

ABSTRACT

Application of GIS on the Identification of Suitable Areas for Water Conservation Technologies in the Upper Tana Watershed of the Central Highlands of Kenya

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Low adoption of soil water conservation technologies has been one of the main causes for decreased agricultural productivity in the Upper Tana Catchment of Kenya. Proper identification of locations to scale-out the individual technologies necessary to improve water conservation is a key determinant for the rate of adoption. Our main aim was to identify the suitable sites for water conservation technologies using the suitability model created by the model builder function in ArcGIS 10.5®. The model combined the thematic layers of soil texture, slope, rainfall, and stream order, which were acquired from assorted online sources. The factors were converted to raster format and reclassified based on their suitability and were assigned fixed scores and weights by use of multi influencing factor (MIF) method. The suitability evaluation was carried out by use of weighted overlay to produce suitability classes for each of the water conservation technique. The delineated suitability maps indicated that check dams are highly suitable in 50% of the study area. Mulching, on the other hand, is highly suitable for 49% of the study area. Zai pits are highly suitable in 43% of the study area. Majority of the study area is moderately suitable for the use of terraces, covering 41% of the study area. The highly suitable areas for the Checkdams are Machakos, Kitui, Tharaka-Nithi and lower parts of Embu. The highly suitable areas for mulching are Kirinyaga, Murang'a, Nyandarua and Nyeri. The highly suitable areas for the Zai pits are Kitui, lower parts of Tharaka-Nithi and the highly suitable areas for the terraces are Murang'a, Nyeri and Kirinyaga. Furthermore, the results demonstrated the effectiveness of GIS in delineating the suitable areas for the use of water conservation technologies.

Keywords: Agriculture zai pits; mulching; terraces; check dams; Geographical Information System (GIS); weighted overlay; suitability map.