The Geographical Journal of Nepal
Vol. 10: 55-72, 2017
Central Department of Geography,
Tribhuvan University, Kathmandu, Nepal

Firewood management practice by hoteliers and non-hoteliers in Langtang valley, Nepal Himalayas

Prem Sagar Chapagain
Central Department of Geography, Tribhuvan University, Kirtipur, Kathmandu, Nepal
Email: ps.chapagain@gmail.com

Langtang Region is the third largest trekking destination in Nepal. The annual tourist flow was about 8000 by 2000. However, after 2000, the number of tourists were increased to about 15000 annually. Out of it, one third tourists visit to the Langtang Valley. With increasing number of tourists, the number of hotels and lodges are also rapidly increased there. Firewood has been the major source of energy for both hoteliers and non-hoteliers for a long time and its demand has been abruptly increased with increasing number of hotels and lodges. Both hoteliers and non-hoteliers collect firewood from nearby forest and also transport from the valley bottom to Langtang village and Kyanjing. However, there are major differences in collection places, and collection strategy especially in terms of distance, preference of tree species, purpose, and relation to nature.

Keywords: Firewood; Langtang; tourist; trekking; tree species; collection strategy; access; forest situation.

Introduction

Firewood is a major source of energy in Nepal as it covers about 77 percent of the total energy demand in the country (WECS, 2010).There are many studies regarding the factors associated to the amount of firewood consumption.Studies from outside Nepal show that the amount of firewood consumption is determined by family size, collection time and labor cost (Fleuret&Fleuret, 1978;Heltberg et al., 2000; Bewket, 2005). However, studies from Nepal claims that differences in private assets like land and livestock holdings (Chapagain, 2011; Kandel el al., 2016),household income, family size, education, ethnicity, location of settlements, proximity to the urban center and

labor cost effect it (Bajracharya & Chaudhary, 1982; Mahat et al., 1987; Regmi, 1994; Sapkota & Odén, 2008).

Mountains are the area of harsh environment.Poverty and environmental degradation are common in the Himalayas as there is growing pressure on environmental resources for managing livelihood (Sharma, 2001). The negative effect of tourism on forest has already been noticed in western Himalayas such as Kumaon and Garwal (Ives, 2006).Firewood is the major source of energy even in the major tourist destinations such as Everest, Annapurna and Mustang regions in Nepal (Nepal, 1999, 2008). The increasing tourism activities in Langtang have also heavily depended on firewood for fulfilling their energy demand (Chettri et al., 2002; Chapagain, 2015). Importantly, firewood and other forest resources are sometimes collected ignoring the existing rules that effect on sustainability of those resources (Campbell, 2005).Langtang is one of the major tourist destinations in Nepal. Ghodatabala, Langtang village, and Kyanjing are the three major places of tourist destination in Langtang Village Development Committee (VDC) where all the hotels are owned and operated by the local entrepreneurs and firewood is used as the major source of energy for cooking and heating by both hoteliers and non-hoteliers. In this context, this paper discusses the firewood collection and consumption pattern by hotels and non-hotel households as there has been no such comparative studies from mountain tourist destinations. It further aims to explore the firewood collection places, collection strategy and local peoples' understanding on firewood availability and forest situation in the valley in particular.

Methods and materials

This study is based on the field data collected in 2012 using household questionnaire survey, key informant interview, and observation methods. The detail questionnaire survey was conducted to 21 hotels of the three major settlements such as Lamahotel, Langtang village and Kyanjing. It covers about 40 percent of the total hotels and restaurants in the area. Similarly, 21 non-hotel households were covered in the survey from Langtang village, Gumbagaon and Mundu village of Langtang VDC that comes to about 33 percent of the total households of these villages.

The semi-structured *questionnaire* was used to collect socio-economic and other data such as firewood collection places, preferred tree species for firewood, amount of firewood they collect by season, firewood consumption amount, distance and forest situation from where they usually collect firewood (Figure 1 and 2). Six *Key Informant Interviews* were conducted that focused to collect information related to institutions

and access pattern to forest resources in the valley. Discussion was also held informally with many people both male and female while having tea and food in the morning and evening. Importantly, the researcher was participated with local people and hired laborers and visited firewood collection places and observed the way that they choose and collect firewood, places they usually visit and the situation of the forest there. It was marked the firewood collection area on the map; took pictures and also asked with hoteliers and non-hoteliers about it. In addition, an inventory sheet was also used to collect information about the number of hotels, establishment date, size, location and details of the available services.Information on tourist data, demographic situation was collected from secondary sources.

