FUELWOOD, FODDER AND LIVESTOCK STATUS IN A HIMALAYAN WATERSHED IN MUSSOORIE HILLS (UTTARAKHAND, INDIA)

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Introduction

Land degradation means the loss in the capacity of a given land to support growth of useful plants on a sustained basis. It is a complex phenomenon driven strongly by interactions among socio-economic and bio-physical factors. The Himalayan foothills are sandwiched between the alluvial plains and rocky Mountains. These cover an area of about eight million hectares in the five northern states of India and form one of the eight most degraded ecosystems of the country. Erratic distribution of rainfall, small land holdings, lack of irrigation facilities, heavy biotic pressure on natural forests inadequate vegetative cover, heavy soil erosion, land slides, declining soil fertility and frequent crop failures resulting in scarcity of food, fodder and fuel are the characteristic feature and the extraction of the fuel and fodder and grazing by livestock causes further degradation of the hilly areas.

In Himalayan watersheds natural catastrophes like temperature fluctuations, high rainfall, snow, floods etc have pronounced effects on the vegetation, soil, livestock and the people of the area. In other words the whole ecosystem gets affected. However, these natural ecosystems have a tendency towards regaining the normal conditions and over a period of time the adaptability and endurable efficiency help in restoration of the ecosystem. It is only when human interventions accelerate these impacts through extraction of various products from the forest and other landuse units that the site ecology does not remain conducive.

The livelihood of hill people is mainly dependent on marginal agriculture on the one hand and rearing of livestock on the other. Fodder and fuelwood is collected by lopping / the vegetative biomass. Moreover, in Uttarakhand hills, it is well known that women are mainly responsible for collection of the fodder and fuelwood. Since vegetation is already in a degraded stage in most of the areas further exploitation of natural resources is a degrading factor. Villagers rear these animals for the milk that adds to their income. Another important factor leading to degradation is the grazing by the livestock.

Livestock Scenario and Associated Problems

The condition of livestock in villages of Arnigad watershed is also typical in the sense that the villagers mostly like the pets to leave in the field wherever the grass/hay is present without caring for the

regrowth or management of the grass field and as time passes the conditions become worse which pave the way for other factors to damage the structure and function of normal ecosystem when this happens there is a disruption in the cycle and problems like no regeneration of the vegetation comes in leading to growth of unwanted grasses or shrubs which are not wanted in any way as these are tough to remove and take a heavy toll in the form of unused land or wasteland/degraded land. In India the problems of overgrazing which are responsible for ecodegradation have not been taken up seriously. India's livestock population, the largest in the world, productivity-wise is very poor. When the condition is judged on the hill side then this gives very shocking results as cattle, goats and sheep etc. grazing on the hillside disturb the structure of the soil layer and make the terrain clear of vegetation and if this is not guided in a scientific way through the environment management and if these solutions are not applied in time, then the hilly terrains will be devoid of vegetation.

During early growing season (May-June) and late growing season (Sep.-Oct) animal spend more time on grazing than the rainy season. Contrarily, in late growing season, translocation of nutrients and the senescence of leaves lead to lower forage quality. As told by the villagers of the Arnigad watershed only few plant species remain available during the month of May and June and as the rain comes then a number of plant species grow in the form of herbs which animal graze. As during the rainy season there is loose soil and trampling of the animals makes the field worse; the soil is lifted up at one place and pressed on the other. To take care of the animals during the rainy season the villagers stall feed them and also fodder collection and extraction becomes frequent than the other seasons of the year. Another fact indicates that diseases and deaths become common during rainy season so the villagers pay extra attention to their livestock.

Animals have a capacity to choose habitat, vegetation types within habitats and plant species or some parts of the vegetation as per food quality and availability. At the time of rainy season cattle movement is associated to active selection of forage or plant species or community due to plenty of herbage mass at this time.

