POSSIBILITY OF RAINFALL-RUNOFF MODELING IN AWASH RIVER BASIN, ETHIOPIA

G. Takele, J. W. Kaluli, A. Z. Gariy and R. N. Mutukui
Pan African University Institute for Basic Sciences, Technology and Innovation, Kenya
Jomo Kenyatta University of Agriculture and Technology, Kenya
Email: *tgadissa@yahoo.com*

Awash River Basin is located between 7°53'N and 12°N latitudes and 37°57'E and 43°25'E of longitudes. It is a major river basin that has serious flood problems and is cited as a high flood risk zone. The purpose of this paper is to review the causes and applicable rainfall-runoff models for Awash River flooding. Uncontrolled deforestation and expansion of farmlands are some of the main causes of flooding in Awash river basin. Vegetation cover in the river basin was reduced from 7.8% in 1983 to 2.5% in 2000, while agricultural land expanded from 41.7% to 46.1% in the same period. This in turn increased sediment load in Awash river flow. The capacity of Koka reservoir has gradually been reduced from 1850 mm^3 in 1960 to 1188 mm^3in 1999. Climate change is also the major factor affecting the magnitude and frequency of precipitation and floods. Rainfall-runoff modeling have potential use in developing countries to minimize the damages that will happen to human life and properties. The most common classification of rainfall-runoff models are: empirical or black box, conceptual or grey box, and physically-based or white box model structures. The physically-based or white box model is demanding enormous data and the requirement for computation is also high. It is used when high level of detail, and consideration of land use and climate change effects is important. By deriving important variables from remote sensing data and using geographical information system (GIS), the distributed physically-based model can be applied to large river basin like Awash where both rain gauge and climatic data are sparse. MIKE-SHE is a physically-based model and has been used in a broad range of applications including detailed flood modeling. SWAT (semi-distributed physically-based) model adequately predicts runoff and sediment yield using remote sensing data. HBV model is a conceptual model and performs well in predicting runoff. If the main interest is simply the estimation of stream flow at the catchment scale, then simpler black box models like Artificial Neutral Network (ANN) often perform well. For the situation in Awash River basin, MIKE-SHE model is capable of simulating major processes such as the prediction of flood, sediment yield and land use and climate changes.

Key words: Rainfall-runoff, models, Awash River, black box, conceptual, physically-based