USING A 'SPATIAL-EPIC' GIS MODEL TO MAP HIGHLY ERODIBLE SOILS WITHIN THE ELK RIVER WATERSHED FOR CLINTON AND JACKSON COUNTIES IN EASTERN IOWA

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Abstract

Soils are an essential component of American agriculture—and to our very survival. Soils provide the anchor and store nutrients for commodities such as corn, soybeans, wheat and other plant species that make up our diet or are used as inputs into a range of products we use. Because soil is such an important natural resource, it makes sense that we manage it in such a way that future generations can also benefit (Shiva 1992). The first part of this paper discusses some of the processes leading to soil erosion and degradation. It then presents an applied study of a watershed documenting some of the strategies and new agricultural practices that farmers can use to preserve soil productivity and the environment currently and for future generations.

The study site is located along the Elk River, a scenic meandering stream located in northeastern Clinton and southeastern Jackson Counties in the state of Iowa. The Elk River Watershed covers 76.9 square miles, or nearly fifty thousand acres with 60 percent located in Clinton County and the remaining 40 percent located in Jackson County (IEPD 2000). Soil erosion is a serious problem in agriculture because it leads to soil loss and reduced productivity. This in turn can prompt farmers to use greater quantities of fertilizers and other chemicals to maintain productivity—raising water pollution and causing ecosystem degradation. In response to this problem, this project applies an EPIC model that integrates available information on soils, climate, and land use. The model uses a microcomputer and geographic information systems (GIS) software technologies (ArcView 3.3) and various soil loss equations, including the revised universal soil loss equation (RUSLE) to augment soil and water conservation planning at the watershed and field level.

A GIS potential soil loss map was generated for the entire watershed region using an assumption that fall tillage was applied and there was no conservation practices used in each of the fields. A second GIS map was generated, this time using actual data from the 2002 harvest season and no fall tillage occurring. The data will be shared with the Natural Resource Conservation Service, farmers, and others interested in sustainable agricultural and soil conservation.