Fuelwood

It has generally been seen that in the villages the family is found to be big enough to give a term of joint family but in these villages of Arnigad watershed the family has been divided into sub-categories as happens in urban areas depending on the agreement of the family members. The people of the villages are still engage in collection of fodder and fuelwood collection irrespective of the LPG gas they have. Although the all families have not registered to get the LPG gas but some even they are sufficient enough to get that but are not in favour of working with the LPG gas because they collect the fuelwood, which is free for them, and this regenerate as time passes. During the studies it has been noticed that families have no problem in collecting the fuelwood and using it for cooking and other purposes. So this can be figured out that the requirement of fuelwood is on regular basis and so the collection of the same. The fuelwood species that are mainly used are : *Thysanolaena maxima, Bauhinia retusa, Grewia optiva,*

Quercus leucotrichophora, Flacourtia ramontchii, Ougeinia oogeinensis, Celtis australis, Debregeasea hypoleuca, Bauhinia vahlii,Lantana camara, Woodfordia fruticosa, Mallotus philippinensis, Butea monosperma, Mangifera indica and *Syzigium cumini.*

Fodder, Grass/Hay

The fodder statistics vary in different villages. Generally those villages such as Makreti, Jhadipani, Kolhukhet and Khetwala where the land availability is less and to compensate these villagers grow the grass and other animal feed in their small field. The grass and hay from these fields is although not enough but gives an addition to the grazing feed at the home side field. Grasses are not sufficiently available during the month of may and so the self-grown grass gives compensation to grazing. The grasses which supplements the animal feed are *Chrysopogon fulvus* (Golda), *Apluda mutica* (Tachhla), *Thysanolaena maxima* (Pidlu), *Murraya koenigii* (Kadhi patta) etc. Some of the fodder needs is also contributed by the lopped trees like *Bauhinia retusa* (Semla), *Grewia optiva* (Bhimal), *Quercus leucotrichophora* (Baanjh), *Flacourtia ramontchii* (Kandai), *Ougeinia oogeinensis* (Saandan), *Celtis australis* (Khadki), *Debregeasea hypoleuca* (Shisharu), *Bauhinia vahlii* (Maalu), *Woodfordia fruticosa* (Dhola), *Mallotus philippinensis* (Raini), *Butea monosperma* (Dhaak) the small loppings of these trees help to add it to animal feed. Some villages like Jhadipani and Barlowganj borrow the land to extract the grass on regular basis to accomplish the needs of animals they keep.

If any forest floor herbage is to be used for fodder and natural litter fall in the fuel source (Pandey and Singh, 1984) large areas of forest are required to support current village activities. In contrast carefully managed lopping areas well stocked with appropriate fodder species are used for production of fuel and fodder much smaller forest areas could prove adequate (Moench, 1989). There is a huge variation in the production and consumption of fuel and fodder in *Himalayan watersheds. For example,* Pandey and Singh (1984) estimated that 16.7 to 50.7 hectares of forest are required per hectare of agricultural land for fodder production in three villages in Kumaon while Moench (1989) estimates that as little as 4 hectares of forest (1.2 ha lopped +2.8 ha for grass collection) per hectare of agricultural land could meet fodder needs *in a Garhwal villages.*

Due to the household collection of fuelwood and fodder there has not been adverse changes on the greenery of the watershed area but the effect is mainly due to the trampling by people as well as cattle. The bald patches which are now and need to take regular care and study so that the soil erosion and soil loss could be saved from becoming a wasteland. As observed the people of the villages can reverse the condition of bare patches to green field if given regular visits and take care of their observations. The bare patches that have been developed in the current time can be treated to give it proper shape for the purpose of the cultivation or raising some trees of their requirement.

Study Site

Present study has been undertaken to assess the livestock population, fodder and fuelwood collection and their consumption in the Arnigad watershed

located in the indicating towards the current status of the Arnigad watershed. The watershed is located of Uttarakhand. The Arnigad watershed is situated in the Dehra Dun District in the Mussoorie hills (Mussoorie Forest Division) of Uttarakhand State in India. Total area of the watershed is 13.39km^2 and the elevation ranges between 836 m and 2,175 m amsl. This is a typical Himalayan watershed and lies between 30° 23' 25" to 30°27' 50" North latitude and 78° 05' 05" to 78°07' 08" East longitude.

The climate of the area is typically monsoonic with three distinct seasons, viz., summer, monsoon and winter. The watershed lies in sub-tropical zone with an average annual rainfall of 2,150 mm. Monsoon normally breaks in the middle of June and lasts till middle of September. About 75% of the total annual rainfall is received from June to September. Winter rains are generally intermittent and mild. May and June are the hottest months with average maximum temperature of 38°C. Minimum temperature recorded during December and January is 1-3°C. Frost occurs during these months and sometimes causes damage to tender seedlings and vegetation.

