

Subject: Environmental Science (Hons.)

Semester/Year : 2nd Semester/ 1st year

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**Name of Topic: Drivers of Land use and land cover
change in Western Ghats**

Drivers of Land use and land cover change in Western Ghats

Land-use and land-cover (LULC) change is a dynamic process governed by human aspirations. Humans have modified over 83 % of Earth's land surface due to different land-use. Western Ghats (WG) is the UNESCO world heritage site and one among the top eight hottest biodiversity hotspots in the world. Many scientists have attributed the ecological changes in WG to agriculture and pastoralism. The rate of deforestation in WG has been 0.57 % annually during period of 1920–1990. But now it is observed that 0.90 % annual decline in natural forest cover. Different eminent and scientists and researchers have observed the changes in the land-use patterns in southern parts of WG for 22 years (1973–1995) using satellite remote sensing and encountered high degree of deforestation in the area.

Drivers of Land use and land cover change

There are 5 major drivers that control the land use and land cover change in Western Ghats region. These are as follows:

- i. Demography (Anthropogenic pressure),
- ii. Agriculture (Cropping pattern),
- iii. Temperature,
- iv. Rainfall,
- v. Topography (elevation and slope)

Drivers are discussed below in details:

i. Demography (Anthropogenic pressure):

The LULC of WG has been altered due to significant anthropogenic pressure in the past several decades.

- Construction of railways, road and dams during the British period had opened channels for resource exploitation and caused rapid change in LULC which continued to the present.
- Many hill stations have come up and grown beside constructions of new special economic zones (SEZs) and residential zones.
- Forest fragmentation in WG was initiated during colonial times for timber demand. This resulted in construction of roads which later on coupled with increasing population, became major sources of resource extraction leaving the forest fragmented.

ii. Agriculture (Cropping pattern):

There is a trend of replacement of paddy fields with coconut plantation in Kerala (Unni1983) mainly due to poor productivity of crops. The present-day LULC changes in the Sothern WG are driven by economic gains rather than for ensuring the food security or getting the shelter. The “grow more food campaign” initiated in this region in pre-independence time opened up forest land for food crop cultivation, which ultimately resulted in erecting rubber plantations. These have significantly altered the WG landscape.

The commercial plantations like coffee were promoted at the cost of traditional crops like paddy, tea and rubber plantations; which has grown exponentially today and form a major land-use of WG.

iii. Rainfall

The rainfall plays an important role in establishment of land-use in WG. This is one of region having highest rainfall in India due to long presence of Indian Monsoon. During the monsoon the wet wind enters to India from the south western part of the country covering Indian Ocean and Arabian Sea.

Then it collides with its western side of the Western Ghats and created an area with rich annual rainfall. The rainfall of this region varies from 2550 mm (in Maharashtra) to 6000 mm (in Karnataka) per year. As a result of this one of the tropical Rain forest was formed containing rich floral and faunal diversity.

iv. Temperature

The Northern WG (NWG), particularly the regions of northern Maharashtra and Gujarat, has significant temperature variations, as compared to southern WG (SWG) including southern Karnataka and Kerala. Such variations give rise to specific vegetation types. Tropical dry deciduous forest are dominant in NWG, whereas evergreen forest in the SWG. The rainfall and temperature together cause unique climatic situations in WG which supports specific commercial plantations such as tea and coffee. The Northern WG is hotter than the Southern WG with maximum temperatures above 40 °C. These areas are dominated by the crop land as against Kerala and Tamil Nadu (SWG) which are dominated by plantation (mainly tea, rubber, coffee, and coconut). Karnataka has significant area under both plantation (teak, areca nut, rubber, etc.) and crop land.

v. Topography (elevation and slope)

Forest, particularly in very low to low elevation regions of Maharashtra and Gujarat has exhibited degradation to shrub land. This is significantly lower than the forest to shrub land conversion. Such conversions were also observed in some areas of Kerala. The low-lying deciduous broad leaf forests of Northern WG are under higher pressure as compared to other forest types. Conversion of forest to crop land is prominent in Northern WG

rather than in Southern WG particularly in very low elevation areas. Most of the forest that is converted to crop land in these regions is mainly deciduous forest, and there are less instances of conversion of evergreen forest to crop land across all the elevation zones. The grassland is found mostly in the high altitude regions of WG. Around 45 % of grass land is found in regions beyond 1245 m up to 1389 m elevation, whereas around 46 % of grassland is found in the regions beyond 1390 m. The grasslands are generally undisturbed and not significant class inter-conversions. Mangroves are available in plain and very low elevation regions in the vicinity of creeks and mostly confined to NWG. Water body increased in area gradually from 1985 to 2005. This is mainly due to the formation of new dams particularly in NWG. There are instances of conversion of crop land to water body due to formation of dams.