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Through the National Nonpoint Source Monitoring Program (NNPSMP), states monitor and evaluate a subset of watershed projects funded by the Clean Water Act Section 319 Nonpoint Source Control Program.

The program has two major objectives:

1. To scientifically evaluate the effectiveness of watershed technologies designed to control nonpoint source pollution
2. To improve our understanding of nonpoint source pollution

NNPSMP Tech Notes is a series of publications that shares this unique research and monitoring effort. It offers guidance on data collection, implementation of pollution control technologies, and monitoring design, as well as case studies that illustrate principles in action.

Minimum Detectable Change Analysis

Introduction

The purpose of this technical note is to present and demonstrate the basic approach to minimum detectable change (MDC) analysis. This publication is targeted toward persons involved in watershed nonpoint source monitoring and evaluation projects such as those in the National Nonpoint Source Monitoring Program (NNPSMP) and the Mississippi River Basin Initiative, where documentation of water quality response to the implementation of management measures is the objective. The MDC techniques discussed below are applicable to water quality monitoring data collected under a range of monitoring designs including single fixed stations and paired watersheds. MDC analysis can be performed on datasets that include either pre- and post-implementation data or just the typically limited pre-implementation data that watershed projects have in the planning phase. Better datasets, however, provide more useful and accurate estimates of MDC.

Minimum detectable change analysis can answer questions like:

“How much change must be measured in a water resource to be considered statistically significant?”

or

“Is the proposed monitoring plan sufficient to detect the change in concentration expected from BMP implementation?”

Minimum Detectable Change

The Minimum Detectable Change (MDC) is the minimum change in a pollutant concentration (or load) over a given period of time required to be considered statistically significant.

The calculation of MDC has several practical uses. Data collected in the first several years of a project or from a similar project can be used to determine how much change must be measured in the water resource to be considered statistically significant and not an artifact of system variability. Calculation of MDC provides feedback to the project managers as to whether the proposed land treatment and water quality monitoring designs are sufficient