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RESEARCH ARTICLE

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Socio-economic feasibility of some of the villages of Chamoli district of Garhwal Himalayas

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ABSTRACT : The socio-economic status of eight villages with a total of 521 households surveyed during the study, including 2820 members in different groups and community. The average family size was reported to be 5.41 members per family. During the survey of villages, it was found that the adult literacy rate in male was 51.19 per cent as comparison to female literacy rate 48.80 per cent, respectively. In the livestock of the eight villages the various categories of livestock the buffaloes were the maximum 57.82 per cent followed by sheep/goat 26.30 per cent. The average daily fuel wood consumption during summer and winter in different villages varied from 83.41 kg/day/village to 535.40 kg/day/village in summer and 150.70 kg/day/village to 757.05 kg/day/village in winter which are supplemented by existing agroforestry upto considerable extent. The utilization of fodder tree varied from 301.05 kg/day/village to 1009.15 kg/day/village in the summer and 650.50 kg/day/village to 2011.50 kg/day/village in the winter season which is also supplemented by traditional agroforestry trees in a sizeable limit. The land holding size ranged from 0.03 to 5.6 ha per family with 77.9 per cent families under marginal category, 19.05 per cent under small category and -3.04 per cent families comprised of medium- large landholding size.

KEY WORDS : Literacy rate, Livestock, Fuel wood, Fodder tree, Agroforestry, Land holding size

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INTRODUCTION

The Indian Himalayan region occupies a special place in the mountain ecosystems of world. Dispersed small settlements and terraced agricultural fields carved out of the raising crops, with numerous multipurpose tree species growing, particularly on the boundaries of rain fed terraces, are typical features in the temperate area of Garhwal Himalaya. Average cultivated land per farmer in the central Himalaya is 0.5 hectares, but production is supplemented from the adjacent forest ecosystem (Tewari *et al.*, 2003). The link between forest management and the wellbeing of communities in forested areas has traditionally been defined by forest sector employment opportunities (Sharma and Gairola, 2007). Continuous heavy and unsustainable exploitation of forest resources has resulted in overall degradation of forests (Khanduri *et al.*,2002).The farmer have integrated crops,

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trees and animals in their farming and land management systems reasonably for solving problem of acute shortages of fuel wood, fodder and other produce (Bargali *et al.,* 1998). Traditionally in this area, agricultural activities are concentrated at elevations between 1000 and 2000 meters above mean sea level, often called the agricultural or populated zone; pressure on forests is at a maximum in this range (Tewari *et al.,* 2003). Mountain inhabitants by and large face with the widening gaps of demand and supply of basic needs *i.e.* fodder, food, fruit, fuel timber and related land based products besides other problems of subsistence. One of the basic reasons for this kind of unsustainable growth and development of mountain farming system has been the improper land use technologies development.The agriculture production is not enough to meet the demands of the region. Therefore people migrate from this area in search of jobs (Sharma *et al.,* 1999). This paper study the socio-economic status as well as the amount of fodder tree, fuel wood used, number of livestock and land holding size of villages.

EXPERIMENTAL METHODS

Study sites :

The study was carried out in eight different Gharhwal Himalayan villages *viz.*, V_1 (Srikot), V_2 (Siron), V_3 (Jakh), V_4 (Garhsari), V_5 (Bakarkot), V_6 (Melchuri), V_7 (Danedar), V_8 (Chopta) in Chamoli district of Garhwal in Uttarakhand, India, varying in elevation from 1000 – 3000) m asl. The different study sites fall between sub tropical to temperate zones and lie between 79º 02' 39" & 80º 03' 29" E longitudes and 29º 55' 00" and 31º 03' 45" N latitudes.

