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Integrating data and models in the Catskills to assess effectiveness of Phosphorus BMP's

Best management practices (BMP's) have proven to be a cost effective means of reducing non-point phosphorus (P) loading to surface waters at the field and farm scale. However, very little research has explored BMP's efficiency at the watershed or basin scale. We propose to evaluate the impact of P BMP's in the Cannonsville New York watershed using various modeling techniques, statistical inference, and a detailed BMP database. The BMP database will be combined with the extensive flow and water quality data collected since 1990, data on P sources, land use, manure handling and data from numerous smaller sub watersheds (both farm and non-farm) in the basin. This will allow us to quantify the impacts of P BMP's in the basin, while controlling for exogenous factors such as weather, runoff mechanisms, farm P balance, and changes in dairy herd populations. We will rank the impacts of BMP's using models calibrated for the entire basin (SWAT, VSLF) and for smaller sub watersheds (SMDR). VSLF and SMDR were developed to include saturated excess runoff variable source areas (VSA's) which is critical to assess the impact of BMP's. Since SWAT is based on Hortonian flow we are currently modifying SWAT to recognize VSA's in the watershed. BMP's to be considered include crop rotation and tillage, barnyard improvements, manure management and export, nutrient management, fencing, and filter/buffer strips. The main objective will be to optimize BMP selection to produce the largest P reduction in the most cost feasible manner.

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