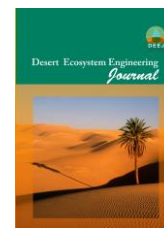




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## Drought Spatial Analysis of Sirjan Basin Using Remote Sensing

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### Extended Abstract

**Introduction:** Drought is a natural and recurrent phenomenon. It is considered ‘a natural disaster’ whenever it occurs in an intensive manner in highly populated regions, resulting in significant damage (material and human) and loss (socioeconomic). Although drought occurs in areas with different climatic conditions. But more is happening in arid and semi-arid areas with less annual rainfall. In general, droughts occur when the amount of annual precipitation is lower than the average long-term precipitation of the area. In other words, a drought occurs when the amount of water in the water resources of a region is continuously reduced in a continuous period. Climate, hydrology and agriculture drought are different types of drought. Drought is one of the most important natural hazards that causes a lot of damage in different areas each year, and it can turn into famine. Due to variety, complexity and various effects of drought, various indicators for its analysis are used. Accordingly, most of the indicators used in drought monitoring are climate variables such as temperature, precipitation and soil moisture. Today, drought can be accurately analyzed and evaluated using remote sensing data. Accordingly, this research tries to evaluate and monitoring the drought of Sirjan basin using remote sensing data.

**Materials and methods:** This are an applied research, which uses NDVI (Normalized Difference Vegetation Index) products of MODIS sensor with a resolution of 250 meters and 16-hour time resolution. It also uses the LST product of this sensor with a spatial resolution of one kilometer and a resolution of 8 days. The data are for June 2000 to 2017. After receiving the data in the first step, Correction of molecular dispersion, ozone and dust absorption, radar correction and solar radiation angles were performed on the NDVI product using the BRDF (Bidirectional Reflectance Distribution Function) model. NASA has made corrections such as georeferencing, radiation calibration, the removal of cloud effects, atmospheric and steam temperatures on NASA's LST product. Then in the next step the VHI (Vegetation Health Index) index was calculated from the combination of VCI (Vegetation Condition Index) and TCI (Temperature Condition Index) indices based on the 18-year time series (2000-2017) in June. Eventually drought zoning maps based on the VHI index were produced in four classes: Severe drought, Moderate drought, Mild drought and without drought.

**Result:** According to the De Martonne method, a large area of Sirjan basin is located in Arid and hyper arid zone. Average rainfall is different, in northern and northeast parts is about 500 mm and decreases to 99 mm in the central and southern parts of the basin. Also, the mean long-term temperature varies from an average of 1° C to the north and north east of the basin to 18°C in its southern parts. Generally, the research findings have

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been shown that droughts did not have a regular trend in the Sirjan basin.

**Discussion and Conclusion:** Basically, rainfall is the most important factor in the occurrence of drought. The results of various studies worldwide show that satellite indicators along with ground-based meteorological indices can monitor the drought trend effectively. The results of the study showed that the effects of drought on surface temperature and vegetation are different. Moreover, that depends on the various factors such as the type and characteristics of the vegetation and their temperature conditions. VHI is one of the most important combination indicators for assessing the severity of drought in different regions. Because, this indicator can simultaneously show the effects of drought on vegetation and land surface temperature. The results showed that 2007, 2008 and 2017 have had the highest drought severity. So, in 2007, with a maximum drought, 4377 Km<sup>2</sup> of the study area suffered from severe drought. The area under severe drought in 2017 and 2008, was 3795 and 3782 Km<sup>2</sup>, respectively. Accordingly; the lowest level of drought in the region was estimated in 2009, where 4195 Km<sup>2</sup> of the studied area were located in a without drought zone. In this year, only 4 Km<sup>2</sup> of the study area was located in a severe drought zone. In general, the use of drought intensity zoning maps that are produced using Combined Indicators helps in drought monitoring and planning to reduce drought losses.

**Keywords:** Zoning, Drought, Remote Sensing, Sirjan Basin.