Figure 1. Having discussing with hoteliers in Kyanjing.

Figure 2. Conducting questionnaire survey in Langtang

The data were tabulated and analyzed in Microsoft Excel. The firewood data were reported in local unit (*bhari*) that was converted to kilogram taking an average of 40 kilograms (Kg) per bhari.

Study area

The Langtang Region lies in the north east of Kathmandu. The government of Nepal declared Langtang National park (LNP) in 1976 that cover 1710 km^2 area. Later, the park size increased to 2130 km^2 included the extended buffer zone area of 420 km^2. The LNP covers parts of Rasuwa District (56 %), Sindhupalchok district (38%) and Nuwakot District (6%). There are three main regions in LNP. These are i) Langtang Valley ii) Helambu and iii) Gosaikunda Lake region. Langtang valley is extended from Syafrubesi (2000m) to Langtang Lirung (7345m). The Langtang VDC covers major area of the Langtang Valley. This study covers five villages namely Lamahotel, Gumbagaon, Langtang village, Mundu, and Kyanjing (Figure3). Among these villages, there are only hoteliers in Lamahotel and Kyanjing while there are primarily non-hoteliers in Mundu

and Gumbagaon. Langtang village is the oldest and major village of the Langtang VDC where there are both hoteliers and non-hoteliers.

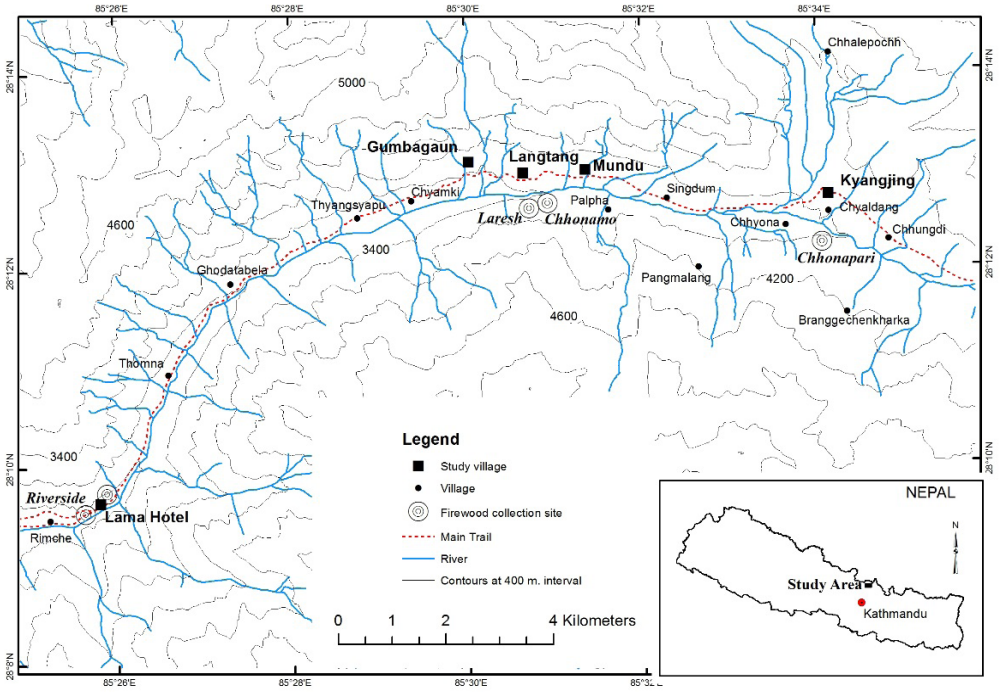

Figure 3. Study area: The Langtang Valley

The mean annual temperature is about 14°C. Winter's temperature is very cold and characterized by cold nights, usually near freezing, and days remains fairly clear. Snow occurs from November to May (Sayers & Norconk, 2008). Population size of the valley has been changing over the time. In 1973, there were 69 households with 353 population in Langtang VDC (Hall, 1978). In 2011, there were 152 households with a total of 415 people (CBS, 2012).Household size of hoteliers is 5 while it is 4.2 for non-hoteliers. Seasonal migration is common in both groups to Kathmandu and Dhunche. They send their children primarily to Kathmandu for the purpose of study. Literacy situation is quite different as 70 percent hoteliers are literate while it is only 44 percent for non-hoteliers.

