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Stream Flow and Sediment Yield Variability in Kenya's Upper Tana Basin

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Brief Report

In Kenya, the Tana River serves as a vital link between the Central Kenya Highlands and the Indian Ocean. In terms of freshwater, nutrients, and sediment discharge, he is correct. The river supports distinct marine and aquatic ecosystems in the Ungwana Bay region of the West Indian Ocean by the discharge of various materials. However, different developments in the Tana Basin's upper reaches, particularly the Upper Tana Basin, have resulted in significant shifts in material transit to the coast. Past studies in the basin have demonstrated that the Masinga reservoir, the basin's and Kenya's largest, has dramatically altered the flow of the Tana. The river's sediment load has also been reduced as a result of terrigenous materials being trapped in the reservoir. The siltation of the Masinga reservoir is gradually reducing the reservoir's storage capacity and reducing the dam's life expectancy. According to certain assessments, Masinga reservoir has already lost about 13.6%of its design storage capacity. Without effective soil and water conservation, including population decrease in the Upper Tana Basin, Kenya's most important HEP reservoir's storage capacity would be significantly diminished by 2050. This means that the dam's benefits, such as water supply, hydropower generation, flood control, and recreation, as well as ecological and environmental benefits, will be significantly affected.

Climate change in the Upper Tana Basin is causing considerable variations in the river's flow, in addition to the effects of hydroelectric dams. Rainfall variability has grown in the Central Kenya Highlands, the main water catchment area for the Tana river, in recent years. At the watershed level, changes in rainfall patterns have resulted in changes in stream flow (decrease) and silt production (rise). Land use and land cover change in the basin have mitigated the effects of climate change. Since the beginning of the nineteenth century, when European settlers opened the Central Kenya Highlands for settlement and agriculture, considerable land use and land cover changes have occurred, resulting in high rates of soil erosion. Due to a paucity of data, the extent to which these changes have impacted the river's stream flow and sediment load has yet to be determined. Several studies on river discharge and sediment output in the Upper Tana basin have failed to determine how critical variables like rainfall variability and land use vary Changes in agricultural usage have an effect on sediment output and river discharge in the catchment over time. Although land use, plant cover, and rainfall variability are known to have a significant impact on stream flow and sediment output, there is a scarcity of data to establish the interaction between these variables in Africa's tropical river basins. Seasonal and inter-annual changes in land use and drainage complicate the effects of rainfall on stream flow and sediment output and cover of vegetation.

As a result, without data on seasonal and inter-annual changes in stream flow, as well as land use/land cover changes, determining how the latter contributes to current stream flow patterns in the Upper Tana Basin becomes difficult. The study's major goal was to see how land use/land cover change and rainfall variability affect stream flow and sediment output in the North-West Upper Tana catchment in Central Kenya. This research adds to the existing discussion over how climate change and land use change affect river discharge and sediment production in Africa's tropical river basins. The findings of this study will be important in developing appropriate and long-term land and water management plans in the basin and throughout the Africa,

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