

# LIVELIHOOD TRANSITIONS IN HILAUNGAD WATERSHED



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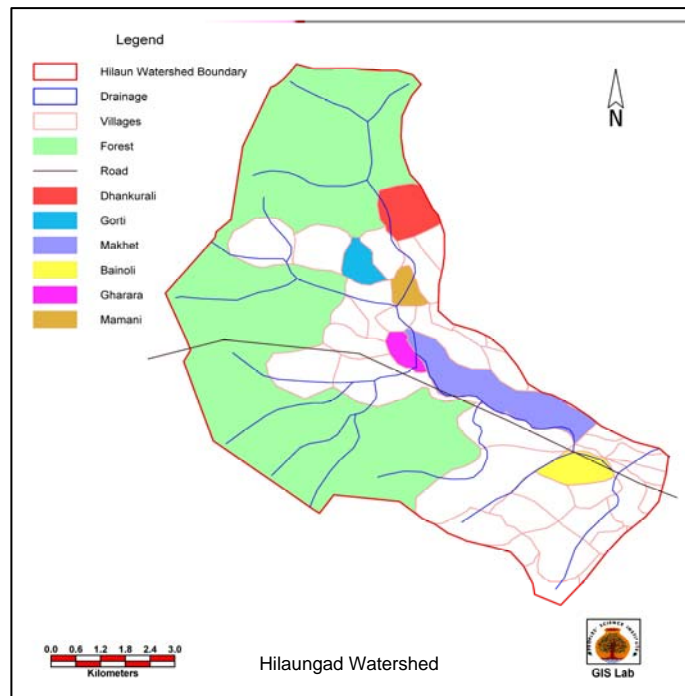
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## I. INTRODUCTION

The Hilaungad watershed, a sub-catchment of the larger Lastargad basin, lies on the west bank of the Mandakini river which rises from the nearby snow covered peaks of the high Himalayas.<sup>2</sup> It is spread across an area of 78.77 sq. km (7877 ha) from a lower elevation of about 900m to an altitude of about 2600m. It lies on the eastern side of the mountain ridge that divides the Mandakini valley in the east from the Bhilangana river valley in the west. A major motor road from the town of Tilwara on the banks of the Mandakini to Ghansali town on the banks of the Bhilangana runs through the watershed.

Reserved forests cover 51 per cent (4000 ha) of the total watershed area.<sup>3</sup> They lie along the upper northern and western slopes of the watershed (See Fig.1). The remaining area (3877 ha) contains 27 villages. Its cultivable area is 2128 ha of which just over half (1072 ha) is presently cultivated and the remaining (1056 ha) is described as cultivable wastes.<sup>4</sup> The latter include village commons, community forests (Van Panchayats) and waste lands. The watershed has a total population of 11780, the density being 150 persons/km<sup>2</sup>. There are 1228 women per 1000 men in the watershed. Scheduled Castes (SCs) make up 9.5 per cent of the total population.

For the purposes of this study six villages were selected on the upper, middle and lower slopes of the watershed. These are Dhan Kurali and Gorti (upper slopes), Mamani and Gharara (mid-slopes), Makheth and Bainoli in the valley (See Fig.1). In 2005-08 People's Science Institute (PSI) and Centre for Development Initiatives (CDI), a local voluntary organization, carried out participatory research with the six selected communities as part of a project "Linking Community-Based Water and Forest Management for Sustainable Livelihoods of the Poor in Fragile Upper Catchments of the Indus-Ganges Basin", funded under CGIAR's Challenge Programme for Water and Food (hereafter CP-



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<sup>2</sup> *Gad* is the local term for the main stream that drains a mountain valley and feeds into a river. Lower order streams that feed a *gad* are called *gaderas*.

<sup>3</sup> Survey of India (1964): Topographical Sheet No. 53, J/15.

<sup>4</sup> \_\_\_\_\_: Primary Census Report-2001, Census of India 2001, Office of the Registrar General of India, GoI, New Delhi.

23 project). The data generated was used to study the local resource use patterns, livelihood and equity issues and the legal, policy and institutional frameworks required for integrated resource management. This paper presents the study of livelihoods and equity issues in the Hilaungad watershed.

## **II. METHODOLOGY**

In each selected village the research began with a series of village meetings where the project background and purpose were explained to the villagers. Transect walks were undertaken to understand the geography and land use patterns. Discussions with elderly residents helped prepare a timeline with particular reference to the availability and use of natural resources. This was followed by extensive participatory social mapping and wealth ranking exercises. In all the villages more than 60 per cent of the families were present during these exercises.

The wealth ranking exercise was followed by a 50 per cent households questionnaire-based purposive sample survey to gather data on household incomes, expenditures, resource consumption and migration patterns.

Resource mapping was done to understand land use and cropping patterns, the extent and types of forests, product flows from them, water availability and access. Trend analyses of resource availability were done. Biomass productivities of the forests and fields were measured. The daily routines and mobilities of men and women were determined. Chapati (Venn) diagrams and discussions were used to develop an understanding of the functionality, accessibility and importance of local institutions.

The data gathered for each village was compiled and analyzed. The data and analyses were presented to the villagers at meetings in each village. Their comments were used to make necessary revisions.

## **III. LIVELIHOOD ASSETS**

Livelihood opportunities and constraints can be comprehensively understood by analyzing the conditions of the human, natural, social, physical and financial assets in the watershed.

### **Human Assets**

The six selected villages are home to 515 households with a total population of 2920 persons. Women marginally outnumber men due to the outmigration of men in search of employment. (This issue is discussed later in a separate section.) The females to males ratios in the selected villages are lower than the ratio (1228:1000) for the entire watershed. The average household size varies from five to six persons. Demographic details, the caste structure and literacy levels for each village are given in Table 1. Most villages are dominated by one or two castes. Dhan Kurali has only Rajput households, Scheduled Castes (SCs) live essentially in Gharara and Gorti villages, while Other Backward Castes (OBCs) live primarily in Gharara and Makhet.

Literacy levels in the selected villages compare favourably with the state averages (Male 82% and female 62%). In general the total literacy levels tend to increase as one goes down the valley. Literacy levels in Gharara, however, do not follow this trend. This is perhaps a reflection of the fact that 50 per cent of the households in the village are SC families. Young male adults in these villages are likely to be educated at least upto the twelfth standard, whereas young female adults are likely to be educated at least upto the eighth standard. One generation ago the corresponding levels would have been the eighth standard for men and fifth for the women. Increasing education levels are enabling the younger generation to look for livelihood opportunities away from the villages and off the farms. There is almost a 20 per cent literacy differential between the men and the women in five villages reflecting a clear gender bias in education. Bainoli, however, is an exception to this trend. The overall literacy level in Bainoli is very high and the gender differential is only nine per cent.

**Table 1: Demography, caste & literacy**

Village	Dhankurali	Gorti	Mamani	Gharara	Makhet	Bainoli	Total
Area (ha)	30.68	100.0	21.66	75.00	40.23	36.16	303.8
Households	58	147	65	88	96	61	515
Total Population	323	931	329	496	521	320	2920
Av. Hhold size*	6	6	5	6	5	5	6
Sex Ratio**	1168	1011	859	1000	1035	1078	1018
<b>Castes</b>							
SC Households	0	72	1	43	-	-	116
OBC Hholds	-	1	-	35	66	-	102
Rajput Hholds	58	69	40	10	30	15	222
Brahmin Hholds	0	5	24	0	0	46	75
<b>Literacy Status</b>							
Male	79%	87%	92%	80%	90%	97%	91 %
Female	46%	67%	70%	62%	74%	88%	71 %
Total	63%	77%	82%	71%	82%	93%	81 %

Source: Social mapping, PSI, 2006-07.

Note: \* Rounded off to the nearest whole number; \*\* Females/1000 males

## Natural Assets

The drainage pattern in Fig.1 shows that the general slope of the watershed is to the south and the east. Reserved forests dominate the northern and western upper reaches of the Hilaungad watershed (See Fig.1). The main species are chir pine, oak and rhododendron, with cedar (deodhar) at the top. Pine is dominant. Other important species are Utees (*Alnus Nepalesis*), Kharsu (*Quercus Floribanda*), Mauroo (*Quercus Semicarpifoloi*) and Kafal (*Marica Nagi*). About a dozen first order streams (*gaderas*) emerge from these forests and feed the main Hilaungad stream. People practice terrace farming. On the slopes the plots are small and narrow. Their sizes increase near the outlet of the watershed.

The present land use pattern of the selected villages is shown in Table 2. All the six villages are small, their geographical areas being well below 1 km<sup>2</sup>. Gorti has an area of exactly 1km<sup>2</sup>. Just under half the geographical area is cultivated land (47%). Gorti, Makhet and Bainoli residents have agricultural lands in other villages also. Community forests, known as Van Panchayats, cover about a fifth of the area. The civil lands (village commons) are quite degraded and are mainly used for grazing animals.

