



Sediment budgeting for a dynamic analysis of slope processes in the Northern Ethiopian Highlands

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Rates and extent of slope processes in the 200-ha May Zegzeg catchment nearby Hagere Selam in the Tigray Highlands (Northern Ethiopia), as well as their controlling factors, have been measured and analysed. As the catchment presents high elevations and a subhorizontal structural relief, it is typical for the northern Ethiopian Highlands. Soil loss rates due to various erosion processes, as well as sediment yield rates and rates of deposition within the catchment (essentially due to soil conservation activities) were measured using a wide range of geomorphological methodologies. Mean rate of soil erosion by water in the catchment is 14.4 t ha⁻¹ y⁻¹, which accounts for 97 % of the change in potential energy of the landscape. Considering medium-term erosion rates, 33 % is due to gully erosion. Other geomorphic processes, such as tillage erosion and rock fragment displacement, are also important, either within certain land units, or for their impact on agricultural productivity. Estimated sediment yield rates (5.9 t ha⁻¹ y⁻¹) and sediment deposition rates (8.6 t ha⁻¹ y⁻¹) within the catchment are compatible with observed sediment deposition rates. Twenty-six percent of total soil loss by sheet and rill erosion is trapped more downslope, in enclosures, whereas, in cropland, 70 % of the eroded soil is deposited behind soil conservation structures. The anthropogenic factor is determinant in the present-day erosion processes in the Northern Ethiopian Highlands. Human intervention led to an overall increase in erosion process magnitude, but, through targeted interventions, society is now on the way to control and reverse the degradation processes.