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Fuel and fodder consumption pattern with special reference to environment: a case study

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Abstract

The present study was conducted in Chajjla village of Poonch district of Jammu and Kashmir, India to understand the status of fuel and fodder consumption and its effect on local resources. The study was based on survey method. Data was collected by using a questionnaire involving various parameters related to resource utilization in the area. The significant sources of fuels satisfying the energy need of individuals in the study area were found to be wood, kerosene oil, LPG and dung cake. The total fuel energy consumption in the study area was found to be 18.78×10^5 kcal/month out of which wood constituted the main source of energy (46.17%). The regular fodder consumed in the study area was found to be crop residue, green fodder, tree leaves and top feeds. Consumption of tree leaves as fodder was found to be (43.34%) maximum. It has been found that the area under study depend upon local forest resource for meeting their demand of fuel and fodder. The study also took into account various socio-economic factors and the local environmental issues related to resource consumption in the area. It has been observed that rapid rate of deforestation and resource degradation has occurred in the area. It has become evident from the study that the dependence of local community on forest couldn't be avoided until the appropriate measures for the development of alternate and economically viable energy resources must not be adopted.

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Introduction

Fuel and fodder is an important component for the survival of rural communities in the Himalayan region.

The rural communities in India depend intensely on the traditional biomass based energy resources like fuel wood, crop residue, and animal dung for meeting their energy needs. In most of the Himalayan regions fuel wood is the main source of energy supplying almost the entire cooking energy requirement. Fuel wood has remained the principal component of rural domestic energy in India and most of the developing countries. Fuel wood collection and consumption is intricately linked to natural resource management. In most of the developing countries, forests are the main source of fuel, fodder and timber.

Overutilization of fuel wood as an essential source of energy for residential purposes has brought about extreme destruction of forest in the Himalayan region.

According to household consumer expenditure survey conducted by National Sample Survey Organization in the year 2007-8, more than 77 percent of family units in rural areas of the country kept on relying upon fuel wood, 7 percent utilize dung cake and just 9 percent utilize LPG. In Jammu and Kashmir huge amount of energy is required as fuel for cooking food as well as keeping the houses warm during severe winter. To meet these demands the households usually depends on the forests or other available resources. However different socio-economic factors influences fuel utilization. Family size and domesticated animals have negative relationship with fuel wood utilization while land holding, number of trees and yearly income have positive relationship with fuel wood utilization. Fodder assumes a basic part in conventional farming in the mountainous region of the Himalayas. Gathering of fodder plays an important role in uplifting the rural economy of the village communities. In Himalayan region about 30-50% of total animal feed is derived from forests and grasslands (Bajracharya, 1999).

Jammu and Kashmir is also facing issues of insufficient fodder to support large domesticated animal population. Though fodder from forest, orchids and fields are in excess over fodder, yet the efficiency of domesticated animals in state is below the national average. However data is still insufficient, particularly with respect to energy supply in the rural areas of the State. Lot of work on resource utilization has been done in the Himalayan region by different workers (Gupta *et al.*, 2009; Tomar and Lall, 2009; Malaviya *et al.*, 2015). Due to overexploitation of fuel wood and fodder there has been a detrimental impact on the forest resources resulting in deforestation, soil erosion, loss of biodiversity etc. Hence there is a need to devise a system for the sustainable utilization of resources in the Himalayan region for the overall development of environment. Keeping this in view, the present work was undertaken in Chajjla village of Poonch district of Jammu and Kashmir, India to study fuel and fodder consumption pattern with reference to natural resources and environmental.

Material and methods

Study area

The present study was conducted in a central village of Poonch district namely Chajjla, which lies in the Pir Panjal range of western Himalayas, Jammu and Kashmir India and is geographically located 33° 37' 0" North Latitude and 74° 8' 0" East Longitude with an altitude of 977m above sea level.

The village is situated at a distance of 48km from Poonch district headquarters. Climate ranges from sub tropical to temperate with a temperature scope of 19-34°C in summer to 6-17°C in winter. Agriculture is the primary occupation of the villagers followed by cattle rearing. Maize and wheat are the staple crops grown in the area. Study area partially depends upon perennial streams for growing crops. The village is bordered by a dense forest of Oak and mixed vegetation locally known as Beri. The village communities depend upon forest and other accessible natural resources for meeting their daily requirement of fuel and fodder.

