Comparative Study of Climate and Satellite Indices in the Process of Sandy Zones Change in Sarakhs

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Extended abstract

1- Introduction

Sarakhs is strategically and geopolitically important in Khorasan Razavi province and the country. Existence of Khangiran Refinery, Sarakhs Special Economic Zone, Silk Highway, Sarakhs Great Transit Customs, etc ... It has led to the development and prosperity of the city that has added to the city's population in recent years. On the other hand, the three of the wind erosion crisis, and progress of the wind erosion zones in the region due to drought and the persistence of dust storms, are the most important threats to the strategic locations of the region. It is important for planners and managers to be aware of changes in wind erosion zones over a period of time and their relationship to climate. One of the most cost-effective ways to determine sandy zones variations is to use satellite images and related indicators. Among the many vegetation indices, NDVI is one of the global vegetation indices. On the other hand, global warming has had a significant impact on vegetation growth in recent years and has had a significant impact on vegetation dynamics. The purpose of this study was to compare the capability of detecting satellite and climate indices in the changes occurring in Sarakhs plain. That drought has detrimental effects on environmental and human resources, In this research, we are trying to identify the trend of expansion of sandy areas that is a serious threat to the resources available in Sarakhs city, using drought, dust storm and satellite indicators

2- Methodology

In this research required data including implemented projects, general statistics and information of the area, layers and topographic maps, meteorological data, satellite images, field sampling and ... were collected and were analyzed with statistical software, satellite image processing and geographic information systems software. The statistical term for studying changes in climate and satellite indices is 15 years, from 2000 to 2015, based on this time base, meteorological data were selected for qualitative, homogeneous and reconstructed Landsat satellite images. The climate indices calculated in this study were SPI and DSI index. That daily data of dust, horizon and daily precipitation data of synoptic stations, rain and evaporometer stations were used to calculate these indices and the satellite indexes include the NDVI and SDI, which use the Landsat ETM + satellite imagery. The results of the calculation of these indices were compared and analyzed.

3- Results

Investigation between the values of climate and satellite indices showed, according to climate indices, the years 2000, 2005, 2007 and 2010 are considered as dry years, with NDVI and vegetation levels also decreasing. In 2015, the vegetation level is at its highest level and this means that the amount of vegetation has increased as the rainfall changes and the climate changes to normal or wetter compared to other years. The results of the indices were also compared with the changes of the sandy area for the four periods of 2000, 2005, 2010 and 2015. Results show that the 2005 drought occurred after four years of climate-normal conditions in

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the region therefore, the area of sandy zones was less than other years of statistical period. Comparison of the surface of the sandy zones in the four studied periods shows in 2015, despite the SPI index showing normal natural climate conditions and the DSI index showing the lowest number of days of dust in the region during the statistical period, the area of sandy areas has increased dramatically due to years of continuous drought.

4- Discussion & Conclusions

The study of drought index shows that during the study period 2007 and 2015 are the driest and most productive years, respectively. This is also confirmed by the results of the dust index That highest and lowest number of dust storms occurred in the Sarakhs plain in 2007 with 98 days of storms and 2015 with 16 days of storms, respectively. A comparison of land use changes in the Sarakhs plain shows that the highest agricultural land development is 7% in 2010 compared to the previous period and while in 2015 the area has fallen by 12 percent due to droughts. On the other hand, rangeland degradation in 2010 reduces land use by 15% in 2010 Caused by the droughts of 2007-2010. Reduced rangeland and bare land could be another reason, including dryland cultivation in the area. Calculation of the NDVI index for the period 2005-2010 also showed that the amount of vegetation decreased significantly (From 125/69 to 111/53 km2) While in 2015 as an almost normal year, the vegetation rate increased according to the NDVI index. (Approx. 60 Km2) which indicates the effect of drought on the vegetation of the region. In this study, the ability of detecting two climate indices and one satellite index, to study changes in wind erosion zones in Sarakhs plain was studied. The results show that the NDVI index is in good agreement with the SPI and DSI climate indices. As a result, the level of sandy zones varies according to the drought situation, the intensity of dust storms, and the level of vegetation cover in the years studied.

Key Words: Dust storm index- Standardized Precipitation Index- Normalized Difference Vegetation Index – Sandy zones- Remote sensing- Sarakhs