

EVALUATION OF RESOURCE BASE AND RESOURCE FLOW IN LESSER HIMALAYAN REGION: A CASE STUDY OF KALSA RIVER BASIN IN KUMAUN REGION OF UTTARAKHAND

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ABSTRACT

Himalaya is made up of fragile ecosystem and has limited carrying capacity. Due to increasing pressure of population and unsustainable harvesting, land resources are being depleted day by day. Land degradation is one of the serious issues throughout the Himalayan region resulting into the scarcity of food, water, fuel and fodder resources. It is a great challenge to stop further degradation of these resources, which are essential for the very existence of mankind. This investigation is therefore aimed to examine the existing resource base and resource flow with special reference to forests.

INTRODUCTION

The scarcity of land based resources in the Himalaya has been explained by various scholars and planners such as Singh et. al.(1988), Jackson(1985), Martin(1987), Pant & Singh(1987), Singh & Singh(1986), Gadgil(1985,1989), Gadgil & Guha(1989), Guha(1989) and Shah(1986). With the increase in population the demand of forest resources is growing day by day. The inhabitants of mountains have overexploited the forest resources through grazing, burning, and encroachment. There is a net annual depletion of forest stock amounting to 3.76 million cubic meters per annum or an exponential rate of depletion of 5.8 percent per annum in U.P. hills (Shah, 1986.). It is also predicted that at a rate of 8.4 quintals per year per capita consumption (including timber and fuel) the carrying capacity of forests will be overreached by 2031 A.D.

The area has undergone rapid degradation, fragmentation and loss of wildlife habitat. Even the developmental activities such as construction of roads etc. have also contributed towards the destruction of the hill ecosystem. Due to lack of proper planning and management the resources are becoming scarce in the region. This can be understood well by the distance to be travelled for the collection of fuel wood and fodder.

STUDY AREA

The area under present study falls in lesser Himalayan region of Uttarakhand state covering Kalsa river basin in District Nainital. It extends between 29°16' to 29°27' North and 79°32' to 79°41' East covering an area of about 145.5 sq. km. Total population of the region is 23,226 as per census 2001. The study region falls within the cool temperate zone of the lesser Himalayan sub province. The vast range of altitude from 783 m to 2423 m results in a variety of climatic characteristics from one part of the region to another. The basin has 58.8 percent of its area under forest cover. Out of this about 47.9% is under reserved forests owned by State Forest Department, remaining 10.9% is under civil, Panchayati, shrubs and bushes. The reporting area has been grouped into seven categories (Table 1)

Table 1. Major Land use in Kalsa River Basin 2007-2008

Land Use Category	Reporting area (in ha)	Percentage to total reporting area	Percentage to total category
Reporting area	6625.68	100.00	100.00
1. Forest area (including both civil and panchayati)	1603.61	24.20	100.00
2. Area not available for cultivation	436.92	6.59	100.00
a. roads and settlements	245.53		
b. water bodies	191.39		
3. Area not suitable for cultivation	43.86	0.66	100.00
4. Cultivable waste	2002.64	30.22	100.00
5. Fallow land	334.45	5.05	100.00
a. old	145.64	2.20	43.61
b. new	188.81	2.84	56.39
6. Cultivated Land	1757.84	26.53	100.00
a. irrigated	292.42	4.41	13.27
b. unirrigated	1465.42	22.57	86.73
7. Orchards	446.31	6.75	100.00

Source: Revenue Records, District Nainital.

Maximum area of the Kalsa Basin is under cultivable waste covering 30.22 percent of the total reported area. The cultivated land covering about 26.53 percent is the second major land use category. Forests including both panchayati and civil forests, and bushes and shrubs stand next to cultivated land with 24.20 percent of the reported area. About 6.74 percent comes under the area not available for cultivation.

Degradation of Forest Land: Forests are among the most important life supporting system. Our food security and water scarcity are embedded within it

The forest availability is counted one forest per village in the area. The pressure on forest land separately for fodder and fuel can also be understood through the ecological relationship existing between the forest and cultivated land.

Table 2 Availability of Forest Land

Patwari circle	Forest per hectare of cultivated land
Purvi agar	2.16
Sundarkhal	0.34
Sarna	0.57
Churigad	0.45
Babiyad	3.04
Pinron	2.97
Chanfi	0.67
Ramgarh	0.70
Purvi chhakhata	1.42
Pandegaon	0.37
Total	0.91

Forest Stock and Requirement of Fuel and Fodder: forests support the demand of villages irrespective of some legal constraints imposed by the forest or village Panchayati system. The

forest scarcity analysis is attained at the Patwari circle level. The forest area (excluding the reserved forest) is converted into forest stock expressed in tons per year. Various research findings have suggested different consumption norms for the fuel wood demands. Singh et. al. (1988, p23) has calculated 14.3t /ha/ year production for the forest system of central Himalaya including branch, twig and leaf which gives both fuel and fodder. 1.9 kg of fuel wood per capita per day as estimated by the survey conducted by the Tata Energy Research Institute as mentioned by shah (1988-89) and a simple consumption ratio of 5 kg of fodder per cow unit per day was adopted from the National grazing Policy report (1984) for the estimation of fuel and fodder requirement in the study area (Table3).

