

Emerging issues regarding environment and need of Environmental Management in Shivalik foothills

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ABSTRACT:

The purpose of this chapter is to accentuate the needs and methods of environmental management to save the natural region of Shivalik foothills from further deterioration. The study was conducted in various areas of the foothill region from Una to Ropar. Stratified random sampling method was adopted for studying different sized quadrates. Ecological computation methods were used for the analysis of vegetation of various life forms in different areas of the foothills region. Floristic of the region was analyzed by laying quadrates of 10m*10m size for trees, 5m*5m for shrub layers and 1m*1m for herb. Quadrates were laid at random in selected areas of the region.

Himalayan regions are under high degree of pressure due to excessive exploitation of natural resources above the carrying capacity of the region. Deforestation is being carried out at a much faster rate than natural regeneration process of these trees. Large scale erosion, loss of biodiversity, construction of roads and dams, industrialization and siltation further intensify the problem. Moreover these factors lead to many natural disasters in the region like landslides, floods, forest fires etc. which leads to crores of loss of country in form of life and property. So, these problems are to be seriously dealt with before it is too late and here arises the need of environmental management.

Key Words: Biodiversity, Conservation, Deforestation, [Environmental Degradation](#), Floristic, Management, Siltation.

Introduction: Shivalik hills are considered to be recently evolved and show a lot of variation in their height and topography. Irregular hill tops, uneven clefts and slopes form the important features of the feeble soil and vegetation [1].

Shivalik hills continues in a stretch of about 1000 km in the north-west to south-east direction of India between 72°-30' to 81° east longitudes. Longitudinally, the North West Shivalik Foothills can be divided into Punjab Shivaliks from Indus to the Sutlej and Kumaon Shivalik from Sutlej to the Kali. This belt varies in the width from about 280-650 km between the north latitudes of about 29°-37' and transverses from west to east mainly the states of Jammu & Kashmir and Himachal Pradesh and the hilly to sub-hilly regions of Punjab, Haryana and the Uttar Pradesh [2].

However, the present study is conducted in Himachal Pradesh and Punjab covering hilly to sub hilly regions of Una (adjacent part of H.P. with Punjab) to Ropar in the total length of about 200 km covering upto 5 to 20 km interior of hills. The low hills of, Anandpur Sahib, Kiratpur Sahib, Bharatgarh and Ropar were surveyed to investigate pattern and soil profile particularly erected from the base of hills to the height of 250-550 ft. from foot of hills covering base camps towards Punjab.

This region occupies very significant place in the geography of India and gives birth to important rivers like Sutlej and Ghaggar. The rich soils of Punjab are the product of alluvial deposits brought by these rivers from the Himalayan hills and are nourished with higher catchments areas [3].

The Rolling Plains of the region primarily lie in Roopnagar, Anandpur Sahib and Daroli area and are comprised of piedmont plain, the upland plain and the flood plain corresponding to descent in the gradient of North West Himalayan foothills [4].

Now the North West Himalayan Foothills are found to be sparsely forested but according to [5] they probably carried a very rich vegetation in the preglacial times, the evidence of which comes from the luxuriant and discrete flora and fauna discovered from wide and distant localities in this area [6]. The account of the present day flora and fauna shows that much has been lost more so in the last 150 years.

Findings:

The low foothills area of Una, Nangal, Anandpur Sahib, Kiratpur Sahib, Bharatgarh and Ropar were surveyed. These areas are under high pressure of human interference. The population of this region is almost entirely rural and about 94.2 percent of the people agriculturists on small piece of lands. Their needs with respect to agricultural pursuits consist principally of wood for implements, looping for fodder and litter, and grazing for their cattle. Timber is required for houses and less useful woods of fuels for domestic requirements. Consequently the forests form an integral part of the economic fabric of the population along entire course of low hills and their surroundings. Along these uneven hilly tracts, particularly at higher altitudinal ranges the soil is poor and stony and the slopes are too steep for economic farming. As the people inhabiting between Una to Ropar own few Kanals to hectares of land hence food produced locally is insufficient to meet the local requirement. In spite of that, almost all available cultivable land has been brought under plough. Population cannot live on agriculture alone and they have been forced to keep large herds of cattle as cows and buffaloes and flocks of sheep and goat for milk and milk products.

Excessive grazing

In a period of 10 years from 2008 to 2018, let us take the example, livestock population of Himachal Pradesh has been increased by about by 600,000 heads. In Punjab also, the pressure of grazing gets heavier and heavier as the cattle population increase, and areas available for grazing either diminish in extent or deteriorated in quality. Much of the live stocks in Una, Nangal, Anandpur Sahib, Bharatgarh, Sisawan regions are pastoral and more than 90% of them move here and there in search of food with the flocks during winter and dry seasons and to augment their income. Grazing in the region vis-à-vis preservation of the forests is a very complex socio-economic problem bristling with numerous difficulties. In spite of best efforts, no satisfactory solution has been found and it still continues to be baffling.

