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Participatory assessment of grazing scenario in Kumaon Himalaya

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Livestock is one of the most important and dynamic components of mountain farming systems and their linkage with forest and agro-system are the very basis of sustainability of mountain agriculture. But, livestock economy in the mountain region is suffering a set- back due to poor production, which is mainly contributed by inadequacy of quality fodder and pitiable condition of forests and grazing land. In Uttaranchal, permanent pasture and other grazing land is only 4.04%, while the huge livestock population is multiplying at a high rate and the resultant grazing pressure on grazing lands is increasing. A study was conducted in two blocks namely Ramgarh (29° 26' 60'' N and 79° 32' 60'' E) and Dhari (29° 52' 47'' N and 78° 38' 15'' E) in Nainital district of Kumaon hills to present a scenario of livestock grazing in the region. Tools of Participatory Rural Appraisal (PRA) namely resource map, matrix ranking and seasonal calendar were used to collect the information. It was found that most of the hill livestock except buffalo and crossbred cattle are still maintained on extensive grazing. Due to uncontrolled grazing, the quality of grasses has decreased and people are now shifting towards stall feeding and reducing the numbers of livestock unit. So, the grazing should be regulated as regards the time and place, and also the number of animals permitted. Moreover, the quality of the forest grasses can be improved by the intervention of people involved in the managing of the forest through plantation of quality grasses.

Key words: Livestock, hill, grazing, participatory rural appraisal.

INTRODUCTION

Livestock is one of the most important and dynamic components of mountain farming systems and their linkage with forest and agro-system are the very basis of sustainability of mountain agriculture (Singh and Rathi, 1993). The local cattle mostly survive on fodder trees, grasses cut from forests, grazing in nearby forests, and hay stored for lean months such as winters when the grasses do not grow due to severe cold and snow (Chander and Mukerjee, 1995). But, livestock economy in the Himalayan region is suffering a set- back due to poor production, which is mainly contributed by inadequacy of quality fodder and pitiable condition of forests and grazing land. There is acute shortage of fodder especially green nutritious fodder, which is the major cause of low productivity of the livestock, especially in hilly area (Debboy et al., 1980). The state of Uttaranchal had a deficit of about 33.83% in case of green fodder and about 17.48% in case of dry fodder in 2009 to 2010 (www.ahduk.org/challenges, accessed on 21.05.2013).

Out of the total geographical area of Uttaranchal,

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228944 ha (4.04%) form the permenant pasture and other grazing land (Rawat, 2010), while the huge livestock population is multiplying at a high rate and the resultant grazing pressure on grazing lands is increasing. Therefore, this paper is an attempt to study the farmers perception towards the current status of livestock grazing in the Kumaon hills of Uttaranchal.

METHODOLOGY

Kumaon hills of Indian Himalayas have six districts of Uttaranchal, India. Out of six districts, Nainital was selected purposively due to forest grazing being quite significant, widespread and often a cause of persistent conflict in the region. In Nainital district, two blocks namely Ramgarh (29° 26' 60'' N and 79° 32' 60'' E) and Dhari (29° 52' 47'' N and 78° 38' 15'' E) were randomly selected. Two clusters of villages, one from each block, were randomly selected. Cluster I (in Ramgarh block) consisted of two villages namely Dharmoli and Pitholi, while cluster II (in Dhari block) also consisted of two villages namely, Chakhuta and Kanyager. Livestock grazing in the forest was persistent in cluster I (Ramgarh) while banned in cluster II (Dhari). Cluster I was 15 km from the main road while cluster II was just half a kilometer from the main road. The data collection team consisted of an agricultural scientist, an animal scientist and an extension personal (the researcher himself). In each cluster, tools of Participatory Rural Appraisal (PRA), namely resource map, matrix ranking and seasonal calendar were used to collect the information with full participation and representations from people of different caste, sex, age and wealth group of the clusters to identify key grazing resources, rank different grasses available in the cluster and identify seasonality of the grazing and grasses available.

