

Forest Utilization and Its Consequences in a Rural Society

—A Case Study of a Mountain Village in Central Nepal

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農村における森林利用とその影響

—中部ネパールの一山村における事例研究

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Abstract

Forest deterioration in Nepal which typifies the forest destruction problem in the developing world is attracting worldwide attention. The deterioration has a close connection with forest utilization of the rural inhabitants. Moreover, as production facilities are not developed and as there is no hope of heavy investment which could carry out extensive afforestation in this country, the participation of the inhabitants becomes essential for the reforestation and conservation programs. In this paper, various aspects of forest utilization by the inhabitants of a village in the Middle Mountains of Nepal are studied.

In the area, forms of the forest utilization are basically reclamation for cultivation and gathering of feed for animals which maintain the agro-pastoral system, together with extraction of firewood and timber for daily life. These exploitations have been accelerating in recent decades, affected by socio-economic changes from outside of the village. Consequences of this deterioration are damage by landslides, shortage of cultivable land and livestock, as well as conflicts among villages. All of these results cause oppression in rural life.

From the comparison of the main uses of the forests, it became apparent that fodder lopping for livestock has the greatest influence upon both the forests and the lives of the inhabitants by its characteristics and the way of gathering rather than its amount.

As a solution to this problem, coordination of agro-pastoral production and forest conservation, and especially the plantation of fodder crops in the devastated area is recommended. For the practical management, consideration of the landuse and life-style of the inhabitants is necessary.

要 旨

ネパールにおける森林荒廃は、開発途上諸国での森林破壊問題の典型として注目を集めている。この森林荒廃は、地域住民の森林利用と密接なつながりを持ったものであり、また、生産基盤が未発達で、多額の投資を行なって大規模な再造林を進める事も困難なこの国では、森林の保全、育成に住民の参加が不可欠な要素となる。本論では、こうした地域住民の森林利用を、ネパール中間山地の一山村において多面的に考察した。

この地域における住民の森林利用は、基本的に農牧システム維持のための農地開墾と家畜の飼料採取、及び日常生活のための薪、木材採取である。こうした森林からの搾取は、外部からの社会的、経済的影響を受け、ここ数年に著しく加速されてきており、土砂崩壊による被害、可耕地及び家畜の不足、村落間の争議の増加などの現象を引き起こし、住民の生活を圧迫している。

本論は、村民の様々な森林利用形態のうち、家畜の飼料採取が、量の大きさよりもむしろその資源としての性格や、採取法における特徴から、森林資源と住民生活の両面に、最も大きな影響を与えている事を明らかにした。

この森林破壊問題を解決するためには、農業生産と森林保全の両立がなされるべきであり、これには荒廃地への飼料木の植栽が有効であろう。また、施業にあたっては、住民の土地利用や生活様式を考慮する必要がある。

Introduction

The disappearance of forests in the developing world has been proceeding at a rapid rate recently, leading to a deterioration of the rural life in each region. As this crisis of forests is in most cases ascribed to the destructive activities of the rural inhabitants, it becomes very important to understand the patterns in forest usage of these people in order to improve the situation. Above all, it is essential when promoting community forestry projects which are to prompt rural people to plant and conserve trees voluntarily.

The foothills of the Himalayas are referred to as one of the most severely deforested areas in the world. In Nepal, accompanied by its steep topographical features and heavy monsoonal rainfall, the forest deterioration is causing environmental problems as well as socio-economic problems created by scarcity of land and forest products. A large portion of Nepalese territory is occupied by a mountainous region, where the elevation of living standards has been very slow due to poor productive facilities for industries, such as motorways. This is the very area where the forest deterioration shows its most serious phase.¹⁾

However, in spite of the necessity, only a few investigations have yet been made into the relationship between existing forests and the rural inhabitants. Research so far can be divided into two categories. One is from the geographical and anthropological side. Macfarlane (1976)²⁾ in his study on the relationship between population and economy of Gurung* society, deals with forest utilization in a Gurung village called Thak, comparing

* An ethnic group in Central Nepal

quantities of the different kinds of forest products.