Table 3 Forest Stock and Requirement of Fuel and Fodder in Kalsa Basin

Patwari circle	Forest Stock (year-1)	Fuel requirement per year	Fodder requirement per year	Total requirement per year	Shortage	
					In tons	in %
Purvi agar	4129.41	1592.28	3054.14	4646.42	517.01	11.13
Sundarkhal	2062.29	1592.28	7550.94	10922.04	8859.75	81.11
Sarna	3623.09	3371.10	10398.85	14352.49	10729.4	74.76
Churigad	635.52	3953.64	1126.03	1802.89	1167.37	64.75
Babiyad	3317.10	676.86	2918.18	3409.87	92.7	2.72
Pinron	4272.99	491.69	2342.39	2959.6	1312.5	44.35
Chanfi	1430.84	617.21	638.75	6127.84	4697	76.65
Ramgarh	886.31	2163.03	3964.81	1768.46	882.15	49.88
Purvi chhakhata	1716	1129.71	1832.30	2514.01	798.01	31.74
Pandegaon	858	1171.32	2319.58	3490.09	2632.9	75.44
Total	22931.57	15848.55	36145.97	51993.71	31688.79	60.95

Fodder Source: Fodder is derived from the land which can be classified into two groups.

1. Grazing area consisting of forest pasture area not suitable for cultivation. The uncultivated land and forest land constitute the main source of fodder in the hilly regions of District Nainital.

Forest land in some circumstances is not found free for grazing. Regarding the optimum capacity of grazing land the national commission on agriculture (1976) quoted in Chand et. al. (1989) considers rainfall as determinant of natural sustaining capacity of the grazing land. The permissible grazing incidence for the various areas receiving different rainfall has been expressed as cow units per ha in various rainfall zones.

2. Non grazing areas including the gross cropped areas. Agricultural waste and tree leaves from around the cultivated fields have been taken into account to estimate fodder from non grazing areas.

Three main sources of fodder supply in the region are as follows

1. Crop Residue
2. Grasses from Forests, Orchards, Agricultural Wastelands and Fallow lands.
3. Fodder leaves from Forests, Agricultural land, other Shrubs and Bushes.

Due to small size of farm holdings and lack of irrigation facilities fodder is by and large, not cultivated and the animals depend on forests, pastures and waste lands. Average of fodder and grasses is dwindling both qualitatively and quantitatively due to poor management practices and degradation of land.

Resource Flows: The management of fuel, fodder and other needs of the local people is a great problem for them. In many villages people use very inferior quality of fuel wood collected from the fencing surrounding the agricultural fields. The non availability of building material and timber are other issues affecting the day to day life of people. Singh et al.(1987), during a case study of some villages of Kumaun, where most of the agriculture is rainfed, observed that for the collection of fuel and firewood more than twenty times larger energy is needed than for human labour devoted to agricultural work. This is approximately equal to total human labour output.

Singh et. al. (1984) calculated that 5-12 ha of well stocked forest are needed per ha of cultivated land to meet the fuel demand and Airy and Shastry (1982) reported at least 30.74 ha forest land per ha of cultivated land to satisfy the fodder needs of the villages. Against this requirement only 0.91 ha of forest is available in the area(Table2). This shows intense pressure on the forest.An

analysis of forest stock (Table 3) estimated for Patwari circles in the study area reveals that none of the circles have a shortage of resources. Six circles have up to 20 percent surplus resources with Pinron having the least surplus (3.78%), followed by Babiyad (7.18%), Purvi Agar (8.09%), Purvi Chhakhata (10.25%), Ramgarh (13.95%) and Churigad (19.84%). The remaining four circles have surplus ranging between 25 and 40 percent, they are, Sarna (27.70%), Pandegaon (28.45%), Chanfi (30.55%) and Sundarkhal (37.03%). The study region is comfortable with its overall surplus of 15.74 percent which is attributed to its 24.20 percent area under panchayati and civil forests. This also indicates that the adjoining reserved forests would be having only minimal pressure from the adjoining villages.

It can be therefore concluded that a significant part of the fuel needs of the people are met by forests encroached by the villagers. Fuel wood is also stored during winter months for the use in the remaining part of the year. Exclusive use of fuel wood for cooking is becoming uncommon year after year as people have started using cooking gas.

Forests are also major sources of fodder followed by agricultural lands (crop residue) and cultivable wasteland. A significant portion of fodder needs are met by dry fodder which comes from the personally managed grasslands. The villagers cut the grasses from these lands after rainy season and use them in the winters to feed their cattle.

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