

An interactive online tool to forecast spatially distributed saturation and runoff dynamics in the Finger Lakes region¹

Helen E. Dahlke^{*1}, Zachary M. Easton¹, Daniel R. Fuka¹, and Tammo S. Steenhuis¹

¹Department of Biological and Environmental Engineering, Cornell University, Ithaca, NY 14853, USA. E-mail: hed23@cornell.edu

Abstract:

In agricultural watersheds in the northeastern US water quality is impaired by runoff from agricultural fields, which can contaminate runoff and receiving water bodies with both pathogens (e.g. E. coli, Salmonella) and excess nutrients (phosphorus and nitrogen). Agricultural producers in New York State are required by law to identify high-risk areas and restrict nutrient applications therein (e.g. NRCS 590 standard). High-risk areas exist where applications of excess nutrients (e.g. manure) impede with so called hydrological sensitive areas (HSAs) that generate runoff during storm events due to saturation excess of soils. In the past two decades, implementation of so called Best Management Practices (BMPs) and Nutrient Management Plans (NMPs) helped to improve non-point source pollution of streams. However, the methods for determining the optimal placement of BMPs require extensive expertise and focus mainly on the nutrient or pathogen *sources* and less on pollutant *transport processes* in the landscape.

In order to simplify the BMP planning process, we developed an interactive online tool for Salmon Creek watershed that identifies locations in the landscape based on their quantifiable risk of generating runoff and nutrient transport to streams. A prototype of this on-line tool is available at <http://128.253.238.176/website/Imagetest/viewer.htm>². The online tool (Figure 1) incorporates hydrologic, geographic and land management information and presents the resulting HSAs on maps that can be accessed online. The methodology behind this web service is based on long-term research on variable source area hydrology and hydrological models developed for watersheds in the humid areas of the northeastern US. The surface runoff potential in Salmon Creek is calculated on a daily basis using a water balance model (Thorntwaite-Mather) and free precipitation and temperature data from the National Climatic Data Center and is distributed via a soil topographic index to capture HSA dynamics. In addition NOAA weather forecast data are used to provide a 24 to 48 hour forecast of areas that potentially could saturate and produce runoff during storm events. The tool is designed to interactively assist planners and especially farmers in the BMP planning process. It can be used to locate fields with low runoff risk that could, potentially receive more liberal nutrient applications without increasing the risk of NPS pollution. In addition we will investigate its use as flood forecast model that can be employed by emergency personnel for real time predictions of areas that might have to be evacuated during large rainfall events. During the presentation we will discuss the background of the model, and if Internet is available, we will give a live demonstration of the tool.

^{*} Correspondence to: Helen E. Dahlke, Department of Biological and Environmental Engineering, Cornell University, Ithaca NY 14853, USA. E-mail: hed23@cornell.edu, +1 (607) 255-2463 (office), +1 (607) 255-4080 (fax)

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² The posted URL is currently only from inside of Cornell University visible due to security reasons.

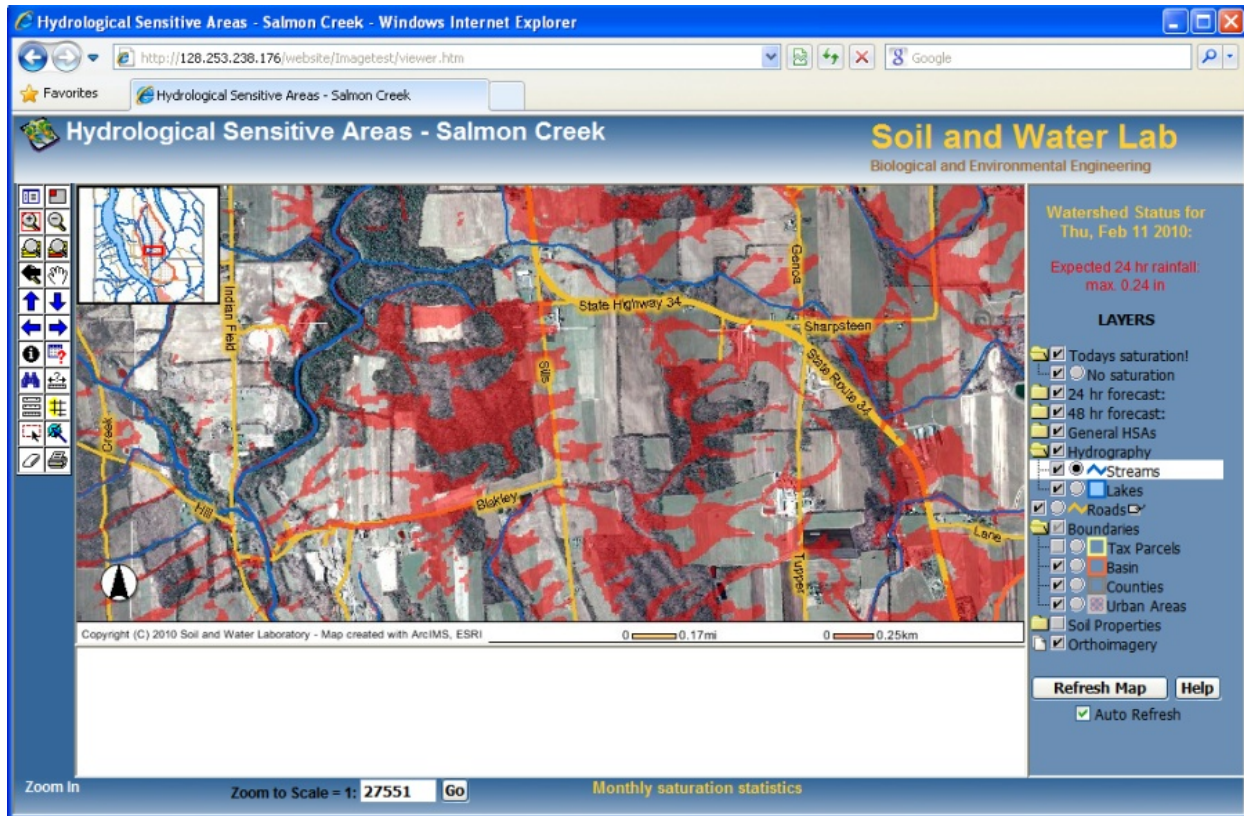


Figure 1: The online tool for predicting hydrological sensitive areas.