Water Resour Manage (2011) 25:1737–1757
DOI 10.1007/s11269-010-9772-z

Comparability Analyses of the *SPI* and *RDI* Meteorological Drought Indices in Different Climatic Zones

Davar Khalili · Tohid Farnoud · Hamed Jamshidi · Ali Akbar Kamgar-Haghighi · Shahrokh Zand-Parsa

Received: 31 July 2010 / Accepted: 21 December 2010 /
Published online: 7 January 2011

Abstract Comparability analyses are performed to investigate similarities/differences of the standard precipitation index (*SPI*) and the reconnaissance drought index (*RDI*), respectively, utilizing precipitation and ratio of precipitation over potential evapotranspiration (ET_0). Data are from stations with different climatic conditions in Iran. Drought characteristics of the 3-month, 6-month and annual *SPI* and *RDI* time series are developed and Markov chain order dependencies are investigated by the Log-likelihood, *AIC* and *BIC* tests. Steady state probabilities and Markov chain characteristics, i.e., expected residence time in different drought classes and time to reach "Near Normal" class are investigated. According to results, both indices exhibit an overall similar behaviour; particularly, they follow the first order Markov chain dependency. However, climatic variability may produce some differences. In several cases, the "Extremely Dry" class has received a more critical value by *RDI*. Furthermore, the expected residence time of "Near Normal" class and expected time to reach "Near Normal" class are quite different in a number of cases. The results show that the *RDI* by utilizing the ET_0 can be very sensitive to climatic variability. This is rather important, since if the drought analyses are for agricultural applications, utilization of the *RDI* would seem to serve a better purpose.

D. Khalili (✉) · T. Farnoud · H. Jamshidi · A. A. Kamgar-Haghighi · S. Zand-Parsa
Water Engineering Department, College of Agriculture, Shiraz University, Shiraz, Iran
e-mail: dkhalili@shirazu.ac.ir

T. Farnoud
e-mail: t.farnoud@gmail.com

H. Jamshidi
e-mail: hjamshidi61@yahoo.com

A. A. Kamgar-Haghighi
e-mail: aakamgar@shirazu.ac.ir

S. Zand-Parsa
e-mail: zandparsa@shirazu.ac.ir