**Table 2: Land use pattern**

Village Location	Village	Cultivable Land		Waste Land (ha)	Civil Land (ha)	Van Panchayat Land (ha)	Other Land (ha)	Total (ha)
		Irrigated (ha)	Unirrigated (ha)					
UPPER	Dhan Kurali	1.0	19.6	0	6.4	0	3.7	30.7
	Gorti	3.5	35.4	4.4	41.8	5.7	9.3	100.0
MIDDLE	Mamani	5.2	7.5	2	0	4.1	2.9	21.7
	Gharara	9	32	0	23	8	3	75
	Makhet	8.1	3.4	2.3	2.3	22.1	2	40.2
LOWER	Bainoli	10.3	7.9	0.2	2.2	13.9	1.7	36.2
	<b>TOTAL</b>	<b>37.1*</b> <b>(12%)</b>	<b>105.8 (35%)</b>	<b>8.9</b> <b>(3%)</b>	<b>75.7</b> <b>(25%)</b>	<b>53.8</b> <b>(18%)</b>	<b>22.6</b> <b>(7%)</b>	<b>303.8</b> <b>(100%)</b>

Source: Land revenue records, 2004.

Note: \*The PRA exercises revealed that by 2006 the irrigated command of the six villages had increased to 63.7 ha.

**Agriculture:** Not all the cultivable land is being farmed presently. Transect walks revealed fallow fields in Makhet, Gharara and Mamani. A flash flood about 15 years ago had left many fields uncultivable in Makhet. Food grains are the main crops in these villages. Paddy in the kharif (summer monsoon) season and wheat, barley and mustard in the rabi (winter) season are the main irrigated crops.

Vegetable cultivation in these villages is quite limited. Most villagers grow some vegetables in their kitchen gardens for household consumption. There is some commercial farming of potatoes in Dhan Kurali village. Makhet has one enterprising farmer who does a substantial amount of vegetable cultivation. Traditionally onions and garlic have been cultivated for sale on irrigated lands. But farmers in Bainoli claimed that this practice was also in decline now, ostensibly due to reduced productivity.

In general, the soil fertility of the cultivated lands varies from poor to moderate. Nutrient contents increase going down the slope (See Table 3a). Nitrogen and potash levels in the soils range from poor to medium, whereas phosphorus and organic carbon contents are adequate.

**Table 3a: Soil fertility levels (kg/ha) of agricultural lands**

Village	Un-irrigated Land				Irrigated Land			
	N	P	K	Org. C (%)	N	P	K	Org. (%)
Dhankurali	250	42	84	0.79	448	49	168	2.34
Makhet	406	61	90	1.11	392	42	101	1.15
Bainoli	420	49	129	1.42	234	61	67	0.65

Source: Soil analysis, PSI, 2007-08

Nitrogen Level: High (>560 Kg/ha), Medium (280-560 Kg/ha), Poor (<280 Kg/ha)

Phosphorous Level: High (> 25 Kg/ha), Medium (11-25 Kg/ha), Poor (< 11 Kg/ha)

Potassium Level: High (> 280 Kg/ha), Medium (108-280 Kg/ha), Poor (< 108 Kg/ha)

Organic Carbon: High (> 0.75 %), Medium (0.5-0.75 %), Poor (< 0.5 %)<sup>5</sup>

The productivities of different crops in all the study villages vary from low to medium. Farm productivity also increases going down the slopes (See Table 3b). In general, crop productivities in the valley villages are double those of the villages in the upper slopes. Crop production is also lowered due to intrusions of wild animals, particularly monkeys and wild boars.

<sup>5</sup> D.Singh, P.K. Chhonkar & R.N. Pandey: *Soil Plant Water Analysis: A Methods Manual*, Indian Agricultural Research Institute, New Delhi (undated).

**Table 3b: Crop productivity (Q/Ha)**

Village Location	Village	Crops							
		Paddy		Wheat		Mustard*		Barley	
		Irr.	UnIrr.	Irr.	UnIrr.	Irr.	UnIrr	Irr.	UnIrr
Upper Slope	Dhankurali	12	9	10	6	1	0.5	7	5
	Gorti	15	11	12	9	1.5	0.8	8.5	5
Middle Slope	Mamani	26	18	20	12	1.8	0.8	15	8
	Ghardha	21	15	18	10	1.6	1	12	5
Valley Villages	Makhet	32	18	20	10	1.8	1	18	9
	Bainoli	35	21	22	12	2	1.2	20	10

Source: Sample Household Survey, PSI, 2006-07.

Note: \* Mustard is grown as a mixed crop with wheat

Irrigation has a substantial impact on paddy productivity but much less on the productivities of the rabi crops as shown in Table 3b. The construction of irrigation canals has been significantly stepped up since the formation of the state of Uttarakhand in November 2000. Once the systems presently under construction are completed the irrigation potential will double in the study villages. Not all the existing potential, however, is fully utilized due to inadequate maintenance. This is more so the case with the larger systems built by the Irrigation Department. The canals built by the Minor Irrigation Department or the *guhls* made by the communities tend to be smaller but better maintained, generally by the villagers' own efforts. Farmers claim that the productivity of irrigated fields has increased in recent years due to the use of better quality seeds, fertilizers and modest amounts of pesticides in these fields.

Very few households in the watershed make cash investments in agriculture. Out of our sample of 257 households, only 93 (36%) bought chemical fertilizers, pesticides and good quality seeds.<sup>6</sup> These expenses are detailed below in Table 4a.

**Table 4a: Expenditure on chemical fertilizers, pesticides, insecticides & quality seeds**

Village	No.of HHs	Cul. Area (Ha)	Chemical fertilizers			Pesticides & Insecticides			Good quality seeds		
			HHs using	Area appl. (Ha)	Ann. Exp/HH (Rs.)	HHs using	Area appl. (Ha)	Ann. Exp/HH (Rs.)	HHs using	Area appl. (Ha)	Ann. Exp/HH (Rs.)
Dhankurali	12	1.96	2	0.08	300	1	0.02	25	2	0.55	628
Gorti	22	2.94	11	0.81	128	6	0.41	99	6	1.92	397
Mamani	10	4.16	2	0.5	150	6	0.68	335	1	0.24	500
Ghardha	18	4.30	13	1.5	155	10	1.3	112	2	0.14	250
Makhet	19	6.06	15	3.04	171	7	2.3	119	-	-	0
Bainoli	12	6.38	6	2.8	164	4	0.8	215	12	1.38	743
<b>Total</b>	<b>93</b>	<b>25.8</b>	<b>49</b>	<b>8.73</b>	<b>161</b>	<b>34</b>	<b>5.51</b>	<b>160</b>	<b>23</b>	<b>4.23</b>	<b>589</b>
<b>Per Cent</b>			<b>53</b>	<b>34</b>		<b>37</b>	<b>21</b>		<b>25</b>	<b>16</b>	

Source: Sample Household Survey, PSI, 2006-07

Note: Percentage figures are for the 93 households sampled.

A few households also invested in labour. Their expenses are recorded below in Table 4b. In addition to the operations listed below, two households invested an average annual amount of

<sup>6</sup> In contrast, it is interesting to note that the expenditure on the consumption of alcohol and cigarettes ranged from a minimum of Rs.440/person/year in Bainoli to Rs.2300/person/year in Makhet. The latter is also the village with the highest average household income.

Rs.46 in labour for irrigation purposes; three households hired labour for transportation purposes with an average annual investment of Rs.101 and seven families spent an average of Rs.149 annually on labour for intercultural operations.

**Table 4b: Operations-wise investment in labour.**

Village	Land Preparation		Seed Sowing & Transplanting		Intercultural Operations		Harvesting		Threshing & Winnowing		Average for all labour*	
	HHs	Ann. Exp./ HH (Rs.)	HHs	Ann. Exp./ HH (Rs.)	HHs	Ann. Exp./ HH (Rs.)	HHs	Ann. Exp./ HH (Rs.)	HHs	Ann. Exp./ HH (Rs.)	HHs	Ann. Exp./ HH (Rs.)
Dhan Kurali	1	300	1	600	0	0	0	0	0	0	1	900
Gorti	10	650	7	506	2	202	3	471	1	300	14	873
Mamani	1	800	1	2000	2	311	1	1500	1	700	2	2911
Gharara	3	1700	2	1300	0	0	0	0	0	0	4	1940
Makhet	8	913	4	550	3	6	0	0	1	2	14	682
Bainoli	2	1028	1	2000	0	0	0	0	0	0	3	1362
<b>Total</b>	<b>25</b>	<b>882</b>	<b>16</b>	<b>809</b>	<b>7</b>	<b>149</b>	<b>4</b>	<b>728</b>	<b>3</b>	<b>334</b>	<b>38</b>	<b>1062</b>

Source: Sample Household Survey PSI, 2006-07.

Note: \*All labour also includes that for irrigation, transportation and intercultural operations.

**Livestock:** Almost every household has one or more heads of cattle (See Table 5). In the last few years there has been a growing preference for buffaloes over cows. This is largely a result of the demand for milk from the roadside *dhabas* (restaurants) or teashops. It is surprising that mules are not domesticated in the selected villages since they are routinely used as beasts of burden in mountain villages. Goats and sheep are raised by a few families and their meat is sold commercially. The sheep are sheared for wool which is subsequently used for making woolen materials like shawls and blankets.

