



Watershed Field Research

Public concern has grown over the past 30 years regarding the health of our ecological resources and the contamination of water supplies by sediments, chemicals (e.g., pesticides, fertilizer nitrates and phosphates), metals, and pathogens (e.g., fecal coliforms, *E.coli*, and enterococci). Contaminants are transported from their site of application to nearby streams and lakes via the atmosphere, storm runoff, and sub-surface flow, including ground water. The U.S. EPA conducts field research to collect environmental data that describes contaminant release, movement, and related exposures. These data are used to assess existing conditions and to develop and field test mathematical models for use in predicting future conditions and in evaluating alternative management and restoration approaches.



Stream sampling with cableway system.

An Integrated Watershed Research Approach: The integration of field research and model development in the study of watershed-scale ecological exposure is a prime focus for scientists at the Ecosystems Research Division (ERD) of the U.S. EPA Office of Research and Development's National Exposure Research Laboratory. Scientists collect data for use in the development and field testing of multimedia exposure models. These models simulate the relationship between contaminant release; its fate and transport through air, soil, and water; and the degree of exposure to humans, fish, and wildlife. To be meaningful, results must be gathered for at least three years to account for variables such as seasonal weather patterns. Site location, site characteristics, cropping patterns, application rates, and other variables are selected to enable a better understanding of the relationship between cause and effect for the measured contaminants.

Scientists from the ERD and the EPA Region 4 Water Management Division and Science and Ecosystem Support Division are collaborating to collect field data in the South Fork Broad River Watershed of the Savannah River Basin, Georgia. Field research is now underway in this watershed to simultaneously measure contaminants and their impacts on ecological health. Data obtained from this project will be used to develop and test models and to develop protocols for calculating the Total Maximum Daily Load (TMDL) of bedload (sediment that is transported along the streambed), suspended sediments, nutrients (e.g., nitrate, ammonia, and phosphorus), and pathogens in the watershed. A TMDL is an estimate of the maximum pollutant loading from point and nonpoint sources that receiving waters can accept without exceeding water quality standards.

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Benefits:

- The data obtained through the field research is used to provide improved field assessment methodologies and monitoring protocols and is widely used for field testing models.
- The data can be used for planning purposes by EPA regional offices, program offices, local government agencies, and the general public.

Purpose:

- This research supports the Agency's Sound Science and Clean Water goals by providing an improved understanding of environmental risks.

Accomplishments:

- Fourteen field studies have been conducted at various locations over a thirty year period.
- Comprehensive databases have been developed on the transport of pesticides and nutrients and on the leaching of pesticides into ground water.
- Field monitoring protocols have been developed for contaminant runoff and leaching.
- Sample requirements have been estimated for pesticide leaching.
- Pesticide and nitrate concentrations have been compared from on-farm drinking water wells and research monitoring wells.

Participants:

- The U.S. Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, Ecosystems Research Division and the EPA Region 4 Water Management Division and Science and Ecosystem Support Division.
- Other Federal Agencies, States, and landowners.



For More Information

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