



UNITED NATIONS  
UNIVERSITY

**UNU-LRT**

UNU Land Restoration Training Programme  
*Árleynir 22, 112 Reykjavik, Iceland*

*Final project 2015*

## **EFFECT OF PHYSICAL AND BIOLOGICAL EROSION MITIGATION MEASURES ON RUNOFF AND GULLY DIMENSIONS. THE CASE OF THE *ENABERED* CATCHMENT, NEAR ADWA, IN CENTRAL TIGRAY, ETHIOPIA**

**Haftamu Deribe**

Bureau of Agriculture and Rural Development (NRM)  
P.O. Box 10, Tigray, Ethiopia  
*haftamuder@hotmail.com*

**Supervisor**

Dr David C. Finger  
Reykjavik University  
*davidf@ru.is*

### **ABSTRACT**

Integrated land restoration management is an advanced rehabilitation approach that has been widely implemented since 2004 in the Tigray region in northern Ethiopia (*Enabered* watershed). The general objective of this study was to assess the effect of integrated physical and biological soil and water conservation practices on erosion and subsequent land degradation in the *Enabered* watershed, a typical case study in the Tigray region. In order to achieve this objective the repartition of land uses were assessed before (2003) and after (2014) land rehabilitation efforts. By means of statistical analysis the effects of various restoration measures on runoff and soil loss due to sheet, rill and gully erosion were quantified. The results revealed that large parts of the watershed covering 672 ha were changed to different land uses. The biggest change occurred through the reorganization of homestead areas to cultivated land, accounting for 124.5 ha (18.5% of the entire watershed). The most important changes were bush land converted to area closures, forest area and plantations. In total these changes accounted for almost 50% of the total area. Furthermore, the entire grazing land and bare land were converted to plantations and area closures. Finally, the observed changes in gully dimensions revealed that restoration activities of the watershed have reduced the soil loss by 86%. Similar effects were determined in the change of the runoff coefficient, which resulted in a decreased by 32.6% of runoff yield. Based on these results the study concludes that the physical and biological soil and water conservation practices led to successful ecological restoration.

**Keywords:** restoration, soil loss, runoff, sheet and rill erosion, gully erosion.