

Pilot project for river basin management planning, Odense river – DK

1. Policy Objective & Theme

- ADAPTATION TO RISK: Preventing and managing natural hazards and technological (human-made) hazards
- SUSTAINABLE USE OF RESOURCES: Sound use of resources and promotion of less resource intensive processes/products

2. Key Approaches

- Integration
- Participation
- Ecosystems based approach
- Socio-economic

3. Experiences that can be exchanged

The development of a river basin management plan.

4. Overview of the case

This case demonstrates and tests the methodology laid down in the Water Framework Directive (WFD), from initial characterization of surface waters and groundwater, to the establishment of environmental objectives based on reference conditions to preparation of a programme of measures optimised on the basis of economic cost analyses and cost-effectiveness.

5. Context and Objectives

a) Context

The WFD aims to protect all bodies of surface water (watercourses, lakes and coastal waters) and groundwater, sub-dividing surface water bodies into five classes of ecological quality ("High", "Good", "Moderate", "Poor" and "Bad") and groundwater bodies into two classes ("Good" and "Bad"). Surface water bodies and groundwater bodies both have to achieve "Good quality", or "Good status" as it is referred to in the directive. Terrestrial ecosystems directly dependent on the aquatic ecosystems, for example mires and coastal meadows, are also encompassed by the provisions of the WFD. It requires that water should henceforth be administered in units based on sub-division into naturally defined river basins instead of existing administrative boundaries, for example municipal boundaries. In Denmark, four river basin districts have been designated encompassing 23 natural river basins. A good example of such a naturally defined river basin is the Odense River Basin. This drains into Odense Fjord and encompasses the River Odense, 14 large lakes and a wealth of small lakes and many watercourses, groundwater bodies and wet ecosystems. At the same time, the basin spreads across several different administrative boundaries.

Odense Fjord, including the inner fjord Seden Strand, is a shallow fjord with a water surface of 65 km². Since 1780, the area of water surface has been reduced by approximately one third, primarily due to land reclamation for agricultural purposes. Water exchange between the fjord and the sea takes place through a narrow opening called Gabet bordering onto the northern Belt Sea. Odense River Basin covers an area of approx. 1,050 km², corresponding to one third of Funen. There are just over 1,000 km of watercourse in the river basin, including the largest river on Funen, the River Odense, which is about 60 km long

and drains a catchment of 625 km². There are approx. 2,600 lakes larger than 100 m² included in the river basin management plan. Land use in Odense River Basin is dominated by agriculture. Many of the watercourses in the river basin are presently culverted, and a large proportion of the remaining open watercourses are physically regulated through channelisation and watercourse maintenance, etc. It is estimated that drainage has been established on at least 55% of the arable land in Odense River Basin over the past 50–100 years. Moreover, 13 large lakes and circa. 30% of Odense Fjord have been drained and converted to farmland.

b) Objectives

The pilot aimed to focus on agricultural nutrient pressure and its impact on achieving WFD objectives. Its main target was to demonstrate the development of a cost-effective programme of measures to reduce levels of nitrogen and phosphorous originating from agricultural activities in the Odense river basin. Further goals were to prepare a Pilot River Basin management plan and make available the project's results to other environmental and rural development authorities and stakeholders within the EU.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

The Odense Pilot River Basin initiative was carried out by Environment Centre Odense under the Danish Ministry of the Environment – and earlier by the Nature Management and Water Division of the former Fyn County. It was an open process with the participation of two external advisory boards (a national and a regional), an external technical expert group and an environmental economics expert group. A large number of stakeholders and institutions have thus made significant contributions to the project.

