Geophysical Research Abstracts, Vol. 9, 01340, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01340

1 Factors controlling sediment yield variability in the Northern Ethiopia

N. Haregeweyn (1), J. Poesen (2), J. Nyssen (1,3), G. Govers (2), G. Verstraeten (2), J. de Vente (2), J. Deckers (3), J. Moeyersons (4)

(1) Department of Land Resources Management and Environmental Protection, Mekelle University, P.O.Box 231, Mekelle, Ethiopia, (2) Physical and Regional Geography Research Group, K.U.Leuven, Celestijnenlaan 200 E, B-3001 Heverlee, Belgium, (3) Division Soil Water Management K.U. Leuven, Celestijnenlaan 200 E 3001 Heverlee, Belgium, (4) Agriculture and Forestry Economics, Royal Museum for Central Africa, B-3080 Tervuren, Belgium.

In northern Ethiopia, lack of sediment yield data and appropriate methodologies for predicting sediment yield have led to rapid reservoir sedimentation. The objectives of this study were: (1) to assess the spatial variability of absolute sediment yield (SY) and area-specific sediment yield (SSY) and to identify their controlling factors on 11 representative catchments and (2) to develop sediment yield predictive models. We quantified sediment yield from reservoir sediment surveys and studied the role of biophysical characteristics of the catchments and their interactions in controlling the SY and SSY variability.

There is a high spatial variation in SSY between catchments, and the average SSY for the 11 reservoirs was 989 ($\pm$ 446) t $km^{-2}y^{-1}$. Total drainage length (TDL) and the proportion of the catchment area that is treated with soil and water conservation (SWC) practices are the strongest variables controlling the SY and the SSY variability, respectively. Interactions between controlling factors were found; SWC practices and average catchment slope (Av_slope) (r = 0.80), SWC and area proportion of cultivated land (CUL) (r = -0.64) and CUL and Av_slope (r = -0.81). We found that SWC activities are less adopted in catchments where there are a relatively high CUL and less

steep topography.

Best results were obtained with the SY regression model with a high model efficiency (ME) of 0.88. The SSY model gave a reasonable ME of 0.66. The SY model allows prediction of SY in the planning phase of new reservoirs in Northern Ethiopia. However, such models need new calibration if they are to be used beyond the region where they were developed and they do not allow spatially-distributed input and output. Simulation of sediment yield can be achieved by application of spatially-distributed sediment delivery models.

1.1 Keywords: Reservoir sedimentation; Spatial variability; Absolute sediment yield; Area-specific sediment yield; Spatially-distributed sediment delivery models.