Unfortunately, it is due to the wrong social concepts that the trend has developed to fell a tree without replacing it. Unrestricted grazing with an ever increasing number of cattle have been carried out on the assumption and presumption that's forests have unlimited capacity and think a reservoir to support grazing. Those living near the forests have the absolute right to avail this cheap and easily available opportunity and may consider this gift even bi misuse or abuse.

Unlimited or uncontrolled grazing is incompatible with proper and scientific management of the forest. Efficient forest management requires that grazing must be regulated as regard the tune, availability of resources and space and number of cattle to be grazed. Unrestricted heavy grazing in village wastelands and ultimately invading in nearby forest has rendered them unstable and liable to erosion. Hundreds of major and minor landslips can be seen in throughout tracks of hill areas. A glance at the isolated scrubs on hills, not protected from excessive grazing is sufficient to show the steady deterioration of vegetation which in many cases is bound to disappear by looping and for firewood. Eventually this sorrow state of affairs calls for the correct grazing policy if the land, water, soil and vegetation of the region are to be preserved. Adjacent plains are to be saved from the ravages of highly intensified and frequently floods. To avoid siltation and perpetuate the capacity of the hydro-electric projects, reservoir and irrigation system there is an urgent need to grow more trees along hill slopes.

Excessive deforestation and denudation of hills

The main causes of excessive deforestation and denudation is cutting for fire wood and fodder for livestock in large numbers which is, excess than bearing capacity of the pasture available. Cattle are reared not for their milk but kept mainly for manure. They are not well fed but allowed to graze freely where ever they want but unfortunately fodder is not sufficient, only a fraction of the manure produced by them during the night is utilized. Large scale looping of board leaved trees is done to provide fodder as well as cattle bed of these animals. This result not only is denudation of grazing areas but also medium produced is not at all commensurate with the number of cattle maintained.

The thinning of the leaf cover reduces the protection of the forest soil and induces the growth of grasses. This poses a fire hazed for the unmanaged forest. Heavy looping also leads to death of the trees leaving only those unlucky trees which can survive even after brutal treatment. Not only has this, the indiscriminate grazing by sheep and goat also added fuel on the fire to cause heavy losses and area showed a ghostly degraded look.

Digging of soil for economic benefits:

Not only vegetation but soil is also being exploited to earn economic benefits. As the soil is sandy type and is exorbitantly desirable for construction purposes. Sandy soil is divided into three groups as tiny sized, Medium and large sized grained sandy soil. There is large number of sites where labour is employed to separate different types of sand particles on daily basis. Out of these medium sized grained sand is preferred for construction and it rates higher than other varieties of sand. It is quadriangular white without any contamination of clay and other type of soils. Locals sell the area on thekka basis to thekkeder for sale and don't even spare the rough soil for earning benefits. Sand from khads around Una, Talwara, Daroli, Gauj, Nakiaqn, Sarsa etc are dug located in 100 cubic ft to 160 cubic ft. trolleys to be carried to be construction site, Sand is sold every year of theka basis and traders sold @ of Rs 550-650 per trolley for construction work. About 5400-6600 sq. feet sand was picked up daily for at least three months during dry seasons of April to June and from October to February in winters. Land owners wait for rain as it washes away sand from upper hills to lower side. When there is no rain, sand as property does not yield and result.

Cutting of tree as means of earning livelihood

More than 50 percent of the population in this area is residing below poverty line. They earn their livelihood by exploiting bountiful vegetation surroundings them. They cut the trees unlawfully and supply them at *dhabas* by picking on their heads, cycle rickshaw and trolley in bundles and halwais in the market through camels and earn money. This is a part of their daily routine. Wood is also supplied in similar manner to the funeral places, saw mills and religious places. Such reckless felling of trees is a very common site in Nangal dam, Guru Ka Lahor, Dashmesh Academy Road and near Religious places. Large trees of *Albizzia*, *Cassia*, *Pongamia*, *Delbergia*, *Acacia* etc are often found lopped. Some of them are cut during night by local and traders for fodder and firewood and they are picked up early in the morning loading on their heads and on camels, then sold in market @ of Rs 70-80 per quintal. About 66-110 persons load firewood their heads and then 10-20 camels are used to carry wood to saw mills and owners of firewood. Large sized boles are sold to saw mills @ of Rs. 120-180 cubic ft depending upon quality of wood. Rest of trees and branches are sold @ of Rs. 50-70 per quintal to traders.