Socio-economic study :

The object of the socio-economic survey was to gain information about the resource use patterns by the in habitants of the area. A common questionnaire containing all the information was drawn in close consultation with each household, mostly head or the elder person of the family. In order to ensure the correct answers to the questionnaire, house to house visit was followed by field survey as well. During the interview, families representing all economic classes were selected. At the time of interview of household, the information pertaining to their family life, number of family members, sex, age, religion, family background, land holding, land use pattern, cropping pattern, cropping sequence, trips taken per week to collect fuel wood and fodder, the number of fruit trees and MPTs within the agriculture fields, existing agroforestry systems, livestock population, nature of employment, type of houses, availability of light and water, government facilities such as school, hospital, post office at village level etc were also discussed(Gairola *et al.,* 2009). Thep participatory rural appraisal (PRA) technique following (Chambers *et al.,* 1989) was used to analyze the feasibility of traditional agroforestry systems in terms of estimating the input – output ratios. The rationality of agroforestry systems and their direct or indirect impacts on the life of people was determined by drawing the ideas from the local people of the study area as per the procedure followed by Misra and Ramkrishnan (1982).

Fuel wood and fodder consumption pattern :

The fuel wood and fodder consumption of the selected villages in the study area was carried out with the help of data collected from the villages using questionnaires. The fuel wood requirement was based on daily consumption rates on per capita basis, which was later multiplied by the number of individuals in the village. The demand of fuel wood was calculated separately for the summer and winter seasons. The fuel wood consumption was calculated with the consideration of number of weekly visits of the household to the forest. The calculation was based on the weight of stock of fuel wood (stacking) carried by the individuals in a visit which was averaged in the range of 20 – 30 kg/head/visit. The daily fuel wood consumption pattern was calculated as:

$$\text{Average daily fuel wood consumption of the village} = \frac{\text{Average amount of fuel wood consumed daily per family}}{\text{Average no. of individuals in that family}} \times \text{No. of individuals in the village}$$

The fodder requirement was based on the daily consumption of fodder in yhe village, which was calculated on cow unit basis. The cow unit refers to: 1 cow/bullock = 1 cow unit, 1 buffalo = 2 cow unit, 1 goat/sheep = 0.5 cow unit (Khanna, 1982). The demand of fodder (tree fodder, grass, agricultural residue) was calculated separately for the summer and winter seasons. The fodder collected from the

adjoining forest area, fodder from the trees of the existing agroforestry systems, residues of agricultural crops and grass in agricultural crops and grass in agricultural fields and forest area were calculated using feedback from the questionnaires. The daily fodder consumption pattern was calculated as:

$$\text{Average daily fodder consumption of the village} = \frac{\text{Average amount of fodder consumed daily per family}}{\text{Average no. of cattle per family}} \times \text{No. of cattle per village}$$

EXPERIMENTAL RESULTS AND ANALYSIS

The socio-economic status of eight villages with a total of 521 households surveyed during the study, including 2820 members in different groups and community. The average family size was reported to be 5.41 members per family. During the survey of villages, it was found that the adult literacy rate in male was 51.19 per cent as comparison to female literacy rate 48.80 per cent, respectively as shown in Table 1. The near about

Table 1: Socio-economic and demographic patterns of different villages of the study area

Village name		Siron	Srikot	Mandal	Nagnath swami	Malchuri	Bakarkot	Devriyatal	Chopta	Total
		V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	
Elevation (m a msl)		1014	1437	1500	1920	2200	2350	2438	2900	
Total agricultural land (ha)		110	48	103	43	113	57	40	35	539
Irrigated land (ha)		13	31	17	10	15	33	5	--	93
Rainfed land (ha)		37	17	86	17	37	17	47	108	366
Total family		53	48	94	137	58	64	37	30	521
Human population (total)		321	257	508	703	347	365	187	132	2820
Human	Male	172	150	265	340	156	172	83	100	1438
population	Female	193	181	243	363	191	193	104	115	1583
Literate male		134	102	203	276	126	128	58	21	1048
Literate female		113	100	166	273	132	137	67	11	999
Illiterate male		38	27	62	64	30	44	25	35	325
Illiterate female		36	15	77	90	59	56	37	40	410
Families	Land less farmers	--	--	--	--	--	--	--	--	--
	Marginal land holding (<1 ha)	41	35	85	116	47	48	32	20	424
	Small land holding (1-2 ha)	12	10	06	18	09	15	05	03	78
	Medium land holding (2-4 ha)	--	1	3	3	2	1	--	--	10
	Large land holding(>4 ha)	--	--	--	--	--	--	--	--	--
Employment	Govt. employ	14	07	29	33	23	13	11	07	137
status	Self-employ	12	02	22	31	14	21	07	05	114
	Dependent totally on agriculture	27	03	43	73	21	30	19	10	226
Domestic animal	Buffaloes	61	45	103	128	77	78	42	35	499
population	Cows	05	--	05	14	07	09	09	--	49
	Oxen (pair)	12	03	12	14	03	06	03	02	55
	Goat/ Sheep	46	27	18	56	11	32	27	10	227
	Mule	08	06	03	--	--	08	06	--	31
	Others	--	--	02	--	--	--	--	--	02