Fodder for the livestock is obtained from the reserved forests, community forests, the village commons and fields. A few families migrate with their cattle to 'chaanis' in the reserved forests during the monsoons and stall feed them there. Free grazing is generally done in the early part of the year. Agricultural stalks are fed to the animals after harvesting the paddy and wheat crops in the early winter and summer seasons.

**Table 5: Livestock population**

Village	Large Animals				Others	
	Cows	Oxen	Buffaloes	Mules	Goats	Sheep
Dhankuruli	46	54	46	0	31	10
Gorti	80	73	74	0	52	0
Mamani	50	39	39	0	35	20
Gharara	35	59	59	0	8	-
Makhet	68	75	65	0	32	30
Bainoli	52	51	38	0	40	7
<b>Total</b>	<b>331</b>	<b>351</b>	<b>321</b>	<b>0</b>	<b>198</b>	<b>67</b>

Source: Social Census Data, PSI, 2006-07

**Forests:** Reserved forests are outside the village boundaries. They are under the control and management of the state's Forest Department. Villagers have the right to enter these forests and

collect fodder grass and fallen branches for fuelwood. In the early part of the 20<sup>th</sup> century, every village was allocated a fixed volume of timber annually for construction purposes. The Forest Department identified the trees to be cut and the *Gram Panchayat* organized the cutting of these trees. Individual families obtained timber on application to the designated forest official. The tardiness of the Forest Department in granting requests for timber led to unauthorized lopping and felling of trees. This system was suspended in 1996 following a ruling of the Supreme Court of India in the interest of forest conservation. Nibbling of forestland near the villages is visible. In some locations there is actual encroachment inside the reserved forests where villagers have made cattle sheds, cultivate potatoes, fence plots for fodder or grow fruit trees. Good quality forests are visible mainly on the uppermost slopes.

In the study villages community forests or Van Panchayats were extracted from village commons following the promulgation of a Government Order in 2001.<sup>7</sup> This was accompanied with the formation of Van Panchayats in every village to manage them. Under the provisions of the new rules a minimum of 4 ha was allocated for the new Van Panchayat forests. No Van Panchayat has been formed yet in Dhan Kurali. The ones in Gorti, Mamani, Gharara and Makhet are dysfunctional. The Van Panchayat in Bainoli, registered earlier in 1995, is functioning very well. Van Panchayat lands in Mamani and in Gharara have been encroached for a long time by the local villagers; hence their lack of interest in the functioning of the Van Panchayats.

The biomass productivity of the Van Panchayat lands is very low in comparison to the reserved forests, except in Bainoli where the Van Panchayat has been managing its forest in an effective manner. In Gorti and Mamani there are no trees in the Van Panchayat area. The biomass productivity of the trees in the Gharara and Makhet Van Panchayats is low because the trees are still young.

**Civil Lands:** Village commons or civil lands in all the villages are degraded and heavily encroached upon. Villagers have parceled most of them into small plots for growing fodder for their livestock. The parceling of these plots reflects the power structure in the village, with some families having no plots. The parts not encroached are left open for free grazing. Grass productivity is therefore very low (See Table 6).

**Table 6: Biomass productivity**

Village	Van Panchayat (VP) Forests Biomass density and productivity					Reserved Forests (RF) Biomass density and productivity		Civil Lands (CL) Grass productivity	
	Area (ha)	Tree Density (Trees/ha)	Fuelwood (tons/ha)	Leaf Fodder (tons/ha)	Grass (tons/ha)	Fuelwood (tons/ha)	Leaf Fodder (tons/ha)	Area (ha)	Grass (tons/ha)
Dhan Kurali	-	-	-	-	-	489	734	6.4	0.75
Gorti*	5.7	0	0	0	0.75	910	882	41.8	0.5
Mamani*	4	0	0	0	0.75	910	882	0	0
Gharara**	8	217	35	35	2.3	300	177	23	0.75
Makhet**	22.1	326	28	14.7	2.5	300	177	2.3	0.65
Bainoli	13.9	297	270	0	3.0	274	0	2.2	0.75

Source: Biomass measurements, PSI, 2006-07;

Note: RF = Reserved Forests; Dhan Kurali does not have a Van Panchayat.

Villages marked \* and \*\* share the same compartment in the RF.

<sup>7</sup> The Uttaranchal Panchayati Forest Rules (2001).

**Water:** The average annual rainfall in the watershed is 1243mm, two-thirds of which falls during the June-September monsoon period.<sup>8</sup> Dhan Kurali, the uppermost village in the watershed receives some snowfall during the winter. The annual precipitation replenishes a large number of springs and streams in the study villages (See Table 7). About half the *gaderas* and the most of the springs have a perennial character. Discussions during the seasonality exercises showed that there is less water in the *gaderas* during the lean months now than compared to a decade ago. The villagers believe that the 1999 earthquake, which resulted in fissures and heavy damages in the watershed, has affected the underground flows.

**Table 7: Water resources**

Village	Springs	Gaderas	Tank	Diggi*	Stand posts	Hand pump	Canal	Guhl	Hydrant
Dhankurali	8 (8)	4 (2)	5 (4)	3 (3)	9 (9)	0	3 (3)	1 (1)	0
Gorti	2 (2)	2 (0)	2 (2)	1 (1)	8 (8)	1 (1)	1	0	0
Mamani	6 (3)	5 (1)	5 (3)	1 (1)	5 (5)	1 (1)	4 (4)	1 (1)	1 (1)
Gharara	5 (3)	3 (2)	2 (1)	2 (2)	18 (18)	0	3 (2)	1 (1)	0
Makhet	6 (3)	3 (2)	2 (1)	1 (1)	17 (10)	0	4 (4)	1 (1)	1 (0)
Bainoli#	3 (3)	6 (3)	3 (2)	0	8 (8)	1 (3)	4 (4)	0	0
<b>Total</b>	<b>30 (22)</b>	<b>23 (10)</b>	<b>19(13)</b>	<b>6 (6)</b>	<b>65 (58)</b>	<b>3 (3)</b>	<b>19 (18)**</b>	<b>4 (4)</b>	<b>2 (1)</b>

Source: Resource mapping, PSI, 2006 -07.

Note: ( ): Functional Resources; # Bainoli also has two small ponds called chaals. \*A diggi is a small cemented tank;

\*\* Some are only partially functional.

A number of water harvesting structures and irrigation systems have been constructed to meet the communities' needs. The larger canals convey water from the main Hilaungad to the fields while the smaller guhls bring water from the *gaderas*. The guhls are earthen channels made by the villagers whereas the canals are cement-lined and made by state agencies. All the villages, except Gorti have a stream flowing through them or by them. The residents of Gorti were quite bitter that no new irrigation facility had been developed in the village for a long time. In the present decade two new irrigation works have been started in Gorti.

### Social Assets

Two types of institutions can be discerned in the Hilaungad watershed – traditional and modern. Traditional institutions, e.g., caste, kinship and *panchayats* are strong and enduring. It is well-known that a person's caste often plays a decisive role in determining his/her livelihood opportunities. The Scheduled Castes families are in general poorer, with a larger number of poor families. They have small landholdings and relatively lower level of education. Such effects of caste can be observed in the selected villages. Kinship ties with outmigrants in towns and cities, along with education, provide opportunities for further migration from the villages in search of employment.

In recent years state governments have promoted a number of development-oriented institutions like the Gram Panchayat, Van Panchayat, Mahila Mangal Dal and Yuvak Mangal Dals. These, however, are quite weak. As a local self-governance body the Gram Panchayat is the most important institution in the villages, formed by direct elections every five years. Rural development funds are being increasingly channeled through Gram Panchayats. But these bodies are dominated by the Gram Pradhans. The affiliated sectoral sub-committees are non-existent while the Gram Sabhas are not actively involved in decision-making. Since many of these

<sup>8</sup> Forest Department, Jakhni (2003), based on ten year rainfall data.

institutions have been formed as a result of government orders, villagers display little sense of their ownership.<sup>9</sup> Similar institutions have also been promoted by voluntary organizations as part of development projects. They help spend the project funds effectively but their sustenance beyond the project period is questionable. Increased participation of the community in decision-making in such projects, however, is creating a base for ownership of the development process by the community.

The villagers believe that community spirit has waned over the years, e.g., earlier people would help each other in farming operations or in house construction. Now such cooperation is limited to family or kinship ties. Farmers do come together as informal users' groups to manage the traditional irrigation systems or the smaller canals. In addition to undertaking repair and maintenance of irrigation channels they also supervise the distribution of water by rotation.

### Physical Assets

Compared to mountain villages in general the selected villages have reasonable access to infrastructural facilities like schools, health centres, banks, markets, etc. as shown in Table 8. Most of these facilities are located in Jakholi, the block headquarter, Mayali and Tilwara. Though Mayali and Tilwara are officially revenue villages, in reality they have the character of urban areas.<sup>10</sup> Tilwara lies on the main Kedarnath tourist route, Jakholi has a Tourist Rest House run by a state agency along with a number of administrative offices, Mayali boasts of a bank, bus stand, restaurants, a lodge and photocopying and fax facilities.

