World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:16, No:12, 2022

Assessment of Land Use Land Cover Change-Induced Climatic Effects

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Abstract : Rapid population and economic growth resulted in changes in large-scale land use land cover (LULC) changes. Changes in the biophysical properties of the Earth's surface and its impact on climate are of primary concern nowadays. Different approaches, ranging from location-based relationships or modelling earth surface - atmospheric interaction through modelling techniques like surface energy balance (SEB) are used in the recent past to examine the relationship between changes in Earth surface land cover and climatic characteristics like temperature and precipitation. A remote sensing-based model i.e., Surface Energy Balance Algorithm for Land (SEBAL), has been used to estimate the surface heat fluxes over Mahi Bajaj Sagar catchment (India) from 2001 to 2020. Landsat ETM and OLI satellite data are used to model the SEB of the area. Changes in observed precipitation and temperature, obtained from India Meteorological Department (IMD) have been correlated with changes in surface heat fluxes to understand the relative contributions of LULC change in changing these climatic variables. Results indicate a noticeable impact of LULC changes on climatic variables, which are aligned with respective changes in SEB components. Results suggest that precipitation increases at a rate of 20 mm/year. The maximum and minimum temperature decreases and increases at 0.007 ℃ /year and 0.02 ℃ /year, respectively. The average temperature increases at 0.009 ℃ /year. Changes in latent heat flux and sensible heat flux positively correlate with precipitation and temperature, respectively. Variation in surface heat fluxes influences the climate parameters and is an adequate reason for climate change. So, SEB modelling is helpful to understand the LULC change and its impact on climate.

Keywords : LULC, sensible heat flux, latent heat flux, SEBAL, landsat, precipitation, temperature
Conference Title : ICCM 2022 : International Conference on Climate Modeling
Conference Location : Paris, France
Conference Dates : December 29-30, 2022