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Crisis in Treasury: Himalayan Ecosystem, Life for All

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Abstract: ***The Indian Himalayan Region (IHR) comprises of Jammu and Kashmir in the north-west, Kumaun and Garhwal in the central region and Sikkim, Arunachal Pradesh, Assam, Nagaland, Manipur, Mizoram, Tripura, Meghalaya and Derjeeling districts of West-Bengal in north-east. The region occupies 16.20 per cent of total geographical areas of country. The forest area of the total reporting area ranged from 10.14 per cent in Jammu and Kashmir and 90.38 per cent in Mizoram. The total human population in the region is 6.28 per cent of the county's total population. The age old harmony between man and the environment has been altered and shaken significantly in recent days through a variety of biotic activities. The increasing ferocity and frequency of floods, landslides and rock-falls, deforestation and change in climate have clearly shown the fall of Himalayan eco-system. An attempt is,therefore, made to convey consequence of the biotic interventions on the Himalayan eco-system.***

Keywords: Himalaya, Ecosystem, Environment, Biotic,Landslides**,** Erosion

1. The Environmental Problems in Himalayan Eco-System

Problems Originated due to Accelerated Natural Processes

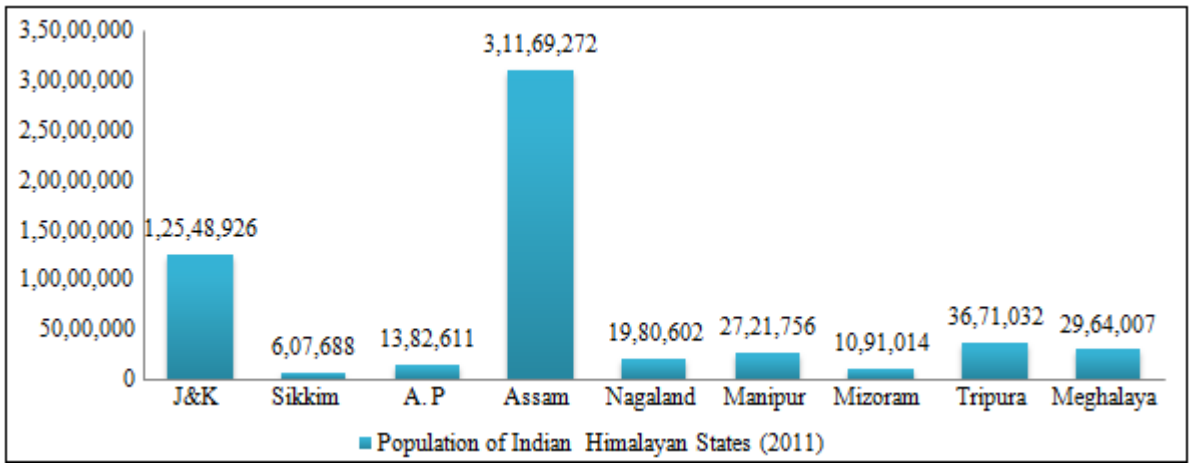
Being seismically very active, the Himalaya is very sensitive to change. Among the natural processes, the frequency of earthquakes has increased during recent years, particularly in fragile regions. The glaciers are generally dendric in form of moving at two to five per year. Most of the glaciers had a negative mass balance. The receding glaciers leave behind uncontrolled debris as the source material for landslides. Huge moranic features are obvious in Pindari and Milam glaciers in Kumaun, Kathiling glacier area in Garhwal, Gara glacier area in Himachal Pradesh and Chandanwadi along the river Lidder in Kashmir. These moraines have blocked the passage of melt water and formed morainal lakes causing flash floods.

Photo: Destruction Caused By Snow Avalanche in Pahalgam, Kashmir and Landslide in Himalayan Region

The snow avalanches accompanied by rock fragments, etc. led gully erosion. Avalanches in Kashmir and Himachal Pradesh have damaged Alpine meadows and are constant threat to life, forest land and agriculture.

