

## Aquarius enters its second year

• By Irene Asta Wiborg

Farmers as managers of a good water environment under changing climatic conditions is the main theme for the seven pilot projects in six countries that together make up the project Aquarius.

The Aquarius project was started in 2009 with the basic idea that climatic changes in the North Sea Region pose new challenges as well as new possibilities for agricultural production.

The joint objective for the project is to develop methods that make it possible to continue profitable farming while still considering the environment under the new circumstances that climatic changes offer. The challenges vary in the project areas. Flooding, water shortages and too much leaching of nutrients are among the main problems.

### 2010 – finding and developing tools

The results from the individual pilot projects will be disseminated to the mutual advantage of all and expert networks ensure that the best professional knowledge will be available across the pilot areas.

In 2009 focus has been on data gathering and analy-

sis. In 2010 focus will be on finding the tools that will make it possible for setting the scene for the farmer as water manager.

In this newsletter you can read about current activities in Aquarius and you can see a status for a row of the pilot projects.



*Project leader Irene Asta Wiborg expects 2010 to be a busy year for everybody involved in Aquarius.*

*Focus will be on finding and developing tools that will enable the farmer to fill the role as water manager.*

[www.aquarius-nsr.eu](http://www.aquarius-nsr.eu)

## Pilot study Sweden: River Smedjeån – floods and droughts

• By John Strand

**Main problem:** Hydrological extremes with both floods and droughts which have large implications for farming in the catchment area. These problems are likely to increase in frequency as a result of climate changes. Apart from the negative effects on farming, there are several environmental concerns regarding for instance increased nutrient leeching and erosion connected with floods, constraints on the fauna during droughts, including negative impact on fish such as Trout, Salmon and River Lamprey, as well as on invertebrates including Freshwater Pearl Mussel.

**First Year objectives and results:** During 2009, we have compiled existing data on the river and catch-

ment area regarding farm practice, hydrology, ecology and sociology.

### Field work:

**Hydrology.** A major hydrological survey has been completed, and a large number of automatic measuring equipment has been placed in the field. These include flow measurements, climate stations and water-level gauges. These will be in the field during the project and give valuable data for hydrological modelling. So far, preliminary results from the hydrological studies indicate that the floods, although spectacular and “media focused”, might not be as critical for the farmers as the droughts are. As a result of this it is possible that there will be



Smedjeån flood – The river Smedjeån overflows its banks in the summer of 2007.

a slight change, with the project focusing more on how farmers can act in order to reduce the negative impact of droughts. A survey of the river bed and its near surroundings revealed that the implementation of buffer strips was fairly successful, but that the physical disturbance was large locally and that several migration barriers for fish existed in the river.

*Ecology.* We have also carried out studies on ecology in the catchment area, for instance how construction of wetlands (CV), which are good for both nutrient reduction and irrigation, affect the breeding bird population. The results clearly show a comprehensively positive effect of CV:s on bird biodiversity. Studies on the invertebrate fauna and vegetation of the CV:s in the catchment area also show substantially positive ecological effects.

*Sociology/Farm practice.* A number of “pilot farms”

have been selected for more in depth studies on the farm level regarding irrigation needs, crop selection, nutrients etc. In addition surveys have been distributed to get an overview of the opinion of farmers regarding, for example, the foremost current problems and future perspectives. Meetings with the farmers, fisheries, etc guarantee in addition that the measures are planned and implemented in cooperation with the stakeholders.

*Future work:* During 2010, we will together with farmers, and based on different stakeholders opinions, evaluate possible tools that might be used by the farmers in order to act as water managers. This will include; wetland construction, water level manipulation of dams, physical alterations of the river bed, changes in farm practice to decrease nutrient load and increase efficiency in irrigation and other aspects.



Farmers and stakeholders on an excursion along the river Smedjeån, May, 2009.

