



Impact of land use changes on hydrology of Mt. Kilimanjaro. The case of Lake Jipe catchment

Keziah Ngugi (1), Harun Ogindo (2), and Maurits Ertsen (3)

(1) South Eastern Kenya University, School of Water, Kitui, Kenya (chayvo@yahoo.com), (2) Maseno University, Maseno, Kenya, (3) Delft University of Technology, Department of Water Management, Delft, Netherlands (m.w.ertsen@tudelft.nl)

Mt. Kilimanjaro is an important water tower in Kenya and Tanzania. Land degradation and land use changes have contributed to dwindling surface water resources around Mt. Kilimanjaro. This study focuses on Lake Jipe catchment of about 451Km² (Ndeti 2011) which is mainly drained by River Lumi, a tributary of river Pangani. River Lumi starts from Mt. Kilimanjaro and flows North east wards to cross the border from Tanzania to Kenya eventually flowing into Lake Jipe which is a trans-boundary lake. The main purpose of this study was to investigate historical land use changes and relate this to reduction in surface water resources. The study will propose measures that could restore the catchment thereby enhancing surface water resources feeding Lake Jipe. A survey was conducted to document community perspectives of historical land use changes. This information was corroborated using Landsat remote sensed images spanning the period 1985-2013 to determine changes in the land cover due to human activities on Lake Jipe Catchment. River Lumi flow data was obtained from Water Resources Management Authority and analyzed for flow trends. The dwindling extent of the Lake was obtained from the community's perspective survey and by Landsat images. Community survey and remote sensing indicated clearing of the forest on the mountain and conversion of the same to crop production fields; damming of river Lumi in Tanzania, conversion of bush land to crop production fields further downstream of river Lumi and irrigation. There is heavy infestation of the invasive species *Prosopis juliflora* which had aggressively colonized grazing land and blocked irrigation canals. Other land use changes include land fragmentation due to subdivision. Insecure land tenure was blamed for failure by farmers to develop soil and water conservation infrastructure. Available River gauging data showed a general decline in river flow. Heavy flooding occurred during rainy seasons. Towards Lake Jipe after the river gauging station, several springs discharge into river Lumi and the river becomes permanent. The community believes Lake Jipe is a dying lake and will be gone in the coming years unless interventions to save it are implemented. Most of river Lumi water was delivered directly into the lakes outlet, river Ruvu, thus by-passing Lake Jipe. This was due to siltation that blocked river Lumis mouth. Consequently, lake Jipes volume and surface area have reduced dramatically from over the years. Drying of Lake Jipe will affect a lot of people who depend on the lake and the ecosystem. Addressing the problems requires re-afforestation measures and soil and moisture conservation. The severe runoff need to be dammed especially on the Kenyan side to create artificial surface water resources. River Lumi should be trained to discharge into the lake. Land tenure security need to be improved as incentives for proper land utilization. New farming methods to increase land productivity will encourage farmers to practice soil and water conservation measure.