



Biotic Interference and Fuelwood Consumption in Shiwalik Foothills of Mansar in Samba District

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ABSTRACT

Study was conducted to assess biotic interferences and their relationship with ecological degradation in Mansar Shiwaliks of Samba area in Jammu and Kashmir. Various interferences like incidence of fire, lopping, grazing and fodder collection, litter removal, soil erosion, tree felling, invasion of exotic species, fuelwood consumption in households etc.

Increased population and developmental activities are putting huge pressure on the forest resources and has lead to ecological degradation in the area.

KEYWORDS: Shiwaliks, Sub-tropical, Biotic interference, Fuelwood, Forest Fires

Introduction

Human impact on forest ecosystems is right from his presence on earth. But it has gradually increased with time and human development particularly with the dawn of industrialization. Biotic interferences are one of factors which determine the type of vegetation or status of vegetation in any area. Anthropogenic influence on the landscape modifies landscape, ecosystems, communities and population structure, the physical environment and availability of resources (White and Pickett, 1985). Severe disturbance has a depressing effect on biodiversity. The severity of biotic disturbance in the forests is increasing day by day as a result of population explosion which has resulted in conversion of agricultural land for residential purposes and the forests are under threat of encroachment and degradation. The various factors responsible are urban sprawl, encroachment on forest land, loss of forest cover for non-forest uses, illicit felling, lopping for fuel wood and fodder, removal of forest floor litter and forest fires (Sharma et al., 2008).

The rural populations in most of the developing countries depend mostly on forest to meet most of their needs. In order to satisfy their need, they engage in tree felling to get timber, fuel wood or to make money by selling them illegally. Due to heavy pressure of demand, the regeneration of tree species is affected. Excessive lopping of trees and shrubs can cause slow death of tree species due to fungal infection, infecting fruit and seed production and ultimately hampering process of regeneration. Frequent lopping of trees meant to provide fodder to livestock results in reduced growth of tree girth and production of leafy biomass (Bhat et al., 2002). Forest fires are one of the major causes of degradation of forests every year in different parts of the world. Fires coupled with uncontrolled grazing result in elimination of tender species. The forest fire adversely influences the succession, growth and survival of the seedlings and saplings. About 90% of forest fires in India happen due to humans (Roy, 2000). Damage to seed banks, seedlings and saplings from fire hinders the recovery of original species (Woods, 1989).

Recurrent fires decrease the green cover by preventing regeneration and lead to slow death of the forest (Ranganathan, 1934). also reported impact of grazing on plant species and forests. They reported higher population of livestock as cause of deforestation and loss of plant species because regeneration is hampered due to grazing beyond the carrying capacity of the forests (Taddesse et al, 2002 and Sharma et al., 2008) and Litter removal from the forest floors may affect the process of succession and establishment of plant species. Litter removal also affects the germination of seedlings and decreases the species diversity. Developmental activities like road- widening, construction of new houses, shops and roads are also having a negative impact on plant diversity. These also destabilise the slopes and cause enhancement in landslides and land subsidence (Sharma et al. 2008). Fuelwood use and over-exploitation is one of the major cause of depletion of forests. Fuel wood is still the main domestic fuel in the rural households in most of the developing countries. The household surveys over large areas in

India found that wood accounted for 56% of their energy use (Chopra and Dasgupta, 2000). Exotic species are also posing threats to native species in different parts of the world. According to the Convention on biological Diversity (CBD), the second worst threat to the existence of biodiversity is the biological invasion of exotic species (WCMC, 1992).