After identifying the grasses and grazing resources through resource mapping and seasonal availability and quantity of the grazing resources through seasonal diagram, the farmers were asked to allot maximum of 25 marks to the individual grasses on the basis of the attributes perceived as important by them. The grasses were then ranked on the basis of total marks obtained for individual grasses. The information collected for the research work was mainly qualitative in nature. So, the qualitative information was analyzed in terms of their content with reference to the concepts and relations that they represent. The information gathered through different tools of PRA was triangulated with each other for the consistency of facts. The diverse view points were analyzed with focused attention on farmers perception.

RESULTS

The study area has an elevation ranging from 520 to 1518 m. The annual rainfall varies from 1200 to 2647 mm. Wheat, rice, maize, barley and coarse millet are the main field crops cultivated in the area, while the main vegetables are potato, onion, cabbage, chilli and tomato. The fruits include apple, pear, peach, plum and apricot. Cattle, buffalo and goat are the main livestock reared by the people of the study area.

Grazing map

Figure 1 shows the grazing map of cluster I while Figure 2 shows the grazing map of cluster II.

Key grazing resources

Cluster I

In the cluster, the available grazing land varied with the season of agricultural operations. The total grazing land in the cluster was 283.44 ha during the off season while it was 227.52 ha during the agricultural season. The grazing density was 2.01 LU/ha (cattle and buffalo: 1 LU, goat and sheep: 0.5 LU) and 2.51 LU /ha during the off season and agricultural season, respectively. Forest is the key grazing resource for the livestock in cluster. The forest managed by Indian Veterinary Research Institute (IVRI) was present on the western and northern border of the cluster while *van panchayat* forest was present in the southern border. But the *van panchayat* forest was degrading and was in poor condition. The nutritive and palatable grasses were vanishing from the forest due to uncontrolled grazing. In their place, the poor quality grasses were found in abundance inside the forest. IVRI forest was still in little better condition, as the villagers were not allowed to graze their livestock inside the forest.

Yet, the villagers, sometimes, took their animals for grazing inside the IVRI forest due to lack of alternatives. Beside the forest, the wasteland, private land and the land adjacent to the village roads were also the sources of green grasses in the cluster.

Cluster II

The total grazing land of the cluster was 111.96 ha. While practiced, the grazing density was 5.10 LU /ha. Private forest, wasteland, private land and land adjacent to the village roads were the key grazing resources in the cluster. Due to ban on grazing in the panchayat forest, the animals were mainly stall-fed. The deshi cattle (*Bos indicus*) and goats graze on the wasteland, private forest and only the goats grazed on the bunds. The grasses from the aforementioned resources are limited in quantity.

Grasses available

Cluster I

Heteropogon contortus, *Pennisetum orientale*, *Dasmostachya* spp., *Andropogon munroi*, *Brachiaria villosa*, *Imperata cylindrica* etc. were the main grasses found in the cluster. Villagers did not cultivate the grasses. They were naturally growing inside the forest and on the bunds around the terraces. Grasses growing in the field were of better quality as compared to those inside the forest. Forest grasses had detoriated in quality over the years.

