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Strategies for Knowledge Based Protection of the Danish Drinking Water Resources

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ABSTRACT

All Danish Drinking water is groundwater and usually distributed to consumers after simple treatment at the waterworks (aeration and filtration - no disinfection). To preserve this highly valued resource a national strategy for sustainable abstraction and groundwater protection has developed over the last 50 years.
Cost efficient sustainable regulation calls for knowledge on the pressures and response in groundwater systems. In Denmark nitrate and pesticides are the largest causes for groundwater to fail the drinking water standards. Development of scientifically sound conceptual models for the natural protection in aquifers against these agricultural pressures plays an important role when implementing protection. The impact of nitrate leaching on groundwater and surface waters depend on the site specific hydrological pathways and denitrifikation.
There is a growing awareness in the political and agricultural communities that cost efficient measures to reduce the environmental impact of nitrate and pesticides on nature and surface waters in the future should be site specific and not based on national standard regulations. Scientific developments in mapping methods in regard to hydrogeology and geochemistry are a prerequisite before this goal can be realized. The Danish case is a strong example of the potential of the science policy interface to develop better resource efficiency.
Especially a better knowledge of the nitrate reduction in the subsurface and aquifers is required in order to implement site specific measure for protection of nature and surface waters. Since 1999 the National Groundwater Mapping Program has detailed mapped the hydro-geo-chemical settings of about 40 % of Denmark followed by delineation of nitrate vulnerable areas in drinking water abstraction areas. Cost efficient sustainable regulation of agriculture for protection of groundwater, nature and environment calls for a proper monitoring strategy of the efficiency of implemented measures. E.g. agedating of monitored groundwater has proved indispensable while interpreting the collected data.

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