Watershed Diagnostics For Improved Adoption Of Management Practices: Integrating Biophysical And Social Factors in Urban and Agricultural Landscapes

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Objective

Develop next-generation GIS-based assistive tools that use both biophysical and social factors to target pollution hot spots and prescribe appropriate BMPs in urban and agricultural watersheds (Fig. 1).

Methods

Geo-referenced biophysical and land management data will be used by process-based biodynamic models to simulate watershed responses to selected stressors under different climate change scenarios, and identify localized pollution hot spots. A diagnostic decision support system (DDSS) will rank likely environmental causes to pollution and prescribe a BMP allocation plan.

Fig. 1. Study watersheds. Left panel: Choptank watershed on the Eastern Shore, MD, which is mainly agricultural but with growing urbanization. Right panel: Watts Branch sub-watershed in the Anacostia River watershed and Wilde Lake sub-watershed in the Patuxent River Watershed.

Fig. 2. DDSS to target pollution hot spots, prescribe BMPs, and assess water quality improvements from BMPs.

Integrating Biophysical and Social Data

Social research instruments (e.g., surveys, interviews, focus groups) will quantitatively measure stakeholder attitudes and behaviors towards watershed health and BMP adoption, and develop a BMP adoption behavior sub-model (Fig. 3).

Fig. 3. The BMP adoption behavior sub-model filters out recommended BMPs from the DDSS based on the likelihood of adoption within specific socio-economic and cultural contexts.

Improving Education & Extension Using Social Science Evaluations

Interventions (see below) will be evaluated by before-after survey research instruments (surveys, focus groups, interviews).

Community-Based Participatory Research * Photovoice * 4-H Eco-Stewards Program * Youth Bioassessment Workshops * Blended Watershed Ecosystem Class * Watershed Stewardships Academies * Annual Symposia * Town-hall Workshops * Social Marketing

Changes in BMP adoption based on intervention success will be modeled along side stressors (climate and pollution) to predict long-term changes in pollution and watershed sustainability.

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