Problems Originated due to Biotic Activities

The population growth has tremendously increased during the last decade all over the region.The increase is more in north-east region, compared to north-west region. The growth rate of human population in Meghalaya and Arunachal Pradesh is tremendous (27.8 and 25.9 per cent respectively). The population density is maximum (397 persons km^{-2}) in Assam and minimum (17 persons km^{-2}) in Arunachal Pradesh. The growth rate of density is highest (+28.80) in Mizoram and followed by Assam with (+18.75).



The increasing population has resulted in degradation of the Himalayan eco-system. Some notable consequences are as fallow:

Deforestation

The forests have largely been destroyed for domestic and industrial demands, even from the colonial period. In all the states, the actual land covered by forests is far less below the 60 per cent as recommended by National forest policy, 1952. The good forests (more than 60 per cent crown cover) are limited, for example, in central Himalaya only 4.4 per cent is under good forests. Besides meeting the national and regional demands of forest products, wherever there is demand for more land for expanding agriculture, orchards, and industries and for other purpose. In U. P alone more than two hundred hectors of forests has been lost two decades, of which the greater part or per cent was diverted to river valley projects and rail tracks. Deforestation has accelerated the run-off, loss of top soil and flash floods, remarkably. Mathur and S.S Sajwan recorded total increase of 28 per cent in run-off and 73 per cent in peak discharge rate due to deforestation. Apart from tree removal, the heavy resin-tapping from Chir-Pine (Pinus roxburghii) trees has resulted in the decrease in volume increment and diameter increment above the tapping region, low seed production, reduced tree growth,the increased susceptibility to beetles,diseases and wind storms, low rate of occlusion of resin channels and tree mortality. During heavy storms, the tapped trees fall down, creating gaps in the canopy. Since, in this region, agriculture is largely based on the forests for energy, the requirement of forest land for sustaining per hectare of cultivated land has declined drastically, e.g. , in central Himalaya against the requirement of 13 ha of forest land ha^{-1} of cultivated land, the ratio of agriculture land to well stocked forests is only 1: 0.84 (Pandey, Uma and J.S Singh) estimated the total growing stock of forest at $66x10^6$ m^3, outturn of $4.54x10^6$ m^3 yr^{-1} and annual increment at $0.78x10^6$ m^3 yr^{-1}. Thus, with a consequent net depletion of 5.8 per cent per year, the grazing stock by the year 2041 will be only $3.32x10^6$ m^3, if the current rate continues. The regeneration of multiple use tree species, e.g., Oaks (Quercus spp.) is worst, therefore, the forests are becomingnon-renewable resources.

Overgrazing

Both the grasslands and forest floors are used extensively for rearing animals in the region and 60 per cent of the fodder requirement of animals, while remaining 40 per cent is met from crop residues, weeds, top feeds and concentrates. The incidence of grazing has crossed the carrying capacity of these resources, over grazing has increased run-off and soil-loss on one hand, and destroyed the seedling and growing plants of trees, on the other. Also the over grazed areas are being encroached upon by weeds, viz., Anaphalis sp., Lantana camara, Artemisia vulgasis and non-palatable grass species, as Heteropogoncontortus.

Erosion

The major cause of accelerated erosion is the lossof protective vegetal cover. The rate of erosion in catchment areas has increased five times, compared to the past, the present rate being upward of 1mm yr^{-1}. The rivers are transporting large amount of sediments at rate of 16.5 ha m $100km^{-2}$ yr^{-1} leading to rapid siltation of reservoirs and lakes, and also covering the fertile valleys. The river Ganga, originating from central Himalaya, is carrying $340x10^6$ metric tons of sediments yr^{-1} (K.S Valdiya). The construction of 44,000 km long road has generated $2650x10^6$ m^3 of debris and each year every kilometer of these roads produces 550 m^3 of debris by landslides and landslips, so that every year $24x10^6$ m^3 of sediments slide down the slopes destroying the vegetation, smothering natural springs and developing blockades. The Alakhnanda in one flood only on July 20, 1970 deposited in its channel $9.1x10^6$ m^3 of sediments. Deprived of vegetal cover, the Himalayan soils are no longer capable of absorbing infiltrating rain water. The result are recurrent floods, the dimension of their hazards are increasing phenomenally from 5.94 million ha in 1953 affecting more than 2.5 million people to 11.42 million ha and 54 million people in recent decades. A large number of erosional and depositional river terraces along the river course or at the confluence of two rivers are, thus, common all through the region. Around Kalagrah dam site at Amost and Bokar, 3- 1.88 m thick terraces have recorded. The reservoirs formed behind the dams are being filled at the rate of 3-5 times faster than estimated by the planners so that their effective lives reduced markedly.

