

FOREST, FODDER AND HILL AGRICULTURE : AN ANALYSIS OF INTER-DEPENDENCE IN UTTAR PRADESH HIMALAYAN REGION

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Interoduction

There has been a growing concern about ecology, scientific management of forests and development of resources along with fulfillment of local needs of the people in hill areas of the country. The emphasis, however, still remains on those aspects of management and conservation of forests which are related to commercial demand. There is scant consideration for local needs of the people. Moreover, there is paucity of information about quantum and pattern of forest use by local rural population. This paper is aimed to analyse pattern of requirement of fodder so essential to maintain the livestock for agricultural purposes in the hill region and the role of forest in this process.

Locale of Study

The hill region of Uttar Pradesh extends between 28° 43' 24" and 31° 27' 50" North latitudes and 77° 34' 27" and 81° 02' 22" East longitudes covering an area of about 51,125 km². Administratively, the region is composed of five districts of Garhwal Division namely, Uttarkashi, Chamoli, Tehri Garhwal, Pauri Garhwal and Dehra Dun and three districts—Pithoragarh, Almora and Nainital of Kumaon Division (Fig. 1).

The economy of this region is predominantly agricultural. Only about 13 per cent

of total area is under agriculture, and to very large extent depends on the forest for fuel and fodder.

Data base of Study

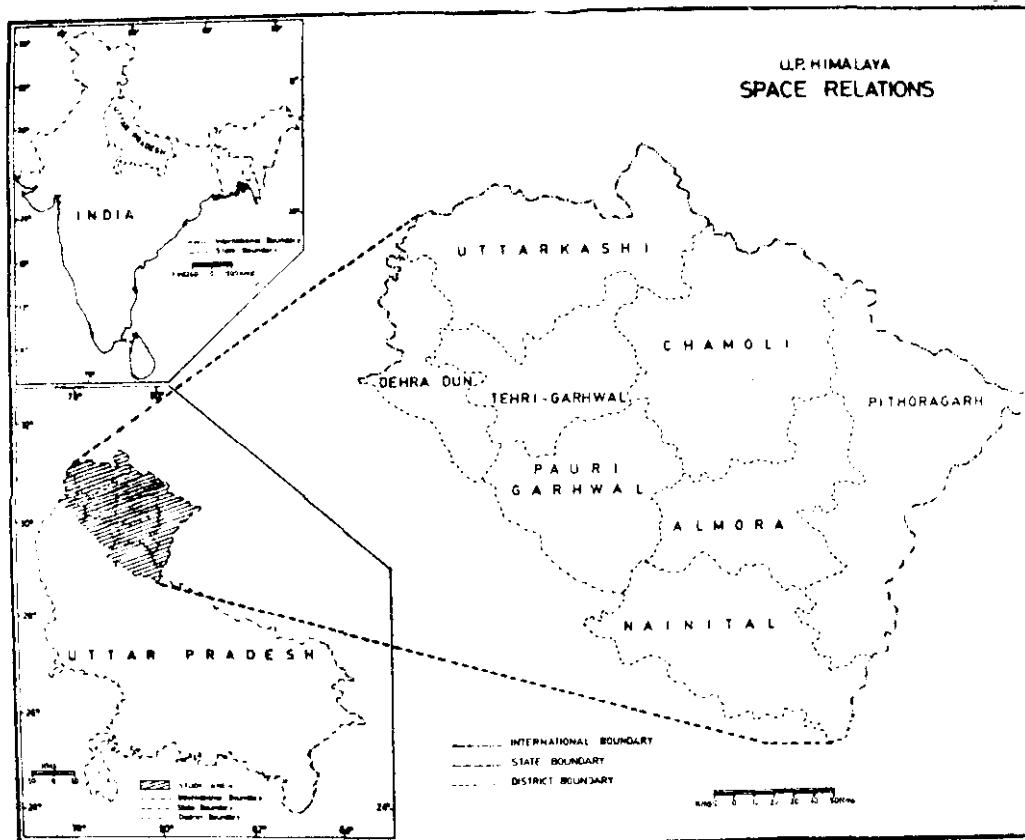
The primary information collected from 350 households of 21 sample villages spread over eight districts. The villages were selected from different altitudinal zones and population sizes to represent varied eco-climatic and socio-economic characteristics of the hill economy. In the selected 21 sample villages, 12 are of small size having population of less than 200 persons, 6 are medium sized with population between 200 and 500 persons and 3 are large size villages with over 500 persons. Altitudinally, 4 villages are situated at the height of less than 900 meters above mean sea level, 10 are situated in the zone of 900 to 1800 meters and 7 above 1800 meters (Fig. 2).