b) ICZM tools

The quality elements employed in the Odense Pilot River Basin project were: Lakes: phosphorus concentration; Watercourses: a physical index and a fauna class index; Odense Fjord: the depth distribution of eelgrass. The advantage of using eelgrass is that good historical data are available on its distribution in Danish marine waters that can be employed to establish reference conditions. The distribution of eelgrass – and hence also the depth at which the eelgrass is able to grow – is affected by the concentration of nitrogen in the water. The lower the water concentration of nitrogen, the lower the abundance of planktonic algae. The lower the abundance of planktonic algae, the clearer the water and hence the greater the depth at which eelgrass is able to grow. Given a knowledge of eelgrass biology and its present distribution, a pre-determined reference condition and the present level of nitrogen loading of Odense Fjord, it was possible to calculate the maximum annual level of nitrogen loading of the fjord that is compatible with the achievement of “Good status”. The criterion for “Good status” applied in the present pilot is that the depth distribution of eelgrass must not deviate more than 25% from the reference condition. The baseline characterization of the river basin included an assessment of the risk that the individual surface water bodies and groundwater bodies would fail to achieve “Good status” by the year 2015 with the environmental measures already adopted.

The risk assessment showed that in order to fulfil the environmental objectives for the water bodies and terrestrial ecosystems in the Odense River Basin it would be necessary to implement a programme of measures to reduce the pressures responsible for the lack of compliance with the environmental objectives. A programme of measures was therefore drawn up for Odense River Basin containing a balanced combination of different types of measure that would, together, ensure that the water bodies and terrestrial ecosystems comply with their environmental objectives. In the pilot, the programme of measures for the water bodies was integrated with Natura 2000 planning. These to some extent also included measures that would concomitantly contribute to ensuring fulfilment of the Habitats Directive objective of “Favourable conservation status”. Some of the measures in the programme aimed to reduce a specific type of pressure. An example is the group of measures “Environmental optimization of crop production” which reduce diffuse nutrient loading of water bodies from agriculture. Other measures were multifunctional, for example the group of measures “Set-aside of farmland under crop rotation – lowland/river valleys”. In this case the set-aside of land to form new wetlands would concomitantly reduce nutrient loading of surface waters, reduce physical pressure on the watercourses and recreate new terrestrial ecosystems. The new terrestrial ecosystems would eventually help ensure the necessary dispersal corridors in the cultural landscape and halt the decline in biodiversity.

An economic analysis of various scenarios of measures that could be used to ensure achievement of the provisional

environmental objectives for the individual water bodies identified the most cost-effective programme of measures for the river basin. The calculated economic cost of the programme of measures for ensuring full achievement of the environmental objectives was approx. DKK 94 million per year. Given that the present total expenses for water use in Odense River Basin amount to DKK 612 million compared with a total income and production value of DKK 116,600 million, the programme cost thus corresponds to an increase in the total expenses for water from 0.5% to 0.6% of the total income and production value. The corresponding budget cost amounts to DKK 65 million. The programme of measures would entail the set-aside of 12,479 ha of farmland – corresponding to 19% of the farmland in the river basin.

7. Cost and resources

The total budget was €514,641 of which there was a Life contribution of €201,841.

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

A cost-effective programme of measures to reduce nitrogen and phosphorus losses from agricultural activities in the Odense river basin in order to meet the WFD objectives ahead of the official Water Framework Directive time schedule was produced. It also developed a Pilot River Basin Management Plan. Participation of stakeholders was primarily achieved through the establishment of various advisory boards and expert groups

9. Success and Fail factors

The baseline characterisation of the Odense River Basin was prepared ahead of the official timetable together with a quantitative assessment of the various sources of pollution and the establishment of environmental objectives. The pilot also accorded particular attention to the problems concerning agriculture and the aquatic environment. The preliminary inventory of necessary and possible measures was subjected to a cost-effectiveness analysis in order to ensure that the improvements needed to enable the water bodies to meet “Good status” would be achieved as cheaply as possible. The experience and knowledge gained through the Odense Pilot River Basin project and the other pilot projects was disseminated to water management authorities regionally, nationally and internationally, as well as to the EU Commission.

10. Unforeseen outcomes

None so far.

11. Prepared by

A H Pickaver, Coastal & Marine Union (EUCC)

12. Verified by

It has not been possible to verify this case.

13. Sources

- Odense Pilot River Basin. Pilot project for river basin management planning. Water Framework Directive Article 13. Layman's report (2007) Danish Ministry of the Environment

