



## Resource utilization and anthropogenic pressure in a part of Submontane forest of outer Himalaya, Uttarakhand

Bhasker Joshi and Pramod Kumar ✉

Received: 28.12.2010

Accepted: 16.03.2011

### Abstract

Forests and wild life are essential for ecological balance of an area. Forests are important components of our environment and economy. Present study was conducted in a part of submontane forest of Kumaun, Outer Himalaya adjacent to Kashipur, at (29° 14-43.6)–(29° 19-50.5) N latitude and (79° 03-22.6)–(79° 04-23.2) E longitude at an elevation of 253.4–265.5 meter above the sea level, within the districts of Nainital and Udham Singh Nagar to check the various resources and effect of anthropogenic pressure in forest ecosystem.

**Keywords:** *Submontane forest, Anthropogenic pressure, Ecosystem, Chopping, Lopping, Grazing, Forestfire*

### Introduction

Forests are an important renewable natural resource dominated by trees. Forests are linked with our culture and civilization. The chief product that forests supply is wood, fuel, raw material for paper industries, timber for furniture *etc.* however, canes, gums, resins, dyes, tannins, lac, fibers, flocs, medicines, katha *etc.* are minor products supplied by forests. Besides, this they are the major factor of environmental concern by providing protection to wild life, help in balancing the gaseous cycles of atmosphere, tend to increase local rainfall and water holding capacity of soil, maintain the soil fertility and regulate the earth's temperature regimes, check soil erosion and landslides.

The forest cover of India is 63.7 million hectare and it is one of the richest areas for biodiversity in the world (Anon, 1999). According to the latest report of the Forest Survey of India, forest covers 19.39 % of India's geographical area. Only 11.48 % are well stocked dense forests (canopy density > 40%) (Bahuguna and Upadhyay, 2002). The Uttarakhand state has 64.79 % of its total geographical area declared as forest area with forest against all India state only 45.65%, forest area is legally under forest department. The per capita forest area of

Uttarakhand is 0.41 hectare (Verma, 2009). Various informations are available on impact of anthropogenic pressure on Himalayan forests given by Shah (1982), Pandey and Singh (1984), Khoshoo (1987), Singh *et al.* (1988), Singh (1989), Yadav *et al.* (1993), Sundriyal and Sharma (1996), Singh *et al.* (1997), Metz (1997), Samant *et al.* (1997), Silori (2001) and Chhetri *et al.* (2006).

The Shivalik foothills are one of the world's most spectacular landscapes, encompassing the tall grasslands and the *Shorea robusta* (Sal) forests. Construction of roads, urban expansion, settled agriculture, industrialization and deforestation cause massive forest destruction in this area. There are also many abiotic factors like forest fires, weather *etc.* however many biotic factors like human influence in terms of competition between species, insects, diseases, grazing, chopping and lopping of trees, alcohol formation that can cause changes in forests over time. Thus, this study highlights the effect of biotic and abiotic factors in a submontane forest of outer Himalaya of Uttarakhand.

### Geographical Location

This study area is located in submontane forest of Kumaun, outer Himalaya adjacent to Kashipur, at (29° 14-43.6)–(29° 19-50.5) N latitude and (79° 03-22.6)–(79° 04-23.2) E longitude at an elevation of 253.4–265.5 msl, within the districts of Nainital and Udham Singh Nagar and occupies the middle

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### Author's Address

R. H. Govt. P. G. College, Kashipur. Uttarakhand (India)  
E-mail: bhaskerjoshihd@yahoo.com

reaches of the River Kosi and Dabka. The area of study site was 674.61 ha (Source: Office of Tarai West Forest Division, Kumaun, Ramnagar, (Uttarakhand). The study was conducted from April, 2007 to March, 2008.

### Materials and Method

There was no standard method available for studying anthropogenic pressure and resource utilization in forests. In present study, anthropogenic pressure and resource utilization sites was studied by frequent field visits, from experience of personals of forest department and the local natives.

### Results and Discussion

Biotic factors play an important role in resource-limited habitats due to plant competition (Chapin and Shaver, 1985; Tilman, 1988). However, abiotic

factors become important in the nutrient poor habitats (Campbell *et al.*, 1991; Grime, 1977 and Keddy, 1989). Forests are important components of our environment and economy. Various types of resources are present in forests of present study area. So due to utilization of these resources, forest are directly or indirectly affected.

#### (A) Timber Resources

Various species of trees are present in forest area. In Tarai and Bhabhar, wood have high commercial uses. These include *Tectona grandis* L.f., *Shorea robusta*, *Dalbergia sisso* Roxb., *Eucalyptus hybrid* L. Herit., *Haplophagma adenophyllum* Wall., *Cedrela toona* Roxb. and *Adina cordifolia* (Roxb.) Benth & Hook, f. for timber. Collection and utilization of timbers from these forests is prohibited. However, villagers surrounding to forest areas collect timber by lopping (Fig.3).

