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Integrated Vulnerability Assessment of Ground Water for Hillsborough County, Florida: A Case Study

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ABSTRACT: Contamination of subsurface waters by anthropogenic activities has been a major concern for agencies involved with water management, water quality, water quantity and human health. Berndt et al., (1998) reported that water from parts of the Georgia-Florida Coastal Plain aquifer, which lies beneath the proposed study area, had higher median concentrations for all pesticides in ground water (GW) than the surface water. The same study also reported that Nitrate-N concentrations exceeded the US EPA drinking water standard (maximum contamination level) for more than 20% of the GW samples from the aquifer in agricultural areas. This research reports an innovative approach to predict the contamination potential of GW in Hillsborough County, Florida using an integrated method of Geographic Information Systems (GIS), Neuro-fuzzy techniques and Remote Sensing. Neuro-fuzzy techniques have been used because of their ability to manage imprecise and incomplete data. This approach employs heuristic learning strategies derived from the domain of neural networks theory to support the development of a fuzzy system. Integration of neuro-fuzzy, GIS and remote sensing provided a modeling framework that facilitate spatial analysis and scientific visualization of GW vulnerability. Policy makers and planners can use this information to ensure sustainable growth. The input data layers are depth to ground water, recharge of aquifer, soil media, impact of vadose zone, pedality, drainage, hydrologic group and landuse. Well water quality data was used for validation of the models. Use of neuro-fuzzy model allowed vulnerability mapping with imprecise data as well as incorporation of temporal data in the model.

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