

RESEARCH ARTICLE

Fuel wood and fodder consumption in Van Panchayat forests of district Nainital in western Himalaya

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SUMMARY

Survey was conducted in two villages of Nainital district at an elevation of 1480m to 1565m, to evaluate the socio-economic condition as well as existing pressure in van panchayat forest during the year 2013. To get the requisite information of the work, data were obtained by formal interview using a structured questionnaire, focusing the details about the socio-economic development and related issues of forests. Total area ranged from 13.49ha to 48.47ha in van panchayat forests. The total annual fuel wood consumption and fodder consumption ranged from 102.75 to 1536.55 tyr^{-1} and 299.97 to 3733.02 tyr^{-1} , respectively.

Key Words : Fuel wood, Fodder, Livestock, Socio-economic, Structured questionnaire, Van panchayat

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According to the World Bank (2002), more than 1.6 billion people throughout the world relying heavily on forests for their livelihoods and around 350 million people depends only on forest both for their subsistence and income. India's consumption of fuel wood is about five times higher than what can be sustainably removed from forest (FAO, 2002). In Uttarakhand people highly depends on Van Panchayat forest to draw fodder, fuel-wood, timber, NTFPs etc. Considerable efforts has been made to study the historical evolution,

organizational structure, management resource utilization, and enforcement of rules and regulations of Van Panchayats here village households rely mostly on farming, livestock raising and working forestry activities. These revenues generally include expenditure components such as labour, machinery and seed. Thus, household budget in these villages often has deficit (Türker and Ayaz, 1998). Forests are the major source of timber, fuel wood, fodder and food for the native people of the Himalayan region. Here, dependency of human population on the forest products for running their livelihood is tremendously high and it is a century old practice.

In Nainital district there are more than 495 Panchayats and due to low connectivity with the urban

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areas; the alternate sources of energy are not easily accessible hence, making the population totally dependent on wood resources of the area; the needs in these region is high, particularly during the winters, forest can yield both timber and non-timber forest product which contain fuel wood, fodder wood, edible fruit medicinal plant etc. it is estimated that about 270 million tonnes of fuelwood, 280 million tones of fodder, over 22 million cubic meter of timber and countless non-wood products are removed from forest annually (Tewari, 2002). Main fuel wood species present in Nainital districts are- Banj (*Quercus species*), Chir (*Pinus roxburghii*), Toon (*Toona ciliata*), Kharak (*Celtis australis*). The natural resources of Uttarakhand, forests are the most important, both economically and environmentally (Sati, 2005). The forest is the main sources of the fuel in the state; the use of fuel wood is the only form of energy for cooking; men, women and children from nearby forested areas collect firewood. At higher elevations people collected firewood during winter months only and store it in heaps for the whole year, whereas, at lower elevations collection is made throughout the year. Due to collection of huge amount of firewood, forests near to the villages are subjected to rapid degradation and over exploitation. Fuel wood has remained the principal component of rural domestic energy in India and most of the developing countries, fuel wood collection and consumption are intricately linked to natural resource management. Wood biomass is the main energy source for world's population about half of population depend on wood for energy needs. Fuel wood has always been and could remain an important source of energy in the future (Hall and Scarse, 1998). Many countries around the world are now increasing the use of wood as an energy source. The main fodder species of Nainital are- Bhimal (*Grewia optiva*), Tilonj oak (*Quercus floribunda*), Banj oak (*Quercus leucotrichophora*), Semal (*Bombax ceiba*), Toon (*Toona ciliata*), Timil (*Ficus roxburghii*), Rianj (*Quercus lanuginosa*), Kharsu oak (*Quercus semecarpifolia*) and Tusar (*Debregeasia longifolia*). Apart from fodder another major thing for which most people depend upon forest are Fuel wood almost 2/3rd of world population depend upon fuel wood for cooking and heating. Fodder refers particularly to food given to the animal (including plant cut carried to them) rather than that which they forage for themselves. It includes hay, straw, leaf litter grasses etc. (Thapa *et al.*, 1991). Main objective of fodder tree species is development of fodder to fulfill requirement of local people. Degradation of

forest, over exploitation of pasture and grazing land has posed serious problem in view of increasing demand of fodder. As reported by Dhyani and Maikhuri in year 2012, women of the central Himalayan region of India have spent their lots of time and energy to the collection of the fuel wood and fodder into the forest and they had added their drudgery. In the Himalayan region, the domestic animals provide main drought power for agriculture system. They also process crop residues, provide essential organic manure and generate farm income when they are sold (Thapa *et al.*, 1991). Socio-economic status (SES) is a combined measurement of economic and social position of an entity compare to other in society. It influence to accessibility to resource, livelihood pattern, food etc. The SES of hill farmers is an important subject for study as farmers in hills are dwelling in a complex, diverse and risk-prone situation. They are usually practicing traditional ways of cultivation which adds very little to the input. A hill farmer who is only dependent on agriculture hardly secures his family food and nutritionally. The farming system prevalent in the hills is subsistence-farming framers cultivate the crops in their land for the living. The land holdings are smaller in size with majority farmers coming in the marginal category. Agriculture is heavily dependent on energy flows from uncultivated lands such as forests and grasslands recycled in to manure through livestock was reported by Mahadev in 1979. In central Himalayan region, almost farmers have small land-holdings and farming system is mostly conventional, with lot of agricultural diversity, which also plays key role for ensuring fodder supply to the livestock. People living in central Himalaya totally rely on forest for their sustainability. Present study was carried out following objectives were (1) To access fuel wood and fodder consumption in each Van Panchayat forest and (2) To evaluate socio-economic conditions of people in each village.