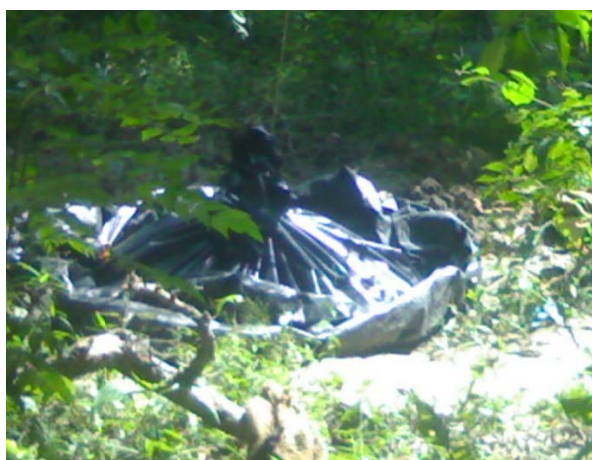


Fig. 1: Preparation of alcohol in forest



Fig. 2: Utilization of wood in alcohol formation



Fig. 3: Collection of fuel wood from forest



Fig. 4: Collection of vegetation after chopping in forest

Liquor preparation is a common practice in the outlying villages for which extra fuel wood is consumed, but it is prohibited in forests (Fig.1&2). Due to this activity they utilize wood and forest land and waste material after alcohol preparation contaminate water of river site in forests. The nearby villages had extra consumption of fuel wood to protect their crops during nights from animals of nearby forest area.

### (B) Chopping

Local native and Van Gujjars collect fleshy leaves and small twigs for forage to their domestic animals by chopping (Fig.4). They cut down small twigs and some time whole plants for firewood. Forests are good source of food, fodder and forage. Local natives surrounding to forests collect forage for their domestic animals from forests.



Fig. 5: Movement of buffaloes in forest for grazing

For this purpose, they cut down small leafy twigs of trees having up to 22cm diameter. This process is called chopping. *Acacia catechu* Willd., *Bauhinia malabarica* Roxb., *Broussonetia papyrifera* Vent., *Ficus racemosa* L., *Ficus religiosa* L., *Terminalia bellerica* Roxb. and *Trewia nudiflora* L. are mostly affected by chopping. *Dalbergia sisso* Roxb., *Eucalyptus hybrid* L.Herit., *Eugenia jambolana* Lam., *Mallotus philippenensis* Muell. Arg. and *Tectona grandis* L.f. were not affected by chopping, because cattle do not like leaves of these plants.

### (C) Grazing

In Tarai and Bhabhar regions of Kumaun Uttarakhand local native and Van Gujjars directly use forest as grazing land (Fig.5).



Fig. 6: Extraction of minerals from River Kosi

### (D) Minerals, Stones and Sand

River Kosi flows in the center of the forest. It provides huge amount of minerals, stones and sand (Fig. 6). Minerals, stones and sand are good source of money for forest department.

### (E) Medicinal Plants

There are various medicinal plants present in the form of trees, shrubs and trees at forest sites, which have high medicinal value for human being and were used by local natives for treatment and remedy of disease. Collection, utilization and trading of medicinal plants from these forests are prohibited. *Acacia catechu* Willd., *Biophytum*

*sensitivum* Zucc., *Centella asiatica* (L.) Urb., *Holarrhena antidysenterica* Wall., *Piper nepalense* Miq. (E.) and *Zingiber capitatum* Roxb. are mostly used medicinally.

### (F) Other Resources

In rainy season *Saccharum spontaneum*, L. (Kans) mostly grows in forest area. Van Gujjars and local villagers use this plant in making of cottage roof and domestic animals use it as forage. Wax and honey are also good resources of forest. Honey contains carbohydrate, minerals and vitamins. Local villagers collect them illegally from forest, utilize it and sell at very high rates.

In winter and early spring, fruits of *Zizyphus xylopyra* Willd. get matured, local villagers collect it and sell it on their own prices. In rainy and winter seasons *Themeda arundinacea* (Roxb.) Ridley (Sarkanda grass) grows in forest. This grass is good raw material for paper industry. So it can be good economic source for forest department if they make arrangement to sell *Themeda arundinacea* (Roxb.) Various biotic and abiotic factors are also harmful for forests, because they reduce forest vegetation silently. These are fungi (*Fomis badius* - *Acacia catechu* Willd., *Gonoderma* sp. - *Dalbergia sissoo* Roxb., *Ciliandro caladium* - *Eucalyptus hybrid* L.Herit.), shrubs (*Lantana camara* L. and *Lantana indica* Roxb.), climbers (*Bauhinia vahlii* W. and A., *Ichinocarpus fructescens* R.Br. and *Tinospora*

*cordifolia* Miers.), floods and forest fire.

Forest fire is a major problem during spring and summer season in forests (Fig.8). Fire affects flora and fauna of forest directly and indirectly. Removal of ground vegetation during forest fire is major problem. Fire plays a key role in ecosystem process and can change the vegetation composition (Timoney and Wein, 1981). Fire also stimulates flowering, fruiting and vegetative reproduction of many herbaceous species as the overstorey is reduced (Pyne, 1991). Fire also temporarily reduces competition for moisture, nutrients and light thereby selectively favoring some species. In present study, forests of Tarai and Bhabhar also suffer from forest fire during late spring and summer season.