Landslides and Rock falls

These are originated by the combined effect of intensive human activities, excess rainfall, cloud burst, flash floods and slope undercutting by meandering rivers, deforestation and seismicity of the river systems, formation of transient reservoirs and the subsequent floods pulsations. The

blockade formed in August 1978 into the Bhagirathi near Gangnani in Garhwal, blocked completely the onward flow of Bhagirathi for 4 hrs and later on washed away many eroded rocks, about 60000 trees, 12 bridges and many telephones poles and houses together with damage to 130 km long road between Dabrani and Uttarkashi, and Uttarkashi and Tehri. The resulting flood increased the silt load and carbon dioxide concentration (7.5 ppm), reduced concentration of dissolved oxygen in water to 3.8 ppm and affected adversely aquatic flora and fauna.

Flash Floods

The Himalayan Rivers are characterized by broad bed widths alternated with narrow constricted gorges. The severity of floods can be expressed by citing following examples:

a) Alakhnanda floods in 1894 destroyed the entire township of Srinagar (Garwhal).
b) Balakuchi floods in July 1970 washed away the halting station- Balakuchi on the way of Badrinath shrine.
c) The recent floods in river Brahmaputra.
d) The recent horrible floods in Jammu and Kashmir Ladakh (2010) and in Srinagar (2014) almost destroyed the every corner of the respective region.

Pic: Deadly Floods in Jammu and Kashmir (2014)

Drying-up of Springs

There are widespread evidences that more than 50 per cent of the hill springs are drying-up. With the removal of forest cover, the capacity of the soil to absorb rain water diminished, there is no recharging of ground water and, hence, no spring downslopes. Thus, only melt water of the snow-fed rivers would be available. The rainfall has dropped remarkably. For example, in Nainital the average rainfall for a year ending 1973 was 2582mm but for the subsequent seven years ending 1981, it fell to 1894mm or a drop of 23 per cent and now it has reached 1639 mm. while in Bhimtal, it was 2781 mm for the seven years ending 1964 and fell to only 1570 mm in the subsequent 15 years. The problem is so acute that the drought has become a national issue.

Pollution

The noise and air pollution are by and large confined to urban centers, while pollution of water is common in both in rural and urban centers. While the high altitudes lakes are mostly oligotrophic, the mid and low altitudes lakes and wetland represent advance stage of eutrophication. Dal and Manasbal lakes and Trigan wetland in Kashmir, and lakes Nainital, Bhimtal and Khurpatal in central Himalaya are highly polluted. The increasing glacial silt in high altitude lakes and extensive tourism influx, unplanned settlement, land-use and developmental activities in the catchment areas in mid and low altitudes lakes are the major causes of their degradation. In Dal Lake, the area has been reduced to 12 km^2 on 1980 from 22 km^2 in 1940. The recent study conducted by Kashmir University revealed that Dal Lake has lost 24% area in last 157 years. The area of Lake Bhimtal has reduced to 46.3 ha from 60 ha in 1904 and the capacity of lake has shrunken considerably over 50,000 cu ft. The lake Nainital has shallower by about 6m in the last 83 years, and will become a Swamp in about 200 years, even if the present rate swallowing (8 cm yr^1) continues.

