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**Using watershed and stream models to estimate sediment sources and BMP effects in the Spring Creek Watershed, PA**

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Abstract:

Scientists and managers often rely on a single watershed model to estimate the water quality improvements from best management practices (BMPs). This approach assumes that the structure of the selected model accurately reflects the dominant landscape processes driving contaminant transport and delivery. For example, most watershed models assume that hillslope erosion is the primary source of observed sediment loads. There is increasing evidence, however, that in-stream processes, including bank erosion and sediment resuspension, may influence water quality more directly. Stream-based models that explicitly incorporate such processes have been challenging to implement at a watershed scale because of the fine-scale topographic information required for parameterization. In the Spring Creek watershed of central Pennsylvania, we are developing stream-based models using fine-scale topographic data (1 m resolution, 15 cm vertical accuracy) to predict the impacts of bank stabilization BMPs on observed water quality. To evaluate the underlying assumptions driving sediment generation in streams and estimate improvement from BMPs, we are comparing the performance of stream and watershed models by quantifying how well each matches observed stream gauge data.

Impact Statement:

Outputs: 1) Methods development for using large-scale topographic data (LiDAR data) to parameterize stream models; 2) Assessment of agricultural and riparian BMPs on stream water quality within the Spring Creek Watershed.

Outcomes: 1) Developed methods for using LiDAR data for watershed assessments. 2) Preliminary results indicate the value of using multiple models to assess uncertainty and improve the reliability of stream discharge predictions. The multiple-model set-up can provide a basis for developing an adaptive management framework.

Partnerships: This project is funded through a partnership between the Penn State Institutes of the Environment, the Smithsonian Environmental Research Center, and the Canaan Valley Institute. Additional collaborators include the Spring Creek Watershed Community, the USDA-ARS Pasture Systems and Watershed Management Research Unit, the USDA-ARS-NSL Channel and Watershed Processes Research Unit, and Centre County Soil Conservation District/Chesapeake Bay Program.

Leverage Resources: Each of the three members in our partnership, funded by the USDA CEAP program, leveraged resources from our respective institutes to cover expenses including salary and benefits, and laboratory space and equipment.

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