10th Alexander von Humboldt International Conference
Addis Ababa | Ethiopia | 18 – 20 November 2015
AvH10-4

Gully Geometry for Estimating its Cost of Control Measures

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A gully experiences a dynamic change in length, width and depth from the time of its appearance till its stabilization. A total of 448 cross sections on 139 gullies were investigated in the region between Ambo and Guder in Western Shewa in Ethiopia. A gully head is usually having a vertical wall. Assuming this geometry of gully head, equations were derived for calculating the volume of soil to be removed so as to slope a gully head at a given angle, and the surface area of the sloped gully head. The volume of soil removed while shaping the gully heads were measured using a calibrated box. The surface areas of the sloped gully heads were measured using millimetre paper. The measured and computed values showed strong correlation. An equation for determining an actual perimeter of a gully cross section at an enlargement stage was investigated. The measured perimeters of gully cross sections were compared with the values calculated for the perimeters of triangular, trapezoidal and parabolic cross sections of channels. The linear relationships were justified by plotting the measured versus the calculated values. The comparison showed that the realistic shape of a gully at enlargement stage lies between a triangle and a trapezium. The perimeter of a gully can be used in gully reclamation work to determine the side slope surface area of a gully for estimating the amount and cost of materials (e.g. stones, bricks, fertilizers, seedlings, etc) and the labour cost required for covering the gully side slope. Soil conservation planners, extension workers, etc can use the derived equations for planning gully erosion control measures.