Clearing of forest for agriculture

Large pieces of lands around Ropar and Chandigarh area are being cleared for agriculture due to food shortage and land hunger. Huge amount of soil has been picked up by trucks and land is made into small fields for cultivation of crops. Similarly, large numbers of medium hill tops are made plain and converted into fields for the cultivation of citrus. No doubt, in such situation claim of agriculture on wastelands may appear to be stronger than those of forestry, but such marginal lands which are more suited to forestry should not be transferred to agriculture. Instead the solution of the food problem of an ever increasing population must be sought primarily in intensive cultivation on existing fields and not in natural region by encroaching upon to the forests.

Construction of motor roads

Another major cause of the destruction of the Floristic of Himalayan region has been construction of motor roads. It is thought that motor roads are the first requisite for any work of development in the mountains. One can see the construction of these highways is accompanied and followed by widespread devastation of the landscape, make the hills hogbacks and serrated knife edged hills. Virgin slopes cut up and disfigured into hogbacks at every place and during construction but after the roads are made wide areas become accessible to commercial exploitation of the forest wealth, chiefly fire wood, fodder and less to timbers. To carry on the spoiltation, new contractors have come into action with permanently employed labor gangs made up largely of low wages laborers. Earlier, about 20 years back enormous logs of wood were being carried out on large scale in and around Nangal area to different distinct places connected, as main road connectivity Bhakra dam and Gwaithai, interconnected roads in industrial area of Guwalthi and Jalfamata temple. Large number of new roads have been constructed to connect the villages with main cities like Una, Nangal, Anandpur Sahib, Kirtarpur Sahib, Bharatgarh and Ropar. One can see the road network development after depleting the intact soil & vegetation.

Even in Bharatgarh and Anandpur Sahib area, large stones, smaller stones and bajri are being used for road activities and construction purpose. At Bharatgarh, large crushes are being

used to crush the larger stones into smaller ones for use in construction. If not checked these huge crushers will soon gallop the huge hills and end this beautiful nature to a barren land with huge heaps of bajri all around. A stretch along Dashmesh Academy road upper Daroli, upper Bunga Sahib and Kiratpur Sahib presents a picture of total desolations. High voltage power cables running along the roads add to ruin, and seem to be further denuding of the hills. New project for indexing the roads which come across in these hills into also deteriorated the soil and vegetation.

Consequences:

Altogether, these factors have caused disappearance of many floral species and some species are facing various degrees of threat of extinction. This drastic loss of biodiversity further leads to a number of ecological disasters.

Young trees have been axed for firewood, which further deteriorates vegetation because juvenile trees could not approach reproduction system. It has been determined during previous years that large scale degradation of vegetation was carried out in open places and enclosed areas in particular among hills beds. Situation even worsened due to removal of trees even by theft. Moreover, due to less recorded rain fall during previous years there was an overall fall in vegetation of forests. Although trees of *Accacia*, *Delbergia*, *Eucalyptus*, *Mangifera* and *Delbergia* in certain pockets of Talwara, Daroli, and Bharatgarh persist their growth but open hill slopes still support scrubs spiny and non-spiny plants.

There is natural regeneration of *Delbergia*, *Adina*, *Acacia* over the period. But human interference continuous unabated, unplanned and unorganized for firewood in Talwara, Bhakra road, Una, Zindwari, Nainadevi area, Nakian, Gaj, Thalugh, Gardley and afforested trees of *Acacia*, *Adina*, *Cassia* etc, leads to marked change in vegetation pattern. It is most important cause for fast depletion and serious degradation of natural forests near Una, Guru ka lahore, Kotla, Gambirpur, Suraval and Anandpur Sahib. In spite of forest area under deforestation due to biotic interference and failure of afforestation or reforestation schemes situation is still alarming as far as stable forests are concerned. Before start of rainy season locals liberately set fires dry vegetation presuming that it will grow much faster.

Soil erosion leads to the loss of top soil thus converting productive soil into shallow soils which are one of the major factors of low and unstable crop yield in the rain-fed semi arid to sub-humid tropics of Ropar. Major portion of hills have crops only if there is a rain during rainy season and winter. There are vast areas of degraded common grazing lands uncultivable waste lands and degraded forests that pose a serious threat to adjoining productive crop land and to the existing flora and fauna native to these hill areas.

