



Soil erosion and sediment delivery issues in a large hydro-electric power reservoir catchment, Ethiopia

Amsalu Nebiyu (1), Bayu Dume (1), Samuel Bode (2), Hari Ram (2), and Pascal Boeckx (2)

(1) College of Agriculture and Veterinary Medicine, Jimma University, Ethiopia, POB 307, Jimma Ethiopia, (2) Isotope Bioscience Laboratory - ISOFYS, Faculty of Biosciences Engineering, Ghent University, Coupure links 653, B-9000 Gent, Belgium

Land degradation and associated processes such as gullying, flooding and sedimentation, are among the developmental challenges in many countries and HEP reservoirs in the Gilgel Gibe catchment, Ethiopia, are under threat from siltation. Soil erosion is one of the biggest global environmental problems resulting in both on-site and off-site effects which have economic implications and an essential actor in assessing ecosystem health and function. Sediment supply in a catchment is heterogeneous in time and space depending on climate, land use and a number of landscape characteristics such as slope, topography, soil type, vegetation and drainage conditions. In the Ethiopian highlands, sediment delivery depends on discharge, the onset of rainfall, land use and land cover, which varies between rainfall seasons. There is also a variation among catchments in suspended sediment concentration due to the variation in the catchments characteristics in Ethiopia. Rainfall-runoff relationship, sediment production and delivery to rivers or dams is variable and poorly understood; due to heterogeneous lithology; various climatic conditions across small spatial scales; land use and land management practices in Ethiopia. Spatial variation in sediment yield in Africa varies to differences in seismic activity, topography, vegetation cover and annual runoff depth. In the Gilgel-Gibe catchment, the annual sediment load of the Gilgel-Gibe River has been estimated to be about 4.5×10^7 tons taking the contribution of sheet erosion alone. Also, the suspended sediment yield of the tributaries in Gilgel-Gibe catchment has been estimated to be in the range of 0.4-132.1 tons per hectare per year. The soil loss due to landslide alone in the past 20 years in the catchment was about 11 t/ha/yr. Heavy rainfall, bank erosion and river incisions have been indicated as the main triggering factors for landslides and the associated sediment delivery in the Gilgel-Gibe catchment. Approaches for catchment restoration and reduction of sediment flux are considered. The long term sustainability of HEP power generation in Ethiopia is evaluated in this context.