Data collection and analysis

The present study was conducted from September 2018 to February 2019 and is based on primary data. For the survey and collection of data, a detailed questionnaire was prepared involving various aspects such as socio-economic status of people, type of occupation, land utilization pattern, detail of bovine population, type and kinds of fuel and fodder used, infrastructural facilities and resource availability. The survey has been conducted in 30 percent of the houses on random basis from center of the village to the periphery so as to acquire the real pattern of data. During the survey various units related to human population, domestic animal population, land holding and energy were used. To find the demographic status and the average size of the family, adult units were used i.e., one man =1 adult unit, one women=0.8 adult unit and one child=0.5 adult unit (Sharma, 1993).One kanal =1/8 Acre, and one hectare=2.471 Acres were used as the units for calculating the landholding. Livestock resources/Bovine population in the sample households were converted into cow units using equality coefficients i.e., 1 cow unit for one cow, 1.5 cow units for one buffalo, 0.15 cow unit for one goat/sheep and 1.5 cow unit for one bullock (Jackson, 1981). For the different types of fuels used, energy units were used, i.e., one kilogram of firewood=4000 k.cal, one kilogram dung cake=2400 k.cal, one kilogram crop residue=3200 k.cal, one kilogram of LPG=10800 k.cal and one litre of kerosene=7900 k.cal (Venna, 1988).

Results and discussion

Socio-economic status of the people in the study area

On the basis of monthly income, population of the study area was divided into four categories viz., very low, low, medium and high. The representation of medium income class was observed to be (44.9%) higher followed by (23.99%) low, (17.84%) very low and (13.27%) high income class (Table 1).

The highest representation of medium income class in the study area was found due to their highest share in land holdings and in employment.

Table 1. Various income classes in the study area.

S.No	Income Class	Percentage of families
1	Very Low	17.84
2	Low	23.99
3	Medium	44.9
4	High	13.27

Very Low<Rs 2500/month
Low Rs 2500-3500/month
Medium Rs 3500-5000/month
High Rs 5000/month.

It was found that families with medium land holding category represented the (57.24%) highest land holding followed by (29.96%) low and (12.8%) large land holding category respectively (Table 2). No family in the study area was found to be in minimal land holding category.

It was also observed that the households belonging to medium land holding category had (49.82%) highest share in total land holding followed by (32.74%) small land holding category and (17.44%) large land holding category respectively. Total number of families in the study area was found to be 1144 with a population of 6558 and sex ratio of 1002 which is higher than the state sex ratio. Education rate of male and female in the study area was 61.98% and 41.17% respectively and is lower as compared to literacy rate of male and female in the state i,e 78.26% and 58.01% respectively. The lowest literacy rate in the area was found to be due to the lack of awareness regarding education among the villagers, agro pastoral nature of society and financial problems etc.

Table 2. Land use pattern in study area.

S. No	Land Holding Category(LHCs)	Representation of Families (%)	Share of land holding category in total land holding (%)	Pattern of land holdings (%)	
				Irrigated	Non- irrigated
1	Large	12.8	17.44	42	58
2	Medium	57.24	49.82	28	72
3	Small	29.96	32.74	---	100
4	Marginal	-----	-----	---	---

LHC: Land Holding Category (Marginal <0.1 hectare, Small 0.1-1 hectare, Medium 1-2 hectare, Large >2).

Livestock resources

Maximum percentage of bovine in the study area was shared by (68.27%) buffaloes and least by (3.72%) he-buffaloes (Fig. 1).The reason for the largest share of buffaloes among the livestock resources in the study area was due to the dependence of villagers on buffaloes for milk and milk products which help them to generate income also. This study is in consistent with Qureshi *et al.* (2015) who also reported highest share of buffaloes in bovine population during their study in Shahdara Sharief village of Rajouri district.

Table 3. Fuel consumption pattern in the study area.

