

Concept for Risk Assessment and Prioritisation of Point Sources

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Abstract:

The number of point sources that pose a threat to the ground water resources is very large. Therefore actions are required in order to a) establish an adequate knowledge level enabling trustworthy risk assessment and – in some cases – b) implement remedial actions. However, remediations are costly and often have a large impact on natural resources. Thus, prioritisation of such actions is critical in order to ensure overall sustainability. Important questions are: What actions to take at what sites and in which order.

The KRIPP-concept was developed in order to enable a uniform and transparent risk assessment and prioritisation of point sources. The concept handles point sources at various knowledge levels and consider local as well as catchment scale. It is based on contaminant fluxes to the groundwater and subsequent calculation of impacts on receptors such as downgradient supply wells and surface waters.

An initial step in KRIPP is a simple screening of sites based on criteria such as handled contaminants, thickness of protecting clay layers, distance to supply wells etc. This screening is handled in a GIS system.

The next step is calculation of contaminant fluxes on local scale as well as an evaluation of the related uncertainties. The fluxes are calculated in different ways depending on the knowledge level (from standard values based on previous experience to relatively advanced leaching models covering separate phase and solutes). Related uncertainties are calculated using a scoring system including an evaluation of both the historical and investigation data.

The calculated contaminant fluxes and uncertainties are subsequently assigned to particle traces determined in a 3-d solute transport flow model, and resulting impacts on the receptors are finally calculated by dividing the fluxes from different sites with e.g. the amount of extracted water at the supply wells.

All results are presented in GIS themes showing sources with different contaminants, different fluxes and different uncertainties. An overall prioritization is done by a flexible scoring system. The concept furthermore enables the possibility of testing different scenarios related to sorption and degradation, and also the consequences of remedial actions.

The concept has successfully been tested in a catchment zone north of Copenhagen.