## Sustainable Flood Management – The Aberdeenshire Approach

• By Linda Mathieson

Over the last few years the North East of Scotland has experienced weather patterns that have left land waterlogged for long periods of time. Wet ground combined with periods of intense rainfall has led to local flooding of both agricultural land and on some occasions homes and industrial premises. There are concerns that these weather patterns are likely to continue or even increase in the future as a result of climate change.

Aberdeenshire Council in partnership with the Macaulay Land Use Research Institute and Landcare North East hopes to identify ways to reduce the impact of these flood events on homes and businesses in the area and have been gathering baseline data in the Tarland Burn catchment to help identify potential flood alleviation options to reduce future flooding in the settlements of Tarland and Aboyne.

### An opportunity to develop

The Tarland catchment was chosen as the Scottish, Aberdeenshire pilot area as the Aberdeenshire Coun-

cil, Flood Prevention Team were already looking at flood alleviation measures for the village of Tarland and Aboyne but the Aquarius Project offered the opportunity to develop a greater understanding of the likely impacts of future climate change on the range of options available and hopefully identify opportunities to use natural flood management solutions rather than the traditional engineered approaches.

Throughout 2009 officers from the 3 organisations have been working together to establish the baseline information required. The Aberdeenshire Flood Prevention Team have been working with consultants to develop a flood risk model of the Tarland sub catchment to identify the likely areas of flooding from a 1:10 to 1:200 flood event. While Landcare North East have met with each of the key land managers (Farmers and Estate Owners) to complete a baseline questionnaire and the Macaulay Land Use Institute have been looking at the recent patterns of land use and developing climate change scenarios and for the catchment.



The Professor from the University explains the background for the wetland programme in Sweden to the Scottish Group.

## Bilateral learning

The Scottish Aquarius Project Team have also benefited from the experiences of our European Partners particularly our Swedish Partners who have similar flooding issues in the catchment of the River Smedjeån in the municipality of Laholm on the south west coast of Sweden. A number of the Scottish partners visited Sweden in October 2009 to look at the 150 hectares of wetlands that have been created in the catchment to assist in the reduction of human-induced nutrient emissions to the Baltic Sea. These wetland have however, also improved the biodiversity of the area and to a small extent contributed to flood alleviation. The aim of the visit was to learn about both the construction and maintenance of these wetlands, how they were integrated into the land use of the area and the role and views of the local farmers have of the wetlands.

In late October 2009 a workshop was held with local Agencies and Advisors to get their perspectives on the proposed approach to sustainable flood management in the Tarland Burn catchment and to ensure that the Scottish Partnership had the right regulatory and advisory context to the information that it had pulled together for the transnational baseline workshop.

In December 2009, at the end of the 1st year of the Aquarius Project, the Scottish Partners hosted a Transnational Workshop for the seven European Partners at Douneside House in the Tarland. The focus of the workshop was to pull together the baseline information for each of the seven pilot areas and identify the similarities and differences that there were across the six European countries (two of the pilots are in the Netherlands) in relation to the effects of climate change on their activities and in how their farmers were engaging and assisting with deliver of the pilot objectives. A summary of this exercise can be found of the Aquarius website – [www.aquarius-nsr.eu](http://www.aquarius-nsr.eu)

For the Scottish pilot area and its partners the most important stage of the Aquarius Project begins, the need to take the baseline information out to the local farming community both to ground proof the information that has been gathered to date and to begin to scope out what the potential flood alleviation options might be and what delivery mechanisms there could be working in partnership with the local farmers and land managers.



Flooding in the village of Tarland

## First results from Aquarius in Drenthe

• By Deirdre Buist-Murphy

The Province of Drenthe, the water authority Hunze en Aa's, LTO Noord (the regional organisation of the Dutch Federation of Agriculture and Horticulture) and Grontmij are working together on the Aquarius project in Drenthe. The knowledge gained from two other current projects within this cooperation (Hotspot and WaterSense) is being used to test the most modern technological solutions, with the help of local farmers. These farmers have, in effect, become managers of their own water systems as they test small weirs and sensors which continuously register the amount and quality of the soil moisture on their land.