S.No.	Land Holding Category	Wood(Kcal/month)	Kerosene oil(Kcal/month)	LPG(Kcal/month)	Dung(Kcal/month)
1	Small	3.9×10^5(44.98%)	1.2×10^5(28.50%)	1.0×10^5(22.22%)	-----
2	Medium	2.88×10^5(33.21%)	2.3×10^5(54.63%)	1.82×10^5(40.44%)	1.4×10^5
3	Large	1.89×10^5(21.79%)	0.71×10^5(16.87%)	1.68×10^5(37.33%)	-----
4	Marginal	-----	-----	-----	-----
	Total	8.67×10^5	4.21×10^5	4.5×10^5	1.4×10^5

Fuel consumption pattern in the study area

During the study it has been found that wood, LPG, kerosene oil and dung cakes were the common sources of energy used as fuel in the area. Total fuel requirement in the study area was calculated 18.78×10^5 kcal/month. It has been observed that among the fuels consumed in the area, fuel wood shared the maximum percentage of 46.17% followed by (23.96%) LPG, (22.42%) kerosene oil and (7.45%) dung cakes respectively (Fig. 2).

Table 4. Fodder consumption pattern in the study area.

S.No.	Fodder type	Quantity required(kg/family/day)	Percentage of total	Source of collection of fodder	Average distance covered for the collection(km)
1	Green fodder	13.72	32.85	Agricultural fields	0.4km
2	Top feed	1.12	2.68	Markets	09km
3	Tree leaves	18.10	43.34	Forests and local lands	0.2km
4	Crop residues	8.82	21.12	Agricultural fields and common lands	0.4km

Family unit wise overall fuel consumption was observed to be highest in case of medium land holding category. It was found that fuel wood utilization was higher in (44.98%) small LHC followed by (33.21%) medium LHC and (21.79%) large LHC respectively. Kerosene oil utilization was higher in (54.63%) medium household class followed by (28.50%) small and (16.87%) large landholdings units respectively. As far utilization of LPG is concerned medium land holding consumed 40.44% followed by large and small landholding with 37.33% and 22.22% respectively. Only medium land holding category was seen to utilize dung cake as fuel (Table 3).The highest consumption of fuel wood by small household units in the study area was found due to their poor economic condition to buy kerosene oil or LPG and also due to easily and openly availability of fuel wood from the local forest area.

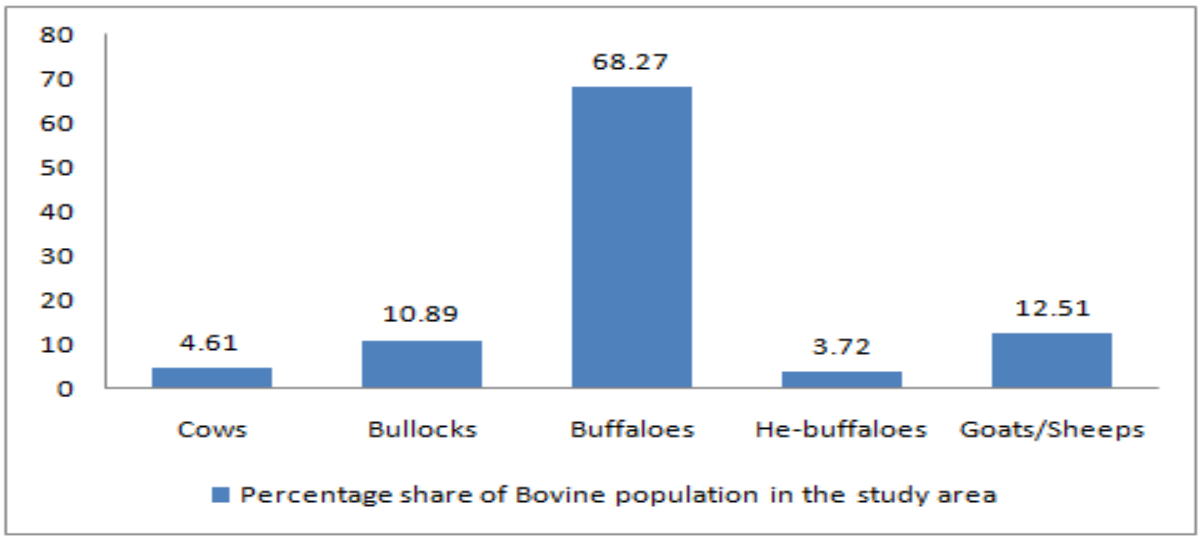

Fig. 1. Detail of Livestock resources/bovine population in the study area.

It was also observed that fuel wood extraction was higher in winter as compared to summer for meeting the requirements of heating and warming. Similar results were found by Rawat and Sharma (2010) during their work in Rudra-Prayag district of central Indian Himalayas. However in rural areas preference is given to those fuels which can be easily available simple to use and have high calorific value.