Metalled motor roads connect Mamani and Bainoli to Mayali, Jakholi and Tilwara. Buses and jeeps are the main means of transport for people and goods. Dhan Kurali, the uppermost villages in the watershed is closer to Jakholi than to most other villages in the watershed, though the distance has to be traversed on foot. Telephone facilities exist in all the villages. Many residents also own mobile phones.

**Table 8: Infrastructure facilities**

Facilities	Location	Distance from the village (km.)					
		Dhankurali	Gorti	Mamani	Gharara	Makhet	Bainoli*
Primary School		Each village has at least one primary school					
Sr Sec School	Jakholi	5	8	5	18	8	11
Degree College	Jakholi	5	8	5	18	8	18
Health Sub- Centre	Tiyonkhar	5	5	4	0	2	11(Tilwara)
Pr. health centre	Jakholi	5	8	5	18	8	11
Bank	Mayali	5 (Jakholi)	10	8	13	13	11
Post office	Kot	3	0.5	1	0.5	0	11
Veterinary	Jakholi	5	8	5	18	8	11
Market	Mayali	10	10	8	18	8	11
Road	-	3	0	0	0	2	0

Source: Venn diagrams, PRA Exercises, PSI, 2006-07.

Note: \* Bainoli residents go to Tilwara (11 km) or Agastyamuni (18 km).

Education facilities upto a degree college are available within Jakholi block. For post-graduate education the nearest college is located in Agastyamuni, about 25 km from Mayali. The presence of these facilities is enabling the younger generation to go for higher education, which in

<sup>9</sup> D.Sen, R.Chopra, S.Bharadwaj & D.Negi (2008): "Disowned Institutions in Hilaungad watershed", a report on institutional frameworks prepared by PSI as part of the CP-23 Project.

<sup>10</sup> Many villages in Uttarakhand with an urban character are resisting conversion into urban areas because the quantum of funding for rural areas is much greater at present than for urban areas with the same population.

turn improves their prospects for off-farm employment. Basic health facilities have been established by the government in Jakholi, Tionkhar in Gharara village and in Tilwara. Private ayurvedic medical practitioners also exist at these locations.

### **Financial Assets**

In a situation of general poverty, the study villages appear to have a relatively high proportion of well-to-do households.<sup>11</sup> Forty households reported a combined annual revenue of over Rs.100,000 from earned income and farm production. Twenty six households are engaged in business enterprises. Thus a good number of households have investible surpluses.

The main sources of financial capital for consumptive or productive purposes are the traditional moneylenders. Most villagers do not go to banks for loans because of their cumbersome procedures. Some of the wealthier people have, however, taken bank loans to purchase motor vehicles for plying taxis. Individuals in Mamani village have taken bank loans for purchase of buffaloes and establishing a tailor's shop in Mayali. Members of a thrift group in Makhet have collectively accessed a bank loan for purchase of buffaloes.

Loans for agricultural purposes are taken from the Agricultural Loan Committee (Krishi Rin Samiti) of the District Cooperative Bank. At data review meetings, on different occasions, villagers revealed that they never receive the full amount of the loan, a significant portion being deducted as 'commission' by the loaning officers. Some of the money is spent for consumptive purposes. Generally about 25-30 per cent of the loan amount is actually spent on agriculture. Agricultural loans are also obtained from moneylenders.

In addition to moneylenders and banks each village has one or more saving and credit (thrift) groups, who have accumulated from Rs.22, 000 to Rs.127,000 in their bank accounts. Only a few of them provide loans and those too are only for consumptive purposes. So far only a few groups have accessed some bank credit.<sup>12</sup>

## **IV. LIVELIHOODS ASSESSMENT**

In each community, the villagers ranked every family in the village as well-off, middle-class or poor. This was followed by a 50 per cent households purposive sample survey to determine their incomes, expenditures, livelihood activities and resource use patterns. The categorization of households into the different wealth classes was done on the basis of the major source (more than 50 per cent, or providing the larger share of the income in the case of multiple sources) of income for the family, assets ownership and their quality. Though there are some variations between the different villages, the broad composition of the three groups is:

**Well-Off:** Government servants or pensioners, officers in the private sector, persons serving overseas, businessmen (store owners, taxi owners and local contractors) head the well-off families. The villagers ranked 197 families (38%) in the selected villages as being well-off.

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<sup>11</sup> The Planning Commission estimated rural poverty in Uttarakhand in 2004-05 at 40.8% and 31.7% using the 30-days and 365 days recall period respectively. These figures are the fourth highest rural poverty levels among all the Indian states. Press Information Bureau note dated March 2007.

<sup>12</sup> For details see D. Sen et. al (2008): *op. cit*

**Middle-class:** These households are headed by modest jobholders in the private sector (e.g., hotel staff), tradesmen (like painters, electricians, water millers, etc), drivers, petty shopkeepers and sheep or goat rearers. Middle-class families were estimated to number 209 (41%).

**Poor:** The poor include households headed by widows, disabled persons, unemployed elderly persons not receiving a pension, milk or grass vendors, labourers and artisans (including masons and carpenters). The villagers identified 109 (21%) households as poor.

### Household Income Levels

Household incomes include earned incomes and subsistence values.<sup>13</sup> Earned incomes are largely received in the form of salaries, wages for daily labour, business transactions or sale of goods and services. All farm production has been monetized at prevailing prices and included in the household income.

Every family in the selected villages was categorized into one of the above three classes by the villagers as part of the social mapping exercises. Of these, the 50 per cent household sample survey covered 257 families. The household sample survey yielded a range of salaries for the well-off, middle class and poor families. An estimated range for each category, accommodating almost all the families identified by the villagers, in each category, was determined. The outliers were adjusted in the appropriate class. Thus the sampled households were divided into three income classes as shown below:

- A: > Rs.65,000/hh/yr
- B : Rs. 25,000-Rs.65,000/hh/yr
- C: < Rs.25,000/hh/yr

Class A accounts for 36 per cent (92 families) of the sampled households. Class B includes almost half (49%) the sample (126), while Class C makes up 39 households (15%). Table 9 shows the average class-wise incomes for the different villages. While no clear trends are visible, it is seen that the income levels of Gharara, a mid-slope village, are similar to those of Dhan Kurali in the upper slopes.

**Table 9: Average class-wise income-levels**

Reach	Upper Slopes		Mid-Slopes		Valley Villages	
Village	Dhan Kurali	Gorti	Mamani	Gharara	Makhet	Bainoli
Class	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)	(Rs)
A	87,612	118,042	121,738	96,605	175,973	116,842
B	37,348	40,144	45,484	37,070	39,134	47,931
C	19,574	17,664	18,413	16,631	16,509	22,343
<b>Average</b>	<b>48,150</b>	<b>53,973</b>	<b>70,695</b>	<b>50,015</b>	<b>117,542</b>	<b>76,576</b>

Source: Sample Household Survey, PSI, 2006-07.

Most sampled households had more than one source of income. The estimated income in the previous year for each household was recorded. The occupation that provided more than half

<sup>13</sup> Though there are non-market subsistence flows in the form of water, fuelwood and fodder, we have chosen not to monetize them because these are public goods.

the total income, or provided the largest share of the income was noted as its principal occupation. The average income levels for the different occupation groups are summarized in Table 10.

**Table 10: Average annual household incomes\* by occupational groups**

Village Location	Upper Slopes		Mid-Slopes		Valley Villages		Total Households (Rs)
	Dhan Kurali (Rs)	Gorti (Rs)	Mamani (Rs)	Gharara (Rs)	Makhet (Rs)	Bainoli (Rs)	
<b>Agriculture</b>	28517 (7)	23624 (7)	32794 (4)	44077 (5)	53315 (7)	56865 (7)	<b>40211 (37)</b>
<b>Livestock</b>	- (0)	79995 (1)	62970 (1)	10744 (1)	- (0)	- (0)	<b>51236 (3)</b>
<b>Daily Labour</b>	24014 (5)	34596 (26)	33410 (7)	32706 (17)	27413 (9)	23890 (1)	<b>32001 (65)</b>
<b>Trade</b>	- (0)	63959 (3)	29960 (1)	- (0)	65977 (4)	55850 (1)	<b>60177 (9)</b>
<b>Business</b>	- (0)	90091 (3)	98419 (4)	52562 (5)	158309 (8)	86359 (6)	<b>104284 (26)</b>
<b>Service/Pension</b>	63332 (17)	70698 (33)	94040 (15)	71918 (16)	174587 (20)	86119 (16)	<b>92655 (117)</b>
<b>Total Hholds</b>	<b>48150 (29)</b>	<b>53973 (73)</b>	<b>70695 (32)</b>	<b>50015 (44)</b>	<b>117542 (48)</b>	<b>76576 (31)</b>	<b>69320 (257)</b>

Source: Sample Household Survey, PSI, 2006-07.

Note: \*Cash income plus value of farm production; Figures in bracket represent the number of households.

Table 10 reveals several significant insights:

Service or pension is the primary income source for nearly half the households (45%).