Study area:

The present study was conducted in Mansar sub watershed, of Basantar Watershed in the newly created district of Samba in Jammu and Kashmir State and falls in the graticules 75° 2' to 75° 8' East longitude to 32° 40' to 32° 46' N latitude. The Mansar sub watershed is part of Basantar watershed and is located in the 'Kandi belt' of block Samba with a total of 11 villages and hamlets. The upper portion of the belt mostly consists of low hills and covered by shrubs and forest and terrain has cultivated land and gully beds. On account of its dry look, this area is included under Kandi belt. Population of the entire belt suffers from water scarcity. Ground water table is very deep and the area remains devoid of water except during monsoon. Basantar is the sub-surface river which is source of water in the area (Gupta et al. 1990). The soils of the study area are highly erodible because of their coarse texture, low organic matter content, intensive and erratic distribution of rainfall (Arora, 2006). Thus, geologically, the study area is composed of thickly bedded sandstones alternated with shales, clay beds, conglomerates and boulders (Gupta et al. 1990). The annual rainfall in the area is around 1055 mm. May to June and October to November are the driest months. The main stay of the population of the area is agriculture and cattle farming. Agriculture in the region is totally dependent on rain, where the type and amount of rainfall is such that if the vegetation is disturbed, large-scale erosion could ensue. Land dissected by innumerable seasonal streams or choes provide a picture of accelerated erosion in the area (Arora and Hadda, 2006). The area is covered with subtropical deciduous vegetation which provides a conducive habitat to a variety of animal species. The area has diverse natural vegetation consisting of scrub-forests, Chir pine forests, and dry deciduous trees. The dominant tree species of the area are Sareen (*Leucaena leucocephala*), Chir (*Pinus roxburghii*), Phulai (*Acacia modesta*), Talli (*Dalbergia sissoo*), Sareen (*Albizia lebeck*) etc., Main shrub species include Phul Jhari (*Lantana camara*), Brankad (*Justicia adhatoda*), Santha (*Dodonaea viscosa*) etc.

Materials and Methodology:

For generating primary data the study area was divided into two land use classes i.e. Forest and Scrub. A total of 60 quadrats were studied for various biotic interferences like incidence of fire, lopping, grazing, litter removal, soil erosion, tree felling etc. with 30 quadrats each in two land use classes. A total of 100 households were studied to collect information regarding fuelwood consumption with help of personal interview and a structured questionnaire. In addition to primary data, the secondary data was collected from different sources like working plan of Jammu Forest Division, J&K Forest Department, village amenity directory, etc.

Results and discussion:

A. Biotic interferences in the study area

Various biotic interferences in the study area are due to increasing population, encroachment of forests, increased demand for forest products etc. in the study area. The results for various parameters are as under:

1. Tree Felling:

Various species like *Talli (Dalbergia sissoo)*, *Sareen (Albizia lebeck)*, are in demand for various purposes. Various other species are under threat as these are being illegally cut and sold to make 'Charcoal' to get easy money by the local and influential people. The highest incidence of tree felling was recorded in Forest land use class where out of total sample plots 22 plots (74%) showed the incidence of tree felling followed by Scrub land use classes with 15 plots (50%) having incidence of tree removal (Table 1).

2. Tree Lopping:

Tree lopping is either done for fodder or for fuel wood in the forests. Various tree species like *Tamman (Grewia optiva)*, *Kikar (Acacia nilotica)*, *Phulai (Acacia modesta)* etc. are exploited for this purpose in the study area. Lopping was observed in 18 (60%) and 9 (30%) of the sample plots laid in Forest and Scrub LULC respectively (Table 1). Frequent lopping induced increased runoff and soil erosion, disturbed wildlife habitat, decreased aesthetics and economic loss with elimination of the wild species.

3. Forest Fires:

Fire incidence was reported from 3 plots each (10%) in both forest and 2 plots (7%) in scrub land use classes. It was observed mainly in Chir pine area or in scrub area along chirpine (Table 1). Forest fires occur usually during hot summer season due to human negligence or deliberately caused to increase the productivity of the grasses, usually by Gujjars in the area.

4. Grazing and fodder collection:

Increasing demand of fodder for increasing local livestock population and seasonal migration of nomads like Gujjars and Bakkarwals is also one of the reasons of forest degradation in the area. It leads to vegetation loss and accelerate soil erosion. Heavy lopping and grazing cause maximum damage to the forest and regeneration process in the forest.