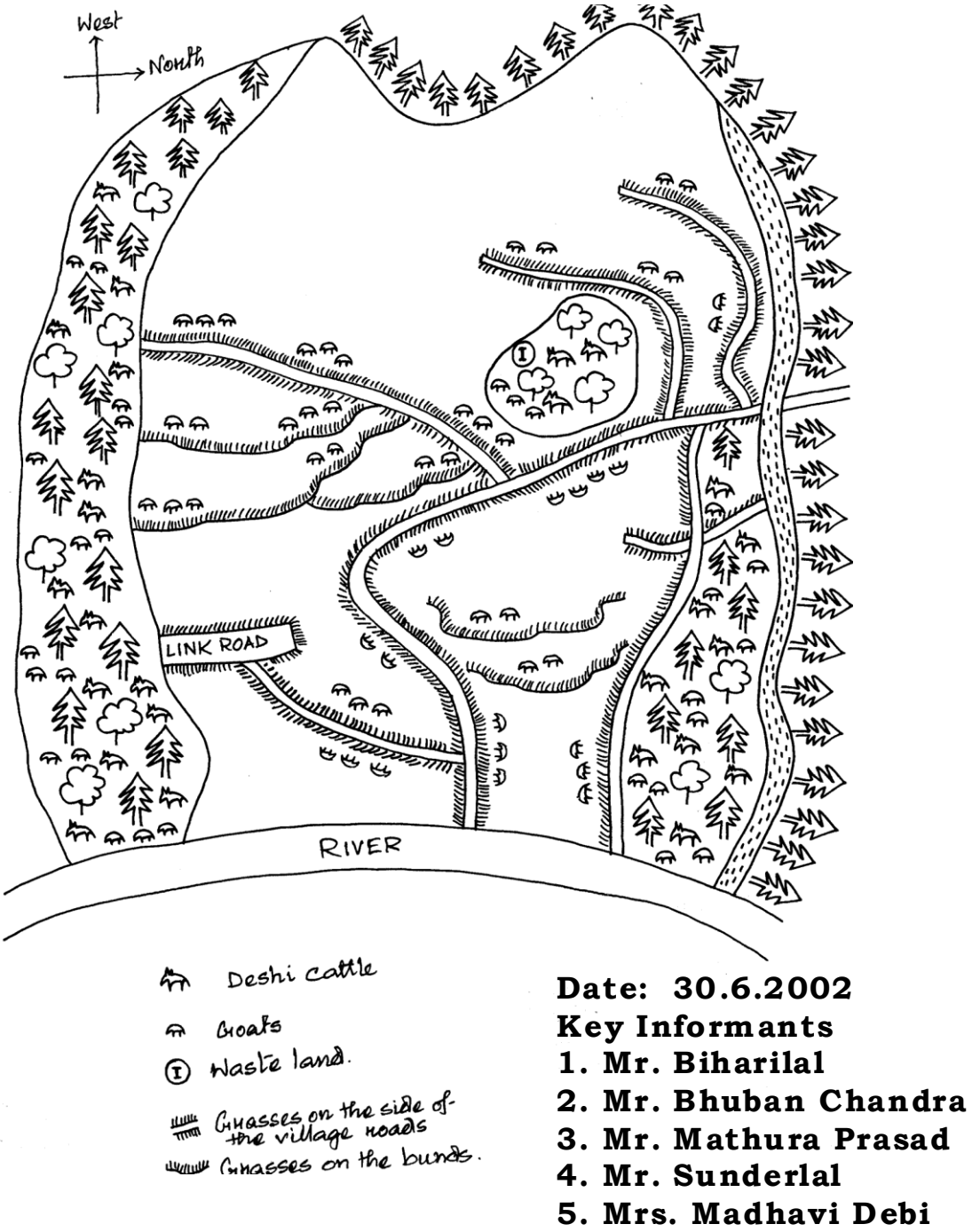

Figure 1. Grazing map of cluster I.

Cluster II

P. orientale, *B. villosa*, *Dactylis glomerata*, *Lolium perenne*, *Pogonatherum paniceum*, *I. cylindrica* and *Saccharum spontaneum* etc. were the main grasses found in the cluster. The grasses were cut and fed to the animals. The grasses were dried and stored as hay for feeding the animals in the lean season.