- The second largest occupational group is of daily labourers (26%). These labourers are non-farm labour engaged in doing roadwork, house construction, etc.
- Agriculture is the primary source of income for just over 14 per cent of the sampled households. Even though almost all families do some farming, only 37 out of 257 derive a major part of their annual income from agriculture. These households form the second poorest occupational group.
- Business is the major income source for 10 per cent of the sampled households, while tradesmen (4%) and livestock rearers (1%) make up the rest.
- The business class is the wealthiest while the daily labourers are the poorest. The average income of the daily labourers, agriculturists, livestock rearers and traders for the selected villages is less than the average for all the sampled households.
- Agriculturists' incomes increase moving down the slopes to the valleys. This corresponds with improving soil fertility and farm productivity moving down the watershed.
- For the sampled households the upper slopes villages of Dhan Kurali and Gorti along with Gharara in the mid-slopes have average household incomes less than the watershed average. These villages have a higher proportion of households engaged in agriculture and daily labour, the two lowest income occupations.

## V. POVERTY ANALYSIS

### Poverty levels

What is the poverty level in rural Uttarakhand? The Planning Commission of India using the NSS 61<sup>st</sup> Round data has determined the rural poverty line in Uttarakhand to be Rs. 478.02/person/month for 2004-05.<sup>14</sup> This figure is based on a 30-day uniform recall period (URP) for all items of expenditure, other than health and education. It works out to Rs.5736/person on an annual basis.

In 2002-03 the Rural Development Department of the Government of Uttarakhand (GoU) used a comprehensive profile to identify the BPL (below the poverty line) households in the state. In addition to the income of the household, it gathered data on ownership of land and other assets, food security, access to water and sanitation, education levels, labour availability, occupations, family size, indebtedness, migration and other criteria to define the poverty level. Thus the GoU's definition of poverty is not simply a numerical level.

It can be argued that people's perceptions of poverty are a valid method of understanding poverty. To understand the local perceptions of poverty an attempt was made to define and estimate the perceived poverty level in the Hilaungad watershed.

At village meetings, villagers identified expenditure on clothing, fuel (gas and kerosene), education, electricity, medicines, local travel and essential social obligations as basic non-food expenses. The sampled households were asked to estimate expenses on these items during the previous year. Given the wide range of expenses, it was decided to take the average non-food expenditure of all the 126 B-class sampled households as the minimum required non-food expenditure. This figure is Rs.2501/person/year (See Table 11). The upper slopes reported higher average non-food expenditure, of around Rs.3178/person/year, than the remaining villages, mainly due to higher transport and energy expenses.

**Table 11: Annual non-food expenses of B-class households**

Village	B-Class Sampled HHolds	Annual per capita Non-food expenses ( Rs.)
Dhankurali	16	3260
Gorti	42	3096
Mamani	16	2086
Gharara	21	1934
Makhet	17	1867
Bainoli	14	1963
<b>Total</b>	<b>126</b>	<b>2501</b>

Source: Sample Household Survey, PSI, 2006-07.

The minimum expenditure required for food was calculated, based on the ICMR (Indian Council of Medical Research) dietary recommendations and the prevailing food prices, to be Rs. 5110/person/year.<sup>15</sup> Thus the perceived poverty line for all the sampled households is Rs.7611/person/year (Rs.2501+Rs.5110) or Rs.634.25/person/month. This amount is about 33 per cent higher than the poverty line determined by the Planning Commission of India. The difference

<sup>14</sup> Press Information Bureau (2007): "Poverty Estimates for 2004-05", GoI, New Delhi, March 2007.

<sup>15</sup> MSSRF & WFP (2001): Food Insecurity Atlas of Rural India, M.S. Swaminathan Research Foundation, Chennai, p.11.

in the two estimates is largely due to the different calculation methodologies. A comparison of the number of poverty-stricken households by the three criteria discussed above is given in Table 12.

**Table 12: Village-wise poverty levels**

Village	No. of Sampled Households	Poverty Levels		
		Planning Commission Rs.5736/p/yr	Local Perceptions Rs.7611/p/yr	GoU's BPL Classification
Dhan Kurali	29	6 (21)	15 (52)	9(31)
Gorti	73	33 (45)	38 (52)	9(12)
Mamani	32	5 (16)	7 (22)	5(16)
Gharara	44	18(41)	29 (66)	23(52)
Makhet	48	10 (21)	15 (31)	13(27)
Bainoli	31	5 (16)	10 (32)	14(45)
<b>Total</b>	<b>257</b>	<b>77(30)</b>	<b>114(44)</b>	<b>73(28)</b>

Source: Sample Household Survey, PSI, 2006-07; revenue records for last column.

Note: Figures in brackets are percentages of the sampled households (257).

The local villagers regard the state BPL data as being erroneous, since a number of families manage to get themselves listed as BPL in order to avail of government concessions. Makhet and Bainoli, the two best-off villages have larger proportions of BPL households than the poor upper slopes villages of Dhan Kurali and Gorti! In the remaining part of the paper we will refer to households with income levels below the perceived poverty line as poor households. The BPL families defined by the state revenue records are simply referred to as BPL households. Nearly 44 per cent of the sampled households may therefore be called poor, while the official BPL figure works out to 28 per cent of the sampled households, slightly less than the number based on the Planning Commission's estimated poverty line.<sup>16</sup>

Among the sampled villages, Gharara has the maximum percentage (66%) of poor households, primarily because 59 per cent of its sampled households are from the SC community, which has a low average annual household income of only Rs.40, 525 and 39 per cent are engaged in daily labour, the highest fraction of all the sampled villages. Just over half (52%) of the sampled households in the upper slopes villages of Dhan Kurali and Gorti are poor, as against less than a third (31-32%) of them in the valley villages of Makhet and Bainoli.

### Who are Hilaungad's poor?

**Occupation-wise:** The distribution of the poor among the different occupations is given in Table 13a. Among all the occupations, daily labourers have the maximum fraction of poor households (below the perceived poverty level), followed by the agriculturists. Families primarily dependent on business or services/pension have the least of number of poor, which fits in with their earnings being the highest and second highest averages in the selected villages. Detailed analysis also shows that seven out of eleven families (64%) dependent on money orders as a primary income source also fall in the poor category.

<sup>16</sup> The Planning Commission's poverty line of Rs.5736/p/yr for rural Uttarakhand was the highest of all the 23 states/Union Territories listed by it in 2004-05. Uttarakhand had the fourth highest fraction of rural poor (40.8%) according to its estimates.

**Table 13a: Occupation-wise poverty**

Household Type	Agriculture	L'stock	Daily Labour	Trade	Business	Service/ Pension	Total
Sampled Hhs	37	3	65	9	26	117	257
Poor Hhs*	26 (70)	1 (33)	49 (75)	1(11)	7 (27)	30 (26)	114 (44)

Source: Sample Household Survey, PSI, 2006-07 and revenue records.

Note: \*With household incomes below Rs.7611/p/yr; Figures in brackets give the percentage of the sampled households in that column.

**Caste-wise:** The Scheduled Caste households have the maximum proportion (59%) of poor households followed closely by the Rajputs (52%). Only one Brahmin household out of every seven lives below the perceived poverty line. The fact that the OBC households fare much better than the higher caste Rajputs may appear surprising. Until recently these families were regarded as Rajputs. They chose to identify themselves as OBCs after the government announced various benefits for the OBCs nationally.

**Table 13b: Caste-wise poverty**

Household Type	Schedule Castes	OBC	Rajput	Brahmin	Total
Sampled Hhs	61	43	118	35	257
Poor Hhs*	36 (59)	12 (28)	61 (52)	5 (4)	114 (44)

Source: Sample Household Survey, PSI, 2006-07 and revenue records.

Note: \* With household incomes below Rs.7611/p/yr; Figures in brackets give the percentage of the sampled households in that column.

**Class-wise:** Almost all the families in class C are poor. It may be surprising to note that there are poor families even in classes A and B. These families with relatively higher household incomes than those in class C, fall below the perceived poverty line when the per capita incomes are determined.

**Table 13c: Class-wise poverty**

Household Type	Class A	Class B	Class C	Total
Sampled Hhs	92	126	39	257
Poor Hhs*	4 (4)	74 (59)	36 (92)	114 (44)

Source: Sample Household Survey, PSI, 2006-07.

Note: \*With household incomes below Rs.7611/p/yr; Figures in brackets give the percentage of the sampled households in that column.

**Poverty Profile:** In summary, it can be said that poor households in Hilaungad watershed are most likely to be daily labourers or agriculturists by occupation, SC or Rajputs by caste and belong primarily to classes C and B.

## Migration

Throughout history and across continents migration has provided a way out of mass poverty.<sup>17</sup> Out of all the 515 households in the six sampled villages, 222 (43%) reported migration of 353 persons (Table 14a). The migrants are mainly from the working age group, 18-40 years.

<sup>17</sup> J.K.Galbraith (1979): *The Nature of Mass Poverty*, Harvard University Press, Cambridge (Mass), p120.

**Table 14a: Age distribution of migrants**

Village	Total Hholds	HHs reporting Migration	No. of Migrants			Total
			0<yrs<18	18<yrs40	>40yrs	
Dhankurali	58	37	0	43	3	46
Gorti	147	46	20	64	13	97
Mamani	65	38	4	42	11	57
Gharara	88	29	4	40	3	47
Makhet	96	51	1	56	11	68
Bainoli	61	21	7	25	6	38
<b>Total</b>	<b>515</b>	<b>222</b>	<b>36</b>	<b>270</b>	<b>47</b>	<b>353</b>

Source: Social Census, PSI, 2006-07.

