

Effects of transnational land deals on peak discharge and sediment transport in the catchments around the Grand Ethiopian Renaissance Dam

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Abstract

Sustainable hydroelectric power development requires protection and conservation of upstream catchments. An interesting case in this regard is the fact that the Government of Ethiopia is constructing Africa's largest hydroelectric power dam, the Grand Ethiopian Renaissance Dam (GERD), on the Blue Nile River while delivering in the same time tracts of land for commercial farming in the closer upper catchments. The dam has an estimated impounding capacity of 74 billion m³ (due completion in 2017). Considering these investments, it is necessary to determine the effects of the commercial farms on peak discharge and sediment in the surrounding of the hydroelectric power dam. Accordingly, this field survey was conducted from February to August 2015 on 20 ephemeral streams in Dangure district so as to compare peak discharges between 5-20 km² catchments draining commercial farmland and others draining land under traditional management. Besides, socio-economic data was collected from 385 households from the study areas. We measured channel characteristics and applied the empirical Manning equation. We presented comparative results on peak discharge among commercial and conventional farming areas, forest, and woodland areas. Results indicate that there is a high rate of deforestation, erosion, stream incision, and gully formation in areas where commercial farming is being practiced. The absence of conservation activities in commercial farmlands contributes to the sediment load that is hazardous to the downstream water body and the livelihood of local people. Failure to shift the livelihood of local people to sustainable land use alternatives contributed to

the increased stream incision and formation of gullies since local Gumuz communities started other unsustainable land use practices. For instance, the large majority of the local households in the study area engaged themselves in renting out of forested lands to domestic commercial farmers through a practice called mofer zement (meaning ‘plough campaign’) and traditional gold mining. The study concludes that there is urgent need to halt the ongoing massive deforestation and woodland degradation in the GERD basin. It is critically important to apply sustainable land management strategies and work towards alternative forest resource use practices such as ecotourism, forest honey production, and payments for environmental service schemes in the area. If not, increased sedimentation could shorten the intended power harvest lifespan of the Renaissance Dam. Moreover, there is a need to: (i) enforce existing companies to use conservation farming or to offer alternative land elsewhere, (ii) build the capacity of districts and kebelles so that they can apply a well-informed integrated forest land management and rehabilitation practices across the catchments, and (iii) improve the agility and capacity of local communities to shift to other sustainable livelihood alternatives. Otherwise, increased sedimentation could shorten the lifetime of the dam.

Keywords: land use change, peak discharge, Renaissance Dam, sediment load, sustainable livelihood.