

Landscape Indicators for Pesticides Study for Mid-Atlantic Coastal Streams (LIPS-MACS)



First Order Watersheds Mid-Atlantic Coastal Plain



Locations and Land Use of Watersheds and Sampling Sites

ABSTRACT

The landscape setting, i.e., the location of a stream within its valley, and the relative proportions of land uses combined with the topography and related physical features, is expected to be a significant factor in assessing a watershed's vulnerability to pesticide and agricultural chemical stressors. A landscape indicator model can characterize the landscape setting by statistically combining and summarizing relevant spatial data. Since measurements are not possible in every watershed because of cost and practical constraints, a landscape indicator model offers a means to efficiently estimate the vulnerability of streams to pesticides, nutrients, and other chemicals. The Landscape Indicators for Pesticides Study for Mid-Atlantic Coastal Streams will develop landscape indicator models for pesticides based on one-time measurements of approximately 200 first order watersheds in the Mid-Atlantic Coastal Plain. The field survey will be conducted in the spring of 2000, and landscape indicator model results will be available for this area in 2001 and 2002.

GOALS

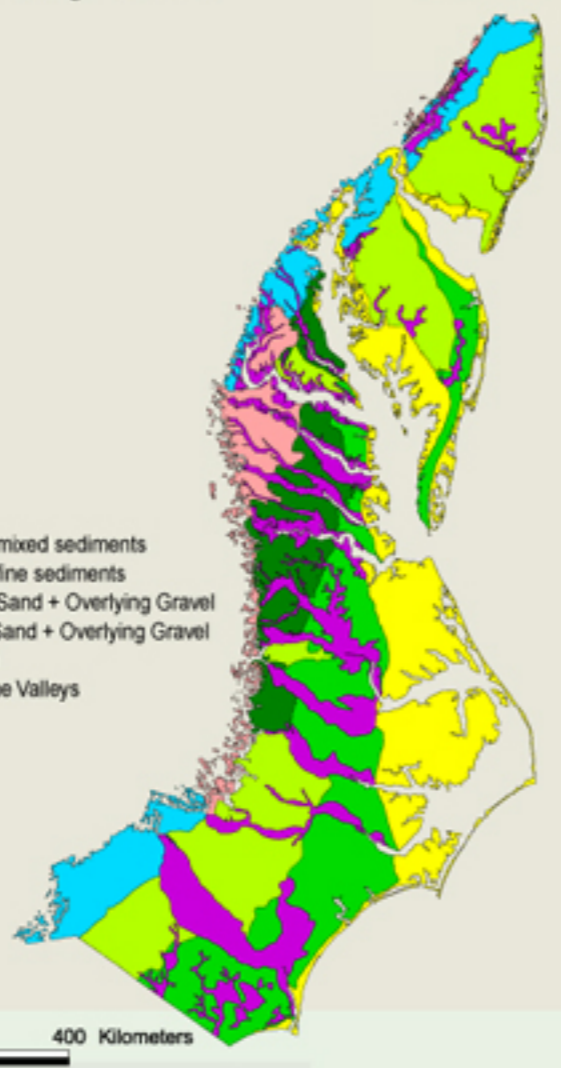
The overall goal of the Landscape Indicators for Pesticide Study in Mid-Atlantic Coastal Streams is to develop and test the performance of landscape indicator models to assess vulnerability of streams to pesticides and agricultural chemicals. Supporting goals include testing the utility of a hydrogeologic framework in interpreting the landscape indicator results, and augmenting the landscape indicator results with hydrologic, chemical, and ecological process model data. The final goal is to leverage resources by sharing data with other projects working in the same geographic area.

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- 1 U.S. EPA, ORD / NERL / ESD
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- 3 U.S. EPA, ORD / NERL / EERD
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- Coastal Lowlands
- Mid Coastal Plain, mixed sediments
- Mid Coastal Plain, fine sediments
- Mid Coastal Plain, Sand + Overlying Gravel
- Deeply Dissected Sand + Overlying Gravel
- Inner Coastal Plain
- Alluvium + Estuarine Valleys



Hydrogeologic Framework Mid-Atlantic Coastal Plain



APPROACH / METHODS

This project is the first in a long term, national research program, the Landscape Indicators for Pesticides Studies (LIPS). The project is being conducted in the Mid-Atlantic Coastal Streams (MACS); the U.S. Geological Survey is collaborating in the study through the National Water Quality Assessment (NAWQA) program. With the experience gained from evaluating existing data, this study was designed to obtain water quality and benthic macroinvertebrate samples for first-order watersheds for a variety of geologic, hydrologic, and landscape settings, grouped by hydrogeologic framework class. Approximately 200 watersheds will be chosen to provide gradients in developed versus undeveloped land cover types. The field study will take place during the spring of 2000, providing a one-time-only synoptic view of streams across the entire area. At this time of year base flow, representing shallow groundwater, will predominate. Measurements include major ions, nutrients, pesticides, pesticide metabolites, for stream water; physical habitat; benthos community composition and abundance; and possibly antibiotics in streams, and pesticides in bed sediments. These data will be used to develop landscape indicator models (based on spatial data such as land cover, topography, soil type, geology, and pesticide loadings) to predict nutrient and pesticide concentrations in streams, stream condition as determined using benthic macroinvertebrates, and physical habitat quality. This information will also be used to evaluate the applicability of a hydrogeologic framework in interpreting landscape indicator results. Three sampling sites with ongoing measurements are also part of the study; these are Chester Branch and Western Branch in Maryland; and Lizzie Site in North Carolina. These sites will provide a temporal perspective for the spatial results.

Sampling Sites by Hydrogeologic Framework Unit

- Coastal Lowlands
- Mid Coastal Plain, mixed sediments
- Mid Coastal Plain, fine sediments
- Mid Coastal Plain, Sand + Overlying Gravel
- Deeply Dissected Sand + Overlying Gravel
- Inner Coastal Plain
- Alluvium + Estuarine Valleys
- Framework



MILESTONES

- 1998**
Review literature, analyze existing data.
- 1999**
Acquire and process landscape data. Choose indicators for design of study.
- 2000**
Conduct field study. Determine quantitative relationships between indicators and aquatic resource data. Select landscape indicators to be used in model.
- 2001**
Develop multivariate landscape indicator models. Test and validate models. Apply models to Mid-Atlantic Coastal Plain.
- 2002**
Evaluate results of models.

- Water
- Low Intensity Developed
- High Intensity Developed, Residential
- High Intensity Developed, Commercial/Industrial
- Hay/Pasture
- Row Crops
- Other Grass
- Evergreen Forest
- Mixed Forest
- Deciduous Forest
- Woody Wetland
- Emergent Wetland
- Bare: Quarries, Strip Mines, Sand Pits
- Bare: Rock Outcrop, Sand
- Bare: Transitional