In the economic sphere, land is an important asset for both groups. All are small land holders. About 60 percent non-hoteliers and 68 percent hoteliers have less than 0.25 hectare land. Besides land, livestock is traditionally remained a major livelihood

basis. The herd size is higher i.e. 6.6 of hoteliers and 5.5 of the non-hoteliers. Hoteliers have focused to keep *chauri* and horse while non-hoteliers to *chauri* and cow. Bigger households' size has more livestock number among the non-hoteliers. Regarding the occupation, 79 percent hoteliers are fully involved in hotel and limited agricultural activities, other are engaged in services etc. while agriculture is the main occupation of 86 percent of non-hoteliers. It is the food deficit area where about 43 percent of both groups manage food for 3-6 months from their own production in a year.

There are many attractions for tourists in the valley. It has mountain peaks and glaciers, different types of vegetation including Langtang pine (*Larix griffithiana* Carriere).The valley is famous for the endangered wildlife such as Red Panda, Musk deer, Himalayan Thar, Wild-boar etc. Tamang and Bhotias are the earliest settlers who are believed to be migrated from Kyirong, Tibet, before the mid-1600s. While migrating from Tibet, they also brought their animals, high-altitude crops and their culture. Besides them, Sherpa also migrated to the valley (McVeigh, 2004). The Langtang valley is the nearest mountain trekking destination from Kathmandu. Tourists start from Kathmandu in the morning and reach to Syafrubesi by bus in the evening. The next day, they trek to Lamahotel via Bambo village. From Lamahotel, they reach to Langtang village in the same day. Langtang village is the oldest village of the valley. From Langtang, tourists take half-day's trek to Kyanjing, the uppermost village of the valley.

Results and discussion

Tourism development and firewood consumption

Trekking and mountaineering are very famous in some pocket areas of the mountain region in Nepal.After Annapurna and Everest regions, Langtang is the third most preferred trekking destination in Nepal.

The number of tourist to Nepal has increased from 162 thousands in 1980 to 790 thousands in 2014. The percent of trekkers visiting LNP ranged from 4.4 percent in 2005 to 15 percent in 2010 (MCTCA,2015). The overall national trend of tourist arrival has also reflected in the case of Langtang valley (Table 1).

Table 1. Tourist to Langtang national Park

Year	Total tourist to Nepal	Total trekkers in Nepal	Trekkers in Langtang	% to total trekkers
1980	162,897	27460	4113	15.0
1990	254,885	61472	7826	12.7
2000	463,646	118414	10917	9.2
2005	375,398	61488	2735	4.4
2010	602,867	70218	10603	15.1
2014	790118	97,185	12552	12.9

Source: MCTCA, 2011 and 2015.

In 1980, more than four thousand tourist visited Langtang region and the number was increased to about thirteen thousand in 2014. It is important to note that all the tourist visiting to Langtang region do not visit Langtang Valley as there are other destinations such as Helambu, Gosainkunda and these three regions together constitute the Langtang region.

Tourism activities in Langtang valley were started even before the establishment of the Langtang National Park in 1976 as the first hotel in Lamahotel was established before 1970. With increasing numbers of tourist, the numbers of hotels, lodges and restaurants have rapidly increased in Lamahotel, Langtang village, and Kyanjing especially after 1980 (Baskota and Sharma, 1998). There were only 10 hotels by 1990 and mainly established in Lamahotel. By 2000, the number of hotels was increased to 18, 31 by 2005, 45 by 2010 and 49 by 2012. In the beginning, hotels and lodges were concentrated in Lamahotel. But after 2000 such infrastructures were built in Kyanjing and Langtang village.Among the three villages, the highest numbers of such facilities are in Kyanjing (20) followed by Langtang village (17) and Lamahotel (12) (Table 2). The total number of beds available in these villages is 333 in Kyanjing, 175 in Langtang and 152 in Lamahotel.

Table 2. Establishment of hotel and lodges in the study villages

Village	Before 1990	1990-'99	2000-'04	2005-'09	2010 and After	Total
Lamahotel	6	4	1		1	12
Langtang	1	1	3	9	3	17
Kyanjing	3	3	9	5		20
Total	10	8	13	14	4	49
%	20.4	16.3	26.5	28.6	8.2	100

Source: Field survey, 2012.