The cattle units maintained by villagers differ significantly in different altitudinal zones as well as in different population size villages. This variation is from 2.73 to 7.50 cattle units for the region as a whole but the highest number of cattle units is in the small villages and highest altitudinal zone (Table 1). The pattern as reflected from the table suggests that more livestock are being maintained where large areas are available

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Fig. 1



for grazing and where scope of agricultural expansion is limited making livestock rearing an important activity.

Livestock Rearing and Fodder Supply

The livestock rearing is an important sector, besides agriculture, in the hill economy of Uttar Pradesh. The livestock is reared for draught purposes, milk, cash income by selling sheep and goats, and also to provide manure for the fields. The quantity of fodder brought from the forest depends on the size of the stock, the nature of feeding and the quantity of fodder available from the agriculture. The animals are both, stalled and grazed. Buffaloes are mostly stalled

while the sheep and goats are grazed. The cattle are largely fed through grazing.

The survey conducted shows that 94.15 per cent of buffaloes, 33.06 per cent of cows and 24.48 per cent of bullocks are stalled. On the whole, among the bovines and draught animals, 48.19 per cent are stalled. A sharp difference is seen in the proportion of animals grazed in different altitudes. This proportion is 30.76 per cent in the villages at lower altitudes but increases to 57.40 per cent in middle altitude zone and decreases to 49.56 per cent in the villages of higher altitudinal zone.

