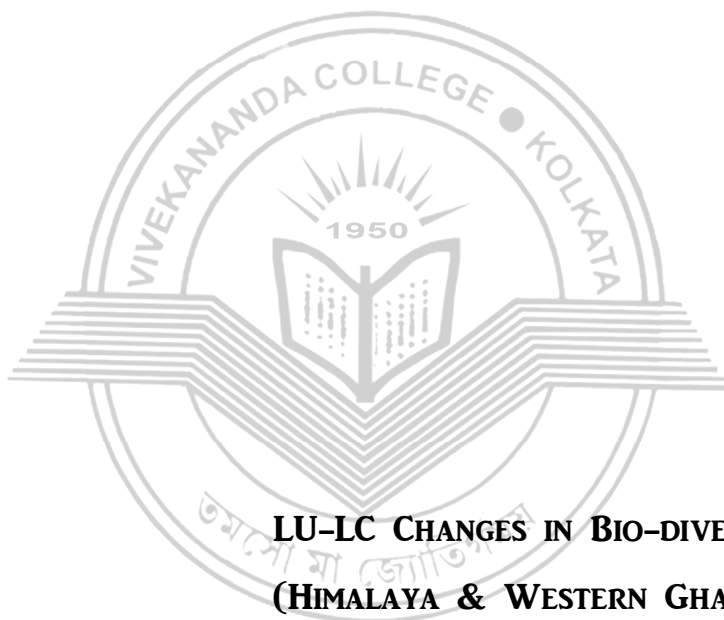


**VIVEKANANDA COLLEGE
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NAAC ACCREDITED 'A' GRADE



**TOPIC: LU-LC CHANGES IN BIO-DIVERSE REGIONS
(HIMALAYA & WESTERN GHAT REGIONS)**

COURSE TITLE: ENVIRONMENTAL SCIENCE (HONS.)

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LU-LC Change in Bio-diverse Himalaya

Himalaya mountain ranges from the North Western part of the India at the Kashmir valley to the extreme Eastern boundary, known as North East Indian boundary that encompasses the state of Arunachal Pradesh. The entire region however, holds a rich biodiversity and among which the Western Himalaya and the North-East Himalaya are two biodiversity hotspots, which signifies both the biodiversity richness and threats as well. Along with the biotic diversity the hilly terrain also hosts a good number of different ethnic groups with their varied cultures, food habits and associated livelihood practices. Most those ethnic cultures and consequent landuse practices are sustainable in nature to fit the environmental set up of the region. However, with advent of civilisation and technology for rapid resource growth the traditional practices are being replaced by new livelihood practices and consequently there is a rapid change in landuse pattern.

The major drivers of landuse/ land cover change in Himalayan region are up to certain extent same as the other areas with a few addition or rather alterations.

- **Climate change** is a major driver for landuse change in Himalaya, as the higher regime of temperature at high altitudes leads to productivity loss for the crops needing low temperature to grow. For example, the fruits like Apple, Orange, Apricot, Strawberry etc. are dependent on a particular range of temperature, which may not be available now a days due to warming of the atmosphere. On the other hand, some cereals, tea cultivation etc. are dependent on particular humidity conditions, which are also facing a changed condition for climate change. In addition, the forest types are also getting vulnerable and the species compositions getting changed due to climate variability. A study at Himachal Pradesh has identified high vulnerability of forest and biodiversity with 5-6° C increase in temperature and 16% increase in precipitation which is likely in near future. Therefore, there has been a trend in cultivation pattern throughout, which sometimes leading to LU-LC changes.
- **Developmental activities** or more specifically the infrastructural developments including laying of railway lines, road networks, bridges, hydroelectric power plants etc. for accommodating the population pressure, economic needs and very often defence activities triggers displacement people, loss of biodiverse lands and agricultural lands or even change in watersheds. These major changes in environmental set up invariably leads to LU-LC changes.
- **Urbanisation** and consequent changes in culture is another driver of LU-LC changes in Himalaya.

In the Himalayan region the land use change dynamics have been found basically dependent on the cropping pattern change as an adaptive capacity development to accommodate the climate change and changing water availability. However, the biodiversity is facing serious threats due to habitat loss, inundation, change and clogging of water streams, habitat fragmentation due to connectivity infrastructure development (like roads, railways, tunnels, canals, towers etc.) and loss of corridor.

