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Application of Landscape Vulnerability Models to Assess Off-Site Pesticide Movement in a Nebraska-Kansas Watershed

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Abstract:

Some landscape positions are more likely than others to contribute to ground and surface water contamination from agricultural inputs and management practices. By identifying these areas at a regional scale, resources can be optimally targeted to address potential problems at the field scale. We developed SSURGO (Soil Survey Geographic)-based models to assess vulnerability to pesticide contamination of ground or surface waters across the landscape. Upon application of the models to a four-county (NE-KS) study area (Blue River Basin), between-county discontinuities emerged. Each county soil map is based on the particular expression of soil-forming factors as interpreted by local mapping teams, but these teams may or may not have input on the mapping of adjacent counties. Soil map units are typically blended across county boundaries, but these changes will not correct fundamental differences in the models used to create soil maps. The discontinuities in our study area may be due to an end moraine that cuts northwest to southeast (predominantly through the western counties), differences in mapping dates (1975-2003), and variations in data interpretation by agencies in Kansas and Nebraska. By incorporating slope and slope length data generated from relatively high resolution 10 m DEMs (digital elevation models), we increased sensitivity to topography at the SSURGO polygon level. Model output between the SSURGO-based and the DEM-based topographic data differed substantially for the eastern glaciated counties, but were relatively similar for the western counties. Assuming that the DEM is correct, this suggests a lack of consistency in defining the SSURGO representative slope and (or) slope lengths among counties. Although discontinuities occur between counties, model output can be used to identify the most vulnerable areas within each county. Model utility is demonstrated by comparing model output with surface water quality measurements in the watershed.

Impact Statement:

Maps resulting from our models show relative landscape vulnerability to pesticide leaching and runoff. This information can be used to prioritize and target areas within a watershed for conservation management practices and other actions that will reduce contamination of water resources and improve water quality. We applied the models to a four-county NE-KS study area (Big Blue Basin) and propose solutions to discontinuities between counties resulting from variations in data intepretation due to differences in mapping teams and dates. We use surface water quality measurements to show the utility of our models.

Category: Watershed Assessment and Restoration
Type of Presentation: Poster Presentation