An integrated model for predicting soil loss and sediment characteristics at field boundaries in Central Chile

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Soil erosion is an undesirable phenomenon from both an agricultural and environmental point of view. It is a major threat to the sustainability and productive capacity of agriculture; and soil erosion and transport is the major pathway for the movement of nutrients and polluting chemicals through the environment. This condition is of great environmental concern in many agricultural watersheds all over the world, and in recent years increased production demands on Chilean farmers have put an ever increasing burden on natural resources, both soil and water. Therefore, broad-based programs to reduce soil erosion and nonpoint source pollutants are key elements of national water resources issues and should be a consideration in all new research endeavors. Thus, this study investigates the soil loss and water-quality characteristics at field boundaries in Central Chile. By using actual soil, climate, and topographic data, this study uses a novel approach to the development of a model for predicting these processes. In the absence of long-term monitoring of field plots, an integrated modeling of environmental and agricultural processes was used to identify those variables that best explain the soil loss and sediment composition. The Water Erosion Prediction Project (WEPP) model was applied to a large number of unit plots representing the combination of many variables typical of local conditions in Central Chile. The results of this study helps to guide methodological decision-making in conservation planning, enabling the planners to predict the average rate of soil erosion and sediment composition for many combinations of soils and climate conditions to describe individual rain storms predicting the size and timing of sediment discharges from hillslopes to rivers.