Abstact

Nowadays, the climate change is one of the most important subjects in the world, so that all major planning in the field of environment and even politics are associated with climate change. Two important variables in hydrology are air temperature and precipitation. Climate change has different effects on the spatial and temporal distribution of water resources, crop water requirements and water consumption in the agricultural. So climate change and its effects, are considered the most important challenges in the planning and management of water resources. Thus, the objectives of this study are improvement of design and planning of water resources affected by climate change, which emphasize on changing river flow and its utilizations. In this study, air temperature and precipitation data of Halilrood basin obtained from the large-scale atmospheric general circulation model (HadCM3) has been downscaled to three scenarios i.e. A1B, A2 and B1 by using LARS-WG. For simulatation of rainfall - runoff by semi-conceptual IHACRES, WEAP and ANN models, air temperature, precipitation and flow data in the base period (1989-2014) were used. Based on the results of the validation, ANN was selected using downscaled outputs for calculation of discharge in the next period (2045-2016). For estimation of the future water requirements, at first ET in the base period (1991-2014) was calculated using Hargreaves-Samani and ANFIS and the results showed ANFIS is suitable method. So ANFIS was used to estimate the water requirement in the next period i.e. (2016-2045). Finally, situation of water resources and water allocation in the future is simulated by WEAP model. the results of the climate model indicate rising air temperature and reducing precipitation in the next period as compared to the base period. So that under A1B, A2, B1 scenarios air temperature increases, 1.2, 1.1 and 1.4° C respectively, and precipitation decreases, 16, 11, 18 percent respectively. As a consequence of rising air temperature and decreasing precipitation, the Halilrood discharge decreases. So that under A1B, A2 and B1 scenarios, Halilrood discharge decreases 15, 17.2 and 20 precent. On the other hand, by increasing air temperature, ET and water requirements increases. Thus, under A1B, A2 and B1 scenarios, water reguirements increases 11.14, 16 and 13 percent respectively, in the next period. At last WEAP model output with respect to climate scenarios and existing cultivated lands indicates that reliability on the water resources system is decreasing.

Keywords: Climate change, planning, Crop water requirements, WEAP, GCM, A1B, A2, B1 scenarios.

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Water Resources Planning of the Halilrood Basin Affected by Climate Change

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