In general households engaged in business or services are economically well-off (Table 10), with income levels well above the government or watershed poverty lines. This fact largely explains the preference for service and to a lesser extent for business. Since jobs in the government (including armed forces) and the private sector – which are generally the first choice – are not locally available, there is a steady migration out of the villages as shown in Table 14b. The table shows that more persons from the better-off households tend to migrate than from the poorer families. The former not only have more money to migrate with, but also more family or kinship contacts in urban areas.

**Table 14b: Class-wise migration from sampled villages**

Village	No. of Hholds	No. of Households reporting migration				Total number of migrated members			
		A	B	C	Total	A	B	C	Total
Dhankurali	58	12	21	4	37	15	26	5	46
Gorti	147	16	21	9	46	50	35	12	97
Mamani	65	22	13	3	38	37	16	4	57
Gharara	88	10	15	4	29	15	26	6	47
Makhet	96	23	22	6	51	33	24	11	68
Bainoli	61	4	13	4	21	15	17	6	38
<b>Total</b>	<b>515</b>	<b>87</b>	<b>105</b>	<b>30</b>	<b>222</b>	<b>165</b>	<b>144</b>	<b>44</b>	<b>353</b>

Source: Sample Household Survey, PSI, 2006-07.

Most of the migrants are from Rajput families (Table 14c). A larger fraction (65%) of Rajput households reports migration than from other castes. This may reflect their preference for jobs in the army.

**Table 14c: Caste distribution of migrants**

Village	Total Hholds	Hholds reporting migration					No. of migrants				
		Rajput	Brah.	OBC	SC	Total	Rajput	Brah.	OBC	SC	Total
Dhankurali	58	37	0	0	0	37	46	0	0	0	46
Gorti	147	36	0	0	10	46	79	0	0	18	97
Mamani	65	24	12	0	2	38	35	20	0	2	57
Gharara	88	6	0	10	13	29	9	0	20	18	47
Makhet	96	29	0	22	0	51	35	0	33	0	68
Bainoli	61	12	9	0	0	21	13	25	0	0	38
<b>Total</b>	<b>515</b>	<b>144</b> (65%)	<b>21</b> (28%)	<b>32</b> (31%)	<b>25</b> (22%)	<b>222</b> (43%)	<b>217</b>	<b>45</b>	<b>53</b>	<b>38</b>	<b>353</b>

Source: Social Census, 2006-07

Note: The per cent figures at the bottom represent the percentage of families from each caste that report migration.

## VI. EQUITY ANALYSIS

Equity in Hilaungad has to be understood in terms of class, caste and gender differentials.

### Class Analysis

There is a clear difference in the assets owned by the three classes (Table 15a). The average annual income of the well-off (Class A) is more than seven times that of the poor (Class C) households. The average per household land ownership of the former is also 2.5 times greater than the latter's. The difference is slightly more for the irrigated lands.

**Table 15a: Class-wise average assets ownership**

Class	No.of Hhs	Land/Hh (ha)			Cattle/Hh	Av. Ann. Hh Income (Rs.)
		Irr.	Non-Irr	Total		
A	92	0.18	0.18	0.36	3	130,297
B	126	0.08	0.10	0.18	3	40,683
C	39	0.06	0.08	0.14	2	17,992
<b>Ave.*</b>		<b>0.11</b>	<b>0.13</b>	<b>0.24</b>	<b>3</b>	<b>69,320</b>

Source: Sample Household Survey

Note: \* Represents weighted average

The well-off class A consists mainly of service and pension holders (69%) followed by business families (16%) and farmers (8%). Surprisingly, three households whose primary occupation is daily labour also fall in class A. It is possible that there is more than one earning member in these families. The largest occupational group in the middle class is also families in service or receiving pension (38%) followed by the daily labourers (33%), agriculturists (16%), businessmen and traders. Daily labourers (54%) account for more than half of the poor C-class households, followed by farmers (24%), service and pensioners (12%), business (7%) and livestock rearers (3%). No tradesmen was found in C-class. The class distribution of the different occupational groups is given in Table 15b below.

**Table 15b: Class distribution of occupational groups.**

Class	Agriculture	Livestock	Business	Daily Labour	Service/pension	Tradesmen	Total
A	7	1	15	2	64	3	92
B	20	1	8	42	49	6	126
C	10	1	3	21	4	0	39
<b>Total</b>	<b>37</b>	<b>3</b>	<b>26</b>	<b>65</b>	<b>117</b>	<b>9</b>	<b>257</b>

Source: Sample Household Survey, PSI 2006-07.

Resource consumption patterns of the three classes also reveal significant differences (Table 15c). Per capita water consumption levels are not significantly different but are far below the national rural water supply norm of 40 lpcd.<sup>18</sup> The sharp difference in fuelwood consumption is mainly due to the use of LPG and kerosene in class A and B households. Cereal consumption in class A families is almost 20 per cent above the norm, while it is just above the norm for classes B and C. Consumption of pulses, vegetables and oil is below the norm for all the classes, while milk consumption is significantly above for all of them.

<sup>18</sup> The water consumption figures represent water used inside the home. Some water is used outside at springs or public standposts for washing clothes and utensils, and sometimes even for bathing.

**Table 15c: Class-wise per capita resource consumption**

Class	No.of Hhs	Water Consump. (lpcd)	Fuelwood Consump (kgpcd)	Cereals (gm/p/d)	Pulses (gm/p/d)	Vege- tables (gm/p/d)	Oil (gm/p/d)	Milk (ml/p/d)
A	92	20	1.0	499	36	96	16	259
B	126	18	1.7	426	30	80	16	207
C	39	17	2	423	26	80	14	240
<b>Ave.*</b>	-	<b>18</b>	<b>1.6</b>	<b>454</b>	<b>32</b>	<b>86</b>	<b>15</b>	<b>215</b>
<b>Standard<sup>19</sup></b>	-	<b>40</b>	-	<b>420</b>	<b>40</b>	<b>125</b>	<b>22</b>	<b>150</b>

Source: Sample Household Survey, PSI,2006-07

Note: \* Weighted average.

## Caste Analysis

Caste-wise assets ownership is shown in Table 16a. Scheduled Caste and Rajput households fare poorly compared to the OBCs and the Brahmins. The SCs have very little irrigated land, even compared to the other castes.

**Table 16a: Caste-wise assets ownership**

Caste	No.of Hhs	Land/Hh (ha)			Cattle/ Hh	Av.Ann.Hh Income (Rs.)
		Irr.	Non-Irr	Total		
SC	61	0.04	0.09	0.13	2	<b>55,055</b>
OBC	43	0.14	0.15	0.29	3	<b>98,695</b>
Rajput	118	0.19	0.11	0.20	3	<b>60,908</b>
Brahmin	35	0.27	0.22	0.49	3	<b>86,451</b>
<b>Ave.*</b>		<b>0.01</b>	<b>0.13</b>	<b>0.24</b>	<b>3</b>	<b>69,320</b>

Source: Sample Household Survey, PSI, 2006-07.

Note: \* Represents weighted average.

The income inequity among the different castes is related to the occupational distribution among them (Table 16b). While 54 per cent of the SC households are daily labourers, the poorest occupation, only 30 per cent SC households earn their primary income from business or service, the two richest occupations. By contrast, 80 per cent of the Brahmin households are in business or service and none are labourers. Two thirds of the OBC households and 56 per cent of the Rajputs are also in business or service.

**Table 16b: Caste-wise occupational distribution**

Caste	Agriculture	Livestock	Daily Labour	Trade	Business	Service/ Pension	Total
SC	5	1	33	2	2	18	<b>61</b>
OBC	6	0	5	3	8	21	<b>43</b>
Rajput	19	2	27	4	8	58	<b>118</b>
Brahmin	7	0	0	0	8	20	<b>35</b>
<b>Total</b>	<b>37</b>	<b>3</b>	<b>65</b>	<b>9</b>	<b>26</b>	<b>117</b>	<b>257</b>

Source: Sample Household Survey, PSI, 2006-07.

For consumption of water and all the food items, the SCs are significantly worse-off than the other castes (Table 16c). The average per capita daily cereal consumption is below the standard only for the SC households. They have the lowest land holding per family and within this their irrigated land is negligible. Brahmins have the most balanced diets followed by the OBCs.

<sup>19</sup> MSSRF & WFP (2001): *op. cit.*

The high fuelwood consumption in SC households reflects less use of commercial fuels like LPG and kerosene.

**Table 16c: Caste-wise per capita resource consumption**

Class	No.of Hhs	Water Consump. (lpcd)	Fuelwood Consump (kgpcd)	Cereals (gm/p/d)	Pulses (gm/p/d)	Vege- tables (gm/p/d)	Oil (gm/p/d)	Milk (ml/p/d)
SC	61	13	2.8	417	27	75	15	155
OBC	43	16	0.9	461	40	89	16	255
Rajput	118	21	1.5	462	29	85	14	222
Brahmin	35	23	1.0	475	38	113	17	270
Ave.*	-	18	1.6	454	32	86	15	215
<b>Standard<sup>20</sup></b>	-	<b>40</b>	-	<b>420</b>	<b>40</b>	<b>125</b>	<b>22</b>	<b>150</b>

Source: Sample Household Survey, PSI, 2006-07.