Firewood is still the major source of energy for hotels in Langtang Valley. They use other sources such as LP gas, cow dung and kerosene in varying quantity which is less than 15 percent of the total energy they consume. Firewood is mainly used for cooking, heating and camping. The average annual firewood consumption is 6229 kg per hotel. Average consumption per hotel by village varies. It is 6760 kg in Lamahotel and 5950 kg in Kyanjing (Table 3).

Table 3. Annual firewood consumption by hoteliers

Settlement	Number of hotel	Annual Firewood consumption (kg)	
		Total consumption	Average consumption per hotel
Lamahotel	5	33800	6760
Langtang	8	49400	6175
Kyanjing	8	47600	5950
Total	21	130800	6229

Source: Field survey, 2012.

The average quantity of firewood consumption is higher in Lamahotel and lower in Kyanjing. The average firewood consumption per bed is lower in Kyanjing compared to other two villages i.e. Lamahotel and Langtang village. Annually, it consumes 400 kg firewood per bed in Kyanjing, 456 kg in Lamahotel and 461 kg in Langtang (Table 4).Lamahotel is close to forest whereas Langtang village is about 4 hours' walking distance from Lamahotel. From Lamahotel, it takes about 7 hours' walking to Kyanjing.

Table 4. Average annual firewood consumption per hotel bed

Description	Villages		
	Lamahotel	Langtang	Kyanjing
Number of total sample hotels	5	8	8
Number of total bed of sample hotels	74	107	119
Firewood consumption per bed/year (kg)	457	461.7	400
Total number of available beds in the village	152	175	333
Estimated annual total firewood consumption in the villages (kg)	69464	80797.5	133200

Source: calculated based on field survey, 2012.

Based on the data of firewood consumption per bed per year, it has estimated 283 thousands kilogram firewood that annually extracted and consumed from the near by forest in the valley. Based on table 4, if lodges are occupied for six months (180 days) in a year, the per day per bed firewood consumption is 2.5 kg in Lamahotel and Langtang village while it is 2.2 kg in Kyanjing. This figure is close to the study done by Watanabe (1997) in Sagarmatha and Langtang region. His estimation was at least 2 kilogram per visitor per day. In a study, Nepal (2000) has estimated 43 kg firewood per lodge per day in the Everest region. In the case of Langtang valley, the per lodge per day firewood consumption ranged from 16 to 18 kg. The wide variation between Everest and Langtang region might be due to hotel occupancy rate, the size (number of beds) of hotels, firewood camping facilities, size of the trekkers team and associated staff, and availability of alternative energy.

In addition to hotel and lodges, there were two restaurants/*bhattis* without having bed in Langtang village and one in Lamahotel that provided services to tourists and associated staffs. Such restaurants and *bhattis* used 6800 kg firewood annually in Lamahotel and 6000 kg in Langtang village. The firewood consumption by hotels varies by the number of beds available in the hotel. The hotels with less than 20 beds consumed 6400 kg per bed firewood annually in Langtang village but hotels with more than 20 beds consumed 5600 kg per bed annually. Thus the amount of firewood consumption by restaurants/bhatti is higher compand to hotels with more than 20 beds. These restaurants and *bhattis* consume higher amount of firewood as they served food, snakes, prepare local alcohol (*raksi*) and serve to tourists, trekking guide and porters. These local restaurants and *bhattis* are relatively cheap, provide fresh food and also are the places of socialization, and entertainment to tourist guide and porters (Chapagain et al., 2012).

Firewood is the major energy used by non-hoteliers in the Valley. In an average, each non-hotel households consume about 7000 kg firewood per year in Langtang and Mundu village while it is 6500 kg in Gumbagaon.But the daily per capita firewood consumption is higher in Gumbagaon followed by Mundu and Langtang village (Table 5).

Table 5. Per capita firewood consumption by non-hoteliers (kg)

Description	Villages			Total
	Langtang	Gumbagaon	Mundu	
Annual total firewood consumption of sample households	57400	52000	34800	144200
Total sample households	8	8	5	21
Average annual per household firewood consumption	7175	6500	6960	
Total population of sample households	26	20	14	60
Per capital daily firewood consumption	6.0	7.1	6.8	6.6

Source: calculated based on field survey, 2012.

