

The study assesses the extent of change in some hydrological and geomorphological aspects within Lake Nakuru catchment area. To achieve this, trends in the climatic elements of rainfall and evaporation, and how they relate to falling water levels of the lake and its feeder rivers for the period 1967 - 2003 were investigated. In addition, spatial distribution of relative relief and land cover in each 1 km² grid were used to map potential soil erosion in the drainage basin. Stream network extent, computed from drainage densities were used to establish the sediment transport capacity for rivers draining into the lake.

Cyclic and non-cyclic visual determination of trends in climatic and hydrologic components was computed by use of various analytical techniques. Time series analysis using regression lines and running averages were computed to examine any cyclic events in the trends. In addition to this, analysis of seasonality patterns was also calculated to establish month to month variabilities in the trends. Characteristics of extreme low flow events in the downstream direction of River Njoro (which has the major inflow into Lake Nakuru) were computed by use of frequency and probability analysis of recurrence intervals. ArcView Geographical Information Systems (GIS) algorithms were used to compute spatial distribution of areas with topographic potential for erosion and directional derivatives of surfaces representing sediment transport routes. To do this, a combination of satellite imagery (SPOT) and topographic maps were used to compute spatial distribution of land cover/use, slope steepness and drainage densities in the Lake Nakuru basin. Runoff potential for each land cover/slope combinations were computed in a grid based analysis to classify potential soil erosion characteristics in the basin. Digital Elevation Maps (DEM) and unit stream transport power analysis were integrated, to visually reveal potential delivery of sediments into the lake.

Findings emerging from the study indicate that only trends of lake levels are significant. This means that water levels of Lake Nakuru have been falling for the period 1967-2003. It was not possible to relate the decrease in lake levels to trends in climatic elements for the last 37 years. Both annual rainfall amounts and 5 - years running averages reveals a fairly stable cyclic pattern. Evaporation amounts on the other hand, show moderate variability though the trend was found not to be significant. Seasonal distribution of rainfall totals was found to have a significant relationship with stream discharges of River Njoro. Consideration of downstream changes in stream flow along the river portrayed different scenarios. The study reveals that during the dry seasons, flow past certain points along the river is decreasing despite an apparently unchanging rainfall regime. This was not the case for wet seasons. The results led to the conclusion that during dry conditions other factors like, surface and subsurface abstractions, contribute to lower flows as the river approaches the lake. In addition, analysis of low flow characteristics indicate that the proportion of time for which given flows were equalled or exceeded continues to decrease towards present. The increase in human population and continued encroachment into forests and grassland areas and fragmentation of farms is believed to be responsible for the low flows in rivers draining the watershed of Lake Nakuru. Results from GIS mapping and modelling indicate that a change in the land cover/use on slopes has a direct effect on the hydrological set-up of the Lake's watershed. Potential soil erosion was found

to be high in the steep headwater region compared to other areas of the drainage basin. A consideration of existing records and field observations indicate that headwater regions have experienced recent encroachment of agricultural fields into forest zones. Drainage density in the steep headwater zones is also high, hence high sediment transport capacity. The study concludes that sediments transported through the streams are contributing to siltation thus reducing the capacity of the lake to hold water. The foregoing events can be used to predict and hence plan changes in sediment production and transport to save the Lake. This could also guide in the formulation of policies that are geared towards management of soil and water resources in Lake Nakuru basin and others with similar land use scenarios.