Geologically, the rocks of the area are of Pre-Cambrian to Early Paleozoic in age with recent and sub-recent deposits. Most of the area forms Krol formation. The rock exposures of limestone, dolomite, dolomitic limestone, impure limestone, quartzite, slates, shales, quartzitic limestone etc. are present on different land uses.

The Arnigad watershed has 14 villages inside and on the periphery. Out of these following ten representative villages have been surveyed for this study:

1. Barlowganj
2. Khetwala
3. Company Bagh
4. Semwala (Simiyana)
5. Jhadipani
6. Talanigat
7. Chamasari
8. Kolhukhet
9. Makreti
10. Kairwan Gaon

Methods

The study is based on the primary data collected through the PRA approach by approaching the various persons representing different age groups and gender. The information collected was recorded on the fact sheet and tabulated. A group of persons such as workers, teachers, farmers, labors, women etc. were also questioned regarding their involvement in different activities viz., resource collection from the different land uses, agricultural activities, dependence on livestock and other income generating activities. This data has been used for estimating the scenario of this watershed with respect to livestock, fuelwood and fodder.

Lists of families were procured from Gram Panchayat and this formed the basis of the sampling frame. Since number of families varied between 6-37 in different villages. There are total 176 families in the ten villages of the watershed. The enumeration of different parameters viz., human population; livestock population, animal behaviour, fuelwood and fodder from each family collected and subjected to statistical analysis.

Similarly a questionnaire survey was attempted among the villagers for

information about their settlements and the activities they do for their sustenance. This questionnaire provided data about the total population, source of income, family structure, level of education, land holdings, livestock, fodder, fuelwood etc. Information generated also emphasized on the villagers dependence on different land uses.

Results

Fuel Consumption Patterns : Proportion of the different fuels used in the villages of watershed is highly variable and in this context the fact is that the electricity is used in all the villages for the purpose of lighting the houses. For other purposes, such as water heating and cooking etc., the most common sources of fuel used are fuelwood, crop residues, cow dung cakes, biogas, cooking gas and kerosene (Fig. 1). The proportion of cooking gas is highest (33%) followed by fuelwood (30.7%) and the lowest used fuel is the kerosene (7.3%).

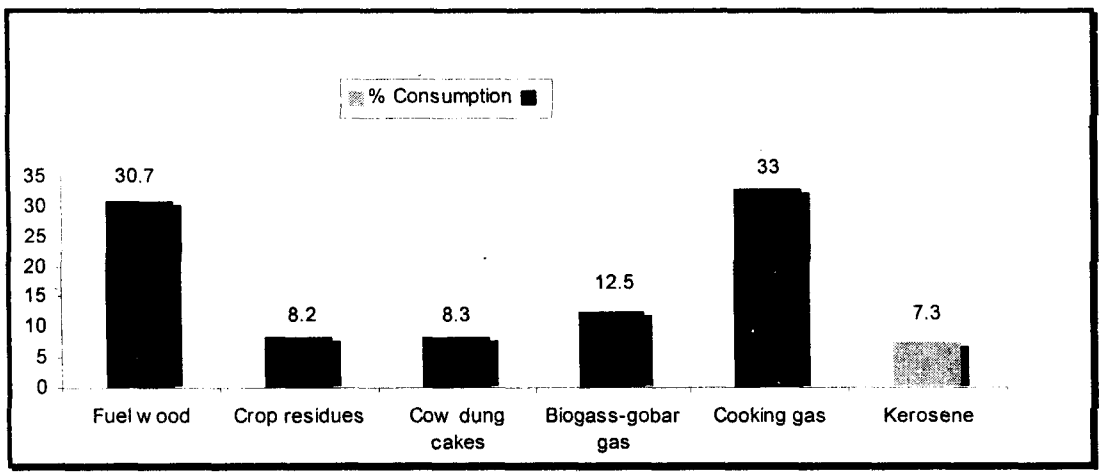
Fuelwood extraction by villagers from different landuse categories of the watershed varies significantly among landuse categories, however the dependence for fuelwood on different land uses is similar for all the villages and hence no significant variation. It is found that while dense forest is the major sources of fuelwood i.e., 112 kg /day (44.44%) followed by Scrub forest 92 kg/ day (36.50%), degraded land 33 kg/day (13.09%) and cultivated land 15 kg/day (5.95%). The trend of fuelwood collection is :

Dense Forest > Scrub Forest > Degraded land > Cultivated land

Among the villages, the consumption pattern of fuelwood ranges between 15-32 kg/day (Table 1).