Annual volume of firewood consumption depends on the size of households. Household size with less than 3 member consumed 5240 kg firewood, 3-4 household size consume 8440 kg and household size 5 and above consume 9400 kg firewood annually.There is lack of data for comparative analysis of percapita daily firewood consumption from Mountain region. The Forestry Sector Master Plan reported that the annual per capita firewood consumption ranges from 480kg to 600 kg in Hill and Mountain region (MPFSP, 1989; Kandel et al., 2016). However, results of this study shows higher amount (2200kg) of annual per capita consumption.

Firewood collection places and preferred firewood species

Both hoteliers and non-hoteliers collect firewood from different places of the LNP.Non-hoteliers collect firewood from the park across the Langtang River especially from, Laresh,Chhonamo and around the Riverside. The hoteliers collect firewood primarily from Riverside near Ghodatabala and also from Chhonapari - forest across the river- in Kyanjing (Figure 4),Laresh, and Ghodatabala. The Riverside (Figure 3 and 5) is close by Ghodatabala where firewood is available in abundance. The old trees, dried one and trees brought by the flood of Langtang Khola are collected there. The large amounts of firewood is collected there and brought to Langtang village and Kyanjing.

Figure 4. Forest across the Kyanjing

Figure 5. Forest in the Riverside.

In the Langtang forest, the commonly available forest species are *uttis*, rhododendron, pine, juniper, birch, and oak. *Uttis (Alnusnepalensis)* and oak are very dominant species upto Lamahotel. Pine and rhododendron are dominant in higher altitude. Juniper and birch are available from Lamahotel to Kyanjing but these species are not in abundance.

In terms of the choice of firewood species, birch and rhododendron are best for the firewood. Big branch and main trunk is the first priority what they refer as the 'good' firewood. Firewood from these two species is called *kadadaura* (strong firewood). *Kadadaura* gives more heat and remains for longer time while burning. The second choice is pine, oak, and juniper. The third choice is *uttis*. There is mixed forest with domination of pine in the higher elevation. *Uttis* is commonly available around Lamahotel and along the river bank up to Langtang. Birch is not so common. Rhododendron is commonly available but its trees are small.

Access to forest and firewood collection

Firewood and other forest resources are opened by LNP for one month in summer and one month in winter in the study area. For summer season, forest is opened for the month of Jestha (May 15 to June 15) and for winter season it is opened for the month of Mangsir (November 15 to December 15).There is an equal access to hoteliers and non-hoteliers so that they can go and collect firewood from the park.

As per the official rule of the park, no green trees are allowed to cut. It is allowed to collect dry branches and fallen branches of trees. However, there is an exception by practice that the fallen green trees and trees brought by river flood are allowed to cut. This is monitored by buffer zone management committee and its sub-committees

together with park authority. The management committee people are local and they are both users and managers.

How much firewood that one household or hotel is allowed to collect and how much they actually collect is a matter of interest. As per the rule, there is no such a limitation. Household members of both hoteliers and non-hoteliers themselves, and together with hired and exchange laborer collect firewood during the opening time. It is further interesting that outside labor also can go alone and collect firewood for hotels and non-hotelier households. Both men and women of non-hoteliers involve in firewood collection. Women collect dry branches and small fallen branches of trees. Women do not go farther away into the forest and mostly collect from nearby distance. So it is said that women cannot collect 'good firewood'. The good firewood is categorized as the major branches of birch, and rhododendron tree (Figure 6 and 7). It is good because those species of firewood give high energy that is known as *kadadaura*. The fallen trees or major branches of such species are bigger in size and it is difficult for women to use big knife (*khukur*i) or axe to chop it down.

Figure 6. 'Good firewood' of birch in Langtang

Figure 7. Firewood stored by hotel in Kyanjing

There is a gender division of work in which men mostly involve in firewood collection, women remain at home looking after children and household affairs. Men can carry more firewood. Generally, men from non-hotelier household collect firewood together with children and exchange labor. Although, they prefer to get wage laborer but it is difficult as the wages is high that non-hoteliers hardly manage to pay. The non-hoteliers only use 10 percent outside laborer in firewood collection. These outside laborers usually go together with household member in most of the cases.

The hoteliers are busy in hotel and they have capacity to pay for laborer so that they use hired labor to collect firewood. Out of total firewood they collect annually, 80-90 percent is collected by outside laborers. The outside laborers also collect firewood from long distance such as Riverside and carry up to Kyanjing village (Figure 8).

Figure 8. Firewood collected in Riverside.

(Labors stay in the hut, prepare food there and cut down trees for making more firewood).