similar work was done by (Bhuyan, 2015). The employment status rate is 30 per cent whereas people dependent totally on agriculture rate is 50 per cent and self-employment rate is 25 per cent. This shows that increase in the land holding was an indicator of socio-economic status and hence, the better financial position. The findings were similar to (Butola *et al.*, 2011). In the livestock of the eight villages the various categories of livestock the buffaloes were the maximum 57.82 per cent followed by sheep/goat 26.30 per cent as shown in Table 1. The similar results were also reported by (Kediyal *et al.,* 2011). The average daily fuel wood consumption during summer and winter in different villages varied from 83.41 kg/day/village to 535.40 kg/day/village in summer and 150.70 kg/day/village to 757.05 kg/day/village in winter which are supplemented by existing agroforestry upto considerable extent as shown in Table 2. The fuel wood consumption is within the range given for Central Himalaya (Pandey and Singh, 1984). The utilization of tree fodder varied from 301.05 kg/day/village to 1009.15

Table 2 : Fuel wood consumption pattern in the selected villages

Village (Aspect)	Fuel wood consumption						Source of fuel wood (% contribution)			
	Kg/day/head		Kg/day/family		Kg/day/village		Adjoining forests		Existing AF trees	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Srikot (V_1)	0.98±0.07	1.17±0.17	4.57±0.63	5.45±0.78	242.04	288.97	70-80%	40-70%	20-30%	30-60%
Siron (V_2)	0.61±0.05	1.15±0.07	2.25±0.25	4.20±0.91	83.41	150.70	50-80%	40-80%	20-50%	20-60%
Jakh (V_3)	1.03±0.07	1.28±0.12	5.70±0.55	7.40±1.80	535.40	701.01	80-90%	30-50%	10-20%	50-70%
Gharsari (V_4)	0.70±0.05	1.14±0.15	2.99±0.15	4.50±0.80	400.50	621.70	70-80%	30-60%	20-30%	40-70%
Bakarkot (V_5)	0.91±0.05	1.37±0.09	4.40±0.31	6.50±1.05	255.55	375.50	60-80%	40-60%	20-40%	40-60%
Melchuri (V_6)	1.21±0.15	1.86±0.03	5.56±0.58	8.54±1.93	355.68	546.75	70-90%	60-80%	10-30%	20-40%
Danedar (V_7)	1.45±0.35	1.89±0.09	3.99±0.98	8.99±0.99	400.50	655.75	70-80%	30-50%	10-20%	30-60%
Chopta (V_8)	1.99±0.15	1.99±0.15	3.55±0.57	7.98±1.99	500.01	757.05	80-90%	40-70%	20-50%	50-70%