Pronounced eutrophication is evident by high values of turbidity, biochemical oxygen demand, concentration of manganese, nitrogen and phosphorus, and anoxic condition at the mud water interface. A High Most Probable Number (MPN), algal blooms, swarming of certain zooplanktons, photosynthesis ratio of < 1, absence of macro-zooplanktons < 7 m, decline in the population of food fishes and their infection by fungi and trematodes, envasion by exotic weeds and excessive growth of macrophytes, e.g., *potamogeton pectinatus* also reflect deterioration of water in Himalayan lakes. The eutrophication has caused two major physiological changes in fisheries:

1) Increase in mortality during the past two years and decline in fish population and production.
2) Destruction of spawning and breeding grounds of each fishes.

Problems of Agriculture

The marginal agriculture practice in fragmented and scattered land- holdings have stimulated soil erosion tremendously. Many noxious weeds as *Oxalis corniculata,* etc., are prevalent in the region. The growth of *Lantana Camara* has become menace for cultivated lands below 2000 m elevation. In northern eastern region, the slash and bush agriculture (Jhuming) has increased sedimentation rate. Water loss and flash floods; reduced the forest cover and eliminated many plant and animal species. According to P.S Ramakrishnan, nearly 21 and five times greater sedimentation and water loss, respectively, has been recorded when a 8-10 years old forest is put under shifting cultivation.

Extinction of Plants and Animals

Several species of plants and animals are at risk or endangered because of habitat destruction through deforestation and development activities. Some notable examples are: *Catamixisbaccharoides, Didicieacunninghammi, Dioscorea deltoidea, Ermostachyssuperba*, among plants; and cheer pheasant (*Catreuswallichii*), pygmy hog (*Sussalvanius*), forest musk deer (*Moschuschrysogoster and M. sifanicus*), etc., among animals.

2. Problems due to Development

The construction of unplanned roads, dams and mining have altered the natural balance in Himalayan ecosystem. Survey of Kumaun region revealed that on average, there are about 8-10 middle sized landslides in each km of road in a year, each of which deposited 400-500 m^3 debris of the road-bed are largely covered by gullies causing erosion, and road clearance debris over the road edge down the steep slopes, has damaged the natural vegetation and site features along the slopes, and aquatic ecosystem in the valleys.

The large dams have induced the seismicity to large magnitude ($M \geq 5$), and lowered the velocity and dissolved oxygen, and increase biochemical oxygen demand of the downstream water due to discharge of tunneling material and by-products of explosive in the stream and rivers. The ill-planned mining has caused following major constraints:

1) Scarcity of slates and stones for local use.
2) Loss of vegetation, fauna and top soil in mined area, and increase in sedimentation flow.
3) Accumulation of excavation debris on arable land through rolling down the hill slopes.
4) Lowering of water table and drying-up of springs, e.g., near Bhatta falls, Murray and Dobighat streams etc., near Mussoorie.
5) Weakening of rocks by blasting.
6) Pollution in water bodies and land due to affluent rich run-off.
7) Increase in amount of dust.
8) Health hazards due to inhalation of polluted air like Pneumoconiosis, silicosis and asbestosis, etc.

3. A Plea for Recovery of Damaged Ecosystem

Obviously, the environmental problems in Himalaya are basically concerned to the conservation of natural resources at ecosystem level in a holistic manner. The development should be curbed where it becomes a threat to environment and life, and need to design future programmes for this mountainous terrain rather than treating hill development merely as an extension of plains and of imported technology. Since, forest have an overriding role on the environment and economy of the region, in particular, and nation, in general, further forest destruction must not only be prevented, but that more land must be reforested using suitable species as per habitat conditions and people's needs.The pressure on the forest land can also be eased by developing industries with low consumption of raw materials and power. They should also be skilled labour intensive and be located in areas already accessible by roads for away from habitation in order to avoid building new roads, deforestation and pollution. Other environmentally innocuous micro industries, such as apiculture, sericulture, fruit and vegetable preservation and mushroom cultivation also have significant potentials. The pressure on forests for fuel can be reduced to a great extent by the supply of kerosene, liquid petroleum gas and coal at a highly subsidized cost at the will of inhabitants. The alternative source of energy, particularly biogas and solar radiation hold good promise. However, for the farmers, economic feasibility and operational efficiency at low temperatures have to be examined and for the latter, existing design of solar dryers, stills, water heater and pumps need to be standardized for the average rural hill community. A network of small power generation structure, rather than big dams and reservoirs, can be installed all over the region where flowing water is readily available.We emphasis the need of implementing following concepts in a co-ordinated manner foroverall recovery of damaged ecosystem in Himalaya.