Protection cover of forests and the humus absorb rain water and due to this humus disappear, no regulatory mechanism remains, and rain water is swept away to the sea in one long gush, carrying millions of tons of silt. Soil fertility in the hills goes down drastically the once perennial streams dry up soon after the monsoon ends, as is increasingly experienced in Ropar district. In several villages, men now walk far away to get their drinking water. Many streams choes have dried up which is something unprecedented. In the plains the rivers carry much less water during the summer months.

The rivers raising the Shivalik Foothill region carry a large volume of soil material and other detritus particularly during the monsoon period, in each catchment. The siltation data recorded at the Bhakra reservoir has shown that 26,51,98,200m³ of silt has been deposited during the first six years of its installation, giving an annual loss of capacity of the Bhakra reservoir as 4,41,99,700m³.

Precipitation falling over wide catchment and draining through the rivers created frequent flood hazards. Earlier such floods left behind an annual legacy of over Rs. 300 crores of damage to crops, animals, houses and public works. The problem of protection and proper land use of Himalayan catchments, therefore, assumes a very important significance.



Large scale erosion exposing roots of trees in foothills of Una.



Large Scale Sheet Erosion near Guru ka Lahore Area forming vertical ridges



Carrying of bundles of firewood on head of a woman



Cutting of trees and carrying for firewood and fodder by the locals near Una



Dry spell of Sarsa stream showing stones lie open



Low hills of Patti Khad showing *Adena cordifolia* standing alone in entire degraded area.



Hills being eroded to carry sand for building purposes by man.

RECOMMENDATIONS:

As discussed earlier the devastation caused by human interference has reached to such an extent in this area i.e. low and foot hills of Una to Ropar that our approach should be to save the areas from further deterioration through various environment management strategies.

A few of the steps that need to be taken to conserve the biodiversity of this natural forest region are as follows:

Large scale afforestation should be carried out

Adequate utilization of land for productions of food would ordinarily receive precedence over its use under forest in these areas, however this has to be consistent with the principles of the most scientific use of available land. In a terrain, as is obtaining in this region natural limitations are set on the use of land for forest and agriculture purposes. Steeply sloping lands and uncultivable wastes should not be put under agriculture spiny plants. So, quick growing trees like *Delbergia sissoo*, *Acacia decurrens*, *Acacia Arabica*, *Acacia catechu*, *Acacia modesta*, *Albizzia lebbek*, *Leaucopa leucophylla*, *Cassia fistula*, *Azadirichta indica* should be planted to improve the situation and to check excessive erosion.

Scientific management of Ropar catchment areas

The areas forming catchments of the principal streams and river in Ropar district have to be managed and used judiciously, as otherwise, it would cause devastation by way of soil erosion and floods. Grazing fields should be scientifically managed. Division of area should be done based on vegetation. Some areas should be conserved for vegetation and should be strictly protected from natural breeding experimentation. People of this area force their old and unproductive cattles into the forests near to them. Hungry animals eat young herbs and grasses, often eradicate whole plant from their roots destroying their lifespan. Excessive grazing in turn

accelerates the process of erosion in due course of time. So, scientific management should be undertaken so as to bring about prosperity of these areas as well as the plains just below.

Timber trees should be grown on large scale since most of the Amla (*Embllica officinalis*), Katha (*Acacia catechu*) and *Populus deltoids* (Popolar) in this area are in their early years of production, their yield is expected to increase in the years to come if proper rainfall is there. Their yield is expected to reach about 3 lakh tons per annum in the near future so if 18 Kg of fruits are packed in one box, 1,66,66,600 packing cases will be required to pack the whole yield so, 0.6 cubic ft. of wood needs to be produced for one fruit box and about 8 million cubic ft. (228620 m³) of timber will be required for the manufacture of fruit boxes [7]. Horticulture is developing fast in Ropar also and large quantities of wood will be required for packing case manufacture only. There is an ever increasing demand for wood from the people as well as the various wood based industries. This calls for growing of forest trees on much larger scale, even in conjunction with agriculture and horticulture, as a social forestry and pastoral programme.

Eco-development projects

Plantation should be done in such a way that grown plants should contribute to people as socio-economic plants. The development of the hill area should be conceived as a part of the large socio-economic frame work and should not be confined to the acceleration of a few selected activities other than forestry. The forestry development in the region cannot be dissociated from the overall question of land and water management. Development plans for the region should take horticulture as one of the lead sector but it should not be developed at the cost of forestry and pasture development.

Kandi area project-water shed management

Most of the rainfall water in this area goes wasted. In order to conserve this water and make its best use, water shed management project of this rain water should be set up immediately. Smaller dams should be constructed in which this water can be channelized and utilized. People living in upper regions of Talwara and Daroli have dug large sized pits to store rain water for next summer.

