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## Investigation on the Causes of Reduction of Flow in the Major Rivers of the Southeast of Urmia Lake

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### introduction

The reduction of river flows can be related to several natural and human factors. The reduction of entrance discharge to Urmia lake has significant rate on the reduction of the lake water level. The purpose of this research at the first step is to investigate the effect of climatic parameters such as precipitation and temperature and at the second step, to investigate the effect of human factors on the reduction of river flow of basins Sufichay and Mrdqchay located in the southeast of Urmia Lake.

### Materials and Methods

Climate and hydrological change trend were evaluated by Mann- Kendall classic and Modified methods. Then status of weather drought by SPI index and status basins hydrological drought was studied by SDI index in the time periods 3 and 12 monthly and the correlation of two droughts were examined by using Pearson correlation

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test. The status of vegetation by NDVI index and the status of soil moisture was studied by changing tasseled cap at past and present. Finally the discharge of rivers basin were compared at before and after dam construction and discharge of downstream of Alavian dam with precipitation elements.

## Results and Discussion

The results show that both of the average and maximum discharge is reducing in the area during the statistical period. On trending of temperature and precipitation data both Kendall and Sen's estimator methods have the same results and many of data had non-significant trend and only a small percentage of data was significant. On the other side, from this low percentage the trend type on the precipitation data was different. However the temperature significance trend shows a rise on temperature. In examining meteorological and hydrological droughts the characteristics of basins, SPI and SDI index have showed that both study scales indicate, two long periods of droughts during the same period and there was a significant relationship between two droughts. This relationship was for simultaneous 1 to 6 monthly delays. In the appraisal of the relation of vegetation status and soil moisture of basins in 1985 and 2006 the space of vegetation area has increased in both basins in 2006. The soil moisture has increased because of more absorption of rain water by the plants. The average comparison of discharge of Sufichay and Mrdqchay basins showed however that the discharge of two basins has declined after dam construction but the discharge of dam downstream shows more reductive variation. The multiple regression model also showed a strong correlation between basins downstream discharge with dam however, the correlation of discharge with precipitation had been non-significant.