



## Regulation, science and technology transform Danish waters

*National planning and legislation issued since 1970 has been the main driver for the improvement of Danish water quality. The results of the efforts have been measured in a national monitoring program, and adjustments to actions have been initiated when needed. Significantly better quality has been detected in many water bodies. Pollution from waste water has been reduced dramatically, abstraction of water has been reduced and agricultural production has become less polluting. These improvements have been achieved by a combination of technology, changes in production methods and changes in land use. However agricultural production continues to be a serious challenge. In addition there is a risk that climate change will set back some of the improvements.*

Thirty years ago Danish lakes, water courses and coastal areas were in bad condition, mainly due to pollution from waste water and agriculture.

Many Danish waters are more or less closed, with only a minor level of water exchange. Therefore, compared to many other countries, the Danish aquatic environment is very vulnerable to eutrophication due to pollution with nutrients, and as a consequence many areas have suffered from oxygen depletion. In addition, Denmark is relatively densely populated. Two-thirds of the total Danish area is used for intensive farming, including a large livestock production. The consequence is potential high pressure on the environment. There were obviously many challenges ahead

when the measures to save the Danish aquatic environment were initiated in the early 70s.

A dramatic reduction of pollution from wastewater has been achieved through modernisation of the waste water treatment system including introduction of new advanced technology and changes in infrastructure from many small treatment plants to fewer, bigger and more effective plants. In 1987 less than 1 per cent of waste water was subject to advanced treatment, today it is more than 90 per cent.

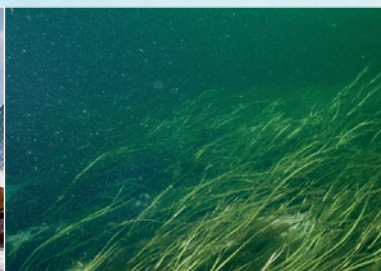
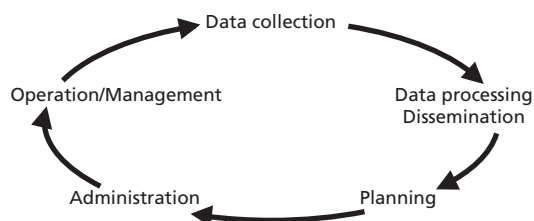
Enforcement of environmental regulations has been decisive in reducing environmental impacts from agriculture. Enforcement is also, however, about

creating awareness and providing information about new environmentally efficient agricultural technologies and practices. The specific actions at local farm level have included the use of environmentally efficient technologies for e.g. storage and handling of manure, green cover of fields during winter, obligatory fertilizer budgets, buffer zones along watercourses and restoration of wetlands. The achievements and choices of solution have been based on knowledge created by monitoring at national and regional levels and experiments at field and farm level.

Today the water quality in Danish water courses is significantly better than 30 years ago as a result of the reduced pollution. The main problem for Danish



## » Strict enforcement of the regulation by local, regional and national authorities has been a main driver for a better aquatic environment, which in turn has seen a development of new technologies and techniques.



water courses is no longer pollution, but poor physical conditions due to the fact that approximately 90 per cent of all Danish water courses have been channelized to secure the drainage of agricultural areas.

Most Danish lakes have been heavily overloaded with phosphorus and nitrates for many years and lakes suffered massive blooms of blue-green algae. Today the phosphorus load from waste water in Danish lakes is very small compared to 1987, and the effect is until now only seen in some lakes. But there is still need for improvement as the diffuse load of phosphorus from agriculture has not changed and it takes time to regenerate the environment in lakes after many years of pollution. The Danish marine areas have been suffering from an overload of phosphorus and especially nitrates leading to a reduced biodiversity and severe oxygen depletion. The effects of the national action plans and

regional planning have reduced the concentration of nutrients in marine areas significantly, especially in the closed fjords and bays. Signs of improvement on the basis of some biological parameters, such as reduced concentration of chlorophyll, have also been seen, but Danish coastal waters are still suffering from oxygen depletion. Further reductions in the load of nitrates are needed to live up to the European standards in the Water Framework Directive.

The Danish groundwater can still be used for drinking water without any need for advanced treatment. Furthermore, water extraction has been reduced by 30% since 1990. This favourable situation has been made possible through a combination of regulation of the use of pesticides and nitrates, continued monitoring of the quality of groundwater, mapping of groundwater resources, planning and regulation of the extraction of groundwater, incen-

tives for water savings and introduction of water saving technologies.

Strict enforcement of the regulation by local, regional and national authorities has been a main driver for a better aquatic environment, which in turn has seen a development of new technologies and techniques.

This general approach to water management has been used in Denmark from the beginning, and in some cases the circle has been travelled several times before the required status was reached.

Today, the main challenges that remain include impacts of climate change and increasing temperature and precipitation (more concentrated and heavy rain) and combining the needs of agricultural production with recreation and the environment. A combination of regulation, science and technological development is needed.

### Contact:

Poul Nordemann Jensen, Senior Adviser  
National Environmental Research Institute  
University of Aarhus  
pnj@dmu.dk

Torben Moth Iversen, Head of Department  
National Environmental Research Institute  
University of Aarhus  
tmi@dmu.dk

Read more:  
[www.ecoinnovation.dk/english](http://www.ecoinnovation.dk/english)  
– choose Danish Lessons