Increasing vegetation cover

Many areas in this low North West Himalayan Foothill region are having scanty vegetation. Vegetation is disturbed either due to human activity or over grazing or due to some natural calamity. New species of dry area origin may be planted in such areas having disturbed vegetation. *Terminalia arjuna*, *Terminalia bellirica*, *Embllica officinale*, *Acacia modesta*, *Acacia catechu* etc can be successfully grown in such areas as these plants have the capacity to survive successfully in the dry soils of this region.

Alternative land use

Introduction of forestry species in place of rising of traditional field crops should be encouraged for restoring productivity of soils and increasing profit of farmers. Eco-friendly system based on the use of nitrogen fixing trees such as *Leucana leucocophala* (subabul) and herbaceous leguminous plants have potential to bring about favorable changes in soil properties by promoting soil fertility and conservation. Perennial plants have capacity to grow under unfavorable conditions. Fast growing trees species like *Eucalyptus* can be used affectively for biodrainage in water logged soils. *Prosopis juliflora*, *Terminalia arjuna* (arjuna), *Albizzia lebbeck* (siris), *Acacia nilotica* (Kikar) and *Eucalyptus teraticornis* (Safeda) can be used in management of alkali soils.

Recycling of crop residue

Degraded soils are inherently poor in fertility and crop production; therefore invariably respond to fertilizer applications. Efficiency of inorganic fertilizers is often low and results in uneconomic return to the user. Upto fifty percent substitutions of fertilizers nitrogen requirement by farmyard manure results almost similar yield as obtained with complete fertilize. Applications of farm yard manure not only increases nitrogen use efficiency of urea but also improved the fertility status of soils. Crop residue can thus be used as efficient source of nutrient substitution for farm yard manure and compost. These residues can be left on the soil as such or can be incorporated in the soil as “Green manure” for supplying nutrients and soil environment.

It has been observed from hydrological studies that some model watersheds with suitable site specific soil and water conservation measures will not only protect the land from degradation in watershed but also enhance the productivity.

Laws should be imposed to shift stone crushers

A large number of stone crushers are a common site in Ghanauli area, which are rapidly in actions to convert these sub hilly areas into flat plains.

Many laws have already been framed concerning the shifting of stone crushers. In M.C. Mehta verses Union of India, directions for stopping stone- crushing activity were issued by the Supreme Court. One of the most important directions given by High court was regarding the stone-crusher owners were liable to pay compensations to citizens of the area who suffered, within the period of two months failing which their license to carry the business of stone-crushing was to be cancelled [8].

Above approach of the court is aimed at protecting the environment and with reference to shifting of crushers from North West Himalayan foothill regions should strictly be imposed so that natural hills can be protected from the laws of horrible stone crushers and will promote sustainable development in the region.

Conclusion:

In preparation of Environmental Management Plan due consideration should be given to socio-economic status of the people dwelling in the area. The Environmental Management Plan, if prepared and implemented in the right way, will lead to the long-term planning for sustainable development in this Himalayan Region.

REFERENCES

1. Malik, J. N., Shah, A. A., Naik, S. P., Sahoo, S., Okumura, K. and Patra, N. R. (2014) Active fault study along foothill zone of Kumaun Sub-Himalaya: influence on landscape shaping and drainage evolution. *Current science*. 106(2): 229-236.
2. Dogra, A. S. (2000) Natural resource conservation and economic development through watershed management in Punjab Shivalik. In: S.P. Mittal, R. K. Aggarwal and J. S.

- Samra (Eds.), Fifty years of research on sustainable resource management in Shivaliks. Central Soil and Water Conservation Research and Training Institute, Research Center, Chandigarh. 145-156.
3. Jerath, N., Puja, Chadha, J. (2006) Biodiversity in the Shivalik Ecosystem of Punjab, India. Punjab State Council for Science and Technology, Chandigarh.
 4. Agarwal, D. K., Farooquee, N. A., Samal, P. K., Sharma, S. and Palni, L. M. S. (2002) Shivalik development Strategy I. Action Plan. G. B. Pant Institute of Himalayan Environment and Development, Almora.
 5. Puri, G. S. (1949) The problem of land erosion and landslides in Hoshiarpur Siwaliks. Indian Forester. 75: 45-51.
 6. Randhawa, M. S. (1945) Progressive dessication of Northern India in Historial Times. The journal of the Bombay Natural History Society. 45: 558-565.
 7. Kukal, S. S. and Singh, M. J. (2015) Soil erosion and conservation. In: Soil Science-An Introduction, Indian Society of Soil Conservation, New Delhi, India. 217-25.
 8. Singh, G. (2015) Environmental law-international and National Prospective. 222-223.