

USING GIS, REMOTE SENSING AND WATER QUALITY MODELING TO ESTIMATE ANIMAL WASTE POLLUTION POTENTIAL

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INTERPRETIVE SUMMARY

Nonpoint source (NPS) pollution from agricultural areas is recognized as a national problem. One of the principal sources of NPS problems is excessive application of animal manure in areas where animal production facilities are concentrated. Alabama, by having a large poultry industry, shares in this problem. Last year, the State of Alabama adopted a regulation that requires animal producers to implement best management practices to minimize surface and groundwater pollution.

One of the needs faced by poultry producers in the state is to identify areas where poultry litter may or may not be applied. Even though several researchers have used hydrologic/water quality models to identify such areas, most of these models are very complex in nature and suffer from large input data requirements. The objective of this research was to develop a GIS-based Animal Waste Pollution Potential Index (AWPPI) that can be used to rank areas based on the potential of nutrient transport from land-application areas to receiving streams.

The study was conducted in the Crooked Creek watershed in Cullman County, Alabama. There are 144 poultry houses located in this watershed. The AWPPI was developed as a function of poultry litter application rate, nutrient availability factor, and

delivery ratio. The input data required by this model are watershed topography, litter application rate, and area where litter is applied. Watershed data were developed using digital elevation model data available from U.S. Geological Survey. Information about location of poultry houses was derived from high resolution color infrared photos.

The AWPPI model was developed in ArcView GIS environment. AWPPI for losses of both nitrogen and phosphorus was estimated using this method, and subwatersheds within Crooked Creek watershed were ranked based on AWPPI. No significant difference in subwatershed rankings was indicated for the two indices. Analysis of AWPPI indicated that it was significantly correlated with poultry house density and the ratio of farm area where litter is applied to the subwatershed area. The ranking of areas using this method represent a simplified approach to identifying the areas susceptible to NPS pollution from poultry litter application. Farmers and regulators can very easily use this method to identify areas suitable for locating new poultry houses or areas where poultry litter can be applied without a significant risk of NPS pollution. All the input data required can be readily assembled from on-line data sources. This method also has the potential to be developed as an internet-based large-scale AWPPI using GIS.

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