

Evaluation of Palmer Drought Severity Index in Central Iran

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Abstract

The Palmer Drought Severity Index (PDSI), which uses hydrometeorological variables to solve a simple water balance equation in the soil and considers the drought or wet conditions as dynamic phenomena, is used for the assessment of drought conditions in many parts of the world. The main goal of this study was to assess the PDSI based on its original assumptions, its regionalized status, using the outputs of already calibrated and validated SWAT model in central regions of Iran. The PDSI was assessed through five methods: 1) original Palmer Index without calibration in which the climate coefficients and the severity equation were derived for Kansas and central Iowa; 2) original Palmer Index in which the coefficients of severity equations were adjusted; 3) the Palmer Index with the calibration of equations in central areas of Iran; 4) the Palmer Index using the soil moisture and potential evapotranspiration from SWAT model; and 5) the Palmer Index using the soil moisture, potential evapotranspiration and runoff from SWAT model. The evaluation was conducted for 17 major basins covering the entire country with a monthly time step for the period 1990-2002. Then, using all five methods, the severity of the drought for 160 sub basins located in central Iran was calculated and evaluated. The results of this study indicated that method 4 provides more acceptable results. Also, the results of this research showed these methods clearly demonstrated (1992) as the wettest year and (2001) as the driest year. The approach used in this study is applicable to regional calibration of Palmer Index and the outputs of other hydrological models.

Keywords: Calibration, Central Iran, Drought, Palmer Index, SWAT model.

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