**Fig. 7: Flood cause forest land degradation**



**Fig. 8: Forest fire**

Based on above investigation it is concluded that regular monitoring of forest is necessary and excess influence of local villagers in forests should be prohibited, because their excess involvement in forest caused massive forest destructions in terms of grazing, chopping, lopping, collection of wood for fuel and other resources.

### Acknowledgement

I am gratefully thanks to Dr. S. C. Pant, H.N.B. University, Garhwal, Prof. Y. P. S. Pangtey, Dr. Lalit Tewari, Kumaun University, Nainital for providing encouragement, moral support, providing necessary suggestions and motivation during study period. I am also thankful to forest members of Tarai West Forest Division, Uttarakhand for providing useful critical information and suggestions for this study.

### References

- Anon, 1999. State of Forest Report, 1999. *Publication of the Forest Survey of India. Dehradun.* 11 pp.
- Bahuguna, V.K. and Upadhyay, A., 2002. Forest fires in India: policy initiatives for community participation. *International Forestry Review* 4(2): 122-127.
- Campbell, B.D., Grime, J.P., Mackey, J.M.L. and Jalili, A., 1991. The quest for mechanistic understanding of resource competition in plant communities: The role of experiments. *Functional Ecology* 5: 241-253.
- Chapin, F.S. II and Shaver, G.R., 1985. Individualistic growth response of tundra plant species to environmental manipulation in the field. *Ecology* 66: 564-576.
- Chhetri, S.K., Singh, K.K. and Krishna, A.P., 2006. Anthropogenic pressures on the natural resources n fringe areas of Khangchendzonga Biosphere Reserve.

- International Journal of Ecology and Environmental Sciences* 32(3): 229-240.
- Grime, J.P., 1977. Evidence for the existence of three primary strategies in plants and its relevance to ecological and evolutionary theory. *American Naturalist* 111:1169-1194.
- Keddy, P.A., 1989. Effects of competition from shrubs on herbaceous wetland plants: a four-year field experiment. *Canadian Journal of Forestry Research* 67: 708-716.
- Khoshoo, T.N., 1987. Strategies for meeting the fire wood needs in the hills. In: T.N. Dhar & P.N. Sharma (eds.). Himalayan Energy System.. *Nainital Gyanodaya Prakashan*. pp. 11-19
- Metz, J.J., 1997. Vegetation dynamics of several litter disturbed temperate forests in East Central Nepal. *Mountain Research and Development* 17: 333-351.
- Pandey, U.M. and J.S. Singh, 1984. Energy flow relationship between agro and forest ecosystem in Central Himalaya. *Env. Cons.* 11: 45-53.
- Pyne, S.J., 1991. *Burning Bush: A fire history of Australia*, Henry, Holt, New York.
- Samant, S.S., R.S. Rawal and U. Dhar, 1997. Diversity, endemism and economic potential of wild edible plants of Indian Himalaya. *Int. J. Sust. Dev. and World Eco.* 4: 179-191.
- Shah, S.L., 1982. Ecological degradation and future of agriculture in the Himalaya. *Indian Journal of Agriculture Economics* 37: 1-22.
- Silori, C.S., 2001. Status and distribution of anthropogenic pressure in the buffer zone of Nanda Devi Biosphere Reserve in western Himalaya, *Bio. & Cons.* 10(7): 1113-1130.
- Singh, J.S., S.P. Singh and J. Ram, 1988. Fodder and fuel wood resource of central Himalaya. *Project report, Planning commission. Government of India, New Delhi.* 159 p.
- Singh, S.P., Rawat ,Y.S. and Garkoti,S.C., 1997. Failure of Brown Oak (*Quercus semecarpifolia*) to regenerate in Central Himalaya. A case of environmental semi surprise. *Current Science* 73: 371-374.
- Singh, V., 1989. *Energetics of agro ecosystem and its relation to forest Ecosystem in the Central Himalaya*. Ph.D. Thesis. Kumaun University, Nainital.
- Sundriyal, R.C. and Sharma , E., 1996. Anthropogenic pressure of tree structure and biomass in the temperate forest on Mamlay Watershed in Sikkim, *Forest Ecology and Management* 81(1-3): 113-1134.
- Tilman, D., 1988. *Plant strategies and the dynamics and structure of plant communities*. Prinston University Press, Prinoutor, New Zealand.
- Timoney, K.P. and Wein , R.W., 1981. The aureole pattern of burned tree vegetation in the subarctic region of north - western Canada. *Arctic* 44: 223-230.
- Verma, M., 2009. *Valuation of forest ecosystem services in Uttarakhand Himalayas for setting mechanisms for compensation and rewards for ecosystem services for communities conserving forests of Uttarakhand State*. XIII World Forestry Congress Buenos Aires, Argentina, 18 – 23 October 2009.
- Yadav, J.P., Khanna ,P. and Shikha A.K., 1993. Human influence on forests in Tripura. Social Forestry Division. Forest Research Institute, Dehradun, India. *Indian Forester* 3: 217-226.