Kawakita (1968)³⁾ (1974)⁴⁾ from his anthropological research in the Sikha Vally of Central Nepal (1963) pointed out that tree leaves from forests are playing an important role as fodder for domestic animals. Later, Namikawa (1977)⁵⁾ (1979)⁶⁾ and Kobayashi (1980)⁷⁾ visited this area, and made observations on the forest vegetation and estimated the quantities of forest products consumed. They suggested that fodder lopping and forest grazing were more serious threats to forests than firewood extraction.

From the forestry side, FAO (1977)⁸⁾ and Australian aid (1980)⁹⁾ made surveys on forest utilization and the people's attitude toward forest conservation as a part of their community forestry projects.¹⁰⁾ Shepherd (1979)¹¹⁾ compared the quantity of used fodder with firewood in terms of energy, concluding that the calorific value of the fodder consumed reaches about twice as much as that of firewood. Therefore it can be considered that food for animals taken from forests is far more than fuelwood in Nepal.

Nevertheless, the impact on the forests cannot be estimated from the mere quantitative comparison of these products. Namikawa⁵⁾⁶⁾ and Kobayashi⁷⁾ mentioned that utilization for stock raising transforms the specific composition of forests, consequently woodlots near settlements are occupied by poisonous tree species for animals. Macfarlane²⁾ also observed that one of the reasons why actual deterioration of the forests is much worse than the abstract account is that nearer parts of the forest to the settlements are destroyed while further-off growth is left untouched.

As mentioned above, the methods of utilization should be observed more precisely. Kawakita (1979)⁶⁾ claimed forest utilization reflects traditional practices and values of the local people. Yet, such things as people's consciousness or local experience has not been considered much so far. One paper reports people's deep consciousness and voluntary measures in conservation while another paper denies them. One reason for this contradiction derives from the diverse regional circumstances in Nepal.

Therefore in this paper the target is to observe the reality of forest utilization in a mountain village of Nepal, giving an example of the pattern of causes and effects of the forest deterioration from the synthetic view point, presenting practical solutions as to how people's needs and the necessity for forest conservation should be coordinated.

General Description of the Village Studied

The study was made in a Gurung village called Hile. This village belongs to Hile-Taksar Panchayat* of Lamjung District, Gandaki Zone. To reach the village, it takes 1-2 days from Kathmandu travelling by car and on foot. It takes about 6 hours to do the return journey between Hile and Besi Shahr, the town in which the district offices are located. There are no transportation facilities between Besi Shahr and Hile. The journey is done on foot, without even the help of animal carriage.

The village is situated on river terraces at an altitude of 1250m above sea level where

* Panchayat is the smallest unit of the local administration. One village panchayat usually includes some villages called "ward".

a large branch from Manasuru Range runs down into the valley of the Marsyangdi River. The sphere of this village stretches from 800 to 1600m. The subtropical monsoonal climate dominates the area and annual rainfall of about 3000mm concentrates on the rainy season from June to September. The inhabitants are composed of hill tribes such as Gurung, Magar, Tamang and service castes like Kami (Blacksmith), Sarki (Leather Workers), Gharti (Convokers). The total population is 344, living in 56 houses. Among them the Gurung are in the majority making up more than half the population as in other villages within this panchayat.

Forests in this village are abundant compared to other adjoining villages. Stainton's classification (1972)¹²⁾ is applicable to presume original forest types in this area. As he mentioned, this region is located on the southern slopes of Annapurna and Himalchuli where annual rainfall is much higher than most of other parts of the Middle Mountains. In consequence, it lacks subtropical deciduous forest and pine (*Pinus roxburghii*) forest. Saal (*Shorea robusta*) forest exists on the arid southern slopes, especially near cliffs in this village, up to 1100m. For the most part, both the northern and southern slopes are covered with forests in which Chilaune (*Schima wallichii*) is dominant. They may correspond to Stainton's forest type of *Schima-Castanopsis* forest, but actually Katus (*Castanopsis indica*, *C. triburoides*) are not so numerous as Chilaune. In damp ravines, there are dense forests which include more diverse tree species that correspond to subtropical semi-evergreen hill forest of Stainton's classification. As forests of this village do not exist higher than 1500m, temperate forests are not observed here.