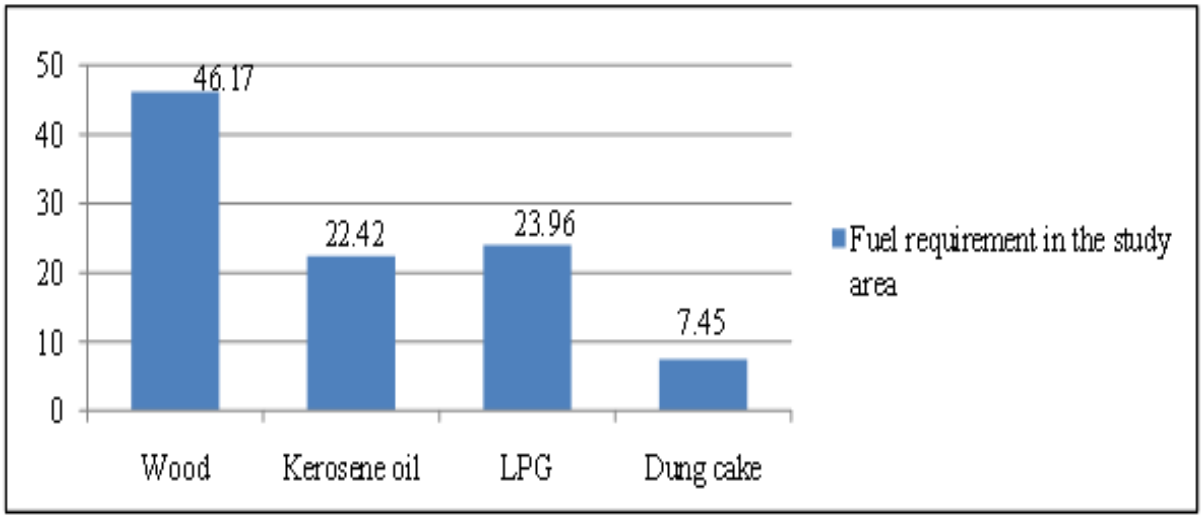

Fig. 2. Fuel requirement in the study area (%).

Fodder consumption pattern in the study area

Common types of fodder consumed in the study area were found to be green fodder, top feed, crop residue and tree leaves. The amount and quality of fodder required per day per family, source of collection and average distance covered for collection (km) is given in Table 4. Total fodder requirement in the study area was found to be 41.76 kg/family/day. The consumption of tree leaves as fodder was found to be(18.10 kg/family/day) maximum followed by (13.72 kg/family/day) green fodder, (8.82 kg/family/day) crop residues and (1.12 kg/family/day) top feed respectively. Least consumption of top feed in the area was because of the reason that it was to be obtained from market which was situated at a distance of 09km with no road connectivity. Moreover, highest consumption of tree leaves and green fodder in study area was due to it's easily availability from the adjoining forest and agricultural lands. It has also been observed that the utilization of different type of fodder vary in various seasons as during rainy seasons green fodder dominates.

Conclusion

People of study area were primarily engaged in agriculture and cattle rearing in addition to various allied activities. Infrastructural need of the study area was found to be below the average level.

In the study area, fuel wood and tree leaves consumption constituted the major share in overall fuel and fodder consumption respectively. Based on the data it has been observed that the study area encountered many challenges in its fuel and fodder utilization pattern both quantitatively and quantitatively, mainly because of increase in population and socio-economic status.

It has been found that forest based resources form an integral part of people livelihood in the area. People in the study area primarily depend on forest and other available natural resources for their livelihood and sustenance as a result various environmental problems such as deforestation, over grazing, soil erosion, forest fires, encroachment of forest land and environmental pollution were reported in the area. Thus, appropriate measures for afforestation and reforestation must be adopted in the study area with ecologically as well as socio-economically viable plant species which will not only fulfill the demand of local villagers but also provide other basic needs to people.

Recommendations

There must be the need for awareness of individuals with regards to the use of renewable energy resources, conservation of soil and water resources, rain water harvesting and sanitation issues so as to make a sound and healthy environment. Villagers must be encouraged to take appropriate education which not only enhance their financial and social status but also help in improving and broadening their awareness regarding utilization of various natural resources.

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