MATERIAL AND METHODS

Study site :

Present study sites were located in two different villages *i.e.* Bagad and Mahrora of Nainital district, in the western Himalayan region of India. Temperature fluctuates according to the weather. The villages have dominated *Quercus* forest at higher altitude and at lower altitude species of *Pinus*, *Cupressus*, *Quercus* and *Grewia* are found, people are usually engaged in agriculture, they

grow various seasonal vegetables like-potato, radish, bean, coriander and green vegetables along with cash crops such as rice, wheat, maize and *Bajra*.

The study was based on the primary survey and data collected through RRA method by approaching the villagers, the collected information was tabulated. The demographic features and livestock information was collected from Gram Panchyat/Gram Shabha or family register of each village. For the estimation of the actual amount of consumption of fuel wood and fodder household level survey was conducted through random sampling method on the basis of involvement of people in collection of fuelwood and fodder.

RESULTS AND DISCUSSION

Demographic features of studied villages : Total households in village Bagad was 223 with 1370 members and Mahrora village have 119 households 564 members with the total forest area of 48.47 ha and 13.49 ha, respectively.

Total livestock per cent in village Bagad was 588 from which buffalo shared 41%, cow shared 44%, goat 48%, ox 8% and horse shared 6% from the total, while in village Mahrora the total livestock was 304, shared was 25%, 38.15%, 17.1%, 15.78% and 3.94%, respectively.

Occupation of the villager's was divided into three categories of people with pure dependency on agriculture; people engaged in agriculture + in other jobs while third category people were based on non-agriculture. In village Bagad percentage of people totally engaged in agriculture shared 49.09%; people involved in agriculture with other alternative job accounted 30.90% while people fully dependent on other alternative shared 20.01% of the total where as in the second village Mahrora only 26.66% people are engaged in pure practices of agriculture, 40% are involved in agriculture along with some other job and the remaining 33.33% were totally independent from

agriculture for their livelihood.

Fuel wood and fodder consumption pattern :

The fuel wood and fodder consumption varies from village to village, the annual fuel wood consumption were 1569295.6 kg to 421753.85kg, respectively in Bagad and Mahrora villages. Total fodder consumption in Bagad and Mahrora were 2116270 kg and 1042440 kg, respectively.

Conclusion :

Annual fuel consumption in Bagad showed higher values 1569.29tyr⁻¹ by 1370 people while the total annual fuel wood consumption was 296.56 to 788.4tyr⁻¹ for Van Panchayat forests estimated by Lodhiyal *et al.* (2011). In village Mahrora total fuel wood consumption was 421.753tyr⁻¹ by 564 people are on the lower side than 119.18tyr⁻¹ by 115 people for chir-pine Van Panchayat forest Nainital (Kapkoti *et al.*, 2013). The increased fuel requirement of villages depict the low alternative source of energy, due to the inaccessibility of roads, villagers of Bagad and Mahrora are still totally dependent on forest for their cooking issues.

The villagers depend on agricultural fields for fodder for their livestock's, the annual fodder consumption in village Bagad was 26kg which was comparable lower than the values 34kg for oak forest reported by Sati and Song (2012) while for village Mahrora the fodder consumption was 1042.44tyr⁻¹ the present values were on the lower side than 489tyr⁻¹ reported in Birla Panchayat of Sirmour district in Himanchal Pradesh (Watershed report, 2010). Bagad village peoples are mainly involved in dairy practices with a huge amount of herd size and so their requirement for fodder increases authentically.

Van Panchayat forest play a significance role in socio-economic development of villagers because they are fulfilled various basic needs such as fuel, fodder, litter,

Table 1 : Demographic profile of the studied villages

Village	Van panchayat area (in ha)	Block	Households	Total population	Vegetation
Bagad	48.47ha	Kotabagh	223	1370	Mixed Oak forest
Mahrora	13.49ha	Kotabagh	119	564	Oak and pine forest

Table 2 : Fuel wood and fodder consumption pattern in studied Van panchayat villages

Village	Fuel wood requirement				Fodder requirement			
	Kg family ⁻¹ day ⁻¹	Kg family ⁻¹ month ⁻¹	year ⁻¹ Kg total family yr ⁻¹	Tonne total family yr ⁻¹	Kg family ⁻¹ day ⁻¹	Kg family ⁻¹ month ⁻¹	year ⁻¹ Kg total family yr ⁻¹	Tonne total family yr ⁻¹

timbers and others. Van Panchayat peoples totally depended on the forest for fuel and fodder consumption therefore the assessment of Van Panchayat forests is imperative for the conservation and management aspect particularly the three category classes, productivity as well as the sustainability of forest ecosystem.

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