Although people in neighboring villages feel envy at the richness of woodland in this village, it remains only on steep slopes or at the bottom of ravines, and is often degraded into bush, in the southern part of the village which is near the settlements. On the contrary, in the northern part which is remote to the settlements, there is a deep impressive forest.

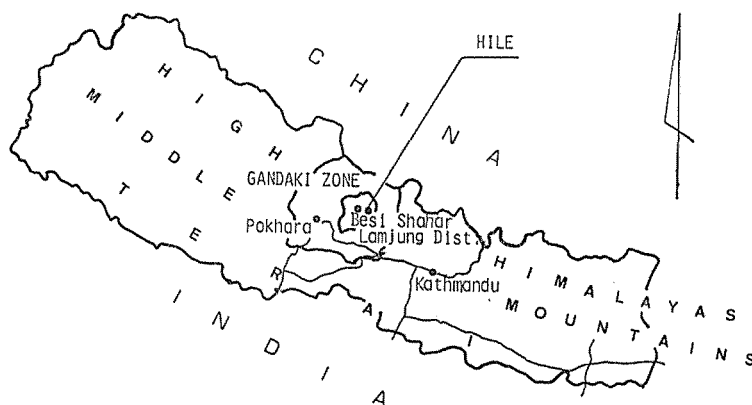


Fig. 1. The Location of Hile.

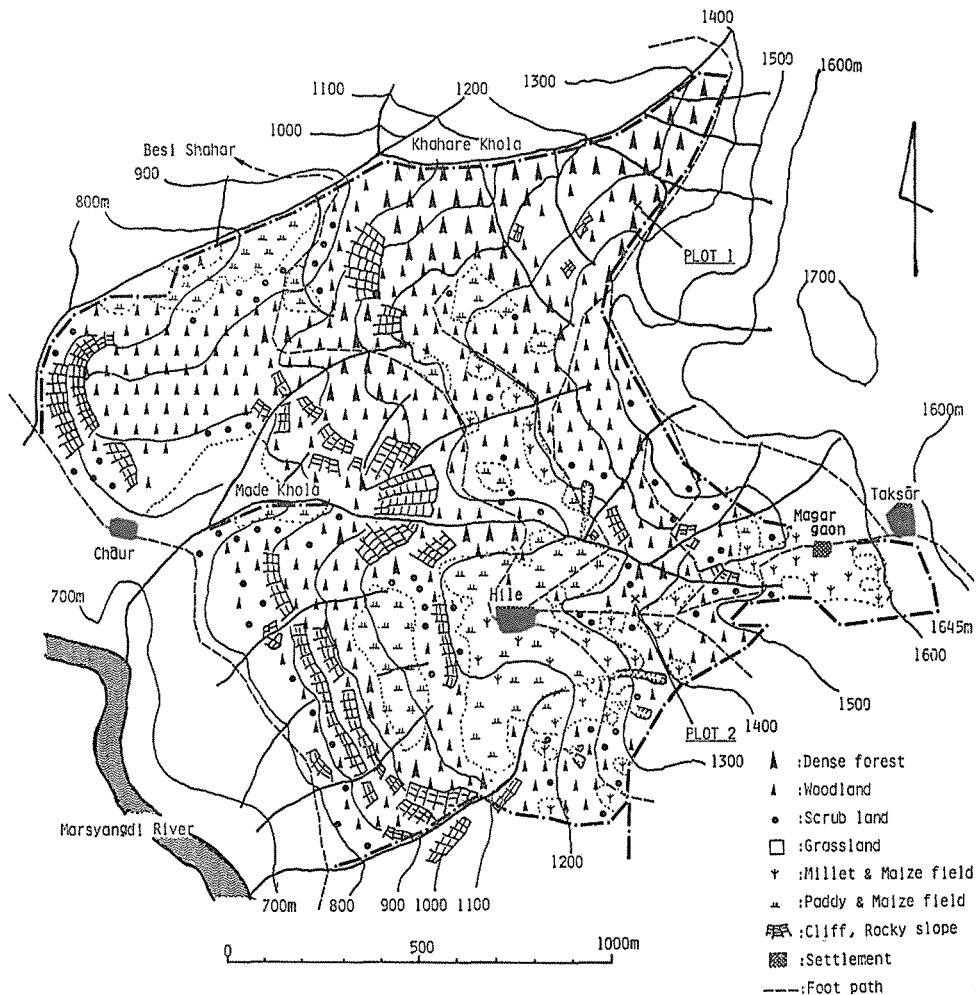


Fig. 2. The village of Hile

Mechanism of the Forest Destruction (see Fig. 3)