On the basis of two way ANOVA on the data presented in Table 1. Significant differences among the fuelwood from different landuse categories at watershed level have been found. However, no significant variation in the fuelwood

Fig. 1



Consumption of different types of fuels in Arnigad Watershed

Table 1

Average Fuelwood dependence on different landuse categories (kg/day/family) by different villages in the watershed

Villages →	Jhadi-pani	Simi-yana	Com-pany Bagh	Kolhu-khet	Khet-wala	Mak-reti	Kair-wan Gaon	Barlow-ganj	Talani-gat	Chama-sari	Total	Mean (±S.E.)
Degraded Land	2	3	2	5	4	2	5	3	3	4	33	3.3 (0.36)
Scrub Forest	5	10	10	8	8	10	10	5	15	11	92	9.2 (0.92)
Cultivated Land	1	2	2	0	0	1	4	0	3	2	15	1.5 (0.42)
Dense Forest	7	16	18	10	9	12	8	8	11	13	112	11.2 (1.14)
Total	15	31	32	23	21	25	27	16	32	30	252	(25.2)
Mean (±S.E.)	3.75 (1.37)	7.75 (3.27)	8.00 (3.82)	5.75 (2.17)	5.25 (2.05)	6.25 (2.78)	6.75 (1.37)	4.00 (1.68)	8.00 (3.00)	7.50 (2.66)		

consumption pattern at village level has been observed.

Fodder collection and consumption : With reference to collection from different landuses as well as among the villages in respect of average fodder collection/kg/day. Maximum fodder in the form of grasses and hay/ tree leaves and young stems etc was collected is highest from dense forest and is 89kg/day/family or 37.27% followed by scrub forest and it is 78 kg/day/family or 32.63%. The lowest collection of fodder is from the cultivated land that is only 14.22% (Fig. 2).

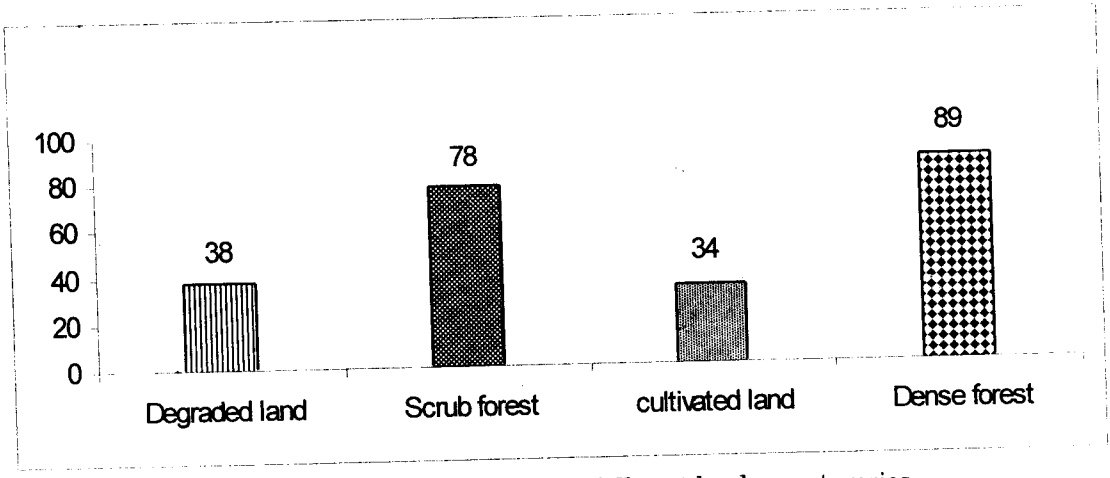
Fodder collection patterns vary significantly among the different villages in the watershed, depending upon the livestock population in different villages (Table 2).