**WaterSense** aims to improve the current agricultural situation by using sensor technology to monitor soil moisture and soil nutrients. The real-time data streams, linked to computer models, give daily recommendations for fertilization and irrigation with as joint goal the improvement of efficient water use

and optimizing agricultural production. The envisaged uses for this system include:

Supporting system for daily management of water levels by the local water authority Hunze en Aa's.  
Decision support system for optimal irrigation and fertilization.

The **Hotspot** aims to assess the possibilities for future development in the most important sectors of agriculture in the northern Netherlands as a result of climate change and the potential consequences for the environment. Issues being studied include:  
The position of the agricultural sector in the Northern provinces and the potential to adapt.  
The definition of the most significant opportunities and threats.

The consequences for farming practises, the environment (emissions and greenhouse gases) and the impact on climate targets.



Sensor technology is an important part of Aquarius in Drenthe.



Policy and technical requirements and a coherent strategy for each region or sector.

Aquarius unites these projects and heightens the ambitions. WaterSense is based on a technical approach to implementation and Aquarius adds to that by focussing on practical measures to improve water use efficiency and conservation. The Aquarius project will fit large weirs with remote controls and build small weirs to be operated by farmers. In addition a new irrigation technique with pivots is being tested on a local research farm and talks have begun to ensure more groundwater is available for irrigation purposes.

Because of Aquarius the Hotspot studies are being carried out on a larger scale, in a wider area and in greater detail in an area of Drenthe, with a strong emphasis on practical farming solutions.

## Aquarius unites

In this newsletter the Aquarius project-team in Drenthe would like to tell you a little more about the current research being carried out.

At the time of writing (January 2010) the first two studies have been completed. Results from the first study, which concentrated on adaptability, indicate that the agricultural sector in the northern Netherlands has substantial competitive capacity within Europe. The trend to increase production per hectare, which has been developing over the past years, is expected to continue as farmers anticipate and react to market and climate changes. The increased production is influenced by the average rise in temperature and CO<sup>2</sup> content in the air. Further investments are needed and farms are likely to become larger in scale but less in number.

The second study on climate and agriculture was completed in December 2009 and focussed more specifically on the climate, the possible consequences of extreme weather conditions for production and potential solutions. To measure the effects a wide scale of crops, both traditional and new, as well as the dairy farming sector, were looked at closely. The results are somewhat diverse as it appears that damage is not only caused by heat-waves, drought

and floods but also that warmer winters and hot, humid summer weather can have an equally negative impact. Per crop, however, there are also significant differences. For example, potatoes are particularly sensitive to heat-waves, as are grasslands. Long periods of drought will affect many crops, depending on the time of the season, and warm, wet weather greatly increases the chances of pestilence and disease. Higher winter temperatures will affect crops in storage. Sugar beets will lose a percentage of their sugar content while seed-potatoes and onions etc. will need to be cooled technically. Dairy farmers can also expect challenges. Consider heat-stress in cows leading to a decrease in milk production, flooded conditions which encourages liver-fluke, warmer weather in summer and winter causing an increase in diseases and sick animals.

## Not all bad news

Fortunately it's not all bad news. Many problems can be avoided if they are anticipated on time and with solid farm management: by growing potatoes on broader furrows and sowing pastures with a more heat-resistant grass-seed mix, for example. Some cowsheds are already being built with adaptations for climate change and research is being done into the feasibility of other, less traditional crops in the region. Artichokes and sunflowers could prove good alternatives for carrots and onions since they have a higher tolerance for saline and dry conditions.

This is a very brief summary of the results to date. The third and final research phase is now underway and concentrates on formulating a package of measures for individual areas in the region. Researchers, farmers, governmental organisations and water authorities are cooperating fully with each other in this project. All are very motivated in their search for solutions to the potential affects of climate change in the agricultural sector in the North of the Netherlands.