1. Causes of the Destruction

1-1. Basic Life Style of the Villagers and Forest Utilization

As the main occupation of the inhabitants is subsistent grain cultivation of paddy, maize and millet, they firstly wish to increase the yield of these crops. Domestic animals such as buffeloes, cows, oxen (4.4 head/house) and goats, sheep, swine (4.1 head/house) are kept in this village. As villagers mention, they are raised mainly to give manure and to cultivate the arable land. This is proved by the fact that villagers seldom eat the meat of these animals or make efficient use of their milk.

For their everyday living and to maintain and increase the agricultural productivity, forests are brought under cultivation or used to take various kinds of things such as timber, fuelwood and food for animals (forest grazing and fodder lopping). Because

they have no customs nor enough land to maintain pastures, tree leaves are lopped, forest floors are grazed all around the year, especially in the farming season when arable land is unable to be used for grazing.

The consciousness of the inhabitants reflects their material life style. They consider arable land and animals as important properties, while the importance of forests is not well recognized. Also, though it is true that villagers have plentiful knowledge of tree names and their practical uses because of the necessity for gathering, their personal understanding of other functions of woodland, e.g. the function for environmental conservation, and consciousness for forest conservation is limited.

However, on the other hand, there was a traditional autonomy system in the community led by a village chief called "Mukhiya". Almost all the forests in the village were possessed in common among villagers and some restrictions on forest utilization existed. For instance, a part of a forest had been preserved and used only once in a year by all the villagers. If a person from another village wanted to use the forests, he had to pay an adequate sum of money or presents to the village chief, (this is called "Thekibheti") in order to get his permission.

Religious beliefs also played a significant role in forest conservation. Hinduism, Lamaism (Buddism), and a kind of spiritism are believed jointly among the villagers, and so are gods and spirits related to the forests. Among them Devi, a Hindu goddess, is important. They deify Devi beside springs. They believe that to keep Devi in peace, woods behind the springs must be preserved. In this manner, they are indirectly preserving the headsprings. Such kind of woods can often be seen in this region. For spirits living in the forests, they sacrifice a cock or a hen each time they fell a large tree.

1-2. Recent Socio-Economic Changes and the Acceleration of the Forest Deterioration

Within the last several decades, the life of the inhabitants has suffered considerable changes. One of these trends is the rapid growth of the population. Villagers say that in late thirty years, the population has nearly doubled. Such population expansion results in an increasing demand for cultivated land and forest products.

Other factors of the social change are administrative measures from the government and economic impacts from the outside of the village. Although it cannot be denied that such external social impacts improved the rural life from some aspects, they have made people abandon their traditional customs and notions.

The largest impact was given by the forest administration. There was nationalization of forest land in 1956. It was reported that the nationalization ended up with an enlargement of the forest destruction all over the country. In this village, too, the nationalization weakened the notion of common ownership of woodland and the self-restraint on deforestation.^{8) 13)}

Economic changes such as inflows of cash and various commodities together with the opportunities of employment prompted male adults to go out of the village for work (mainly for Gurkha regiments), and loosen the unity of the villagers. It is also observed that among villagers, there is enthusiasm for school education. They are preparing to set up a primary school for themselves. This movement is due to their wish to give

2. Effects of the Deterioration

Increasing exploitation of forests has negative effects upon rural life. As a result of the clearance for cultivation on level land, woodland has been reduced remarkably and left uncut only on steep slopes. Furthermore, excessive gathering of any kind of forest product may result in the quantitative decrease of the forest resources. It leads people to further exploitation, so that arable land of low productivity (e.g. millet field), grassland (overgrazed land, deserted arable land or artificial grassland of *Themeda spp.*) and scrub land remain on steep slopes. From these slopes, occasional landslides occur under the heavy monsoonal rainfall. In the history of this village, landslides occurred three times. It was about 50 years ago when the first large landslide occurred, which correspond to the period when the forest destruction came to be a remarkable phenomenon. Particularly, 2 houses were broken, about 1.5ha of cultivated land was buried, 7 head of cattle were killed by the latest landslides in 1982.

