

## **Abstract**

### **Integrated GIS and Machine Learning Algorithms Applied to Ground Water Contamination Mapping: A Comparative Study**

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Mapping contamination potential of groundwater (GW) is not easy due to inherent uncertainty. Therefore, there is a need to develop mapping techniques that assess GW contamination potential under uncertainty.

This study aims at examining use of various machine learning algorithms to predict GW contamination potential for Woodruff County, Arkansas. Three machine learning algorithms were used: a) Neural Networks (NNs), b) Support Vector Machines (SVMs) and c) Neuro-fuzzy (NF) methods. The resultant maps were compared with well water quality data. The study included variables from the DRASTIC model, soil structure (pedality), hydrologic group, drainage and landuse.

Preliminary results showed that inclusion of pedality, hydrologic group, drainage and landuse into the DRASTIC model resulted in over-estimation of 'high vulnerability' category. The NNs and SVM produced comparable results and performed better than the NF models. Integration of these algorithms into GIS allowed evaluation and display of results in a spatial context.

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