Hydrogeological-microbial Characterization and Risk Assessment of Urban Water Catchments

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The German regulations for groundwater protection consist of abstraction control, quality surveys and the gradation of groundwater protection zones. The frequency of quality surveys and water sampling in water wells (2 samples per well and year according to German drinking water regulations) do not obtain representative information from the subsurface contaminant load especially concerning microbial contaminants such as viruses and bacteria. Several case studies in karstic and fissured aquifers in the Northern Eifel Mountains (Germany) used for drinking water supply show, that increasing water sampling frequencies help to identify areas of high groundwater vulnerability e.g. such as leaking sewerage mains, leaky manure pits, sanitation systems in urban residential and industrial areas and disposals with high risks originating from microbial contaminants. According to German drinking water regulations the disease-producing potential of pathogenic micro-organisms is well known and the accepted limit of concentration is defined as "zero" per 250 ml. Therefore a positive evidence of microbial contaminants requires in most cases a sophisticated water treatment. In this context the definition of a representative subsurface loads with quantification the source strengths control the economic and technical reliability of the treatment plant. A specific hydrogeological-microbial characterization and risk assessment of the catchment as shown by the case studies provide the basis for an advanced groundwater protection strategy preventing investments in sophisticated water treatment good-for-nothing.