Livestock scenario in watershed : The data recorded for the ten villages in the watershed shows that village Talanigat has maximum no. of livestock possessed by an average family i.e.21.14 animals per family, followed by Chamasari (10.20 per family) while Barlowganj has least number of animal per family (1.20) i.e., the livestock order in the villages is :

Talanigat > Chamasari > Simiyana > Company Bagh > Kairwan Gaon > Jhadipani > Makreti > Kolhukhet > Khetwala > Barlowganj

Data analysis for fuel and fodder : Fuel and fodder quantity-wise were analysed for the probability use and resource use index following Samant *et al.* (2000, 2003) as follows :

Fig. 2



Fodder collection (kg/day) from different landuse categories

Table 2

Fodder from different landuse categories (kg/day/family) from the villages in watershed

Landuse categories	Villages										Total	Mean (±S.E.)	Sig.
	Jhadi-pani	Simi-yana	Com-pany Bagh	Kolhu-khet	Khet-wala	Mak-reti	Kair-wan Gaon	Barlow-ganj	Talani-gat	Chama-sari			
Degraded Land	2	3	4	3	5	7	4	1	4	5	38	3.8 (0.53)	***
Scrub Forest	4	8	10	8	10	9	9	2	10	8	78	7.8 (0.85)	
Cultivated Land	1	7	10	1	5	2	3	1	2	2	34	3.4 (0.95)	
Dense Forest	9	12	13	9	5	7	6	7	14	7	89	8.9 (0.98)	
Total	16	30	37	21	25	25	22	11	30	22	239		
Mean (S.E)	3.75 (1.37)	7.75 (3.27)	8.00 (3.82)	5.75 (2.17)	5.25 (2.05)	6.25 (2.78)	6.75 (1.37)	4.00 (1.68)	8.00 (3.00)	7.50 (2.66)			
Significant	*												

Mean collection (kg) of the fuelwood/fodder (A) = T/N

where :
T = Total collection of the species in all the samples
N = Number of samples

Mean collection sample^{-1} day^{-1}, Cs =

$$\frac{\sum_{i}^{n} ATPR_i}{\sum_{i}^{n} TPR_i}$$

where :
A = Mean collection of fuelwood/fodder,
TPRi = Total population responsible for collection in the ith village

Mean collection houehold^{-1} day^{-1},
Cd = 2 x Cs

Probability of use (PU) =

$$\frac{\sum_{i}^{n} F_i P_i}{\sum_{i}^{n} P_i}$$

where :
Fi = frequency of collection of total fuelwood/total fodder in the ith village
Pi = population of the ith village

The collection (kg sample^{-1} day^{-1} and kg household^{-1} day^{-1}) and probability of use were calculated :

Resource use index (RUI) = Cy*Pu

where :
Cy = Mean collection household^{-1} year^{-1}
Pu = Probability of use

Discussion

The village statistics shows that villagers are dependent on the collection of the fodder and fuelwood from adjoining land categories for their day-to-day requirements. The fuelwood consumption varies significantly among different landuse categories but the collection and consumption values among different villages do not vary significantly. It is found that dense forest is the major sources of fuelwood (112kg/day or 44.44%)), followed by scrub forest (92kg/day or 36.50%). Degraded (13.09%) and cultivated land (5.95%) are the minor sources of fuelwood (Table 1). Company Bagh and Talanigat show maximum average consumption of fuelwood from all sources (8.00kg/day/family) followed by Simiyana and Chamasari village (7.75 and 7.50 kg/day respectively) which seems considerably higher than the value reported for the rural and tribal communities of the Western Himalayas (1.49 kg/capita/day) by Bhatt *et al.* (1994); for Southern India (1.9-2.2kg/capita/day) by Reddy (1981) and Hegde (1984); for South and South-East Asian countries (1.7-2.5 kg/capita/day) by Donovan (1981) and Wijesinghe (1984), and for Himalayan range of Nepal (1.23 kg/capita/day) by Mahat *et al.* (1987). Comparatively higher firewood consumption by tribal communities of Arunachal Pradesh (3.1-10.4 kg/capita/day) and Garos (5.0 kg/capita/day) has already been reported Maikhuri (1991) and Shankar (2000). All these findings strengthen the present study indicating the immediate measures to educate the people of the watershed area about the ill effects of fuelwood extraction and present an alternative by applying policy options to compensate the economy at the watershed level.