Fig. 2

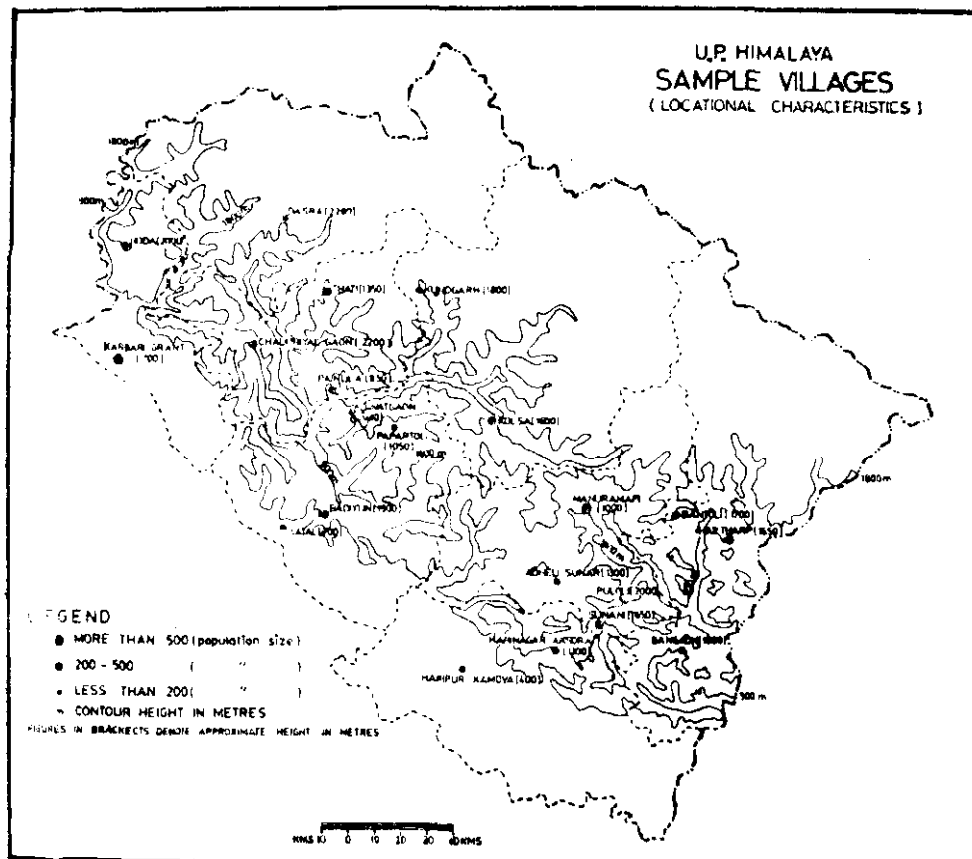


Table I
The average cattle units per sample household

Altitudinal zone of the sample villages (m)	Population size of the sample villages (persons)	Average cattle units		Total
		Garhwal	Kumaun	
Less than 900	Less than 200	5.00	5.91	5.30
	More than 500	2.73	—	2.73
900-1800	Less than 200	4.98	3.90	4.43
	200-500	5.58	5.16	5.37
	More than 500	3.71	3.52	3.59
More than 1800	Less than 200	8.23	6.54	7.50
	200-500	3.47	4.78	3.91
Total (Average)		4.82	4.65	4.74

Fodder from Agriculture

The quantity of fodder available from agriculture is not sufficient. Table 2 showing the months for which the fodder is said to be sufficient refer to the period during which the fodder from crop residue is used normally for completely stallfed animals as well as other animals during the nights. Moreover, this dry fodder is used with green fodder brought from the forest. The information, compiled by excluding the landless and those households who do not have animals at all or exchange the straw for ploughing. The collected information thus, gives an idea of the period for which the crop residue

supplements the fodder from the forest. Lastly, it should be understood that if the available fodder from crop-residue is exclusively relied upon the duration for its adequacy given in the table will drastically scale down.

The data show that the fodder available from agriculture is able to meet the requirement for less than 6 months. The adequacy of fodder from agriculture shows regional variation between Kumaon and Garhwal while it is still more pronounced in different altitudinal zones. In the villages situated below 900 m, the crop-residue-fodder/cultivated fodder meets the demand for about 9 months, whereas in villages

Table 2
Adequacy of supplemental fodder from agriculture

Altitudinal zone of the sample villages (m)	Population size of the sample villages (persons)	Average months for which it is available for each household in		
		Garhwal	Kumaon	Total
More than 900	Less than 200	7.46	9.98	8.35
	More than 500	9.45	—	9.45
900-1800	Less than 200	2.96	3.37	3.17
	200-500	4.86	6.48	5.70
	More than 500	4.71	6.48	5.70
More than 1800	Less than 200	2.97	5.03	3.87
	200-500	4.17	5.40	4.59
Total (Average)		5.04	5.96	5.45

Adequacy of Fodder from Agriculture

Average for the villages with population size	Months
Less than 200	4.54
200-504	5.27
More than 500	6.59

situated between 900-1800 m, this demand is met for 5 months and 10 days and in villages above 1800 m it is adequate only for about 4 months. Taking the population size as the criteria for looking at role of crop-residue as fodder source, the situation is more favourable for larger villages. In these villages, crop-residue is sufficient for six and half months and in medium size villages only for five and a quarter months. One reason for higher availability of fodder from agriculture in lower elevations and large villages is the cultivation of fodder crops. Additionally, more fodder is obtained through different practices of harvesting and threshing. It was also noted earlier that the number of cattle units per household is less in the larger villages and villages at lower elevations. It is however, clear that only limited quantity of fodder is obtained from agriculture and thus farmer's great dependence on forest.

Green Fodder consumption pattern

Varying estimates have been made for the required/consumed green fodder from the forest. While in one study, 5.51 kg per cattle unit/day of fodder (dry matter) excluding the crop residue, has been estimated as the requirement, in another study the total aboveground phytomass consumed per cattle unit/day is estimated to be 26.8 kg, which is in addition to usual grazing. In the present study though the extent of grazing and the quantity of grass grazed could not be estimated, yet the estimation of quantity of green fodder required has been made. The time spent in collection of this fodder and the distance covered in each trip have also been estimated. These parameters define the people's involvement in making the arrangement of fodder from the forests.