Table 3: Fodder consumption pattern in the selected villages

Village (Aspect)	Fodder consumption								Tree based fodder supplemented by existing AF trees (%)	
	Tree fodder				Others(grass, agriculture residue etc)					
	Kg/day/cattle head		Kg/day/village		Kg/day/cattle head		Kg/day/village			
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Srikot (V_1)	3.90±0.40	5.60±0.55	575.60	835.35	4.31±0.50	3.70±0.40	645.65	550.20	10-30%	20-40%
Siron (V_2)	3.01±0.35	6.50±0.80	301.05	650.50	4.85±0.30	3.11±0.35	495.85	310.11	10-30%	20-40%
Jakh (V_3)	4.09±0.55	8.15±1.01	1009.15	2011.50	5.40±0.40	1.85±0.12	1355.45	460.35	20-30%	30-50%
Gharsari (V_4)	3.80±0.61	7.10±0.45	730.30	1350.50	5.11±0.45	2.95±0.35	970.70	555.70	20-30%	30-50%
Bakarkot (V_5)	3.68±0.31	5.28±0.73	614.56	881.76	4.37±0.35	2.74±0.27	729.79	457.58	20-40%	30-60%
Melchuri (V_6)	4.41±0.53	6.45±0.71	835.28	1210.57	4.83±0.55	2.60±0.31	901.20	497.42	20-40%	30-60%
Danedar (V_7)	4.11±0.53	8.45±0.75	735.30	1358.50	5.13±0.48	3.45±0.15	857.75	395.45	20-30%	30-50%
Chopta (V_8)	3.89±0.42	7.01±0.45	579.61	837.38	4.83±045	1.99±0.53	901.55	550.59	10-30%	20-40%

Table 4 : Land holding size of households in the study area

Land holding (ha)	Households in villages								Total
	(V_1)	(V_2)	(V_3)	(V_4)	(V_5)	(V_6)	(V_7)	(V_8)	
0-0.5	12 (22.64)	13 (31.70)	15 (18.07)	26 (22.41)	16 (27.50)	20 (34.48)	15 (31.91)	11 (29.72)	128 (25.96)
0.5-1.0	29 (54.71)	19 (46.34)	59 (71.08)	69 (59.48)	31(53.44)	22 (37.93)	17 (36.17)	10 (27.02)	256 (51.92)
1.0-1.5	7 (13.20)	4 (9.75)	3 (3.61)	13 (11.20)	6 (10.34)	9 (15.51)	8 (17.02)	9 (24.32)	59 (11.96)
1.5-2.0	5(9.4)	1(2.43)	3(3.61)	5(4.31)	3(5.17)	6(10.34)	7(14.89)	5(13.51)	35(7.09)
>2.0	-	4 (9.75)	3 (3.61)	3 (2.58)	2 (3.45)	1 (1.72)	-	2 (5.40)	15 (3.04)
Total	53	41	83	116	58	58	47	37	493

kg/day/village in the summer and 650.50 kg/day/village to 2011.50 kg/day/village in the winter season as shown in Table 3, which is also supplemented by traditional agroforestry trees in a sizeable limit. The findings were also reported by (Khanduri *et al.*, 2002). The land holding size ranged from 0.03 to 5.6 ha per family with 77.9 per cent families under marginal category, 19.05 per cent under small category and 3.04 per cent families comprised of medium-large landholding size as shown in Table 4. The results were similar to Chandra *et al.* (2011).

Conclusion :

This study confirmed the crucial contribution of the forest to the livelihood of rural people in the Chamoli district Garhwal Himalaya. Fuel wood and fodder are extracted from the forest by each household every day. The extraction of large amounts of fuel wood, fodder, from forest has mounted profound and measurable impacts on the forest vegetation and plant diversity in forest areas close to the villages (Moench and Bandhyopadhyay, 1986). Lack of employment opportunities is the major cause of dependency of rural people on forest for livelihood (Springate-Baginski *et al.*, 1999). The forest is thus subjected to intensive anthropogenic pressure upon its natural resources, pressure which has degraded the forest locally and which may soon cause a decline in the well-being of the inhabitants who are almost fully dependent on the forest for their livelihood. Indigenous knowledge of local people on use and management of their plant resources is a valuable source of information for conservation and sustainable utilization of the plant biodiversity and, hence, conservation based on indigenous knowledge is recommended (Cotton, 1997; Turner *et al.*, 2000 and Laird and Noejovich, 2002). Agriculture was done by native households and old people as youth having less interest in agriculture. Therefore, a sound policy and government support is required for enhancing the agricultural biodiversity including value of the traditional crops, promotion of elite landraces selected on the basis of urban consumption need (Kumar, 2008).

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