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***SOIL, WATER, AND CLIMATE***  
***PhD DEFENSE SEMINAR***

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**SWAT modeling of Sediment, Nutrients and Pesticides in the Le Sueur River  
Watershed, South Central Minnesota**

by

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**ABSTRACT**

The Le Sueur River Watershed (LRW) drains 2,850 km<sup>2</sup> in the Minnesota River Basin and generates significant sediment and chemical pollution. The objective of my study was to quantify the spatial and temporal patterns of sediment, nutrient (nitrate-nitrogen, phosphorus) and pesticide (atrazine, acetochlor and metolachlor) losses from the LRW using a watershed modeling approach. The Soil and Water Assessment Tool (SWAT) model was calibrated and validated against observed data from 2000-2006 in the Beauford sub-watershed. The calibrated model was applied to the entire LRW to identify critical pollutant contributing areas and to evaluate effectiveness of alternative best management practices to reduce the loadings. Under current conditions the LRW has estimated annual average loadings of 1.02 kg TP/ha, 18 kg NO<sub>3</sub>-N/ha and 302,000 t/yr of sediment that contribute to water quality impairments in Lake Pepin and the Mississippi River. Alternative management practices are predicted to reduce upland sediment yield by up to 54%, nitrate-N losses by 22%, and phosphorus loadings by 64%. For pesticides, model scenarios showed that watershed losses are very sensitive to application rates. Overall, the SWAT model was able to accurately simulate the hydrology and transport of chemical pollutants under the land use systems, climate, hydrologic and physiographic settings of South-Central Minnesota.