The outside hired laborers in the study villages usually come from Solukhumbu and Rasuwa district. Usually the same laborer visits and work for hotels in Langtang and Kyanjing villages. While coming the next time, the laborer invites his new friends and make familiar to the hoteliers and the forest from where they collect firewood. They collect firewood during the day and live in the hotel at night. Sometimes they stay on tent at forest and make firewood. They often help in agriculture activities. While working for the hoteliers, outside laborer either work on daily wages basis or they are paid based on the quantity of firewood they collect. The choice is up to the laborer. Laborer's decision depends upon his knowledge of firewood availability. If they collect more than two *bharis*, they work on quantity basis. Usually, one bhari firewood in Kyanjing cost 500-700 rupees depending upon the firewood quality. The birch and rhododendron with main branch and pieces of the trunk gets higher price. Pine, uttis's firewood are considered low quality firewood so such low quality firewood gets lower price. While on a daily basis, they get 700 rupees plus food for the whole day labor.

The way that hoteliers and non-hoteliers manage their firewood are quite different with respect to different dimensions such as gender of collector, types of firewood, motives, instruments used for firewood cutting, purpose and relation to nature (Table 6).

Table 6. Dimension of firewood management by hoteliers and non-hoteliers

Sn	Dimension	Firewood management	
		Hoteliers	Non-hoteliers
1	Who collect	• Outside labor, male	• Household members and exchange laborer
2	Targeted type of firewood	• 'Good'. Cut so called fallen trees, *bangotiingo* trees	• 'Firewood', dead and fallen branch
3	From where	• anywhere in the forest	• nearby forest, regularly visiting places for firewood
4	What instruments	• Big *khururi*, axe	• *Khurpa, khukuri* (local knife)
5	Motives	• Maximum collection	• Satisfying basic need
6	Main purpose	• Profit maximization	• Energy (firewood) security

Hoteliers collect firewood by mobilizing outside laborers. Such outsider laborers target to collect 'good' firewood from anywhere in the forest. They use big *khukur*i, axes and often saw so that they can cut and make more firewood within the limited time. They are motivated by market factors as the more they collect the more benefit they get. It is important to mention here that although there is restriction to cut green trees, the outside laborers go to forest and sometime cut out the bark of green trees so that they can have dry trees for the next year.It is therefore, their purpose is profit maximization. The increasing distance and degrading situation of the forest as reported by both hoteliers and non-hoteliers is also the evidences of it. Although, the hotel owner does not like to have detached relation to nature, it is through the laborer working for them degrading the forest.

Firewood availability

It was asked the changes in time distance to collect firewood compared to the situation of 10 year ago. The time distance for firewood collection has increased as reported by 76 percent of hoteliers and non-hoteliers. Only about 5 percent reported the decreasing distance and 19 percent reported constant time distance for firewood collection. It is mainly due to the increasing demand of firewood. It is obvious that the number of

tourists and the numbers of hotels and restaurants have rapidly increased especially after 2005 and the demand of firewood has also increased. Hence, they require to travel farther into the forest to collect firewood and thus time distance has increased.

Forests were already under pressure in Langtang (Shrestha, 1985) and the situation has much deteriorated now**.**Firewood collection distance has increased compared to the situation of 10 years ago. On the one hand tourism sectors has demanded more firewood, on the other hand there is no planning for firewood management. Nearly 52 percent of both hoteliers and non-hoteliers have reported that forest has degraded compared to the situation of a decade ago.Forest degradation was observed in Chhonapari - area across the river in Kyanjing, and Riverside.Forest degradation has not only taken place in Langtang but also widespread throughout Nepal as there isincreasing trend of open forest class, having crown cover 10-40 percent, forest fragmentation and degradation (FAO, 2009).In early 1970s it was claimed that forest was degraded due to population growth and temptation of land for cultivation that resulted heavy deforestation and degradation in Nepal (Eckholm, 1976). It was later refuted and established that deforestation in poor countries is mainly resulted due to the necessity of making their livelihood. Lack of livelihood opportunities, income and employment leads to deforestation (Ives & Messerli, 1989; Gurung, 1981; Hagen, 2000).

Conclusion

Forest is one of the major elements of environment. It has greater role in maintaining ecological balance. Forest is the major base of energy requirement of tourists places in mountain. The increasing numbers of tourists have put questions on its sustainability and Langtang is not an exception as in the context of increasing energy demand by hoteliers. Firewood demand has increased over the years as number of hotels and tourists have rapidly been increased over the time.

