

Management of Groundwater Resources in Denmark.

In Denmark almost all water supply for domestic and drinking water supply are based on groundwater abstraction. Protection ground water is as one of its top priorities.

All the geological information from groundwater drillings have since 1888 been reported and stored on a national level under the Ministry of the Environment. Despite pressures from pesticide use and other contamination, **it has been possible to maintain a high quality of water, which does not need special treatment or purifying before drinking or other use.**

A new law on Environmental and Ecological Objectives including groundwater was issued in Denmark in 2003. In this context a basic characterisation of the water resources is under preparation in 2004 by the water districts.

The assignment of clear responsibilities is very important. In Denmark **the state** is responsible for **the international obligations**, the overall administration and establishment and adjustment of the **legislative framework**. Also **research and development** are under the states responsibility. **The regional level** is responsible for issuing permits on groundwater abstraction based on detailed mapping and planning. The permits are based on a political prioritisation based on **plans for development of the society and its water demands and environmental objectives**. The regional level is also responsible for **exercising protection** of the groundwater resources and regional monitoring. **The local level** is responsible for planning of the water supply for the municipality and the **inspection** of the technical standard at the Water Supply plants and the quality of the drinking water, and **the Water Supply Plant** is responsible for the quality of the drinking water.

Mainstreaming/Sustainability

Issues seen in the context of Integrated Water Resource Management (IWRM) are established and maintained in close co-operation and networking among scientific institutes, national and regional authorities, local municipalities and supply companies and consultants.

At all levels involvement of stakeholders and public participation are considered as key-issues for achieving the objectives and huge efforts are used on information for making the groundwater conditions transparent for the society.

In 1987 a nation-wide groundwater-monitoring network was established. Partly based on existing wells from more than 4500 Water Supply plants and partly on more than 50 special monitoring fields representative for the Danish groundwater conditions. Annual reports from the monitoring program supports that the awareness on the quality of the drinking water and the protection of the groundwater is maintained.

The principle of full cost recovery has been gradually introduced in the groundwater sector during time, including local user fee for water supply costs, national “green tax” on water and a new regional fee for detailed investigations and planning towards targeted action plans for groundwater protection.

Replicating the Initiative

- Clear responsibilities need to be stated by **national legislation**.
- **Water for basic domestic consumption should be given the highest priority** in the allocation of groundwater.
- The **water requirements of the environment** should be recognised.
- The **benefits of groundwater should be distributed fairly** among regions and sectors.
- **Management efforts** for water allocation should be **targeted** at the appropriate scale.
- Groundwater users should be encouraged to **conserve water**.
- **Information for transparency and detection of problems**. Protection of groundwater is the common responsibility of authorities, organisations and individuals, hence information and public participation are key-issues.
- **Targeted protection based on monitoring, assessment and research**. Groundwater sources must receive a high level of protection by targeted protection on an informed basis. Monitoring, assessment and research is vital for prioritising efforts.
- The **permit system** for wastewater discharge must consider the impact on groundwater quality where effluents are disposed to land.
- **Disposal** of solid wastes, effluent discharge and polluted runoff and drainage should be **controlled** to minimise their impact on groundwater quality.
- **Responsibilities must be allocated**. Those who conduct activities that make contact with groundwater in or under the ground must be obliged to take action to protect its quality.
- Groundwater protection **measures must be included in socio-economic plans and plans for the development of sectors**.
- **River basin planning and groundwater management must be integrated**.
- **Groundwater drilling standards** shall include measures to prevent quality deterioration in wells.
- The value of **data for management** is greatly increased by gathering, organising, analysing and modelling.
- **Water planning** is an important tool for dealing with large-scale and cumulative features of groundwater and its use.
- **Water licensing** is a management tool for allocating groundwater, controlling the abstraction of water and implementing the system of rights and obligations of water users.
- **Fees, charges and taxes** are important economic instruments for groundwater management, securing supply and avoiding excess use by households and industry.
- **The establishment and maintenance of standards for groundwater drilling** is required to assure reliable borehole construction and the protection of groundwater from pollution.