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Modeling Landscape Vulnerability to Pesticide Contamination of Surface and Ground Waters

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Abstract Text:

By understanding the physical and chemical properties of pesticides and soils, and how landscape position, climatic and management factors affect agrichemical fate, applicators can better manage pesticides and reduce the potential for surface and ground water contamination. Though we understand many processes controlling pesticide fate at the laboratory and field scales, extrapolation of those processes to the county or regional scale is limited by the resolution of available data and our ability to identify and prioritize processes across scales and environmental conditions. We developed index models to assess landscape vulnerability to pesticide leaching, solution runoff, and particle-adsorbed runoff using pesticide property data and Soil Survey Geographic (SSURGO) data as inputs. We developed functions from SSURGO data to represent adsorption, biotic degradation, hydrolysis, estimated slope length, runoff potential, and other process variables. The functions were uniquely grouped and weighted for each model. Several of the functions have a temporal component so model output can vary across time and space as a function of pesticide properties. The resulting risk assessment output allows targeting of management practices at a spatial scale that will have significant benefits to pesticide practitioners and those tasked with implementing total maximum daily load (TMDL) recommendations.

Impact Statement:

The landscape vulnerability model helps pesticide applicators and environmental managers identify areas that are most sensitive to surface and ground water contamination so that management practices can be properly tergeted to minimize contamination.