Table

Data analysis for

Villages →	Jhadipani	Kolhukhet	Simiyana	Barlowganj
Fuelwood collection/day	3.75	5.75	7.75	4
F (Collection Frequency)/month	15	6	10	8
Fi (Collection Frequency)/day	1	1	1	1
Total population	228	107	66	216
A*TPRi	855.00	615.25	511.50	864.00
Fi* Pi	3420	642	660	1728
Cy	1368.75	2098.75	2828.75	1460
Cy* PU	12939.38	19840.39	26741.39	13802.01

When calculation is achieved different characters of the formula show the following values :
Mean collection of the fuelwood (A) = 6.3,
Mean collection sample^{-1} day^{-1}(Cs) = 5.75,
Mean collection household^{-1} day^{-1} (Cd) = 11.5
Probability of use (Pu) = 9.45,
Resource use index (RUI) = 18748.99

Table

Data analysis for

Villages →	Jhadipani	Kolhukhet	Simiyana	Barlowganj
Fodder collection/day	4	5.25	7.5	2.75
F (Collection Frequency)/month	20	20	15	20
Fi (Collection Frequency)/day	1	1	1	1
Total population	228	107	66	216
A*TPRi	912.000	561.750	495.000	594.000
Fi* Pi	4560	2140	990	4320
Cy	1460	1916.25	2737.5	1003.75
Cy* PU	31710.87	41620.51	59457.87	21801.22

When calculation is achieved different characters of the formula show the following value:
Mean collection of the fodder (A) = 5.975,
Mean collection sample^{-1} day^{-1}(Cs) = 5.28
Mean collection household^{-1} day^{-1} (Cd) = 10.56
Probability of use (Pu) = 21.71
Resource use index (RUI) = 74441.80

3

fuelwood

Chamasari	Talanigat	Khetwala	Makreti	Kairwan	C. Bagh	Total
7.5	8	5.25	6.25	6.75	8	63
8	10	7	8	10	9	91
1	1	1	1	1	1	
175	62	102	109	84	75	1224
1312.50	496.00	535.50	681.25	567.00	600.00	7038
1400	620	714	872	840	675	11571
2737.5	2920	1916.25	2281.25	2463.75	2920	19833
25878.77	27604.02	18115.14	21565.64	23290.89	27604.02	217381.7

4

Fodder

Chamasari	Talanigat	Khetwala	Makreti	Kairwan	C. Bagh	Total
5.5	7.5	6.25	6.25	5.5	9.25	59.75
25	25	15	25	30	25	220
1	1	1	1	1	1	
175	62	102	109	84	75	1224
962.500	465.000	637.500	681.250	462.000	693.750	6464.75
4375	1550	1530	2725	2520	1875	26585
2007.5	2737.5	2281.25	2281.25	2007.5	3376.25	34273.75
43602.44	59457.87	49548.2	49548.23	43602.44	73331.38	47368.11

The analysis reveals that the fodder yields vary highly significantly among themselves, and there is also a significant variation among the villages in respect of average fodder collection. Mean value for the fodder extraction from dense forest is highest i.e. 11.2 kg/day/family followed by scrub forest (9.2 kg/day) the lowest is cultivated land (1.5 kg/day/family). The highest extraction of fodder is done by people of Company Bagh and is 9.25 kg/day/family followed by Simiyana and Talanigat (7.50 kg/day each).

Data analysis for fuelwood and fodder shows that in case of fuelwood the probability of use and Resource Use Index are 9.45 and 18748.99 respectively. This statistics in fodder i.e. probability of use and Resource Use Index come to be 21.71 and 74441.8 respectively. It is found that Pu and RUI are greater in case of fodder than the fuelwood statistics.

The livestock statistics as seen from analysis, the village named Talanigat has highest number of livestock and Barlowganj has the least. To fulfill their requirement there is maximum exploitation of the vegetation in terms of fuelwood and fodder. The study also shows the grazing pattern in these villages which give an indication about the grazing that is being persuaded. During early growing season (May-June) and late growing season (Sep.-Oct) animal spend more time on grazing than the rainy season. Contrarily, in late growing season, translocation of nutrients and the death of leave lead to lower the forage quality. The small families have no option but to care the animals with the grazing but those of large families stall feeding comes in to give the proper care to their pets.

