Detection of Trends in Hydro-Climatological Variables Using Parametric and Non-Parametric Tests in Neka Basin

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Abstract

During the past few decades, the southern part of the Caspian Sea has more frequently experienced extreme climatic events such as drought and flood. Trend analysis of hydro-climatic variables was conducted using non-parametric Mann-Kendall test and regression test for Neka basin in the north of Iran. Trends of precipitation and stream flow characteristics including maximum flow, mean flow and low flow indices were analyzed at the annual, seasonal and monthly time scales from 1358 to 1391 (34 years). Results showed a general decrease in annual and winter precipitation and decrease in daily maximum precipitation, with an increased trend in daily maximum precipitation of spring season. A decreasing trend was observed in 7-day low flow in summer for all sub-basins. Annual and monthly mean flows specifically in winter in all sub-basins decreased, but annual maximum flow increased from upstream to downstream. Land use changes showed that deforestation and urbanization increased during 34 years in the mid and downstream sub-basins. The analysis showed that low flow indices and mean flows are strictly sensitive to climate change. Overall, from hydrological perspective, these results indicate that the study region is getting dryer and facing more severe drought events. The results of this study can predict future droughts to make better decisions for irrigation planning and management of water resources.

Keywords: Climate Change, Mann-Kendal Test, Regression Analysis, Trend Detection.

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