

Climate change impacts on drought severity

A. Loukas, L. Vasiliades and J. Jabiras(1)

(1) Department of Civil Engineering, University of Thessaly (aloukas@civ.uth.gr/Fax: +30 2421074169)

Potential future climate change will have significant impact on local and regional meteorological and hydrological regimes, which will in turn affect ecological, social and economical systems. However, climate-change impact studies on hydrologic regime and especially on droughts have been relatively limited until recently, mainly because of the limitations of Global Circulation Models, which are widely used to simulate future climate scenarios. The major problem of the current generation of GCMs is the limitation of their spatial resolution and the resolution of the output. Various statistical downscaling methods and downscaling through coupling of GCM output and regional meteorological models have been used to overcome the spatial resolution limitation of the GCMs. The Canadian Centre for Climate Modeling Analysis General Circulation Model (CGCMa2) has been used to estimate the precipitation changes for the periods 2020-2050 and 2070-2100 and for two future socioeconomic scenarios (SRES A2, SRES B2). This study investigates and applies two statistical downscaling techniques to generate the possible future monthly values of precipitation for the region of Thessaly, Greece. The downscaled monthly rainfall data are used for the estimation of the Standardized Precipitation Index (SPI) computed at various time scales to assess drought characteristics (intensity, duration, and severity) for present and future climate conditions. The downscaling methods are validated using historical data for the period 1960-2002. Comparison of the drought characteristics for the historical base period (1960-1990) and the two future periods indicates that the drought intensity, duration and severity increases for the examined climate change scenarios.