Although excessive gathering of any forest product may result in a quantitative decline in forest resources, intensive fodder and timber extraction also alters the component tree species and cause a shortage of fodder and housing materials. Scarcity of fodder is particularly serious for rural life because it decreases the number of cattle per household, and that, in turn, means a decline in the agricultural productivity. This, along with the shortage of cultivable land and damage from landslides, forces poor inhabitants to migrate to the plain of Terai, where land for reclamation still remains but may be drained in the near future. From this village, about 10 households have already migrated to Terai.

Moreover, a quantitative decrease and/or a qualitative degradation of forests may result in conflicts among villages by transgressional utilization of woodland. As this village adjoins villages where woodland area is scarce, it often happens that outsiders steal into the forests and gather firewood and fodder without the permission. Now, villagers are getting nervous about such encroachment. All these results from the forest deterioration are creating a crisis in the rural life.

Comparison of the Main Forest Products Gathered by the Villagers (see Table 1)

Although recent social changes accelerated the forest deterioration, the villagers' life still depends on subsistent farming and stock raising for the most part. Accordingly their utilization of the forest is basically linked with the agro-pastoral system of the village.

Main factors of the exploitation, as noted above, are clearance for cultivation and extraction of firewood, fodder and timber. Though these types of utilization sometimes occur simultaneously, clearance for cultivation is becoming comparatively less important. In spite of villagers' wishes and efforts to enlarge their fields, the area of new reclamation is getting smaller. This is partly due to restriction by the government, but mainly because of the scarcity of flat, fertile land suitable for cultivation. Now the largest threat to the forests is the endless exploitation of living materials from the woodland which exists only on steep slopes.

Table 1. Comparison of the Main Forest Products Gathered by the Villagers

	Fuelwood	Fodder	Forest Grazing	Timber
Quantity	40-50bundles/house/year 1bundle=30kg Total:1200-1500kg /house/year	Average number of each animal/house×Fodder consumption/head/year Total*:If given all by grass 57.5t by tree leaves155.0t If a half of the whole amount is taken from forests: 28.8-57.5t/house/year		20 Saal (<i>Shorea robusta</i>) trees of middle size and 1 Chilaune (<i>Schima wallichii</i>) of large size are necessary to build a house. Small trees are often used in various ways Total: Less than that of fuelwood
Quality	No particular choice about tree species Fallen trees and dead branches are preferred Waste wood can be used	Selective extraction of useful tree species Green leaves, particularly young shoots, are preferred		Large trees are necessary
Way of gathering	Gathered and left dried in forests Carried home at a time	Necessary to be taken everyday	Everyday, but easier than fodder lopping	Hard work, but occasional
Places of gathering	Taken equally from everywhere	Partial gathering from the places nearer to settlements	In farming season: in woodland and grassland. In winter season: both in woodland and grassland and in arable land	Northern forest or woodland near cliffs (Saal trees)
Impacts upon forests	Quantitative decrease	Disappearance of useful tree species near settlements Lopping checks tree growth (sometimes killing the tree)	Denudation of forest floors (Hindrance of regeneration) Damage of bark (sometimes killing the tree)	Decrease in the number of large trees
Impacts upon villagers' life	No direct impacts	Shortage of fodder Decrease in number of cattle Hard toil of carrying fodder	Pastures are going further from settlements	Decrease of good house timber
Reactions of villagers	No reactions in particular	22 tree species are planted mainly for fodder	7 tree species are planted mainly for living hedges	Plantation of bamboos Reservation of large trees

