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## Assessing the Potential of Floodwater Harvesting in Seleit Area Wadis, Sudan - Using Remote Sensing and GIS

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### Abstract

Seleit Area constitutes the northeastern part of Khartoum state in Sudan. It is located between 32° 31' - 33° 00' E and 15° 45' - 16° 00' N; and has an area of 1,150 km<sup>2</sup>. The area is a flat plain with some scattered cropouts. It is of a semi arid climate, where the spatial variation in amount and duration of rainfall during the rainy season is dominant (average annual rainfall 120 mm), with sparse vegetation. About 80 % of the area is dominated by the rangeland with little cultivation near the Nile and in the courses of the wadis (ephemeral seasonal streams). The main wadis of this region are El Kangar, El Seleit, El Jaili, and El Kabbashi. The area experienced destructive flash floods due to rainstorms with high intensity and short duration in addition to the sparse vegetation. During the years 1988, 1994, 1998 and 2001, the area was subjected to severe flash floods that left huge losses for the settlement there. The assessment of the potential floodwater harvesting in the area was carried out using the NAM Rainfall-Runoff model to estimate the potential runoff. The watersheds of the four wadis were defined and calculated using ArcHydro. The areas of wadi El Kangar, El Seleit, El Jaili and El Kabbashi are found to be 554.36 km<sup>2</sup>, 398.25 km<sup>2</sup>, 114.17 km<sup>2</sup>, and 57.48 km<sup>2</sup>, respectively. The potential of the water volume for the individual rainstorm was calculated. The runoff for the maximum annual rainfall for wadi El Kangar, El Seleit, El Kabbashi and El Jaili are found to be 1530.213, 1048.119, 163.1, and 321.784 (m<sup>3</sup>/s) respectively. The Remote Sensing and GIS were used to define the wadis of the study area downstream and to localise the WH sites. They found to be of great help for data preparations and for decision making. The study came to a conclusion that the potential of water harvesting in the study area exists. Implementing such systems could open new environments for permanent and better settlement conditions as well as new opportunities for sustainable development.

**Keywords:** ArcHydro, flash floods, floodwater harvesting, GIS in hydrology, NAM model, remote sensing, wadis, watershed