

**Impact assessment of irrigation water abstraction on river flow systems in Usangu plains,  
Tanzania**

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This study was aimed at estimating the irrigation water requirements in the upstream catchments of the Utengule swamp in Rufiji basin. It is an attempt to analyse the contribution of irrigation practice in reducing the flow recorded at Msembe (IKa59), and subsequent inflow into the Mtera reservoir, which is one of the main sources of power supply in Tanzania. Eleven catchments were identified, nine of which had irrigation activities. Irrigation water requirements for the identified irrigation schemes were estimated using a model developed based on Penman-Monteith equation with rice taken as the major wet season crop. The area transplanted in the growing season was determined by use of a model which optimized the area under the constraints of amount of flow in the supplying river, intake capacity, level of abstraction and the maximum irrigated area in the 1999 wet season. The irrigation impact of abstraction of each river unit was determined. Five windows were considered in an attempt to depict effect of areal rice expansion on irrigation water abstraction. From the eleven catchments, inflow was determined. The total inflow to the Utengule swamp was then estimated by correcting the determined inflow for irrigation water abstraction. A comparison was carried out between the total amount of inflow into the Utengule swamp with and without irrigation. Determination of the change in swamp storage as a result of irrigation activities was also carried out. The Puls routing technique was used in an attempt to reproduce the simulated swamp outflows. The continuous decline in the troughs of the observed outflow hydrograph was also investigated. It was found out that during the wet season the irrigation impact by volume is 19% while in the dry season it is 36%. The volume of irrigation water abstraction increased from 10 m<sup>3</sup>/s between 1958 and 1967 to 30 m<sup>3</sup>/s between 1993 and 1998. There is insignificant effect in the depth of storage from irrigation water abstraction. There has been a decline in both inflow volume and storage during the dry season causing a continuous decline in the troughs of the outflow hydrograph.