Geophysical Research Abstracts
Vol. 16, EGU2014-114, 2014
EGU General Assembly 2014

Sediment storage dam: A structural gully erosion control and sediment trapping measure, northern Ethiopia

Mulatie Mekonnen (1,2), Saskia Keesstra (2), Jantiene Baartman (2), and Coen Ritsema (2)

(1) Bureau of Agriculture, Natural Resource Conservation and Management, Bahir Dar, Ethiopia (mulatie.getahun@wur.nl, +251 0582262941), (2) Soil Physics and Land Management group, Wagenigen University, The Netherlands

Gully erosion is a prime problem in Ethiopia. This study assessed the severity of gully erosion and the role of sediment storage dams (SSD) in restoring gullies and preventing further gully development, its sediment trapping efficacy (STE) and its capacity in converting degraded gully lands to productive land. On average 2.5 m deep, 6.6 m wide and 28.3 m long gullies were formed in Minizr watershed, northwest Ethiopia, in 2013. Concentrated surface runoff, traditional ditches, graded terraces without suitable water ways and road construction are the main causes of such serious gully erosion. Over grazing, tunnel flow and lack of proper immediate gully treatment actions after gully initiation are found to be additional causes of the problem. Gully erosion was also found as the major source of sediment for downstream rivers and water reservoirs. The annual volume of soil eroded from only four gullies was 1941.3 m3. To control gully erosion, SSDs were found to be important physical structures, which can trap significant amount of sediment within gullies and they can convert unproductive gully land to productive agricultural land for fruit and crop production. Eight SSDs trapped about 44*103 m3 of sediment within 2 to 8 years. Two representative SSDs constructed using gabion and stone were tested for their STE. Results showed that their efficacy was 74.1% and 66.4% for the gabion and stone SSDs, respectively. Six of the older SSDs were already full of sediment and created 0.75 ha of productive land within 2 to 8 years. SSDs best fits to treat large size and deep gullies where other gully control measures, check dams, could not function well. To prevent gully formation, controlling its causes that is avoiding traditional ditches, practicing grassed water ways to safely remove runoff water from graded terraces, integrated watershed and road side management practices are important solutions.

KEY WORDS: Sediment storage dam, gully erosion, sediment trapping efficacy, productive land, Ethiopia