Table 3 shows the green fodder consumption per cattle unit and its variations. This green fodder consumption includes the quantity consumed by the grazing and partly grazing animals. It should, therefore, be understood that the total requirement of fodder per stalled animal will be much higher. The consumption of green fodder for the region as a whole is around 8.07 kg/cattle unit per day. It varies between 3.80 kg and 11.67 kg in different sample villages. The average variation is from 5.03 kg in small villages at an altitude of less than 900 m, to 10.89 kg in a large village at the same altitude. It is perhaps the extreme proximity of the forest to this particular village (Karbarigrant, Dehra Dun) that highest quantity of green fodder is consumed here. The general trend indicates that quantity of green fodder consumed is the lowest in the villages situated at the lower altitudes and it increases with increase in altitude. This reflects the fact that the availability of dry fodder from the agriculture in higher altitudes is restricted and consequently there is higher dependence on forests. A discernible difference in per cattle unit consumption of green fodder emerges in case of Garhwal and Kumaon. While in Garhwal the average consumption is 8.92 kg, in Kumaon it is 6.95 kg per cattle unit/day. One obvious reason which can be ascribed to this difference is the larger contribution of fodder from agriculture in Kumaon region. Secondly, the proportion of cattle sent for grazing is also higher in case of Kumaon as compared to Garhwal. Altitudinally, the highest green fodder consumption is reported at higher elevations in Garhwal but in Kumaon the consumption is more in middle altitudes. The size of the

Table 3

Quantity of green fodder consumed

Altitudinal zone of the sample villages (m)	Population size of the sample villages (persons)	Average per cattle unit per day (kg)		
		Garhwal	Kumaun	Whole Region (Average)
Less than 900	Less than 200	5.75	3.80	5.03
	More than 500	10.89	—	10.89
900-1800	Less than 200	10.48	8.36	9.52
	200-500	4.61	7.56	6.03
	More than 500	8.75	7.92	8.27
More than 1800	Less than 200	11.14	5.86	9.18
	200-500	11.67	5.83	9.29
Total (Average)		8.92	6.95	8.07

Quantity of green fodder consumed

(Data aggregated according to altitudinal zone and population size of sample villages)

Altitudinal zone of the sample villages (m)	Green fodder consumption (Average per cattle unit/day)	Population size of the sample villages (persons)	Green fodder consumption (Average per cattle unit/day)
Less than 900	7.37	Less than 200	8.48
900-1800	7.47	200-500	7.00
More than 1800	9.21	More than 500	8.79

settlements does not show any marked influence on the green fodder consumption pattern. Nevertheless, small variations exist and the highest quantity of green fodder consumption per cattle unit is discernible in large size villages.

The time spent and distance covered in collection of fodder from the forest

The time spent in collection of fodder from the forest has been measured in hours for one particular trip and the number of days in a year when such trips are made. In

calculating the time only that period has been taken into account which is spent only for fodder collection from the forest. The care has been taken to exclude those households which do not have animals and do not go to the forest for collection of fodder. There are 26 such households out of 350 sample households. There are another 31 households which do not visit the forest for fodder purposes. Among these 20 are from Garhwal and 11 from Kumaon region. Most

of these households belong to the two villages of Karbarigrant (Dehra Dun) and Haripur Kamova (Nainital) situated below 900 m, with good agricultural production, fulfilling most of the needs of fodder from crop residue.

The average time spent in collection of fodder is about four hours in a single trip and these trips are made, on an average, for 215 days in a year (Table 4). The average distance covered is 3.70 kms both ways

Table 4
Time spent in collection of green fodder from forest

Altitudinal zone of the sample villages (m)	Population size of the sample villages (persons)	Average time spent by a household member					
		Hrs/day/trip			Days/year		
		Garhwal	Kumaon	Total (Av.)	Garhwal	Kumaon	Total (Av.)
Less than 900	Less than 200	3.67	3.50	3.64	176	60	163
	More than 500	3.42	—	3.42	168	—	168
900—1800	Less than 200	3.00	3.07	3.03	289	195	242
	200—500	3.05	4.82	3.96	223	243	233
	More than 500	4.92	4.35	4.59	322	165	229
More than 1800	Less than 200	4.90	3.83	4.42	310	128	228
	200—500	3.56	3.67	3.60	144	160	149
Total (Average)		3.92	4.16	4.02	245	178	215