Note: \* Weighted average.

## Gender Analysis

Table 1 showed that the literacy rate for women was 20 per cent less than that for men in the selected villages. Here gender differences are analyzed in terms of the daily routines of men and women, representation in decision making bodies and the status of female-headed households.

**Daily work routines:** Women tend to put in more hours of work per day than men in the sampled villages (Table 17a). Interestingly, the gender differences in daily work hours increase moving down the watershed. The work load in summer is greater than in winter for both men and women.

Though the daily work hours of women decline from a peak of 18 hours in Dhan Kurali -- the upper most village the watershed -- to 15 hours in Bainoli, the corresponding decline in the men's daily working hours is from 16 hours to 10 hours. In Dhan Kurali men and women do similar types of work including household chores, fodder and fuelwood collection, agricultural work -- though the specific activities in agriculture are different for men and women, and care or grazing of livestock. In addition women also look after children while men do off-farm labour. In all the other villages women do more or less all the activities as in Dhan Kurali. But the specific activities of men become limited to ploughing and sowing seeds and grazing of livestock. Exceptions to these roles of men in the different villages are mentioned in the remarks column of Table 17a.

**Table 17a: Daily work load of men and women in the selected villages**

Village	Daily work hours				Remarks
	Summer		Winter		
	Female	Male	Female	Male	
Dhan Kurali	18	16	14	14	Maximum work hours for men and women
Gorti	15	13	12	8	Women spend less time in collecting fodder compared to Dhan Kurali. Men do some household chores.
Mamani	14	10	12	7	Least work for men out of the six villages.
Gharara	16	11	12	10	Men are involved in off -farm daily labour.
Makhet	15	10	14	8	Women spend less time collecting fuel and fodder.
Bainoli	15	10	14	8	Women spend less time collecting fuel and fodder.

Source: PRA exercise, PSI, 2006-07.

**Representation in decision-making bodies:** Women's representation in decision-making positions of village institutions is lower than men (Table 17c). The gender ratio is about 1:3, in

<sup>20</sup> MSSRF & WFP (2001): *op. cit.*

favour of men. But this is similar to the reservation of 33 per cent posts for women as Gram Pradhans. Four out of the six study villages, i.e., Gorti, Mamani, Gharara and Makhet, have women Gram Pradhans. Barring a few exceptions, most of the women decision-makers tend to be passive members of their respective bodies. In all female organizations like the Mahila Mangal Dals and the SCGs, however, women actively participate in decision-making.

**Table 17c: Gender distribution in executive committees**

Village	Gram Panchayat		Van Panchayat		Village Development Comm.	
	Female	Male	Female	Male	Female	Male
Dhan Kurali	2	6	0	0	2	7
Gorti	3	4	4	5	0	0
Mamani	2	5	4	5	3	7
Gharara	2	3	2	3	0	0
Makhet	2	3	2	5	0	0
Bainoli	2	5	0	9	0	0
<b>Total</b>	<b>13</b>	<b>26</b>	<b>12</b>	<b>27</b>	<b>5</b>	<b>14</b>

Source: Gram Panchayat Register and Focus Group Discussions, 2006-07.

**Status of female-headed households:** As a group, female-headed households (FHH) are perhaps the worst-off-in economic terms. The sample household survey identified 12 FHH in Dhan Kurali, Gorti, Mamani and Gharara. There were none in the valley villages of Makhet and Bainoli. Most of the families were small with three or four members. Every household except two had illiterate members. Of the 12 FHH, seven households had incomes below the perceived poverty line of Rs.7611/p/yr. Class-wise, seven families were in class C, four in class B and only one in class A. Six FHH belonged to the Rajput caste, five were SCs and one was Brahmin. The occupational distribution was agriculture (4), daily labour (4), livestock (2) and service/pension (2). Only two families reported outmigration.

The poorer status of the female-headed households is brought out by their assets ownership (Table 17b). It can be seen that land and cattle ownership, water consumption and household incomes for FHH are well below the averages for the entire 257 households sample. Fuelwood consumption is higher, because FHH have less access to LPG and kerosene. Comparison with Tables 16a and 16c shows that FHH are on an average more or less on par with SC households.

**Table 17b: Assets ownership/access of female-headed households.**

Village	No. of FHHs	Land ownership (ha)			Cattle	Water Consumption (lpcd)	Fuelwood Consumption (kg/pcd)	Av. Annual Hhold Income (Rs.)
		Irr.	UnIrr.	Total				
Dhan Kurali	3	0.07	0.07	0.14	2	17	2.3	21,488
Gorti	5	0.04	0.14	0.18	2	15	1.8	47,840
Mamani	2	0.02	0.04	0.06	3	17	3.5	17,473
Gharara	2	0.06	0.05	0.11	1	21	1.6	19,226
<b>Average</b>	-	<b>0.04</b>	<b>0.10</b>	<b>0.14</b>	<b>2</b>	<b>17</b>	<b>2.4</b>	<b>31,922</b>
<b>Total Sample Average. *</b>		<b>0.11</b>	<b>0.13</b>	<b>0.24</b>	<b>3</b>	<b>18</b>	<b>1.6</b>	<b>69,320</b>

Source: Sample Household Survey, PSI, 2006-07.

Note: \* For all 257 sample households.

## VII. DISCUSSION

### **Impact of Migration on Integrated Resource Management**

The most significant finding of this study is that barely 16 per cent of the sampled households are primarily dependent on land – agriculture and livestock rearing – for their livelihoods. Even those engaged in daily labour work off-farm.

The Hilaungad watershed was a part of Tehri Garhwal district till the late 1990s when the districts were reorganized and it became a part of the newly-created Rudraprayag district. A district level survey of about 500 families in Tehri Garhwal in 1998-99 had revealed that agriculture was the primary occupation of just over half the sampled households.<sup>21</sup> The present study confirms conventional wisdom that there is a shift of the population from villages to urban areas and from farms to non-farm occupations. The extent of the change in the Hilaungad watershed, however, is surprising. Given that the Hilaungad watershed is fairly representative of the upper catchments in the Indo-Gangetic basin, this issue raises serious policy questions.

What are the implications of the foregoing for integrated land and water management in the Hilaungad watershed? If present trends continue unchecked, it will most likely lead to increasing migration from the watershed. The economically better-off and the better educated leave first or in greater numbers (Table 14b). With reduced availability of manpower there is a likelihood of agricultural fields being left fallow. Between November 2000, when the new state of Uttarakhand was formed and 2006, the number of operational land holdings decreased by 35,000.<sup>22</sup> Poorer families left behind will face greater problems of food security. The food security of SC households, who on the whole have cereal consumption below the ICMR standard (Table 16c) and who earn the part of their livelihoods by offering services to the upper castes, will be the most vulnerable.

A common concern in the watershed (and other rural areas) is that young men, particularly those who have done high school, are not interested in farming. The income levels for the different occupational groups in Table 10 help explain why village youths do not want to farm. The data shows that business and service yield much greater incomes than traditional farming. Hence the younger generation is looking more to employment opportunities away from the farms and the villages.

Integrated resource management requires effective village level institutions and investment of time by the local communities in decision-making for planning development projects, implementing and managing them. The massive shift of livelihoods from agriculture to off-farm employment has serious implications for community based natural resource management in the area. When the primary source of income for a family shifts from agriculture to non-farm employment, it has a reduced incentive to participate in the various activities required to manage common property resources. For example, such families are less likely to offer voluntary labour for communitarian tasks like the management and maintenance of community irrigation systems. A study of 39 farmer managed irrigation systems in Himachal Pradesh showed that only 11 systems were able to retain their traditional management systems in the face of growing non-farm

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<sup>21</sup> Uttarakhand Rural Development Survey (1998-99): PSI, Dehra Doon, (unpublished).

<sup>22</sup> S .Bhatt(2007): “*Palayan say 35 hazaar jot huyee kum*”, Amar Ujala, Dehra Doon edition, May 31, 2007 (In Hindi)

employment.<sup>23</sup> In nine others the traditional system of management collapsed completely. Nineteen communities responded by changing their governing structure and/or their operating rules. Participation levels in the new order varied from system to system.

It is of course possible to conceptualize a future scenario in which almost all of the local population migrates. In an undisturbed situation, it is likely that wilderness will return. Nature is then free to reclaim and regenerate the degraded lands. But what is the likelihood of such a scenario? It is more probable that the emigrants will sell their lands to hoteliers, vacationers and adventurers from the plains and the poor resident population will get some employment in these ventures, as is happening in other parts of Uttarakhand, e.g., in Ramgarh block of Nainital district. Such a transformation is unlikely to be a smooth one. It goes against many of the prevailing political sentiments that seek to preserve Uttarakhand's land and other natural resources for the domiciled population.