Learn more:

[www.projectwatersense.nl](http://www.projectwatersense.nl)

[www.klimaatonderzoeknederland.nl](http://www.klimaatonderzoeknederland.nl)

[www.ltonoord.nl](http://www.ltonoord.nl)

[www.aquarius-nsr.eu](http://www.aquarius-nsr.eu)



## Chasing win-win situations

• By Irene Asta Wiborg

To a large extent the work in the Danish Aquarius pilot project area around Mariager Fjord centres on finding win-win situations.

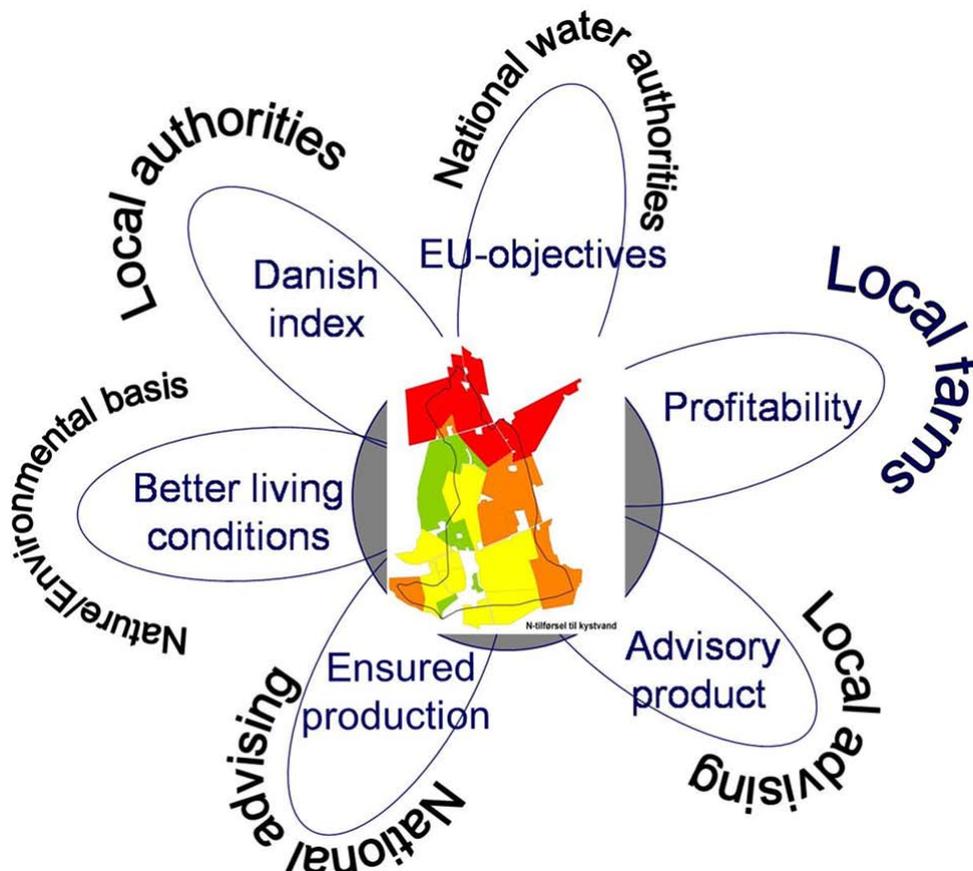
Climatic changes might actually mean better possibilities for agriculture in Denmark in the long run. However, climatic changes might mean that the environment may be further exposed. Considerable amounts of nutrients leach to the fjord and the amount may become even greater, if changes are not made in agricultural practices in the area. Of course this is a problem for the profitability of the farms.