Average time spent in collection of green fodder

Altitudinal zone of the sample villages (m)	Time spent		Population size of the sample villages (persons)	Time spent	
	Hr/day/trip	Day/year		Hr/day/trip	Days/year
Less than 900	3.55	165	Less than 200	3.87	221
900—1800	4.09	233	200—500	3.83	203
More than 1800	4.08	196	More than 500	4.44	221

(Table 5). There are large variations in different regions in time spent and distance covered in bringing fodder from the forest. In case of Garhwal, a single trip can take 3 hours to 5 hours in different altitudes. In Kumaon the average time taken for a single trip is more than 4 hours. Differences also exist in number of days for which a farmer has to go to the forest to collect fodder. In Garhwal, one household member has to go to the forest for as many as 245 days whereas in Kumaon one has to go for 178 days. It is, however, revealed that the people have to cover 4.40 km in a single trip in Kumaon

while in Garhwal this distance is 3.12 kilometres. The analysis brings out the fact that in Garhwal region a household member spends comparatively more days in bringing the fodder from a lesser distance by spending less time in each trip. It can be argued that in case of Kumaon, the lesser number of cattle units per household require less quantity of green fodder as agriculture contributes a larger share of crop-residue. As a result a farmer has to go to the forest for less number of days but generally covers large distance and spends more time in each trip.

Table 5
Distance covered in collecting the fodder from forest

Altitudinal zone of the sample villages (m)	Population size of the sample villages (persons)	Average distance covered by a household member (kms./trip)		
		Garhwal	Kumaon	Total (Average)
Less than 900	Less than 200	2.07	4.00	2.29
	More than 500	2.29	—	2.29
900—1800	Less than 200	2.50	4.76	3.63
	200—500	2.55	3.68	3.13
	More than 500	3.94	5.42	4.82
More than 1800	Less than 200	3.88	3.44	3.68
	200—500	3.27	3.83	3.46
Total (Average)		3.12	4.40	3.70

Average distance covered per trip

Altitudinal zone of the sample villages (m)	Km/trip	Population size of the sample villages (persons)	Km/trip
Less than 900	2.29	Less than 200	3.43
900—1800	4.00	200—500	3.25
More than 1800	3.59	More than 500	4.48

In the villages situated above 1800 m, the average number of trips made in a year are 196 and 3.59 km is to be covered in each trip and 4 hrs. are to be spent to bring the green fodder from the forest. But the problem is most acute in the villages between 900 and 1800 m altitudes where a farmer has to spend 4.09 hrs. per trip, covers 4.00 km of distance for 233 days in a year. Population-wise, a household member in the medium size village makes the least number of trips to the forest for fodder, covers the least distance and takes the least time in each trip.

Contribution of Forest in Fodder needs

The role of forest is very crucial for the success of livestock based agricultural economy of the hill region, due to large scale dependence of hill farmer on forest for fodder. It has been estimated that 71 to 87 per cent of the fodder is extracted from nearby forests by cutting floor vegetation and lopping trees for leaves and grazing. It has also been shown that 4 to 8 hectare of mixed pasture is required to support one mature animal.

Forest serve as source of fodder, in varying degrees for 83.71 per cent of the households (Table 6). It is revealed that 56.85 per cent of the total households meet more than 50 per cent of their fodder requirements from the forests whereas in case of 21.14 per cent of the households this dependence is for more than 75 per cent of the total requirement. Another 26.86 per cent of the households obtain less than 50 per cent of their need from the forests. It has been observed that the dependence on forest for fodder requirement increases with the increase in the altitude. While 47.27

per cent of the households below 900 m altitude do not get any support from forest in respect of fodder, this proportion decreases to 9.18 per cent of households in the altitudinal zone of above 1800 m where 26.53 per cent of the households obtain more than 75 per cent of the fodder from the forest. In case of middle altitudes, about 70 per cent of the households meet more than 50 per cent of their fodder requirement from the forest. The size of the settlement also shows a relationship with the dependence on forests for fulfilling the fodder needs. In small size settlements, higher proportion of rural households depend for fodder on the forest as compared to their counterparts in larger settlements (Table 6). It is, infact, in the middle altitude, where largest proportion of the households show greater dependence. The extent of contribution of the forests in meeting the fodder needs varies between Kumaon and Garhwal regions. While the majority (above 50%) in both the areas, collect more than 50 per cent of the fodder requirements from the forest, the proportion of households collecting 75 per cent and more, is higher in Garhwal (31.28%) as compared to Kumaon (8.38). A significant conclusion of the *present study* is that fodder from the forest is not easily available even in the interior areas of the region. It was also noted during the field survey that increased pressure on forest has resulted in its degradation. After leaves and twigs are lopped off, large branches are chopped with a heavy cutting tool by women and small children damaging young plants. This accentuates forest degradation forcing the hill people to spend more time and walk longer distance to collect the required quantity of green fodder.