The question of how Himalayan forests are going to be used in the future is open. If one looks just at the village component (i.e. ignoring forest department and governmental activities) forest use is a function of village socio-economic activities. The number of buffalo and cattle kept by a village determine fodder needs. The village agricultural system and the amount of fodder produced on agricultural lands determines non-forest component of fodder supply. The number of out-migrants for work in the plains influences the number of people actually living in a village and the access to external sources of income. These in turn, influence agricultural and animal husbandry activities (and thereby forest use patterns) in the village. In sum, village forest use patterns are the result of highly complex socio-economic interactions. Complexity is further increased by the fact that village systems are not static. Village socio-economic systems are constantly evolving in conjunction with the wider society. Road building in parts of the Himalaya has opened areas to milk and vegetable markets. In some villages near Mussoorie, vegetable production has increased greatly in recent years. In others agriculture has been virtually abandoned and the milk production is the main economy. Based on the biomass balance study in one of these villages, increased vegetable cropping is likely to reduce the fodder available as a byproduct from agriculture while increased stocking levels are likely to increase fodder demands. As a result, fodder collection pressures on forests are likely to increase (Moench, 1989)

The people are aware of the fact that the greenery needs to be maintained but this fades away as exploitation continues in their daily routine so if they are given

knowledge on regular basis of proper methods and guidance to use the nearby vegetation in a sustainable way then the works are two fold i.e. the greenery is managed without affecting the villagers' need and this leads us to a management view of the watershed area and to lessen the impact on the selected watershed area from the extraction of fuel and fodder point of view.

Conclusion

While working upon the statistics of fuel, fodder and livestock it has been figured out that all the ten villages under study have a problem of fuel and fodder extraction and as villagers rear animals for their instant income for milk selling or meat purpose the livestock grazing goes randomly and absence of knowledge and illiteracy lead to unawareness of the erosion and loss of sensitive plant species which may have medicinal and soil binding properties. These unawareness if continues then there is loss of soil and vegetation wealth of the area. As the population is increasing and the requirement of the villagers are on increase it is easily predictable that if livestock population goes on increasing and fuel and fodder extraction continues then there is no way to prevent land degradation and occurrence of wasteland but proper and regular educational tour for the village people to make them aware of the facts of aftereffects of fuel and fodder extraction and proper methods for the management of the grazing on sustainable basis can bring the losses down from fuel and fodder extraction and grazing.

Afforestation with ecologically as well as socio-economically viable Himalayan fuelwood and fodder species will not only check the degradation in the Himalayan watershed but will also provide the much needed fuel and fodder requirement of the hill people.

SUMMARY

In the hill areas, the traditional systems of dependence on forest usufructs like fuel for their households and fodder for their livestock has an important bearing on the status of Himalayan watersheds. The population of livestock is therefore also significant. The fuel and fodder requirements of the hill people are important routine activities for which women/ children spend long hours of their day-to-day life. But this regular collection of the fuel and fodder from the different land use categories in close proximity of villages. These activities have been an important factor for causing soil erosion, low fertility of the land and other degradation processes. The situation is further aggravated if animals are not stall-fed but are allowed to graze. To assess these scenarios, a comparative study of the ten villages in Arnigad Watershed, Mussoorie (Uttarakhand) has been done. The results of this study provide a macro view of the societal dependence on the different land use categories in the watershed with reference to fuel, fodder consumption and livestock scenario in the individual villages as well as the watershed.

Key words **: Livestock, Fodder, Fuelwood, Watershed status, Mussoorie Hills, Uttarakhand.**

मसूरी पहाड़ियों (उत्तराखण्ड, भारत) के हिमालयी प्रस्रवण क्षेत्र में ईंधनकाष्ठ,चारे और पशुओं की वर्तमान स्थिति

रामचन्द्र, प्रफुल्ला सोनी व विनय यादव

सारांश

पर्वतीय क्षेत्रों में वनों के फलोपभोगों, जैसे अपनी घर–ग्रहस्थी के लिए ईधनकाष्ठ और अपने पशुओं के चारे