DEEJ (2020) 9 (27) 13-24

University of Kashan

Desert Ecosystem Engineering Journal

Journal homepage: http://deej.kashanu.ac.ir

Investigation of drought intensity changes in watersheds leading to dust centers in Khuzestan province

Fatemeh. Dargahian[1]*Zohre Ebrahimikhusfi[2], Amin Fazl Kazemi[3]

Received: 29/09/2019 Accepted: 22/04/2020

Extended Abstract

Introduction: All watershed-related issues including water management, drought, and other matters should be addressed in an integrated, simultaneous, and interconnected manner based on a comprehensive management model. One of the causes of intensification and development of dust centers Khuzestan province, especially throughout the last decade, has been the occurrence of successive droughts in the upstream and downstream of those basins including the outlet area of the three Great Basins, Great Karun, Karkheh, and Jarahi-Zohre. Drought profiles were used to evaluate the potential spatial and temporal variations of drought and wet events. Moreover, SPI and SPEI drought profiles were also applied .In the year 2008, a severe and widespread drought occurred in Iran. A large drought cycle occurred in the three studied basins from 1986 to 2017 .Water supplies of Khuzestan dam reservoirs have been decreased by 65% over the last decade. Water reserves in Dam Province reservoirs have decreased by 58% while the drought peaked in 2017. Drought indices were used to evaluate the severity, frequency, duration, and magnitude of the drought. To identify the intensity and magnitude of the drought, indices of meteorological drought occurrence could be divided into SPI indices in terms of speed, and SPIE indices in terms of accuracy and temperature conditions considered via the evaporation parameter which has risen due to increasing global temperature.

Materials and methods: Drought indices are used to assess the quality and quantity of drought phenomena. These indicators have different applications depending on the area and purpose of the study. To investigate the trend of decade-long drought changes in the Karun watershed, 44 * 44 km grid precipitation data have been used. Since in addition to precipitation values, evapotranspiration values are required to calculate SPIE indices, evapotranspiration values were, in this study, calculated through mean temperature data and the Torrent-White

1. Research institute of Forests and Rangelands, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran; Fatemeh.dargahian@gmail.com
2. Assistant Professor, Department of Natural Science, Faculty of Natural Resources, University of Jiroft
3. National Drought Center Researcher
DOI: 10.22052/deej.2020.9.27.11

DEEJ (2020) 9 (27) 13-24

University of Kashan

Desert Ecosystem Engineering Journal

Journal homepage: http://deej.kashanu.ac.ir

method. Temperature, evapotranspiration, and transpiration data were also interpolated from daily synoptic and meteorological climatology data and Iranian Water Resources Management Meteorological and Evaporation stations. Data were extracted and analyzed for a 50-year statistical period, and the SPI and SPEI drought indices were collected for each decade. Drought and wetland indices for 79 points were analyzed by bad zone kriging method and spatial distribution of drought and wetland potentials based on the two indices mentioned.

Result: According to the SPI drought index, during the first decade, an extreme and severe drought occurred at the boundary between the two surgical watersheds of Jarahi-Zohre and Karoun Basin, especially in the upstream of the drought basin. Large sections of the two basins were found to be affected by moderate to weak drought, whereas in the Karkheh Basin, especially at its wetlands, extreme drought had occurred. According to the SPEI index, drought intensity in all basins was low. Taking the SPI index into account, during the second decade all three watersheds mostly experienced moderate to weak droughts, and large parts of the watersheds had normal and near-normal conditions. But according to the SPEI drought index, due to the moderating role of temperature in this decade, most parts of all three basins had normal conditions, and the lower part of all three basins faced weak humidity. Within the third decade, all three basins faced humid-to-normal conditions on both indices. In this decade, the range of dust bogs faced weak to normal-humid conditions. In the fourth decade, the basins had near-normal conditions based on SPI. Large sections of the Karun and Karkheh basins had been mildly degraded based on the SPEI index, which may indicate a gradual increase in temperature and evaporation. According to the SPI index, moderate and weak droughts affect most of the area in the fifth decade, with severe drought in the downstream of the Karkheh basin and two core upstream of the Karoun Basin in the Jarahi-Zohre watershed where most foci Walnut specks of dust are located due to the rising temperatures in the SPEI index over a large area of the three watersheds which had been hit by severe and very severe drought. Accordingly, as found by the SPEI, more than 95% of the watersheds faced severe droughts in this decade.

Discussion and Conclusion: Drought is rooted in the general circulation of the atmosphere, and the effects of climate change have increased in recent decades as global warming has intensified regional-scale droughts. Increasing atmospheric CO2 causes global warming which in turn leads, according to the findings of many studies, into wider and more severe droughts. As a natural and inseparable part of the climate, drought may occur in any climate, desert, or even forest. This natural disaster is particularly severe in arid and semi-arid climates with severe constraints on water resources. In the first two decades of the study period when the temperature did not increase significantly, the drought events were, based on the SPEI index, less severe in all basins than the SPI index. However, the downstream of the watersheds and the range of dust bins were much more intense, particularly in terms of the SPEI index, in the last decade due to the increase in temperature and consequently the increase in evapotranspiration and drought intensity.

Keywords: Torrent White Evapotranspiration, Watershed Management, Source Dust, Drought Severity.