Table 6
Contribution of forest in fodder needs (Total hill region)

Altitudinal zone of the sample villages (m)	Population size of the sample villages (persons)	Distribution of households according to degree of dependence (%)			
		Nil	Less than 50	50-75	More than 75
Less than 900	Less than 200	29.17	41.67	25.00	4.16
	More than 500	61.29	38.71	0.00	0.00
900 - 1800	Less than 200	9.09	9.09	48.49	33.33
	200 - 500	11.11	22.22	50.00	16.67
	More than 500	11.96	18.48	43.48	26.08
More than 1800	Less than 200	5.36	35.71	23.21	35.71
	200 - 500	14.29	38.09	33.33	14.29
Total (Average)		16.29	26.86	35.71	21.14

Contribution of forest in fodder needs (Aggregated)

Altitudinal zone of the sample villages (m)	Distribution of households according to degree of dependence (%)			
Less than 900	47.27	40.00	10.91	1.82
900 - 1800	11.17	18.27	46.70	23.86
More than 1800	9.18	36.73	27.55	26.53
Population size of the sample villages (persons)				
Less than 200	11.50	29.20	30.97	28.33
200 - 500	12.28	28.07	43.86	15.79
More than 500	24.39	23.58	32.58	19.51

SUMMARY

Forests as source of fodder, fuel and timber, not only affect the economic activity of the people in the hill region but play a dominant role in shaping their social and cultural life. The livestock which is so essential for the hill agriculture can not be maintained without the fodder coming from forest. The quantity of the fodder brought from the forest depends on the size of the stock, the nature of feeding and the quantity of the fodder available from the agriculture.

Forests serve as source of fodder, in varying degrees for 83.71% of the households in U.P. Himalayan region. It is also observed that the dependence on forest for fodder requirement increases with increase in the altitude. On the whole above 50% of the households collect more than 50% of their fodder requirement from the forest. This work is invariably done by women who on an average spend 215 days in a year to fulfill the fodder need of a single household.

वन, चारा और पर्वतीय खेती—उत्तर प्रदेश के हिमालय क्षेत्र में इनकी पारस्परिक
निर्भरता का विश्लेषण
दिनेश प्रताप व एम०एच० कुरैशी
सारांश

चारा, ईंधन और प्रकाष्ठ के स्रोत रूप में वन पर्वतीय क्षेत्र के लोगों के आर्थिक जीवन को ही प्रभावित नहीं करते बल्कि वे उनके सामाजिक एवं सांस्कृतिक जीवन में भी प्रभावकारी भूमिका निभाते हैं। ढोर-डगर जो पर्वतीय खेती के लिए एकदम अनिवार्य हैं, चारे के बिना रखे ही नहीं जा सकते जो वन से ही प्राप्त होता है। वनों से लाए जाने वाले चारे की मात्रा ढोर-डगरों की संख्या, चारे की किस्म और स्वयं खेती से प्राप्त होने वाले चारे की मात्रा पर निर्भर है।

उत्तर प्रदेश के पहाड़ी क्षेत्र में रहने वाले परिवारों में कमोवेश 83.17% परिवारों के लिए वन चारा प्रदान करने के स्रोत हैं। यह भी देखने में आया है कि चारे की जरूरतों के लिए वनों पर निर्भरता क्षेत्र की ऊंचाई बढ़ने के साथ-साथ बढ़ती जाती है। कुल मिलाकर 50% से अधिक परिवार अपने चारे की जरूरतों का 50% से अधिक भाग वनों से लेते हैं। यह कार्य अनिवार्य रूप से वहाँ स्त्रियाँ ही करती हैं जो औसतन वर्ष में अपने 215 दिन एक परिवार की चारा सवधी जरूरतें पूरी करने के लिए लगाती हैं।

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