Desalination and Water Treatment
www.deswater.com

doi: 10.1080/19443994.2014.984926

57 (2016) 2256–2267
January

Taylor & Francis
Taylor & Francis Group

Assessment of climate change impact in the hydrological regime of River Pinios Basin, central Greece

A. Panagopoulos[a], G. Arampatzis[a], E. Tziritis[a,*], V. Pisinaras[a], F. Herrmann[b], R. Kunkel[b], F. Wendland[b]

[a]*Hellenic Agricultural Organization, Land Reclamation Institute, 57400 Sindos, Greece, email: tziritis@gmail.com (E. Tziritis)*
[b]*Forschungzentrum Juelich GmbH, Agrosphere Institute (IBG-3), D-52425 Juelich, Germany*

Received 19 May 2014; Accepted 11 September 2014

ABSTRACT

In order to assess the potential impacts of climate change in the hydrologic regime of River Pinios Basin, an area-differentiated model for total run-off (Qt) estimation based on the GROWA model was applied with bias-corrected precipitation and temperature data from four regional climate models (RCMs) for the projected periods 2020–2050 (period A) and 2050–2080 (period B). Bias correction was performed using the linear scaling approach. As a reference basis, monthly precipitation data from 57 meteorological stations and average temperature data from 17 stations were analyzed for the period 1980–2000. Relative assessments were achieved by comparing reference to projected periods values for Qt, after incorporating bias-corrected projected climate data from the four RCMs driven by several general circulation models (GCMs) as input data to the hydrological model. Results showed that all RCM–GCM combinations lead to a considerable decrease in total run-off with variable rates between the examined projected periods; the greatest reduction of Qt (62%) from the reference period was forecasted for period A (2020–2050), and was simulated when GROWA model ran with input data from HIRHAM5 model driven by ARPEGE GCM, which indicated greater decrements in precipitation and increments in temperature. Regarding the estimations of total run-off for the end of the projected periods (2080) with simulated climatic data input from HIRHAM–ARPEGE, RACMO–ECHAM5 and REMO–ECHAM5 RCM–GCM combinations, a significant adverse impact to the overall water budget is forecasted, as the total amount of Qt is decreased from 46 to 66%. On the contrary, when Qt was simulated with climatic data from RCA4 RCM driven by HadCM3, smoother rates were exhibited due to smaller variations of precipitation and temperature from the reference period and the relevant Qt reduction by the end of the projection (2080) is 22%.

Keywords: Climate change impact; Water balance; Total run-off; Thessaly; River Pinios Basin

*Corresponding author.

Presented at AdaptToClimate conference, 27–28 March 2014, Nicosia, Cyprus