Firewood is collected in one month in each season. Birch and rhododendron are the first preferred species for firewood followed by oak and *uttis*. Hoteliers mobilize hired labor for firewood collection and mainly collect from forest at Riverside and Lamahotel. The non-hoteliers collect firewood themselves together with exchange labor and visit nearby area across the Langtang River such as Laresh, Chhonapari.Distance from forest, cost of firewood and availability situation also influence in firewood consumption as per bed firewood consumption is higher in Lamahotel compared to Langtang village and Kyanjing. The firewood cost and availability is also higher in the latter two villages. While in the case of non-hoteliers, the per capita firewood

consumption is mainly determined by household size. Both hoteliers and non-hoteliers have experienced increasing time distance to collect firewood and forest degradation. The non-hoteliers usually collect firewood for their household energy requirement and collect dry and fallen branches while hotels mobilize hired laborers whose main purpose is to collect more firewood for earning more money.

Acknowledgement

I highly acknowledges the University Grants Commission of Nepal for providing Faculty Research Grants for conducting fieldwork for the research entitled 'Energy Typesand Consumption Pattern of Rural Households and Hotels in the Langtang Valley of NepalHimalayas' in 2011.

Note:

The 25 April 2015 Nepal earthquake of 7.8 Richter scale triggered an avalanche in Langtang that completely destroyed Langtang Village including Gumbagaon (Gumba village) (also see http://www.icimod.org/resource/18302). I talked to the displaced people in April 2016 who were migrated to Kathmandu and settled in monastery and their relatives' house. After the earthquake induced avalanche about 300 people living in Langtang and Gumbagaon left village. They claimed that 175 local people and 41 foreigners were killed. A few local people have just started returning back to the village and also started constructing hotels/houses in Langtang village. The Langtang National Park open purji (official license/permission) to collect timber from the forest for house construction.It has permitted to cut 125 cubic feet timber to each household by paying the royalty to the LNP.There are many dead and fallen trees due to earthquake induced landslides and river flood in the forest and along the Langtang river banks.

References:

Bajracharya, D.,& Chaudhary, R. P. (1982). Fodder plants of Kalingchowk Region (Central Nepal), a report submitted to National Council for Science and Technology (NCST), Kathmandu.

Banskota, K., & Sharma, B. (1998). Mountain tourism for local community development in Nepal: A case study of Syaphrubesi, Langtang (MEI 98/3). Kathmandu: ICIMOD.

Bewket, W. (2005).Biofuel consumption, household level tree planting and its implications for environmental management in the northwestern highlands of Ethiopia.*Eastern Africa Social Science Research Review*, 21 (1), 19-38.

Bhatt, B., & Sachan, M.S. (2004).Firewood consumption along an altitudinal gradient in mountain village of India.*Biomass & Energy*, 27, 69-75.

Campbell, B. (2005). Nature's discontents in Nepal.*Conservation and Society*, 3(2), 323–353.

CBS. (2012). National population and housing census 2011 (Village Development Committee/Municipality). Kathmandu: Central Bureau of Statistics.

Chapagain, P. S., Sapkota, K., & Pariyar, R.K. (2012).Energy types and consumption pattern of rural households and hotels in the Langtang Valley of Nepal Himalayas. An unpublished report submitted to University Grants Commission, Bhaktapur, Nepal.

Chapagain, P. S. (2011). Energy consumption pattern. In P. K. Pradhan (Ed.), *Environmental resources and cultural landscape: Understanding changing spatial organization of Bhimeshwor, Dolakha* (pp 55-76). Kathmandu: Central Department of Geography, Tribhuvan University.

Chettri, N., Sharma, E., Deb, D.C., & Sundriyal, R.C.(2002).Impact of firewood extraction on tree structure, regeneration and woody biomass productivity in a trekking corridor of the Sikkim Himalaya.*Mountain Research and Development* 22(2), 150- 158.

Démurger, S., & Fournier, M. (2011). Poverty and firewood consumption: A case study of rural households in northern China. *China Economic Review***,** 22 (4), 512-523.

Eckholm, E. P. (1976). *Losing ground: Environmental stress and world food prospects*. New York: W.W. Norton.

FAO. (2009). Nepal forestry outlook study (working paper no. apfsos ii/wp/2009/05). Bangkok. FAO.

