

EFFECTS OF WATER VARIATION ON HYDROPOWER PLANT FUNCTIONALITY

A case of Ntaruka hydropower

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Abstract

This study aimed at assessing the effects of Burera Lake water level variation on functionality of Ntaruka hydropower plant, over last ten years. The existing bathometric data of the lake ranges an approximate depth of 163-169m with a number of underground caves. Direct measurement of Lake water level has been done. The systematic recording began from 2005 to 2015. Historical data on situational and physical characterization of the study area, hydro-meteorological data, status of Cyeru, Rusumo and Kabwa affluent rivers, energy production and Lake water level were collected using reports and visitation of different areas that are affected and therefore draw on aspects of a case study of Ntaruka. The data were analyzed using statistical tools. In two separate rainy seasons with daily peaks varying around 10.00mm of rainfall in every April, May and November. The rainfall over the catchment is approximately 1163.00mm. The catchment registered a high annual evaporation of 1356.47mm due to the high water content from Rugezi Wetland and the lake itself. The lowest level was 1857.04m of altitude with reference to the sea level. When the three electrical tribunes are working at maximum capacity, the plant takes a discharge of 12 m³/s whereas the inlet in Burera Lake is 4.83 m³/s. Energy production relies on water availability, most of time it is necessary to shut down the plant so that water level should increase. This happens most of time during dry season or the time when energy demand is low. When the plant is shutdown; the lake water level is recovered. The critical production of energy is 1.4GWh which corresponds to 1860.00m of altitude; Burera lake water level is recuperated. This research is highlighting the need for alternative source of energy in order to balance water level in Lake Burera which is expected to be affected by several environmental hazards including climate change.

Keywords: *Water, Catchment, Energy production, Burera Lake, Ntaruka Hydropower Plant.*