Reservation of fodder trees
in cultivated land

*	Average number/house	Fodder consumption ⁽⁴⁾ /head/year		Fodder consumption/house/year
Buffaloes	(Adults)	1.3	×	16.5 t
	(Kids)	0.6	×	2.2
Oxen		1.3	×	14.3
		1.1	×	10.0
Calves		0.4	×	0.7
		2.9	×	6.4
Goats	(Adults)	0.7	×	0.3
	(Kids)	0.7	×	2.0
Sheep	(Adults)	0.1	×	0.1
	(Lambs)			
Total:		If it is given all by grass 57.5 t _{9.6} by tree leaves, it doubles 115.0 t		

The ratio of feed which is eaten in grazing and feed given as fodder is not apparent.

Characteristic features of these products are given in Table 1. From the quantitative viewpoint, it is apparent that the weight of feed for livestock taken in forms of fodder lopping and forest grazing is far more than extraction of firewood or timber, although this estimation is quite rough. The relative importance of feed for livestock becomes even more obvious when these products are compared from their characteristics. In fodder and timber extraction or in forest grazing, specific tree species are taken, while there is no particular choice about tree species in firewood extraction.

Though villagers prefer fallen trees and branches for firewood and also waste wood is used, fresh leaves must be lopped and carried home each time they feed animals at home. Grazing is easier than fodder lopping, but animals have to be kept indoors at night or in the period of cultivation, so that some amount of fodder is required everyday. In consequence, villagers tend to overuse woodlots close by the settlements and from these woodlots, useful tree species for fodder disappear.

On the contrary, fuelwood is extracted equally from every woodlot because it is fit for storage. It is gathered mostly in the leisure winter season, left to dry in the forests, then carried home in a short time just before the rainy season and stored again.

After all, firewood extraction brings mere quantitative decrease in forest resource, while the extraction of fodder and timber or the grazing also degrades the quality and the distribution of the forest resources by changing component species and by restraining regeneration and growth.

Such alteration becomes apparent from the comparison of two woodlots where other conditions such as altitude, inclination, exposure and topographical features (in this case, on slopes near ridges) are almost the same, but

distances from the settlements are different. Useful fodder trees such as Tankii (*Bauhinia purpurea*), Panchiso (*Strobilanthus* sp.) and Naurasara (Not identified in Latin) exist in the woodlot which is far from the settlements (Plot 1), while there is no such species in the woodlot close by the settlements (Plot 2), although tree species like Dhale Katus (*Castanopsis indica*), Jyanu (*Eurya acuminata*) and Chilaune (*Schima wallichii*) that are used for firewood but not for fodder exist in common. Moreover, poisonous tree species for animals such as Angeri (*Lyonia ovalifolia*) appears in the latter.

Likewise, from the viewpoint of the impacts on villagers' life, there is no direct impact from the fuelwood extraction in particular. Shortage of fodder, on the contrary, conduces the decrease in the number of cattle and villagers complain of the hard routine work of carrying fodder from the remote place.

Reactions of the villagers reflect this relative importance of each forest usage. 22 tree species are planted around their houses mainly to take fodder. Among them, 13 species are not observed in the forests of this village. Probably they were introduced from the outside. In addition to this, they are reserving fodder trees on the boundaries of their fields. Also, these fodder trees, fruit trees and vegetable gardens are often surrounded by living hedges, protected from livestock. 7 species that have good sprouting capacity but are inedible for animals are used for this purpose.

All these facts about the forest utilization support the significance of the influence of stock raising. It is apparent that the fuelwood problem is less important in places where some of the area is covered by forests. Timber extraction comes to an issue only in the case of large timber of good quality which is essential for housing.

Conclusions and Recommendations

Forest utilization in this area is closely connected with its agro-pastoral system. Exploitation of forests sustains subsistent farming through the medium of stock raising. In this context, feed for animals which is taken in forms of fodder lopping and forest grazing has a great influence on the forest and the life of the inhabitants not only by its largeness in amount but chiefly by its characteristics such as selective exhaustion of useful tree species, damage of the green parts and the necessity of daily gathering.

Gathering of other materials, such as fuelwood, timber and edible wild plants and animals for men is playing just a supplemental role when compared to this usage. Another impact upon forests, clearance for cultivation, is losing its influence due to the scarcity of flat land.

