

Rapid Changes in Agricultural Land Use and Hydrology in the Driftless Region

Background/objective

Farmer land-use decisions can be influenced by many factors, including market forces such as increased selling price for row crops. These decisions, in turn, have the potential to impact regional environmental processes. In land areas with high slope, such as the U.S. Driftless Region (DR), land conversion to annual row cropping systems can lead to soil degradation through erosion. The aim of this study was to quantify relationships between land-use, precipitation, and regional hydrology in the DR during a period of increased conversion to annual row crops.

Approach

Used ArcGIS to quantify spatial and temporal trends in land cover, topography, precipitation, and streamflow for the DR from 2006 to '17.

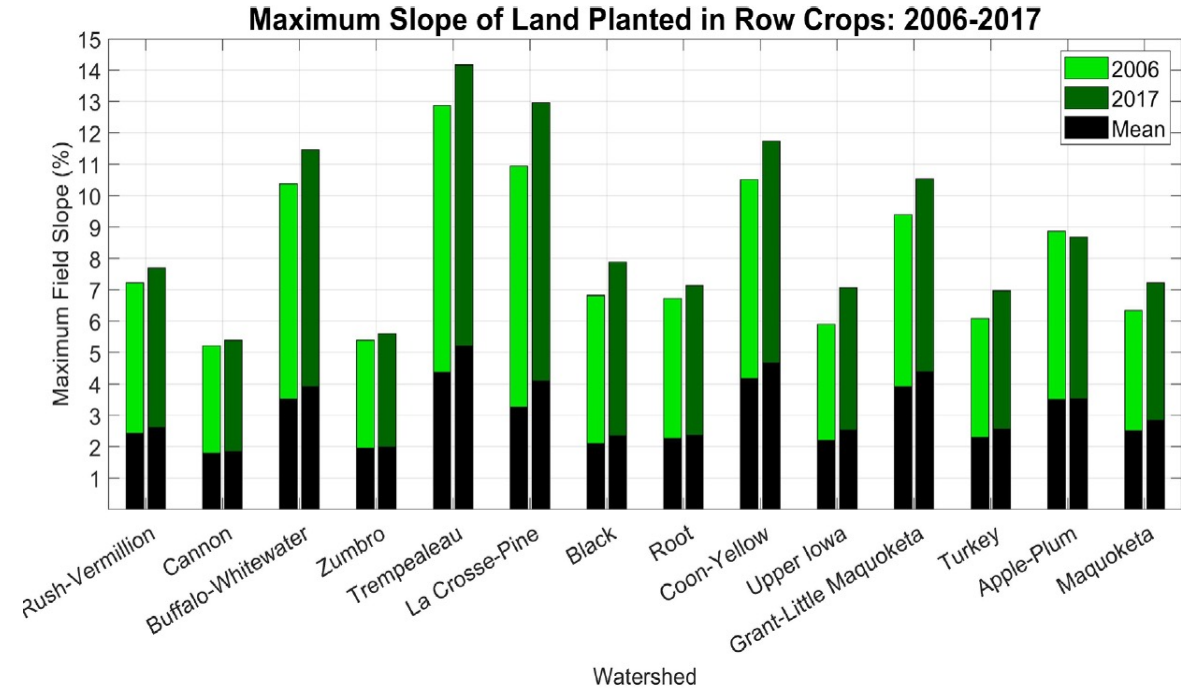
Results

Row crop area increases can be an important factor in explaining hydrologic patterns when:

- ❖ Row crop area expands into land areas with steeper slope
- ❖ There is a combined increase in both row crop area and precipitation
- ❖ These increases are sustained over multiple years

Significance

This work suggests that expansion of row crops onto marginal lands, combined with climate factors such as increased precipitation, may interact to influence overall hydrology, pointing to far-reaching but complex impacts of land-use decisions on regional hydrology.



Slope of land planted in row crops increased between 2006 and '17 in all DR HUC 8 watersheds investigated in this study, suggesting farmer decisions to convert lower-quality land to row crop cultivation.