

A Bayesian Network for Groundwater Risk Assessment

by

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Abstract. We present a Bayesian network for assessing the risk of groundwater pollution from multiple point-sources. The model is based on a logical decomposition of sources, flow, geochemistry, biology, aquifer contamination and so on into basic events. The influence of basic events on each other is represented in a directed, acyclic graph that visualizes conditioning of events on each other. The probabilities of individual events on the influences between them are obtained subjectively from experts. Influences are used to reduce the joint probability of the basic events to simpler, conditionally independent components. We use the rare event approximation to compute the subjective probability of aquifer contamination from various combinations of events for an example including multiples sources and heterogeneous hydrogeology. We also use the network to calculate inverse probabilities, for instance, the probability that a particular site is the source of contamination.