A GIS-BASED MODEL OF DIFFUSE POLLUTION IN THE OAK CREEK AND MENOMONEE RIVER WATERSHEDS (WISCONSIN)

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This abstract describes the development of a model of diffuse pollution for two Milwaukee-area watersheds. In-stream measurements of water quality can be time-consuming and expensive. A computer model is needed that can accurately predict these measurements based on known input parameters. The model would also be useful to predict changes in these measurements due to hypothetical changes in the input parameters, such as those due to increased development. Geographic Information Systems are now widely used in modeling diffuse pollution. Simulation models have been developed to evaluate the magnitude and extent of non-point source pollution, but those models have been limited because of difficulties involved in simulating large areas having heterogeneous properties such as land use, land cover, soils, and topography. Other difficulties arose from extremely large amounts of input data; and lack of sufficient computing resources; and expense. GIS technology has helped to overcome many of these difficulties. In one model, the researchers predicted soil loss in rural areas using the Universal Soil Loss Equation. Sediment yield was calculated using the delivery ratio, while phosphorus loading was calculated by multiplying the phosphorus concentration in the top layer of soil by the sediment yield and the enrichment ratio. The GIS program Arc Info receives inputs, determines the necessary factors for the USLE, sediment yield, and phosphorus concentration calculations to be made in the spreadsheet. In urban areas, the types of land use vary much greater than in rural agricultural areas, so hydrologic models in urban areas must be able to delineate the areas of different land uses accurately. This model will be broken up into components involving hydrologic processes and pollution loadings. Traffic density data are used to determine the pollution due to traffic. GIS is used to associate the pollution source with the watershed it affects. The Universal Soil Loss Equation simulates the sediment from erosion from a variety of land uses. The effects of contaminated soil and the spring snowmelt process is also included.