The over-gathering of forest products changes woodland into scrubland and grassland, where landslides sometimes occur, causing shortage of feed for animals and conflicts among villages.

1. Coordination of Agricultural Production and Forest Conservation

In order to give a solution to the forest destruction problem, the wishes of the inhabitants, that is to say, maintainance and increase of the agricultural production, and conservation and enrichment of forest resource have to be coordinated.

For the promotion of agricultural production, three measures may be considered. These are (1) Enlargement of the cultivated land, (2) Improvement of soil fertility and (3) Reformation of agricultural methods.

Of these three measures, (1) is difficult for the reason stated earlier. For (2), introduction of chemical fertilizer is also considered. However, it is expensive for rural people and moreover, it is in question whether it still has effect under the heavy rainfall of the monsoon season. These facts bring us to reconsider organic fertilizer, i.e. compost of dung and litter. In order to secure more and better compost, larger number of cattle must be kept. Therefore, it becomes necessary to establish the forest management system for stock raising.

Finally, concerning (3), the fact is note-worthy that conversion of dry fields into irrigated paddy field has been taken place throughout the history of this village. It is often said that the introduction of an irrigation system and wet rice increase the yield per unit area with a smaller requirement of manure. If it is true, this conversion both increases the yield and lessens the threat to woodland. However, for this, it is necessary to consider other factors concerning the cultural background of the rural life such as the difference in use of each crop, tastes of the inhabitants etc.. Further, there is a fact that the expansion of irrigation canals became a cause of a landslide in this village.

Accordingly, in order to observe these factors, comparison of forest utilization is appropriate between a village which is mostly occupied by irrigated paddy fields and a village in which dry fields spread. Another necessary field for investigation is a more detailed description of the mechanism and quantitative perception of the flows of materials and labor.

Forest utilization and the condition of forest destruction in Hile have common features with the cases of Thak²⁾ and Sikha.^{3) 4) 5) 6) 7)} Therefore it may be said that this village typifies the reality of the Middle Mountains in Nepal. However, this village and also those two villages still possess an amount of woodland area. Nepal has some regions in which forest area is so reduced that only bare hills are seen. Style of the forest utilization in those regions must be different from this village. Comparison to these areas may also be significant, for in these areas, fuelwood problem may become comparatively more important because even the minimum necessity is not satisfied.

2. Consideration of the Rural Life Style for Forest Management

2-1. Consideration of Land Use

As noted above, forest management toward stock raising is necessary in a village like Hile. In the performance of the management, landuse of the inhabitants must be taken into consideration. Firstly, reforestation for soil conservation is necessary in this village. For this purpose, tree species must be selected which are inedible to animals. Although tree species for multi-use seem useful, plantation of fodder trees runs the risk of damage from grazing.

The next is to establish plantations of fodder crops. If the villagers' convenience is to be considered, it is best to increase the number of trees planted around settlements.

Nevertheless, there is a limit to the plantation, because villagers' wishing to extend their fields will not give the room. The alternative way is the plantation of fodder trees and the establishment of pastures on devastated grassland, scrubland and woodland. In this case, plantation must be done near the settlements. Otherwise villagers cannot use fodder trees everyday.

2-2. Motivation and Organization of the Inhabitants

As it is impossible to carry out afforestation by heavy investment in this country, participation of the inhabitants is essentially important. Therefore it is necessary to motivate and organize people to participate in the afforestation and conservation programs.

In the rural life, women and youth have more opportunities to concern themselves with forest utilization, because male adults are often engaged in cultivation or working out of the village. However, they do not have any notion of forest conservation. As religious restriction is gradually declining, the conception must be taught in school education for which inhabitants have strong enthusiasm.

With regard to organization of the inhabitants, one thing has to be suggested about the objective organization. In the community forestry project of this country, panchayats are appointed to perform the management. However, it seems that the panchayat system does not necessarily fit to the local forest management. In this region, notion of forest ownership and traditional customs of utilization in old village system still exist. Therefore, it is recommended that "ward" level management is taken into consideration.

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