Matrix ranking of grasses

Cluster I

Table 1 shows the matrix ranking of grasses of cluster I, where seven varieties of grasses had been compared through scores against seven criteria. According to key informants, *P. orientale* was the most important grass fed

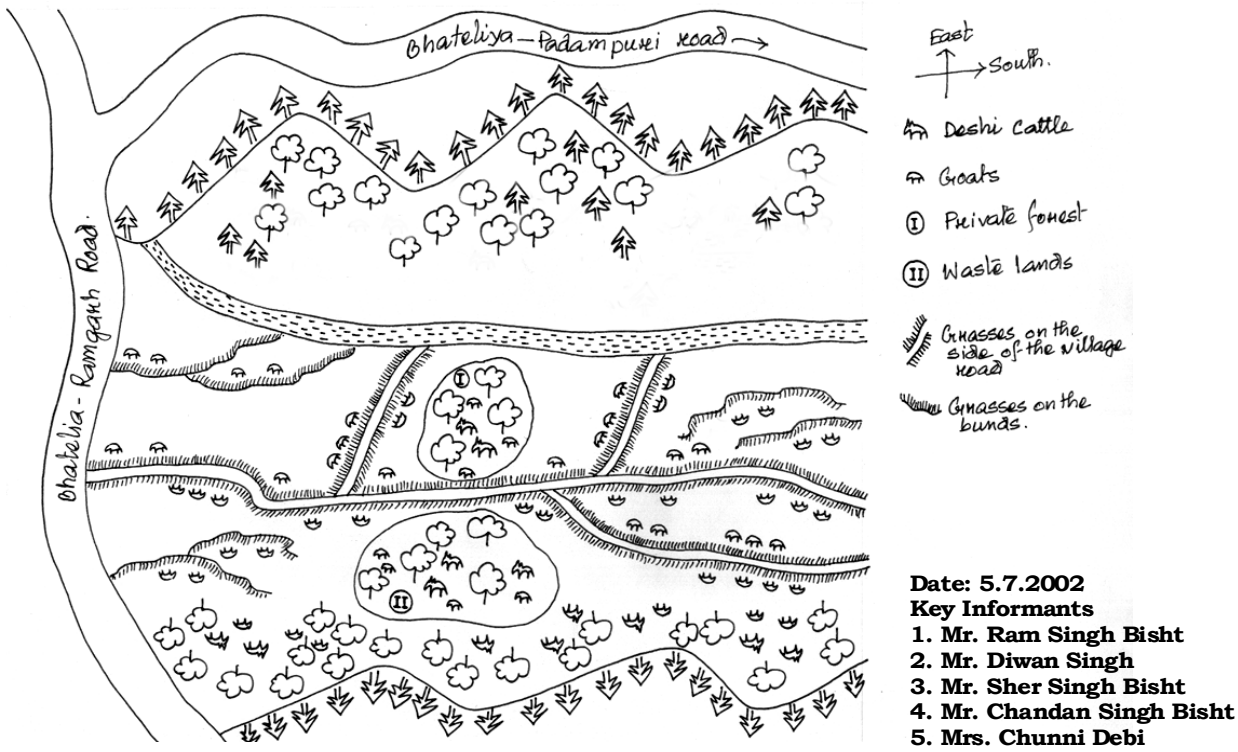

Figure 2. Grazing map of cluster II.

to animals. They had given maximum scores to this species for all the attributes. *H*. *contortus* was given the second highest scores followed by *Chrysopogon* spp., *B*. *villosa*, *A*. *munroi*, *I*. *cylindrica* and *Dasmostachya* spp.

Cluster II

Table 2 shows the matrix ranking of grasses of cluster II, where seven varieties of grasses had been compared through scores against five criteria. According to key informants, *P*. *orientale* was the most important grass fed to animals. They had given maximum scores to this species for all the attributes. *B*. *villosa* was given the second highest scores followed by *D*. *glomerata*, *P*. *paniceum*, *S. spontaneum*, *I. cylindrica* and *L*. *perenne*. But according to them no grass was available throughout the year.

Seasonal calendar

Quality and quantity of grasses

Cluster I: Grasses were mainly available during the rainy season (June to September) and reached its peak during the month of August, then started decreasing and almost unavailable during the winter (December to February). The grasses started growing after the snow melted during the month of March. The quality of the grasses was the best during rainy season.

