PhD project: Gerardo Murillo

Influences of rainfall pattern and land management on erosion rate and streams water quality in Nicaragua's tropical hilly areas

Soil erosion by water is a recognized problem in all parts of the world. The degradation process, particularly in tropical conditions and on sloping land, leads to accelerated loss of topsoil and results in loss of water quality in bodies of free water. New empirical models for predicting erosion, such as the WEPP model, allow the factors involved in the erosion process to be accurately assessed in detail. The process of accelerated erosion and the rate of soil loss are dependent on a variety of factors, e.g. rainfall intensity, duration and frequency, soil properties, land topography, soil use and management, vegetation cover, surface runoff, infiltration and management of agricultural land. This study aims to develop methodology to estimate the effects of erosion processes on agricultural land and water quality in the tropical conditions of Nicaragua, and to estimate erosion-related sedimentation and sediment transport at river basin level. The study will also determine the effects of high-intensity rainfall by recognizing patterns that allow rainfall to be adjusted to a range of intensity lower than that currently used in the models USLE or RUSLE (I30), by using a model that meets our conditions. The WEPP model will first be used as a tool for obtaining decision support for decision-making in planning conservation of the Las Canoas sub-basin. WEPP is a processbased model developed by the USDA Agricultural Research Service for predicting spatial information and analysis of erosion processes and sediment yield on single hillslopes and small watersheds. This study seeks to identify and adopt some techniques suitable for hillsides in tropical conditions. The hydraulic conductivity and water retention will be determined through measuring the physical properties, pore size distribution and bulk density of soil using the Pedotransfer function method and disc infiltrometer, double ring and mini rainfall simulator of hillsides in tropical conditions.