Drought and land use change monitoring using spectral indices and su pport vector machine (SVM) model (Case study: Bonab Rural District, Zanjan County)

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Abstract

Drought is a hazard that can have widespread impacts on biodiversity, wildlife habitats, and ecosystem stability. The present study investigated the drought situation in the Bonab rural district. For this purpose, the Normalized Difference Vegetation Index (NDVI), Water Index (NDWI), Moisture Index (NDMI), Soil Adjusted Vegetation Index (MSAVI), and Land Surface Temperature (LST) were used during the period 2013 to 2024. The results show that the maximum value of the NDWI index increased from 0.16 in 2013 to 0.14 in 2024, which indicates an intensification of drought. However, the status of the NDVI and MSAVI indices, both used to examine vegetation cover, increased, and the maximum value of the NDVI increased from 0.53 in 2013 to 0.58 in 2024, and this value for the MSAVI index for the years 2013 and 2024 was 0.69 and 0.73, respectively. Among the above indices, all indices except the NDWI index had a negative correlation with the LST index, and the MSAVI index had the highest negative correlation with a Pearson coefficient of -0.39 in 2013. The above results are also consistent with the results obtained from the SVM model, as it is also observed in this model that the area of barren lands has decreased from 887 square kilometers in 2013 to 851 square kilometers in 2024.