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Attempts for an integrative (ecological) assessment of groundwater ecosystems status

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Today the assessment of the ecological status of surface waters is routine and made its way into national and international (e.g. European Water Framework Directive) regulations. For groundwater and aquifers a comparable approach, considering ecological aspects, is still missing. In contrast, groundwater monitoring and management schemes follow exclusively physical-chemical and quantitative criteria. However, groundwater systems are, although persistently neglected, ecosystems harboring diverse communities of microorganisms and invertebrates. Directly linked to the biological components, groundwater systems provide various ecosystem services of societal relevance (natural production of clean drinking water). In the recent past, we developed a first concept of an ecologically sound assessment scheme for groundwater systems. Work included (1) the selection of appropriate biological/ecological criteria, (2) set-up of a groundwater ecosystem typology, (3) deduction of natural biological groundwater background values and definition of reference conditions for selected sites, and (4) a first evaluation model. Groundwater has been analyzed repeatedly of more than 100 wells distributed over five investigation areas spread all over Germany. The investigated sites could be assigned to different natural regions, geological regions, hydrogeological units, and aquifer types. The mismatch of groundwater faunal communities with the established classification schemes led to the proposal of 'stygoregions' for Germany. The presentation introduces a number of microbial and faunistic assessment criteria, which have been tested and natural background values which have been deduced. Finally, a tiered framework for assessing groundwater ecosystem status which allows an easy and fast evaluation is introduced.