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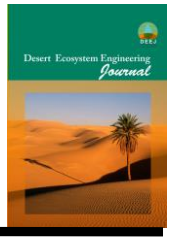

Investigating the Effect of Humidity and Temperature in Gavkhoni Wetland on the Microclimate of the Region

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Extended Abstract

Introduction: As one of the most important national and international capitals, wetlands have a great impact on their surrounding microclimate and ecosystems. Therefore, they need to be greatly protected as the most important natural habitats. Supporting a wide range of ecosystem services, these dynamic systems can modify the temperature of urban areas by acting as a cooler in areas close to highly populated cities. This study used temperature and vegetation to investigate the impact of the Gavkhuni wetland on its surrounding areas. To this end, the temperature rates of four areas, including wetland, vegetated areas around the wetland, the whole area around the wetland, and the surrounding bare lands were examined, using the Surface Energy Balance Algorithm for Land (SEBAL) to illustrate those changes.

Materials and Methods: This study sought to investigate the effect of the Gavkhuni wetland on regional microclimate, using the Surface Energy Balance Algorithm for Land (SEBAL). To this end, the data collected from MODIS and LANDSAT were used. In general, this research can be divided into five general stages. First, the required meteorological data and satellite images were collected and the necessary corrections were made. It should be noted that the meteorological data (minimum and maximum temperature, relative humidity, precipitation, evaporation, wind speed) were obtained from Naein Synoptic Station, which is the nearest station to the wetland, and records accurate information. In the second stage, after analyzing the satellite images and due to the fact that the required images were not available for the study period, MODIS images were used together with the Landsat one, considering the cloudy conditions. In the third stage, the wetland's water and dry surfaces were identified.

Accordingly, ten Landsat and MODIS extracted images belonging to the 2000-2019 period were selected, out of which five images belonged to the wet years (2004-2005-2006-2007-2008) and five images belonged to the drought years (2000 -2013-2015-2016-2019). In the fourth stage, the land surface temperature was measured using the SEBAL algorithm, which is a relatively new algorithm that uses remote sensing to estimate the Land surface temperature, calculating the rate of evapotranspiration via satellite images with the minimum required ground data based on the energy balance. The algorithm finally examines temperature variations and their impact on microclimate.

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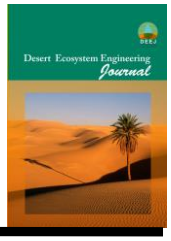

Obtained from $\left(\frac{T}{LST}\right)$ equation, the temperature variation Index of a region represents the relationship between humidity and drought. For this index, the average temperature rate of the Naein Synoptic Station, and land surface temperature were used, using the SEBAL algorithm. In the last stage, the wetness index was used to investigate the moisture content of the area. Then, two images belonging to the wet and dry years were selected. Landsat Image No. 8 belongs to 2016 which represents zero value for the wetland's humidity index, and Landsat image No.6 belongs to 2008 when the wetland's humidity index was 56.7.

Results: The LST maps generated for the four intended areas over a 20-year period through the SEBAL algorithm indicated that the average estimated index for the whole study area was 0.86 and 0.73 in the drought and wet periods, respectively. Therefore, it could be argued that the LST is lower in wet periods than in drought ones. Moreover, the wetness maps prepared by the TASSELED CAP index showed that the average variation index was -0.05 and -0.04 in wet and drought periods, respectively. In other words, increases in moisture content during the wet period and its decreases during the drought period make the index negative in the wet period. The study's results revealed that vegetation was denser around the wetland during the wet period. Therefore, it could be argued that the microclimate of the area around the wetland was directly affected by the wetness or dryness of the Gavkhuni wetland.

Conclusions: Considered as one of the most important natural ecosystems, wetland habitats exert a significant influence on the temperature, vegetation density, and development of their surrounding areas. This study's results indicated that the higher the average moisture of a wetland is, the lower the temperature variation index would be, and the lower the average moisture index of the wetland is, the higher the temperature of the surrounding areas and the greater its influence on the region's temperature would be, leading the decline of the surrounding area's desirability.

Keywords: Humidity, LST, Landsat Images, MODIS Images, SEBAL