Geophysical Research Abstracts
Vol. 17, EGU2015-12742-2, 2015
EGU General Assembly 2015

Restoration of active gully systems following the implementation of bioengineering techniques.

Pablo Borja (1,2), Veerle Vanacker (1,4), and Gerard Govers (3)

(1) Earth and Life Institute, Georges Lemaître Centre for Earth and Climate Research, Universite Catholique de Louvain (UCL), Belgium, (2) Proyecto CUD - Bélgica, Facultad de Ciencias Agropecuarias, Universidad de Cuenca, Ecuador, (3) Physical Geography Research Group, KU Leuven, Belgium, (4) Proyecto Prometeo, Secretaría de Educación Superior de Ciencia, Tecnología e Innovación de la República del Ecuador, Quito, Ecuador

Intensive land use in the central parts of the Andean basin has led to widespread land degradation. The formation of badlands dates back from the 1950s and 1960s. Several studies indicate that human activities have accelerated mountain erosion rates by up to 100 times. In this study, we have evaluated the effects of bio-engineering works aiming to stabilize degraded catchments. Five micro-catchments (0.2 up to 5 ha) have been selected within a 3 km2 area in the lower part of the Loreto catchment (Southern Ecuadorian Andes). The five micro-catchments differ in vegetation cover and implementation of bio-engineering works. The experimental design consisted of three micro-catchments: (1) DI with conservation works, (2) DF with reforestation by Eucalyptus sp and (3) DT with no conservation works. Two micro-catchments have been monitored in an agricultural area: with (AI) and without (AT) bio-engineering works in the active gullies. Small checkdams were constructed in the gully floors of two of the micro-catchments in the badland area (DI) and the agricultural area (AI). The checkdams are made of wood and tires. Water flow has been measured in every micro-catchment, while sediment traps were constructed to monitor sediment transport.

Results show that bio-engineering techniques are effective to stabilize active gullies. Deposition of sediments in manmade dams is strongly dependent on previous rainfall events, as well as gully channel slope, and its vegetation cover. From the experimental data, an I30 max threshold value was determined. Above this threshold value, all micro-catchments are actively contributing sediment to the main river system. The checkdams built with wood and tires have an efficiency of 70%, and were shown to be very effective to stabilize active gullies in bad lands through significant reduction (about 62%) of the amount of sediment exported from the micro-catchments.

Key words: degraded soils, erosion, sediment, restoration, reforestation