

## **Assessing basin heterogeneities for rainfall–runoff modelling of the Okavango River and its transboundary management**

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**Abstract** The neighbouring river systems Cubango and Cuito drain the southeastern part of the Angolan Highlands and form the Okavango River after their confluence, thus providing 95% of the Okavango River discharge. Although they are characterised by similar environmental conditions, runoff records indicate remarkable differences regarding the hydrological dynamics. The Cubango River is known for rapid discharges with high peaks and low baseflow whereas the Cuito runoff appears more balanced. These differences are mainly caused by heterogeneous geological conditions or terrain features. The Cubango headwaters are dominated by crystalline bedrock and steeper, v-shaped valleys while the Cuito system is characterised by wide, swampy valleys and thick sand layers, thus attenuating runoff. This study presents model exercises which have been performed to assess and quantify these effects by applying the distributive model J2000g for each sub-basin. The models provide reasonable results representing the spatio-temporal runoff pattern, although some peaks are over- or underestimated, particularly in the Cuito catchment. This is explained by the scarce information on extent and structure of storages, such as aquifers or swamps, in the Cuito system. However, the model results aid understanding of the differences of both tributaries in runoff generation and underpin the importance of floodplains regarding the control of runoff peaks and low flows in the Cuito system. Model exercises reveal that basin heterogeneity needs to be taken into account and must be parameterised appropriately for reliable modelling and assessment of the entire Okavango River basin for managing the water resources of the transboundary Okavango River in a harmonious way.

**Key words** basin heterogeneity; Cubango River; Cuito River; distributed hydrological modelling; flood plain morphology; HRU, hydrological system analysis; J2000g; Okavango River