

## **Integrated surface water and groundwater resources management in Makueni District, Kenya**

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**Abstract** Makueni District is one of the arid and semi-arid areas in Kenya falling under agro-ecological zone IV-V, and occupying a total land area of 7965.8 km<sup>2</sup> representing 0.014% of Kenya's land cover. The district receives rainfall in two seasons with a rainfall pattern similar to the national rainfall pattern. Rainfall contributes significantly to the availability of water resources in the district. The water resources mainly comprise the few perennial rivers traversing the district and the numerous seasonal streams cutting across deep valleys in the district. The major rivers include the Athi River with its various tributaries of Muooni, Kiboko and Kibwezi, all of which become seasonal in places. Groundwater resources are scanty due to the nature of the basement rocks. The only significant sources are found within the volcanic systems but the yields are relatively low and the water is somewhat saline. Certain areas have springs that contribute enormous amounts of water and include: Simba, Kiboko, Umani and Kibwezi springs. Water from these sources is utilized for horticultural production, domestic water use and livestock watering. These activities constitute the main economic undertakings by the populace. However, due to increasing population and re-distribution in the district, the available water resources are unable to meet the development goals of the district, as well as afford a sustainable use of the available water resources in the district. This paper examines the Integrated Water Resources Management (IWRM) strategies in addressing exploitation and development challenges in the district, and offers options in the management strategies of the available water resources in relation to population dynamics, development strategies and sustainable environmental conditions.

**Key words** integrated strategies; water resources and development options; Kenya