Cluster II: Grasses were mainly available during the rainy season (June to September). The farmers got grasses from the cultivated land and forest.

Grazing in forest

Cluster I: Deshi cattle (*B. indicus)* and goats were sent to the forest for grazing throughout the year expect the month of December, January and February. The pregnant cattle and buffaloes were stall fed as they were larger and heavier in weight and they were unable to graze on the steep slopes. The animals grazed in the forest from 7.00 a.m. to 1.00 p.m. daily during the month of March to May while the duration was 10.00 a.m. to 4.00 p.m. during the rest of the period.

Cluster II: Grazing was banned in the forest.

DISCUSSION

Generally, uncontrolled and continuous grazing is prevalent in the hills. Grazing is a must for the livestock in

Table 1. Matrix ranking of grasses of cluster I.

Grasses attribute	*Pennisetum orientale*	*Heteropogon contortus*	*Chrysopogon* spp.	*Andropogon munroi*	*Imperata cylindrica*	*Brachiaria villosa*	*Dasmostachya* spp.
Increase milk production	25	20	16	13	10	9	15
Palatable	25	20	15	12	8	2	4
Suitable for hay making	24	19	14	10	8	20	3
Amount	25	22	15	5	7	12	5
Height	24	20	17	14	12	8	9
Soil conversion properties	25	18	16	13	7	15	10
Number of cuttings in one season	25	16	13	10	12	24	17
Total	195	155	124	91	74	119	71
Rank	I	II	III	V	VI	IV	VII

Key: Date: 10.8.2002.
1. Mr. Shivlal
2. Mr. Sunderlal
3. Mr. Debkinandan
4. Mr. Mathura Prasad
5. Mrs. Rebati Debi

Table 2. Matrix ranking of grasses of cluster II.

Grasses attribute	*Pennisetum orientale*	*Brachiaria villosa*	*Dactylis glomerata*	*Lolium perenne*	*Pogonatherum paniceum*	*Saccharum spontaneum*	*Imperata cylindrica*
Availability throughout the year	-	-	-	-	-	-	-
Palatability	25	20	12	10	15	20	18
Increases milk production	20	20	15	10	18	12	5
Suitable for hay making	23	15	20	7	10	5	15
Amount available in one season	20	5	5	10	5	10	5
Total	88	60	52	37	48	47	43
Rank	I	II	III	VII	IV	V	VI

Key: Date: 12.8.2002.
1. Mr. Chandan Singh Bist
2. Mr. Dev Ram
3. Mr. Sher Singh Bist
4. Mr. Lakhan Ram
5. Mrs. Chunni Debi.

the hills considering the small land holding, lack of irrigation, limited or no fodder cultivation and plentiful availability of common property resources. As a result, the pressure on grazing resources is increasing and thus, threatening the carrying capacity of the grazing resources. Bhati et al. (1992) reported that in the mixed farming areas of Western Himalayan region of India, pressure of livestock population has been increasing. They reported that, in the low hills, average number of livestock per household was 11 animals: six cattle and five sheep and goats. In the mid-hills, the numbers were eight animals in mixed farming system, and nine animals in the vegetable based farming system. The livestock density per unit of land in the Himalayas is much higher than in the lowlands and there is lack of fodder crop production for animals in the mountains (Rao and Saxena, 1994).

Grasses play an important role for feeding the livestock in both clusters. Grasses constitute the majority (88%) of fodder available in the hills of Uttar Pradesh (now Uttaranchal) (GOUP, 1994). The benefit enjoyed by villagers from grasses is in the form of green and dry fodder for their livestock. The grasses include *P. orientale*, *H. contortus*, *B. villosa*, *P. paniceum*, *L. perenne*, *I. cylindrica*, etc. These grasses are available in plenty during the rainy season. But, in the remaining months, only negligible amount of green grasses are produced. So, at the end of rainy season, these grasses are harvested for haymaking. Quality of the grasses in the forest area is better in cluster II due to ban on livestock grazing inside the forest. So, the availability of grasses is also more in cluster II. The grasses are also found on the bunds, which are cut and fed to the livestock. But the villagers do not cultivate grasses, which could be an option to restore the wasteland. Among all the grasses, the farmers of both the clusters preferred *P. orientale* the most.

