



## **Gully Geometry and Density based on Land Slope and Soil Type**

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The research was carried out on 139 gullies in West Shewa, Ethiopia. The possible causes of gully formation were assessed. Their dimensions were surveyed and their positions were located on a map. Maps showing the extent of gully erosion, soil type, slope ranges and capability classification of the region were prepared. Analyses of cross sections for parabolic, U-shaped, and V-shaped gullies on different soil types and different slopes were carried out. Useful equations were derived for determining areas of gully cross sections and gully side slopes as well as volume of sediment lost based on the cross sectional shape of gullies. Comparison was made between sediment lost from trapezoidal and parabolic gully cross sections. Engineering structures for gully erosion control were investigated. Formulas for determining check dam spacing and number of check dams required were derived. The derived equations were used for calculating cost of check dam construction. New approaches and mathematical expressions were derived for determining volume of soil to be removed from different shapes of gully walls in shaping gully heads and for determining surface areas of gully head to be covered with stones after shaping. The derived equations were used for determining the cost of shaping and covering gully heads with stones. Equations for determining surface areas of gully side slopes were derived for different gully shapes. The derived equations were used for the cost analyses of vegetative control measures. The outcome of this research can help better and refined gully erosion control plan based on land slope and soil type.