- Protection and enrichment of existing forests and forest land, and increase forest cover through all aged multilayered forest plantations for protection and production forestry and domestic needs.
- Improvement and management of herbaceous layer through silvipasture development and encouraging stall feeding in the region.
- Reduction in bovine population through improved animal husbandry.
- Utilizing conservation- oriented agromics practices, e.g., no tillage agriculture, multiple crop species planting and farm forestry.

- Planned urbanization, industrialization and tourism as per carrying capacity of the microsites also taking care of environmental pollution.
- Developing alternative for employment and domestic needs (energy).
- Development activities should not be at the cost of nature and be followed by rehabilitation and recycling measures.
- Extension of "captive breeding" centers throughout the region to multiply endangered plants and animal's species in experimental gardens and zoos.

References

[1] Anonymous, 1992. Action plan for forte Himalayas, G.B. Pant Institute of Himalaya Environment and Development, Kosi-Katarmal, Almora.
[2] Arora, R.K. 1993. Himalayan Resources, Diversity and Conservation, In: U. Dhar (ed.) Himalayan Biodiversity. GyanodayaPrakashan, Nainital. 2: 39-55.
[3] Baduni, N.P. and Sharma, G.M. 1997. Effect of aspect on the structure of some natural stands of *Cupressustorulosa*in Himalaya moist temperate forests. Proc. Ind. Nat. Sci. Acad. 1362: 345 352.
[4] Bargali, S.S., Tiwari, J.C., Rawat Y.S. and Singh, S.P. 1987. Woody vegetation in a high elevation blue pine mixed Oak forest of Kumaun Himalaya. In: Y.P.S. Pangtey and S.C. Josh (eds.), Western Himalaya 1: 121-155.
[5] Bargali, S.S., Tewari, J.C., Rawat, Y.S. and Singh, S.P. 1987. Woody vegetation in blue pine-mixed oak forest of Kumaun Himalaya, India. In: Y.P.S. Pangtey and S.C. Joshi (eds.), Western Himalaya: Environmental problems and development. Pp. 121- 135, GyanodayaPrakashan, Nainital.
[6] Chandra, R. 1991. An altitudinal pattern of woody vegetation along water courses in parts of Kumaun Himalaya. Ph.D. thesis, Kumaun University, Nainital.
[7] Dhar, U. 1993. (ed.) Himalayan Biodiversity: Conservation Strategies.GyanodayaPrakashan, Nainital.
[8] Dhaulakhandi, M. 1996. A study on structure, phytosociology and regeneration of an oak forest of Bhagirathi Valley, Garhwal Himalaya. Ph.D. Thesis, Garhwal University, Srinagar (Garhwal).
[9] Joshi, N.K., 1990. Ecology of fire on vegetation composition, Forest Floor, Litter Fall, Litter Decomposition and Nutrient Return in pure and mixed sal forests of Garhwal Himalaya. Ph.D. Thesis, Garhwal University, Srinagar (Garhwal).
[10] Kalakoti, B.S., Y.P.S. Pangtey and A.K. Saxena, 1986. Quantitative analysis of high altitude vegetation of Kumaun Himalaya, Jour. Ind. Bot. Soc., 65: 384-396.
[11] McIntosh, R.P. 1980. The relationship between succession and the recovery in ecosystem. In: J. Crains Jr. (ed.), The process in Damaged Ecosystem, pp. 11-62. Pant, S.C. 1987.
[12] Vegetation, litter fall and litter decomposition and ground vegetation production of the North-West and South-West facing slopes in forests at Gopeshwar, Garhwal Himalayas. Ph.D. Thesis, H.N.B. Garhwal University, Srinagar.