### Enhancing Resource Productivities and Livelihoods

The key to a positive turnaround lies in enhancing the potential for local livelihoods. A recent review of possible strategies for Uttarakhand's economic development proposes focusing on agricultural development and sustainable tourism in the mountain areas, along with other action points for the plains region.<sup>24</sup>

It is well-known that the surest way to increase agricultural incomes is to provide irrigation water.<sup>25</sup> Recent efforts by the state to enhance irrigation resources in the Hilaungad watershed represent an important step in this direction. New canals in the six study villages are expected to double the present irrigation command area from about 33ha to over 64ha out of a total cultivated area of 143ha. If the new irrigation sources become functional, there is a realistic potential for vastly increased food grains and vegetables production. Recently, introduction of the system of crop intensification on irrigated lands in some of the watershed villages has almost doubled paddy and wheat yields, raising the possibility of the participating households achieving food security.<sup>26</sup>

In the Hilaungad watershed the threat to increasing irrigation comes from the declining stream flows in the non-rainy months. About half the streams in the watershed do not have a perennial character. To ensure year-round flows in the local streams, it will be necessary to have (i) broad-leafed forests cover the upper slopes (ii) create spring sanctuaries in the watershed and (iii) carry out water conservation measures, e.g., constructing check dams in the stream beds, beginning with the upper reaches. A community at Ufrenkhal in the Doodhatoli range in Pauri Garhwal district has employed these measures to revive a dry stream.<sup>27</sup>

Sustainable agriculture in mountain areas requires combining agriculture with silvi-pasture.<sup>28</sup> Increased availability of leaf and grass fodder can provide better nutrition for cattle and

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<sup>23</sup> J.M.Baker (1997): "Common Property Resource Theory and the Kuhl Irrigation Systems of Himachal Pradesh, India", *Human Organization*, v.56, n.2.

<sup>24</sup> NCAER (2007): *Uttaranchal Development Report (Draft)*, NCAER, New Delhi, 2007.

<sup>25</sup> S.J.Phansalkar (2003): *Livelihoods: Promoting Livelihoods Enhancement*, Sir Dorabji Tata Trust, Mumbai.

<sup>26</sup> D.Sen, S.P. Chaturvedi, H.Bharti & R. Bansal (2007): "Promoting System of Rice Intensification (SRI) Among Marginal Farmers of Uttarakhand and Himachal Pradesh", Paper presented at the Second National Symposium on System of Rice Intensification (SRI) in India, Agartala, October 2007.

<sup>27</sup> Sheena & Sharma P.N. (1998): *Ripples of the Society*, GPF-FAO, Gandhi Peace Foundation, New Delhi.

<sup>28</sup> P.K. Khosla & D.K. Khurana (1996): "Agroforestry for Sustainable Development in the Himalayas: Potential and Scope", in *Farming Systems in the Himalayas*, Ministry of Agriculture, GoI, New Delhi.

more farmyard manure for the fields. For this it is necessary to follow an integrated resource management approach based on watershed development so that agriculture is limited to 30 per cent slopes, horticulture and silvi- pasture is done upto 35 per cent slopes and slopes above 50 per cent are reserved for forests.<sup>29</sup> Soil and water conservation measures have to be followed up with livelihoods promotion through the cultivation of foodgrains, vegetables and other high value crops including fruits, flowers, herbs and medicinal plants, provision of credit and crop insurance, establishment of storage, transportation and marketing facilities and promotion of sustainable technologies.<sup>30</sup>

A second possibility is to start new economic initiatives which will encourage people to not only stay back, but also focus their energies on reviving the natural resource base, specifically the forests and the streams. One such possibility is to develop community-based tourism. The crest of the watershed lies along the old pilgrim route from Tehri to Trijugi Narayan and Kedarnath. Properly trained youth and SHGs-managed village tourism offers a potential opportunity. There is a need to experiment with the concept and develop profitable models that are equitable and sustainable. Successful models of sustainable village tourism are just beginning to emerge.<sup>31</sup> The prerequisite for successful village tourism, however, are well managed forests and streams.

Studies conducted at ICIMOD show that niche-based mountain products and services can help local communities to diversify and enhance their livelihoods and improve the environmental resource base at the same time.<sup>32</sup> These may include non-timber forest products like medicinal plants and herbs, oils, fibers, silks, natural dyes, organic products, off-season vegetables, bamboo and bamboo products, bees and bee products.

### Need for Policy, Legal and Institutional Initiatives

The history of natural resource management in Uttarakhand – and in the rest of India – shows that the state has been singularly unable to effectively manage natural resources.<sup>33</sup> Given the present division of administrative responsibilities for managing forests, water and other natural resources, integrated resource management is only possible at the village or Gram Panchayat level where the community is the implementing and managing agency. Integrated resource management requires effective village level institutions and investment of time by the local population in decision-making for planning development projects, implementing and managing them.

The critical constraint in all this is the flagging community spirit, dysfunctional village-level institutions and inadequate knowledge and management capabilities.<sup>34</sup> The involvement of dedicated, capable and honest voluntary organizations can help overcome these handicaps and strengthen local development institutions. The watershed development initiative of Jan Vikas Sansthan, a local voluntary organization supported by People's Science Institute and Sir Ratan Tata Trust, in the upper reaches of the Hilaungad watershed has yielded admirable successes. This

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<sup>29</sup> C.M. Singh & K.K. Katoch (2000): "Management of Hill and Mountain Agro Ecosystem", in Natural Resource Management in India, J.P.S. Yadav & G.B. Singh (Eds), Souvenir volume International Conference on Natural Resource Management, New Delhi, February 14-18, 2000, pp.873-923.

<sup>30</sup> C.M. Singh & K.K. Katoch (2000): *op. cit.*

<sup>31</sup> M. Bell (2008): "Fresh Heights", TIME, May 29, 2008.

<sup>32</sup> K. Banskota (2005): "New Opportunities for Mountain Economies", ICIMOD Newsletter, No. 48

<sup>33</sup> A. Agrawal & S. Narain (1997): Dying Wisdom, Centre for Science & Environment, New Delhi.

<sup>34</sup> D. Sen, *et. al.* (2008): *op. cit.*

has encouraged villagers from this sub-watershed to extend their efforts to build a watershed level platform so that catchment-level development planning can be done. In such a case it is possible to visualize a trade of ecosystemic services between the upstream villages near the good forests and the downstream valley villages. By protecting the forests, the upstream villagers can assure the availability of adequate water for three cropping season to the downstream villagers. A similar experiment has been successfully implemented in the Kuhan watershed in Kangra district of Himachal Pradesh.<sup>35</sup>

Currently, however, there are a number of legal and administrative constraints to the active participation of local communities in managing forests and water resources.<sup>36</sup> They require amendments in the existing policy, legal and administrative frameworks. The Seventy Third Constitutional Amendment offers an opportunity. Gram Panchayats are meant to be units of self-governance and several subjects like water management, irrigation and watershed development are to be transferred to them. This needs to be expanded by also transferring jurisdiction of local forests to either the Gram Panchayats or the Van Panchayats. It is only when people develop a sense of ownership and have usufruct rights over their natural resources that their alienation can end.

## VIII. CONCLUSION

The most significant finding of this study is that barely 16 per cent of the sampled households are primarily dependent on land, i.e., agriculture and livestock rearing, for their livelihoods. The rest depend on non-farm income sources.

Assessment of the nature and extent of poverty in the study villages shows that about 44 per cent of the sampled households live below the locally perceived poverty line of Rs.634.25/p/yr. This is about 33 per cent higher than the Planning Commission's estimated poverty line of Rs.478.02 for rural Uttarakhand in 2004-05. The poor are mainly daily labourers or agriculturists by occupation and Scheduled Caste or Rajputs by caste. An equity analysis reveals that the poor, SCs and female-headed households are marginalized in terms of their incomes, assets and resources consumed.

Household who earn a major part of their income from service/pension or business are generally well-off. The difference in incomes between the agricultural households and those in services or business helps explain the massive shift from farm to non-farm occupations. This has serious negative implications for integrated resource management, which has to be community based.

The key to a positive turnaround lies in enhancing the local livelihoods potential through improved productivities of agricultural, forest and common lands. Other livelihood opportunities based on niche products and services, e.g., village tourism also need to be promoted. A critical constraint is the flagging community spirit, dysfunctional village level institutions and inadequate

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<sup>35</sup> C. Agarwal, S. Tiwari, M. Borgoyary, A. Acharya & E. Morrison (2007): Fair deal watershed services in India, International Institute for Environment & Development (UK), London, pp 33-58

<sup>36</sup> V. Upadhyay (2006): "Water-Forest Management, Law and Policy in Uttaranchal: Issues, Constraints, Opportunities", paper prepared for the CP 23 Project.

knowledge and management capabilities. The involvement of dedicated, competent and honest voluntary organizations can help overcome these handicaps and strengthen local institutions.

Given the good human assets in the region, adequate precipitation, streams and springs and good infrastructural resources, there is good scope for creating desirable local livelihood opportunities. But the present alienation of the local communities is a constraint. It is therefore necessary to create a sense of ownership or community control over critical natural resources like forests and water. Once the community is engaged in planning and implementing its own development, then it can display ownership of the development process. This is visible in a watershed development project being implemented in a part of the Hilaungad watershed. It will require not only mobilizing the communities but also changes in the policy, legal and institutional frameworks.

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