

ENGAGING FARMERS IN ENVIRONMENTAL MANAGEMENT IN DENMARK

Flemming Gertz¹ and Simon Rosendahl BJORHOLM²

¹Chief Consultant and ²Specialist Advisor, SEGES, Denmark

Background

Denmark has 5,7 million inhabitants, a land area of only 42,434 km² but with a coastline of 7,314 km with many shallow coastal waters vulnerable for eutrophication. With 63% of the land area of Denmark used for agricultural production the main environmental focus has for many years been to reduce nitrogen to coastal waters. Approximately 90% of all streams have been modified (deepened and straightened out) and there is pressure on drinking water (ground water based) and lakes, so many other environmental issues have also been targeted.

There are approximately 10,000 full-time farmers and 62,000 people (2.5% of all employed people) today working in the agriculture and horticulture food sector, but still it represents 25% of total Danish commodity exports. Because the majority of the population today have very little or no connection to farming the public debate is often based upon lacking knowledge concerning agriculture and environment.

Historical water management

For 40 years, there has been a water management in Denmark primarily following two main planning tracks: Government Water Environment Action Planning and municipal/county/regional sector planning. The Governments water environment plans (read nutrient reduction plans) have all been plans where the main objective has been national reduction targets of nutrient load through general regulation of point and diffuse sources. The plans have helped reduce diffuse nitrogen and phosphorus surplus in a "top-down" management in the form of general rules and legislation. From 1990 until today, the nitrogen load to Danish coastal waters has decreased from approx. 100,000 tons N to approx. 50,000 tons N. The decrease has mainly happened through national "input based" legislation including N-quotas on farm level and legislation regarding field measures like winter green fields, catch crops, timing of fertilisation etc. In the same period an 80% decrease in P surplus has been accomplished and at the same time a production increase of 10-20%.

The downside of the relatively strict regulation and "top-down" management tradition is a general lack of ownership from farmers to develop and implement new measures.

New targeted regulation

Agriculture is currently competing in an international market. Therefore, it is obviously a clear wish for agriculture that areas used for agriculture as far as possible are optimised for optimal cultivation and that a large part of the environmental efforts are carried out outside the cultivation area. This was the

motive behind a new program for more targeted measures decided by the Danish government in 2015. It includes a 3,400 ton N reduction distributed to implementation of restored river valley wetlands (13,000 ha), drain pipe constructed wetlands (1000 ha), reforestation (12,000 ha) with a total budget (EU + government) of 500 million NZ\$ over 4 years.

To fulfil this decision a new national management concept – Catchment Officers - was implemented in 2017 to support a “bottom up” approach. The concept was developed and tested in an EU Interreg project WaterCoG (Water Co-Governance) with inspiration from the English model for Catchment Officers used by The Rivers Trust. The new concept has a potential for introducing a suite of new targeted drain filter solutions that each have different ecosystem services and suites different locations in the landscape. It is crucial that the best measure is chosen for each different location, to optimise environmental impact and costs. This will only succeed with a “person on ground” with knowledge of the landscape, drains, a suite of measures and a direct and trustful relation to the landowner. The Catchment Officer plays an important role as “intermediary person” between landowner and other stakeholders and authorities, helping to find the win-win solutions and optimising communication between the different actors, and they investigate the concrete needs for implementing measures and helping farmers with start to finish solutions.

SEGES was assigned the coordinating role for the project. SEGES is responsible for training the 28 Catchment Officers, most of whom have a background as environmental/nature advisors. In addition, a number of IT tools are being developed that will help the Catchment Officers in their work to identify, register and describe the various initiatives. The Catchment Officers must, without cost to the farmer, assist in facilitation and they are distributed over the country according to the need for action of the individual coastal catchment areas.

Aarhus University has prepared a potential map for the whole country with a distribution of suitability for establishing either constructed wetlands (drain pipe) or wetland projects (restoration). The purpose of the survey is to avoid establishing constructed wetlands where it is more obvious to establish wetland projects. It is therefore not possible to apply for subsidies for the establishment of constructed wetlands in a river valley suitable for wetland projects or in its direct drainage catchment to avoid conflicting interests between the two measures.

Based on soil conditions, the potential map shows which areas are expected to be drained. Initially, these areas are the focus of the Catchment Officers when they look for drain-filter solutions. The potential map also contains information on the nitrogen effect by establishing constructed wetlands in a given drainage area. The effect is calculated on the basis of the nitrogen loss from the catchment area and the retention from the watercourse to the coastal recipient.

As there is no national mapping of drainage systems in Denmark SEGES has developed a tool based on surface flow of water to help the catchment officers predict the location as well as boundaries of drainage systems. Generally, drains are located where the water would run naturally on the surface. Therefore, surface flow is a good indicator of drains and watersheds. SCALGO is a company which provides a web-tool as well as customised modelling of surface flow and accumulation of water for flood risk planning based on the Danish elevation model. For the catchment officer project SCALGO has

made a national model of the surface flow of water from watersheds of more than 10 hectares. Where the flow paths intersect a cultivated area a crossing is inserted. The crossings are considered a potential location of a constructed wetland. The corresponding watershed of each crossing is mapped as it indicates the extent of the drainage system. The dataset consists of 150.000+ crossings and watersheds. In a subsequent GIS-analysis the nutrient effect of each constructed wetland is calculated based on a nitrate leaching model and the nitrogen retention between the drain and the recipient coastal water. Based on the location of the crossing in relation to nature conservation, landscape and soil type etc. the potential to establish a constructed wetland is characterised. Based on the analysis the best 11,000 potential projects are identified and provided in a GIS-tool. With the tool the catchment officers can focus their outreach to farmers with the best potential projects. The mapping is also provided directly to the individual farmers through the internet media Landmand.dk (Famer.dk) where farmers have access to a web-based map with their potential projects.

All relevant information concerning location, drainage, type of measure etc. is registered in the "Kollecto" tool, which was developed by NIRAS for the catchment officer project. When the catchment officers have found a suitable location for a constructed wetland, they use an add-on program, which SEGES has developed as a module for Mapinfo. The program then calculates the amount of soil to be excavated from the basins. The program is well-suited for finding the best location, designing the constructed wetland in the terrain and assessing whether it is financially realistic to implement the project.

The potential for reducing nitrogen and phosphorus loss from cultivated fields by increasing retention in the landscape is significant. Retention can be increased by not only wetlands and constructed wetlands, but with a whole range of drain filter solutions. Currently only constructed wetlands and wetlands are subsidised by national program, but it is expected that a whole range of new drain filter solutions will be introduced in the next few years. Including "Integrated buffer zones", "saturated buffer zones", small wetlands (not river valleys) etc. During the 3rd plan period in the Water Frame Directive (2021-2027), phosphorus reduction will be required, not only for lakes, but probably also for several coastal waters and for most watercourses. As drain filter solutions reduce the loss of both phosphorus and nitrogen, it is expected that in the future, even more focus will be on these measures.

There are 25 Catchment officers (16 full time positions) with a budget of 15 million NZ\$ over 4 years. 50% payed by farmers (farmers union) and 50% payed by the government. Thereby there is no direct payment for the farmer. In the period March - April applications for all projects will be made. With a relatively gentle start in 2018 applications for 78 projects (CW) were submitted in 2018, but with 400 estimated projects in 2019 the engagement among farmers is increasing due to very intense and targeted strategy for a change in attitude among farmers. The experience so far is that it is possible to engage farmers and change the "no engagement" attitude related to measures based on only legislation towards a combination of legislation and engagement concerning voluntary measures like wetlands and drain filter solutions.