Fleuret, P. C., & Fleuret, A. K. (1978).Fuelwood use in a peasant community: A Tanzanian case study. *The Journal of Developing Areas, 12* (3), 315-322.

Gurung, H. (1981). *Ecological change in Nepal: A native interpretation* (Occasional paper 1).Kathmandu: New Era.

Heltberg, R., Arndt, T. C., & Nagothu, U. S. (2000). Fuelwood consumption and forest degradation: A household model for domestic energy substitution in rural India. *Land Economics,* 76 (2), 213-232.

Ives, J.D., & Messerli, B. (1989). *The Himalayan dilemma: Reconciling development and conservation*. London, New York: Rutledge/UNU.

Ives, J.D. (2006). Himalayan perceptions: Environmental changes and the well-being of mountain peoples (2nd Ed.).Lalitpur: Himalayan Association for the Advancement of Science.

Kandel, P., Chapagain, P.S., Sharma, L.N., & Vetaas, O.R. (2016). Consumption patterns of fuelwood in rural households of Dolakha District, Nepal: Reflections from community forest user groups. *Small-scale Forestry*, 15 (1), 1-15. DOI 10.1007/s11842-016-9335-0.

Mahat, T. B. S., Griffin, D. M., & Shepherd, K. R. (1987). Human impacts on some forests of the middle hills of Nepal part 3. Forest in the subsistence economy of Sindhupalchok and Kabhre Palanchok.*Mountain Research and Development*, 7 (1), 53-70.

MCTCA. (2015). Nepal tourism statistics 2014. Kathmandu: Ministry of Culture, Tourism & Civil Aviation (MCTCA), GoN.

MCTCA. (2011). Nepal tourism statistics 2010. Kathmandu: Ministry of Culture, Tourism & Civil Aviation, GoN.

McVeich, C. (2004). Himalayan herding is alive and well: The economics of pastoralism in the Langtang valley. *Nomadic Peoples Ns*, 8 (2), 107-124.

MPFSP. (1989). Master plan for forestry sector: Forestry resource information and planning Report. Kathmandu: Ministry of Forests and Soil Conservation.

Nepal, S.K. (2008). Tourism-induced rural energy consumption in the Annapurna Region of Nepal.*Tourism Management*, 29, 89-100.

Nepal, S.K. (2000). "Recreation and tourism in Asian mountain forest".In Price M.F, Butt, N. (Eds).Forest in sustainable mountain development.A state of knowledge report 2000 (pp 353-359). Oxford: CABI publishing.

Nepal, S.K. (1999). Tourism induced environmental change in the Nepal Himalaya: A comparative analysis of the Everest, Annapurna and Mustang regions. An unpublished dissertation, University of Berne.

Regmi, R. R. (1994). Deforestation and rural society in Nepalese Terai.*Occassional Papers in Anthropology and Sociology,* 4, 72-89.

Sapkota, I.P., & Odén, P. C. (2008).Household characteristics and dependency on community forests in Terai of Nepal. *International Journal of Social Forestry***,** 1 (2), 123-144.

Sayers, K., & Norconk, M.A. (2008) Himalayan Semnopithecus entellus at Langtang National Park, Nepal: Diet, Activity Patterns, and Resources. *Int. J.Primatol*, 29, 509–530. DOI 10.1007/s10764-008-9245-x.

Sharma, P. (2001). Mountain environment and tourism: The Nepali experience. In T. Watanabe, S. Sicroff, N. R. Khanal, & M. P. Gautam (Ed.), *Proceedings of the international symposim on the Himalayan environments:Mountain societies and ecotourism/biodiversity* (pp. 14- 30). Kathmandu: Graduate school of Environmental Earth Science,Hokkaido; Tribhuvan University, and United Nations University.

Shrestha, C.B. (1985). 'Impact of modernization on the Himalayan ecology: A case study of the Langtang Valley', in S.K. Chaube (ed.) *The Himalayas: Profiles of Modernisation and Adaptation*, (pp 26–34), New Delhi: Sterling Publishers.

Türker, M. F., & Kaygusuz, K. (2001). Investigation of the variables effects on fuelwood consumption as an energy source in forest villages of Turkey. *Energy Conversion and Management, 42*, 1215-1227.

Watanabe, T. (1997). Estimation of the number of visitors impacting forest resources in the National Parks of the Nepal Himalaya.*Quarterly Journal of Geography*, 49, 15-29.