



2008 USDA-CSREES National Water Conference
Sparks, NV

Watershed Spatial Analysis for Volunteer Stream Monitoring Using Geographic Information System

Monica T. Rakovan and Shannon K. Quinn

Abstract Text:

Water resource problems are often complex with multiple natural and anthropogenic variables. These data are critical to address fundamental water resource questions such as changes in hydrology, water quality and quantity, point and non-point source pollution, and channel erosion. Future watershed scale data collection effort can be more effective if there is a strategy for the design and placement of a stream sampling network and integration into watershed management. The Butler County Stream Team (BCST), a monthly stream monitoring program in southwest Ohio, has been collecting and analyzing stream samples by volunteers since March 2006. Over 470 stream samples have been collected so far. The BCST recently analyzed the spatial distribution of environmental stresses within Butler County using Geographic Information System (GIS) to facilitate the selection of volunteer sampling sites. The analysis was performed using GIS spatial analysis tools to rank the sampling locations into high, med and low priorities based on their environmental importance. Input datasets, including land use, population density, hydrology, home septic systems, and public water supply systems were reclassified and then overlaid according to their weighted factors. The data were compared with the sample sites and access locations (bridges and public parks). Results show that only 7% of the sample locations were collected from the high priority ranking areas. Furthermore, over 60% of the accessible sites are located in the medium priority areas. Water quality indicators such as nutrient and bacteria data have been analyzed to evaluate any spatial patterns and the effectiveness of the spatial analysis. The lack of samples obtained from the high priority ranking areas suggest that the spatial analysis tool is needed and can provide a visual and analytical tool for prioritizing sample locations as well as the basis for water resource protection and land use management policy within a watershed.

Impact Statement:

A strategic watershed scale data collection effort incorporates the design and placement of a stream sampling network based on environmental stresses can be more effective and integrated into watershed management. The spatial analysis tool using Geographic Information System provides a visual and analytical tool for prioritizing sample locations as well as the basis for water resource protection and land use management policy within a watershed.