EGU22-5412
https://doi.org/10.5194/egusphere-egu22-5412
EGU General Assembly 2022

Analyzing the Dependence of Major Tanks in the Headwaters of the Aruvi Aru Catchment on Precipitation. Applying Drought Indices to Meteorological and Hydrological Data as a means to evaluate their efficiency

Wiebke Bebermeier, Robin Saase, and Brigitta Schütt
Freie Universität Berlin, Institut of Geographical Sciences, Earth Science, Berlin, Germany (wiebke.bebermeier@fu-berlin.de)

In the dry zone of Sri Lanka, human-made reservoirs, being connected by canals and spillways serve since 2000 years for the collection, storage and distribution of rainfall and runoff and provide irrigation water for the cultivation of paddy (Bebermeier et al. 2017). These systems, known as tank-cascade system, focus on numerous state of the art watershed management strategies like flood prevention, soil erosion control, water quality control and are based on an elaborated governance system (Schütt et al. 2013).

In this presentation we will analyse the dependence these reservoirs (locally called tanks or wewas) in the headwaters of the Aruvi Aru catchment on precipitation as a means of evaluating their efficiency. The the Aruvi Aru is located in the dry zone of Sri Lanka, and numerous human made reservoirs characterize its catchment. Methodologically the study is based on a correlation of climatically and hydrologically drought indices, by applying the Standardized Precipitation Index (SPI) after McKee et al. (1993) to precipitation data at different time scales and to water-level data of five major tanks in the catchment. Achieved results show that near normal present-day average precipitation is appropriate to fill the investigated tanks. As main driving factor of water level changes, the precipitation of the last 6–12 months was identified. Two other factors were responsible for water level changes of the tanks: these are: (i) catchment size together with the buffering capacity of the upstream catchment and (ii) management practices. As the overall conclusion of our study shows, the tanks functioned efficiently within their system boundaries (Saase et al. 2020). In consequence this water harvesting and management system, being well adopted to local conditions, has a high capacity to mitigate effects of climate change in the dry zone of Sri Lanka.

References:

Bebermeier, W., Meister, J., Withanachchi, C.R., Middelhaufe, I. and Schütt, B., 2017. Tank Cascade Systems as a Sustainable Measure of Watershed Management in South Asia. Water, 9(3). https://doi.org/10.3390/w9030231

McKee, T.B.; Doesken, N.J.; Kleist, J., 1993. The relationship of drought frequency and duration to

time scales. In Proceedings of the Eighth Conference on Applied Climatology, Anaheim, CA, USA, 17–22 January 1993; American Meteorological Society: Anaheim, CA, USA; pp. 179–184.

Saase, R. Schütt, B. and Bebermeier, W. 2020. Analyzing the Dependence of Major Tanks in the Headwaters of the Aruvi Aru Catchment on Precipitation. Applying Drought Indices to Meteorological and Hydrological Data. Water, 12(10), 2941; https://doi.org/10.3390/w12102941

Schütt, B., Bebermeier, W., Meister, J. and Withanachchi, C.R., 2013. Characterisation of the Rota Wewa tank cascade system in the vicinity of Anuradhapura, Sri Lanka. Erde, 144(1): 51- 68.