Abstract:
Everyone agrees that soil erosion is detrimental to Iowa agriculture. This study attempts to quantify the effects of erosion on contemporary crop yields and gauge the longer term impact on the agricultural economy in the state.

What was done and why?
Nearly everyone who travels across Iowa sees stark evidence of soil erosion. This is the movement of soil particles by wind or water, especially following spring rains that fall before the growing crops cover the soil surface. Soil erosion pollutes Iowa waters and it likely hurts crop yields. However, there is little reliable information about how much crop yields are reduced and/or the state-level economic impact of erosion on Iowa’s landscape.

Topsoil, the richest soil which has the most favorable effects on crop yield, is thinned by soil erosion. Normally this means water infiltration rates and water holding capacity are reduced, fertility is lowered, and soil health in general suffers. The resulting impacts on crop productivity often are reflected in crop yield variability within a farm field. This yield variability can be recorded with field-level yield maps obtained using combine yield monitors. In fact, combine-obtained yield maps, when coupled with other soils information, can help show the magnitude of soil erosion on crop yield differences within a field.

The goal of this project was to use a combination of:
1) measured topsoil depth at specific locations in a field, and
2) the crop yield at each of those locations obtained from combine yield monitors to identify the effect of topsoil depth on yield.

Once the relationship between topsoil depth and crop yield was determined, researchers estimated the impact of soil erosion on topsoil depth change and the resulting impact on crop yield. With this information, they were able to calculate the impact of soil erosion on broad-scale farming economics.

What did we learn?
Topsoil thinning is closely linked to loss of crop production potential. Typical statewide average erosion rates have only a minor impact on crop yields in the subsequent year. However, cumulative effects are far more significant and contribute to a loss of state revenue that becomes much more important as time progresses. Short-term minor yield impacts on a per acre basis create little incentive for investing in short-term soil conservation strategies available for many farmland renters. However, as the cumulative effect compounds the economic effect over time, landowners that have longer term planning horizons are much better positioned to recover their financial investments in soil conservation practices.