It was observed that the maximum grazing incidence in Scrub LULC with 9 sample plots (30%) affected followed by Forest LULC with 11 (36%) plots showing the incidence of grazing (Table 1). The area is under high pressure of grazing and fodder collection. Indiscriminate grazing in the area has lead to crumbly structure in this Kandi belt.

5. Litter Removal:

Litter removal incidence was very rare in the area and was observed in 4 plots (13%) in Forest LULC whereas it was 1 plot (3%) in scrub land use class (Table 1).

6. Soil Erosion:

Due to above mentioned biotic interferences, the intensity and frequency of soil erosion and landslides is quite high in the area especially during monsoon. The incidents of soil erosion were reported maximum from Forest 17 plots (56%), followed by Scrubs 14 (47%) from the area (Table 1).

B. Other biotic interferences in the area

Other than the sample plots, some more human interferences were also observed and are discussed as under:

1. Developmental Activities:

Mass scale soil cutting, bulldozing, digging and deforestation is making soil prone to soil-erosion. It is also destabilising the slopes and causing enhancement in landslides and land subsidence in the area.

2. Timber Extraction:

The demand for timber and its illegal extraction by the timber mafia worsening the situation in the area. The impact was more visible on tree species like *Acacia modesta*, *Dalbergia sissoo*, *Pinus roxburghii*, *Cassia fistula* etc.

3. Invasion of exotic plants species:

Exotic plant species like *Eucalyptus spp.*, *Leucaena leucocephala* etc. make the conditions unfavourable for other native species. They grow profusely especially *Leucaena leucocephala* and don't allow space and light for under strata. Other exotic weeds like *Lantana camara* and Congress Grass (*Parthenium hysterophrous*) etc. pose serious threat to the native trees, shrub and herbs in the study area.

4. Fuel wood consumption in households of the study area:

The study area is a remote rural area of district Samba and fuel wood is mainly used for cooking and heating purposes. People of the area are economically weak to buy modern fuel for the domestic consumption. Majority of the population depends largely on trees and shrubs to meet their energy requirement for cooking and other purposes. There is huge pressure on vegetation in this respect. Some poor people generate some money by collecting and selling fuelwood to households, sweetshops, dhabas, etc.

On the basis of the total population and the average fuel wood consumed /capita, the fuel wood energy demand for the study area was calculated (Table 2). The results from the table 2 reveal 3.29 q per capita fuel wood consumption / year for the study area. As per the information collected from the local Panchayat, there are approximately 587 households in the study area, with a population of about 2994 persons. Thus, total fuel wood consumption in the study area is estimated to be 985.02 tonnes per annum. Such an amount of fuelwood used in the study area might be because of the backwardness, unavailability of modern fuels and inability to buy to buy modern fuels. Species used as fuel wood include *Dalbergia sissoo*, *Cassia fistula*, *Dodonaea viscosa*, *Justicia adhatoda*, *Lantana camara* etc.

CONCLUSION:

Increased population and developmental activities are putting huge pressure on the forest resources and has lead to ecological degradation in the area. There is an urgent need to devise and formulate strategies to lessen direct pressure of population on forest resources. The number of Rakhs (protected forest areas) in the study region should be increased and strengthened. Modern eco-friendly fuels like L.P.G. should be made accessible to the villagers and at subsidized rates to reduce ecological degradation. Panchayats should work for the education of the locals for environment conservation and soil management in association with various governmental and non- governmental agencies.

Table 1. Biotic interferences in forest and scrub land use classes

S. No.	Land use Class	Tree felling	Tree lopping	Fire incidence	Grazing incidence	Litter Removal	Soil Erosion
1	Forest	22(74%)	18(60%)	3(10%)	9(30%)	4(13%)	17(56%)
2	Scrub	15(50%)	9(30%)	2(7%)	11(36%)	1(3%)	14(47%)

Source: Primary Survey, 2012

Table 2. Fuelwood Demand in the study area

Per capita fuelwood consumption (q/annum)	Households	Average Family size	Total Population	Fuelwood Consumed Tonnes / year
3.29	587	5.10	2994	985.02

Source: Primary Survey, 2012

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