The changed pattern of agriculture for higher productivity or climate adaptation also leads to loss of agro-biodiversity which is a very rich bio-resource of Himalayan region.

However, although LU-LC change in the area is rapidly losing the environmental integrity, still there are scope of rejuvenating the regional environmental set up with proper planning and introduction of climate change resilient sustainable ecosystem management, based on traditional technologies.

LU-LC Change in Bio-diverse Western Ghats

India caters the second largest population of the World being the 7th largest country as per its area. Hence, the pressure over its land resource is enormous leading to rapid landuse, landcover changes throughout the region. The biodiverse areas like Western Ghats and Himalayan region of the country having widest extent of fertile landmasses are more prone to such kind of environmental changes.

Western Ghats are one of the most important 'biodiversity hotspots' of the world, which implies that the region hosts at least 0.5% or more than 1500 species of vascular plants as endemic species, but lost at least 70% of its original vegetation. Hence, both the potential and threats as a biodiverse region is already proven for the area. Western Ghats is the original home of over 1720 species of flowering plants, 16 species of mammals, 91 species of reptiles and 84 species of amphibians and 33 species of fresh water fishes. It is a rich gene pool of number of medicinal plants, wood fuel plants, cultivated plants and wild animals like Malabar civet, Lion-tailed macaque, Nilgiri langur, Malabar giant squirrel, Nilgiri marten and Travancore flying squirrel.

The major ecological and environmental problem leading to degradation of the Western Ghats is deforestation. Forests are being cleared for years for agricultural expansion, plantation development and for various other developmental activities. Major drivers of the Western Ghat landuse changes are basically Socio-economic and in a few cases climate change. The socioeconomic drivers include deforestation for agricultural land and consequently conversion of agricultural lands to settlements, urbanisation and industrialization. Sometimes, mining is also a cause of biodiversity or forest loss. However, deforestation in search of agricultural lands affect the biodiversity and forest ecosystem in two ways. Firstly, the shrinkage of forest directly reduces the number of individuals under varied species. And secondly or consequently the structural integrity of the forest ecosystem is disturbed to a large extent, that leads to further loss of biodiversity.

In the Northern Western Ghats (Maharashtra region) the major trend of changes was noticed to be then formation of open forest or scrub in cost of dense forest. Also, there is a trend of growing water bodies on the previously forested lands, perhaps to cater the needs of growing population. The fragmentation of vegetation was reported to threaten the corridors too.

It is estimated that, forest cover of Kerala dropped from 44.4% in 1905 to 27.7%, 17.1% and 14.7% respectively in 1965, 1973 and 1983. However, as much as 61% of LULC change of Western Ghats are confined to the low elevation areas and the higher elevation mountain with maximum biodiversity is spared a little. The very low elevation areas has witnessed maximum conversion of cropland to built up areas while in the medium low elevation region maximum conversion happened from forest land to croplands.

However, in recent years (during 1995 to 2005 compared to 1985 to 1995) the rate of conversion of forest land to cropland or other landuse units has reduced a lot in Western Ghats owing to the declaration of several protected areas within the region.

The rainfall patterns indeed play very important role in Western Ghats landuse change, as the plantation particularly of tea and coffee are dependent on rainfall intensity. Even it has also

be found during 1995 to 2005 that some of the fallow lands were converted to plantations due to better availability of rainfall of let. It seems that the overall trend of forest cover loss is reducing and with time but the tropical dry forest poses a higher risk of conversion to non-forest lands as the evergreen forests are being increasingly protected as those come under protected forests.

It can therefore be concluded that the biodiverse region of Western Ghats is facing threats of biodiversity loss due to loss of dense forest, habitat fragmentation and deforestation led erosion and siltation at lower elevation. The major drivers being climate change, and population pressure with growing rate of resource exploitation, need for more cropland and built up areas are continuously leading to LULC changes for last 50 years and expected to be so more years to come. However, the conservation efforts including declaration of more and more protected areas has successfully curbed the trend of LULC change at least in case of dense evergreen forest particularly at the comparatively higher elevation.

With inputs from:

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