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# Characterising the flow regime in a largely ungauged natural basin: the Omo-Ghibe basin in Ethiopia.

The Omo-Ghibe basin in Southern Ethiopia is currently largely a natural basin, with very little developments such as water resources infrastructure or irrigation. Despite its size, some 79000 $km^2$, only a small part of the basin is gauged. Hydrological and meteorological gauges are found primarily in the upper part of the basin in the Ethiopian highlands. The lower part of the basin is largely undeveloped, populated only by nomadic tribes. The Omo-Ghibe river terminates in Lake Turkana. There are no outflows from Lake Turkana, making the Omo-Ghibe basin an Endorheic basin, and therefore very sensitive to changes in the water balance. In recent years the level of development in the basin has been increasing, including the large Ghibe-III dam, now nearing completion, as well as the extensive irrigation areas. These developments will no doubt impact the water balance in the basin. However, the lack of data in the basin makes estimating these impacts difficult. Equally difficult is the developing of an understanding of changes in the basin water resources that have already taken place. In this paper an approach is presented where the flow regime in the basin is identified using selected hydrological indices that characterise the variability of the water balance in the basin in terms of magnitude, duration, timing, frequency and predictability. The water balance of the ungauged lower part of the sub-basin, and thereby for the whole basin was determined using a simple Budyko framework, supported by remotely rainfall data and ERA-Interim re-analysis data. These indices developed based on the water balance for the whole basin will improve the impact the proposed developments such as the Ghibe-III dam will have, and may help in proposing strategies in managing the water resources whereby negative impacts are mitigated. The analysis of the indices using the available historical data as well as the estimated water balance in the ungauged area suggest that there are already significant changes to the flow regime, possibly due to land use and land cover change in the basin.