (ed), *Environmental Regeneration in Himalaya*, Nainital, Gyanodaya Prakashan.

Walton, H G (1911a), *Almora: a gazetteer*, Allahabad.

— (1911b), *British Garhwal: a gazetteer*, Allahabad.