

Assessing the integrated sediment trapping role of man-made and natural sediment sinks, Minizr catchment, Ethiopia

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To enhance sedimentation within a catchment, man-made sediment trapping (ST) measures and natural sediment sinks are playing a vital role. To evaluate the ST role of such measures, this study was conducted at Minizr catchment, northwest Ethiopian highlands. Man-made soil and water conservation (SWC) structures constructed within the catchment and natural sediment sinks (floodplain and wetland) were digitized and quantified from Google earth imagery. Sediment pins, vertical cut measurements through the deposit (after the rainy season) and SWC structures dimension measurements (before and after the rainy seasons) were used to estimate the trapped sediment depth. Inflow and outflow suspended sediment measurements were done to calculate sediment trapping efficiencies (STEs). On average, SWC structures trapped ~ 7922 t yr⁻¹ (56 kg m⁻¹ yr⁻¹) and micro-trenches trapped ~ 13260 kg yr⁻¹ (a micro-trench trapped 23 kg yr⁻¹). A floodplain located near the centre of the catchment trapped ~ 9971 t yr⁻¹ (59 kg m⁻² yr⁻¹) and a wetland located near the outlet of the catchment trapped ~ 8715 t yr⁻¹ (36 kg m⁻² yr⁻¹). The STEs of the wetland and the floodplain were found to be 85 % and 77 %, respectively. Substantial difference was observed between the STE of grassed and un-grassed waterways, 75 % and 21 %, respectively. About ~ 40 % of the transported sediment was trapped by major sediment traps (both man-made and natural) and ~ 60 % is still leaving the catchment and entering into Koga reservoir. Although man-made structures and natural sediment sinks trapped large amount of sediment, the rate of sediment red-deposition is lower than the rate of sediment export at the outlet of the catchment, which is because of lack of an integrated ST approach.