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Title of Thesis : **Changing Global Climatic Scenario on Environmental Processes Across India: Its Possible Causes and Impacts**
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ABSTRACT

Global warming is real. Polar ice is melting. Sea level is rising. One-third of plant and animal species is likely to be extinct in the decades to come. Rise in atmospheric temperature and sea surface temperature is likely to influence the atmospheric and environmental processes. Keeping this in view, present study was aimed with the objectives viz., to examine the rainfall variability across the country and its possible causes; to access the land use and land cover change of different parts of the country; to address the impacts of changing climatic scenario to the environmental processes. Rainfall data, atmospheric variables over land and ocean, land use and land cover data were collected from the India Meteorological Department and Indian Institute of Tropical Meteorology. The NCEP/NCAR reanalysis data were also used. The study was conducted in IITM using the available resources like GIS. Rainfall and meteorological parameters were analyzed during pre-climate and post-climate shift. The mean all India annual rainfall showed a decline (32.7 mm) from pre-climate shift period (1949-78) to post-climate shift period (1979-2014) when the year 1978 was considered as the climate shift year. A significant decline in monsoon rainfall led to the decline in annual rainfall since 75.2 per cent of it is contributed during the monsoon season. Most of the geographical area of the country was under dry and very dry zone during all the three seasons except monsoon season. The zonal trends in all India rainfall indicated that the three zones viz., the East Coast (N), the East Coast (S) and the North East India (NEI) showed increase in rainfall while rainfall decline was noticed in all other zones across the country viz., Central Peninsular India, Ganga Plains, North Central India, North Mountainous India, North West India, South Peninsular India, West Coast (S), and West Coast. Decline in rainfall over India could be explained as due to changes that took place in land, ocean, and atmosphere continuum such as the tropospheric and surface temperatures, mean sea level pressure, sea surface temperature, geopotential height, precipitable water, and cloud amount. Weakening of the summer monsoon rainfall is the result of variability in different meteorological parameters. In recent years, the maximum increase in net cultivated area was observed in the state of Manipur by 47.88 per cent from 2000 to 2013. All other northeastern states showed a rise in area under net cultivation. Odisha showed a maximum decline in net cultivation by 35.66 per cent over the period. Maximum increase in built up area was observed in Arunachal Pradesh, which is five times or more in 2013 than 2000. Maximum increase in forest cover observed in West Bengal (57.16 %) while maximum decrease observed in Bihar (27.47 %) followed by Punjab (27.14 %). Maximum increase in intermittent wood was observed in Punjab by two times or more over the period from 2000 to 2013, followed by Rajasthan (66.12 %). Maximum decline in intermittent wood observed in Kerala (81.34 %) over the period. Maximum increase in grass land reported in Arunachal Pradesh by three times or more while maximum decline reported in Mizoram by 77.14 per cent. Maximum increase in barren land observed in Arunachal Pradesh (81.93 %) followed by Punjab (81.03 %). Maximum decrease in barren land was observed in West Bengal (53.61 %). The mean surface air temperature over the globe was 14.67 oC over the period from 1949 to 2014. It was increased by 0.3 oC during post climate shift period (1979 to 2014). Analysis of all India annual mean temperature showed an increase of 0.22 oC, with a mean of 24.4 oC over the period from 1949-2007. Over India, the Central Peninsular India, South Peninsular India, West Coast (S), and West Coast were experienced decline in annual rainfall because in those zones monsoon rainfall also showed a decreasing trend. The Indian states spread over these zones, viz. Madhya Pradesh, Maharashtra, Karnataka, Andhra Pradesh, and Tamil Nadu showed an increase in area under barren land. The same process did not match with the arrest in desertification over Rajasthan. It could be explained due to large scale afforestation that took place in Rajasthan in addition to irrigation facilities provided through the prestigious Indira Gandhi Canal project.

Abstract

