Assessing basin blue-green available water components under different management and climate scenarios using SWAT

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Abstract

Because the pattern of climate and water demand varies, available water (AW) must be determined to facilitate policymaking and to prepare for sustainable use of water resources. This study investigated the components of basin water availability using a comprehensive water balance framework based on SWAT model. The resulting system is capable of supporting systematic presentation of the current status and past trends in the components of AW, presentation of interlinkages of blue and green water components, assessment of measures on AW at farm and basin scales, spatial and temporal variations of AW components under different water policies and climate scenarios and evaluation of water shortage. To explore this methodology, the system was applied to the Tashk-Bakhtegan basin (Iran). The results for the historical period showed wide ranges for the blue water components, which was 113 mm on average. While it was 48.2 mm for green water components. Similarly, blue water was more sensitive than green water to the future annual precipitation variations. Evaluation of the construction of the Durodzan dam (the basin's major water storage facility) showed that it has drastic impact on the spatial blue AW components. Such that they are increased in the adjacent subbasin up to 97% and reduced to half the status quo in the downstream subbasins. The basin has also experienced 30% increase in its cropped areas between 1987 and 2015 that has resulted 1500 MCM water shortage in the current condition. Considering the framework as a relatively easy-to-use tools with readily available data, is strongly recommended for other regions.

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