

Assessment of Agricultural Land Use Land Cover, Land Surface Temperature and Population Changes Using Remote Sensing and GIS: Southwest Part of Marmara Sea, Turkey

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Abstract : Land Use Land Cover (LULC) changes due to human activities and natural causes have become a major environmental concern. Assessment of temporal remote sensing data provides information about LULC impacts on environment. Land Surface Temperature (LST) is one of the important components for modeling environmental changes in climatological, hydrological, and agricultural studies. In this study, LULC changes (September 7, 1984 and July 8, 2014) especially in agricultural lands together with population changes (1985-2014) and LST status were investigated using remotely sensed and census data in South Marmara Watershed, Turkey. LULC changes were determined using Landsat TM and Landsat OLI data acquired in 1984 and 2014 summers. Six-band TM and OLI images were classified using supervised classification method to prepare LULC map including five classes including Forest (F), Grazing Land (G), Agricultural Land (A), Water Surface (W), and Residential Area-Bare Soil (R-B) classes. The LST image was also derived from thermal bands of the same dates. LULC classification results showed that forest areas, agricultural lands, water surfaces and residential area-bare soils were increased as 65751 ha, 20163 ha, 1924 ha and 20462 ha respectively. In comparison, a dramatic decrement occurred in grazing land (107985 ha) within three decades. The population increased % 29 between years 1984-2014 in whole study area. Along with the natural causes, migration also caused this increase since the study area has an important employment potential. LULC was transformed among the classes due to the expansion in residential, commercial and industrial areas as well as political decisions. In the study, results showed that agricultural lands around the settlement areas transformed to residential areas in 30 years. The LST images showed that mean temperatures were ranged between 26-32 °C in 1984 and 27-33 °C in 2014. Minimum temperature of agricultural lands was increased 3 °C and reached to 23 °C. In contrast, maximum temperature of A class decreased to 41 °C from 44 °C. Considering temperatures of the 2014 R-B class and 1984 status of same areas, it was seen that mean, min and max temperatures increased by 2 °C. As a result, the dynamism of population, LULC and LST resulted in increasing mean and maximum surface temperatures, living spaces/industrial areas and agricultural lands.

Keywords : census data, landsat, land surface temperature (LST), land use land cover (LULC)

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