The problems can be illustrated by the flower figure below. The figure has been developed by sociologist Anne-Mette Langvad. The map in the centre of the

flower shows a problem of nutrient leaching, which is shared by all stakeholders. The petals illustrate the meaning of this shared problem to each of the stakeholders. Different stakeholders attach different meanings to the same problem. Win-win situations are about creating solutions to a problem in a manner that is meaningful to everybody. A farmer's primary interest is to ensure that his production is profitable whereas the interests of the other interested parties vary.

### Creating opportunities

The intention of our project is to create possibilities for the farmer to act in order to promote a profitable production while still ensuring that the environment is considered. It is an interesting but also a difficult task.



We have produced a professional baseline, which in detail describes the challenges that we face in the areas. A project group has been formed including two farmer representatives appointed by the local advisory service, AgriNord. The group further consists of representatives from AgriNord, the municipality of Mariager, and the National Centre and Environmental Centre, Aalborg.

## Barriers to development

One of the current big tasks is to loosen up a long row of barriers that prevent the development of new methods and the general approach to change. Of course this is about the way the farmers run their business but just as much about the administrative practice the authorities have settled on.

These somewhat locked approaches from the interested parties constitute a central hindrance for the project's further work, which is why we are currently working hard on creating consensus about the

fact that a new way of thinking is essential for the project's success.



Large amounts of nutrients leach to Mariager Fjord. This calls for changes in agricultural practices in this picturesque part of north-eastern Jutland. The Danish pilot project aims to find tools for the farmers to continue an effective production under the changed conditions.

## Exploring opportunities in Delfland

• By Margreet van der Werve

The Delfland pilot area is the local catchment Midden-Delfland, in the south-western part of the 'Randstad'. Midden-Delfland is often seen as a regional park between big cities and glasshouse horticulture.

This pilot aims at exploring opportunities for green-blue services in the realisation of water storage in this area with agricultural grassland. Improvement of water quality, avoiding water problems, maintenance and ecology are important values to Delfland. Delfland explores efficient ways of cooperation between farmers, the waterboard and local authorities. In the baseline phase in 2009 Delfland works with projectpartners on 5 pilots:

- planning measures about open water storage;
- organisational and legal aspects of green-blue services;
- projects on a voluntary basis with groups of individual farmers and intermediate farmer organisations (Vockestaert and LTO);
- sustainable processing of duckweed;
- reducing use and loss of nutrients by efficient use of fertilizers.

Projectpartners include the municipality Midden-Delfland, Waterkader Haaglanden, Stadsgevest Haaglanden, farmers organisations and nature boards.

## Second partner workshop in Scotland

From 1 to 3 December Douneside House Conference Centre in Aberdeenshire, Scotland was the venue of the second workshop for the Aquarius partners.

The meeting's objective was stocktaking and to give all participants an up to date overview of current challenges in the local projects. Methods to ensure involvement and ownership of the project among the farmers participating in the project were another important item on the agenda. With the Aquarius concept's focus on the farmer as the central player in managing good water environment keeping continuous focus on this theme is central in the process.



Stephen McFarland, Aberdeenshire Council, (left) and a local farmer informed about some of the challenges that the Scottish pilot project faces.



The excursion to the project area gave the visitors a good impression of the challenges and opportunities around Tarland Burn.

At the meeting the postcard presentations that have been produced by the individual pilot projects were presented. These form the basis of the baseline report that has been almost completed.

### Structural changes create flooding

Douneside House lies in the centre of the Scottish project area where structural changes around the stream Tarland Burn create flooding problems for the villages Tarland and Aboyne. These problems were illustrated at an excursion along Tarland Burn with an inspection of the areas where the problems arise. We visited a local farmer whose fields are intersected by Tarland Burn and who is dependent on constructive solutions to the flooding problems.

Irene Asta Wiborg from the Danish Agricultural Advisory service summarizes her impressions of the three days in Aberdeenshire like this: "The workshop in Scotland gave us a very good view of where we all are and the different approaches to our various challenges. It was a well organised workshop where I believe we all got a lot of inspiration to take home and use in our future work in our individual projects."