Grazing inside the forest is banned in cluster II. The Van Panchayat in cluster II started taking interest in restoration of the forest area from 1990 and implemented ban on grazing inside the forest. Due to ban on grazing inside the forest, the forest is recovering but at a slow rate. It means that grazing of livestock inside the forest is not the sole factor for degradation of forest. Other factors are also responsible for the degradation like indiscriminate cutting and felling of trees by poachers, improper lopping of trees etc. But, according to Chaturvedi (1995), livestock grazing is the single biggest reason for low wood production. In cluster I, the animals graze inside the forest and it is uncontrolled. Any male member of the family takes the livestock (mainly cattle and goat) for grazing inside the forest. The animals graze about 8 h daily but in summer, it is slightly reduced. Besides grazing, the livestock are supplemented with the tree leaves and grasses from the forest and private land, which are cut and carried by the female members of the household. Livestock has preferences for grasses. They graze palatable grasses while others are left. This result in the disappearance of the nutritive grasses and the unwanted grasses of poor nutritive value are found in abundance.

Tewari (1990) reported that in the Bugyals (high altitude pasture), the proportion of poisonous grass is on the increase as a result of continuous overgrazing in hills of Uttar Pradesh. Moreover, because of the high stocking rates and the less average rainfall during the past few years, grass development has been seriously affected. The grass has not been able to recover fully due to moisture stress and over-grazing. As a result, the perennial grasses are disappearing. As such, the grasses inside the forest have detoriated over the years. The main reason, believed by the villagers, is the rapid spread of pine trees. They believe that nothing can grow under the pine trees, though Vivekananda Parvatiya Krishi Anusandhan Sansthan, an organization of Indian Council of Agricultural Research has successfully tried to grow good quality grasses under the Deodar and Oak trees in Almora district. Stall-feeding of the animals should be encouraged in cluster I. The carrying capacity of grazing resources increases when fodder is cut and carried for stall-feeding (Bana et al., 1995). This also leads to reduced soil erosion and vegetational losses caused by trampling. Stall-feeding also facilitates the proper utilization of dung for manuring agricultural fields after composting (Singh, 1989). The grazing should be regulated as regards the time and place, and also the number of animals permitted. The ideal grazing or cutting management should be to utilize the herbage species at a growth stage when it is highly palatable and nutritive without much interference to the growth and reproduction.

The most desirable systems of grazing would be rotational grazing but considering the available forest area it is not easy to adopt it on a large scale. So, deferred grazing would be the best alternative besides limiting the number of livestock on the basis of the carrying capacity of the forest.

Conclusion

Livestock is a crucial component of hill farming system. Over the years it has enriched the soil fertility and ensured the viability of hill agriculture. Most of the hill livestock except buffalo and crossbred cattle are still maintained on extensive grazing. The economic viability of the hill livestock sector is at stake owing to the poor productivity potential and shrinking grazing area in the region. Due to uncontrolled grazing, the quality of grasses has decreased and people are now shifting towards stall feeding and reducing the numbers of livestock unit. The grazing calendar reveals that there are months in which grazing is not possible. The availability and quality of grasses also differs in different month which asks for external intervention in terms of feed and fodder supply to the livestock owner. The grazing should

be regulated as regards the time and place, and also the number of animals permitted. The ideal grazing or cutting management should be to utilize the herbage species at a growth stage when it is highly palatable and nutritive without much interference to the growth and reproduction. The quality of the forest grasses can be improved by the intervention of people involved in the managing the forest through plantation of quality grasses. The people's participation in managing the common property resources will be a better approach.

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