Geophysical Research Abstracts
Vol. 20, EGU2018-6979, 2018
EGU General Assembly 2018

Comparing the 2015-2016 drought in Southern Africa with historic droughts – the case of the Incomati River Basin

Lungile Sifundza (1), Ilyas Masih (1), Pieter van der Zaag (1,2)

(1) IHE Delft, Institute for Water Education, Integrated Water Systems and Governance, Netherlands (sifun1@un-ihe.org), (2) Delft University of Technology, Section of Water Resources, Delft, The Netherlands

Southern Africa is one of the regions most affected by droughts with severe impacts, which are expected to increase under climate change and growing anthropogenic pressures on water use. The societies in the region are most vulnerable as the majority of the population depends on rainfed agriculture for their livelihoods, and meeting water demands for irrigation, industry, domestic and environmental uses is a challenging undertaking, especially during dry years. In such regions, drought forecasting and characterization become one of the most critical components for drought preparedness as it informs the mitigation and adaptation measures. Moreover, learning from the past drought experiences is essential to support future drought management.

This paper presents a case study from the Komati and Crocodile catchments of the Incomati Basin in Southern Africa, which is shared by South Africa, Swaziland and Mozambique. The 2015-2016 drought event was characterized and compared with historic drought events using anomaly analysis, Standardized Precipitation Index (SPI) and Standardized Runoff Index (SRI) drought indicators, and reservoir levels. The precipitation anomaly and SPI analyses were based on the data of two meteorological stations, Witklip (station code: X2E010) and Elandspruit (X2E013), available for the periods 1970-2017 and 1981-2017, respectively. The river flow anomaly and SRI analysis were carried out using the data form Hooggenoeg (X1H001) and Boschrand (X2H005) gauging stations for the years 1910-2017 and 1930-2017, respectively. The reservoir storage records of Maguga and Driekoppies dams managed by the Komati Basin Water Authority (KOBWA) were examined for the available period of April 2002 to March 2017.

A clear increase in the frequency, intensity and severity of both hydrological and meteorological droughts has been observed, most notably after the 1980s. The 2015-2016 drought was yet another severe drought in the last 50 years, like the severe droughts recorded during 1982-83, 1991-95, 1998-99, and 2003-05. A strong correlation between SPI and SRI (e.g. r2=0.67 at a one month lag) indicated that hydrological drought could be observed one month after the meteorological drought in the basin. However, in a regulated basin like Incomati, reservoir storage and operations could play a significant role in delaying the impacts of hydrological droughts faced by the water users. For instance, the 2015-2016 drought was already forecasted at the start of the rainy season (October 2015). But the water users (including irrigation farmers) depending on the releases from Maguga and Driekoppies Dams started facing shortages several months later (after April 2016) when water rationing was initiated by KOBWA. This highlights the need of considering water management alternatives while characterizing the hydrological and agricultural droughts in a river basin. Further developments in the drought forecasting tools could support decision makers in drought characterization and scientifically well-informed drought management actions in such basins. Moreover, drought analysis and management should receive more attention in the Incomati, and similar river basins in Southern Africa, where climate change and human interventions have aggravated the drought phenomenon.

Keywords: drought forecasting; drought characterization; drought preparedness; drought management; the 2015-2016 drought; Incomati basin