



## **An early warning system for groundwater pollution based on the assessment of groundwater pollution risks.**

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Groundwater pollution usually is complex and concealed, remediation of which is difficult, high cost, time-consuming, and ineffective. An early warning system for groundwater pollution is needed that detects groundwater quality problems and gets the information necessary to make sound decisions before massive groundwater quality degradation occurs. Groundwater pollution early warning were performed by considering comprehensively the current groundwater quality, groundwater quality varying trend and groundwater pollution risk . The map of the basic quality of the groundwater was obtained by fuzzy comprehensive evaluation or BP neural network evaluation. Based on multi-annual groundwater monitoring datasets, Water quality state in sometime of the future was forecasted using time-sequenced analyzing methods. Water quality varying trend was analyzed by Spearman's rank correlative coefficient. The relative risk map of groundwater pollution was estimated through a procedure that identifies, cell by cell, the values of three factors, that is inherent vulnerability, load risk of pollution source and contamination hazard. DRASTIC method was used to assess inherent vulnerability of aquifer. Load risk of pollution source was analyzed based on the potential of contamination and pollution degree. Assessment index of load risk of pollution source which involves the variety of pollution source, quantity of contaminants, releasing potential of pollutants, and distance were determined. The load risks of all sources considered by GIS overlay technology. Early warning model of groundwater pollution combined with ComGIS technology organically, the regional groundwater pollution early-warning information system was developed, and applied it into Qiqihar groundwater early warning. It can be used to evaluate current water quality, to forecast water quality changing trend, and to analyze space-time influencing range of groundwater quality by natural process and human activities.

Keywords: groundwater pollution, early warning, aquifer vulnerability, pollution load, pollution risk, ComGIS