



Human interventions impacts: the role of reservoir operations on drought propagation

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The reservoir is a hydroengineering structure to regulate discharge in rivers and store water. It can be used for flood control, water supply, irrigation, power generation, etc. It is also used for physical water management to cope with droughts at the catchment scale. The reservoir operations can have a mitigating and/or enhancing impact on droughts and their propagation from meteorological to agricultural and hydrological drought.

The aim of the study is to assess the role of reservoir operation on drought propagation using the Sulejow and Wiory reservoirs as case studies in the catchments of the Pilica and Kamienna rivers (central Poland), respectively. Two approaches, namely hydrological modelling and the observation-based approaches, were used for the study. In the hydrological modelling method, the naturalised hydrological variables in the post-dam period simulated using the Soil and Water Assessment Tool (SWAT) were compared with the observed values in the same period, while in the observation-based approach, the upstream and downstream hydrological variables such as soil moisture (remote sensing data) and observed river discharge were used. In addition, the SWAT with reservoir was considered by applying the target reservoir release method for simulating the downstream hydrological variables and comparing it with the method without reservoir. The threshold method, based on the parameter transfer method, was applied in the analysis of drought conditions to account for the non-stationarity of the hydro-climatic variables.

Preliminary results suggest that the two approaches are consistent in showing the impact of reservoir operations on the propagation and characteristics of droughts. In addition, the comparative analysis between the reservoirs shows differences based on their purpose. The results of the study can be used to understand the propagation of drought in human-altered watersheds and to appropriately manage water resources for drought mitigation.

Acknowledgements

This work was supported by the HUMDROUGHT (<https://humdrought.igf.edu.pl>) project carried out at the Institute of Geophysics of the Polish Academy of Sciences and funded by the National Science Centre (contract 2018/30/Q/ST10/00654).