

# Key Methods



**How to find the right mix of methods to ensure a good water environment and still maintain an efficient agricultural production.**

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# 1 Introduction

"Farmers as water managers" is the slogan for the project Aquarius. The seven pilots all have the objective that farmers and other landowners should function as managers of a good water environment while still conducting an effective and profitable production.

During our work on the key methods – and the right mix of these methods - to achieve this objective, we have found that an important challenge is how to make local landowners and farmers interested in long term solutions to long term problems. In order to maintain an efficient agricultural production, farmers must adapt their production to the changing climatic conditions. The long term strategies for handling for instance flooding, which the authorities or researchers are working with, have a timeframe that is much different from the timeframes of farming. Perhaps 50 years compared to 3-5 years.

This phase of the project relates to development and operationalisation of various key methods that the individual farmer will be able to use in the interaction with authorities and other interested parties.

The primary objective for farmers is to cultivate and make profitable use of as much of their land as possible. If they are to invest in the environment, it is crucial that they believe that they will benefit from these investments. Win-win situations are what we are searching for, which is why some of the most important questions to ask in order to find the right mix of methods are:

- What kind of benefits could be interesting for farmers?
- What to look for to find/create win- win situations?
- How can farmers' interests be combined with the objectives of the water frame directive and other environmental interests like water quality, biodiversity, etc.?

In the Aquarius project we have grouped the various key methods in three categories:

- Technical methods
- Financial methods
- Participatory planning

Each group of methods has been dealt with separately in separate workshops and then combined, since no single method can stand alone. We have organised the three methods in what we call the Problem Solution Wheel. The Problem Solution Wheel and how to make it turn efficiently will be explained in this report.

For further information about the individual methods please see the reports posted on [www.aquarius-nsr.eu](http://www.aquarius-nsr.eu).

# 1.1 Technical methods

## Regional characteristics

Within the pilot areas the problems vary greatly: water shortages, flooding, and water quality. The urgency of these problems varies as well.

Each problem should be approached in a locally appropriate and adaptable way, but nevertheless it is clear that exchange of experience between the project pilot areas helps to prepare initiatives to prevent the negative effects of climate changes.

## Implementation of new techniques and technologies

Several means to disseminate knowledge about new techniques and technologies to farmers are employed by the partners: articles in agricultural papers, presentations at farmers' meetings, or organised farmer groups especially for young farmers.

It is necessary, as well, that local advisers have a high level of information, since they are the ones mainly in contact with the farmers.

Research studies are set up together with innovative farmers in their fields and study trips for farmers are organised to these places. Having these innovative farmers introduce the new techniques and technologies will make other farmers interested in accepting the idea when first it has been proven effective. The findings will be presented throughout the project at seminars, at an end conference and in proceedings like a magazine addressing the different challenges the farmers meet implementing new techniques.

Implementation of new techniques should be facilitated by subsidy schemes including free advice.

Among the Aquarius partners some subjects have specific interest and in the case studies specific interest is shown to

- Catch crops for prevention of erosion and retaining CO<sub>2</sub>. Implementation of buffer zones along surface water
- Changing the shape of the fields to make centre pivot irrigation possible. )

There is a focus on combining different initiatives to create synergy effects. This might include a change of rules and legislation or change in the administration of these.

For instance

- How to allow removal of ponds or (groups of) trees and create/plant new ones in set aside corners in combination with buffer strips along edges of fields as connection zones?
- How to organise that farmers can combine their fields to make large scale pivots profitable?

Exchange visits from the different pilot areas to the project cases should serve as a test for the expected effect of the use of innovative farmers for demonstration of new techniques.

## 1.2 Financial methods

The most important questions are:

- How do we achieve that farmers and water authorities are willing to provide services that prevent flooding, water shortages or leaching of nutrients?
- What are the (financial) barriers for farmers to act as sustainable water managers?
- What is needed to resolve these barriers?

### Transnational conclusions

More incentives are needed to encourage farmers to act as water managers (motivation factors). The Aquarius partners identified some important (economic) motivation factors:

### Transnational findings

- The Aquarius partners distinguished different agri-environmental initiatives to prevent flooding, water shortages or leaching of nutrients.
- The Aquarius partners identified and discussed farmers' interests and the advantages and disadvantages of four financial key methods: Green and Blue Services concept, Capital maintenance, Market oriented model and Insurance model, as important to enable farmers to act as sustainable water managers.

### Regional characteristics

- Institutions, types of initiatives, and spatial characteristics influence successful water management executed by farmers.

### Motivation factors to get farmers interested

- It is important that there is a good cooperation between farmers and other partners in the region and thus it is necessary to seek win-win situations.
- Farmers are interested in acting as sustainable water managers when it is profitable, e.g. sufficient income and water of good quality for irrigation.

### Motivation factors to enable farmers to act as sustainable water managers

- Farmers should be motivated to act as water managers, if they can see a synergy between CAP and Environmental policies and between Cross Compliance and AES (Agri-Environmental Schemes). This should give less overlap and take into account the environmental cost-benefit relationship in agriculture.
- The AES and the Catalogue of Green and Blue Services should match with local characteristics, farmers' interests and water management: more water-related initiatives need to be included in the schemes and more activities in a cluster or package of initiatives need to be compensated for.
- Compensation payments for agricultural enterprises should be more inciting and fair, so that water management becomes a commercially interesting activity for farmers.
- A combination of government subsidies and private money may be necessary to keep the farmers as food producers, landscape and water managers in the area.

### Regulations and tools

- Ecosystem services can provide important benefits to the environment.

- Agri-environmental schemes (AES) are established on a national and regional scale to encourage farmers to provide ecosystem services.
- Ecosystem services go beyond Good Agricultural Practices (GAP): farmers have to comply with environmental, food safety and animal welfare standards and have to bear the compliance costs (Polluter-Pays-Principle).
- Funding of ecosystem services that will distort competition in the Common Market is considered state aid.
- Government payments of no more than EUR 7.500 for agricultural enterprises over a period of three years are not regarded as state aid (Minimis aid).
- In order to prevent any abuse, the Minimis aid needs to be transparent: the aid amount can be calculated precisely in advance without the need of carrying out a risk assessment
- There are different European Community guidelines on state aid that may be of interest for granting ecosystem services.

## 1.3 Participatory planning

### Network

The network in each region consists of:

- Authorities: national, regional and local.
- Regional interest groups and farm advisers
- Individual farmers

### Authorities

The role of the authorities in participatory planning differs. In some countries the regional government - and sometimes the water board - plays a leading role in connecting farmers with environmental projects.

In other countries the national governmental organisations - sometimes research organisations - play the leading role within the network of authorities.

The advantage of direct involvement of national authorities is the possibility of gaining more policy influence and implementing legislation. The role of the EU is mainly restricted to networks like Aquarius and their funding. EU programmes play a vital role in spreading knowledge and cooperation.

### Regional interest groups

These interest groups consist of farmers' unions/farmer advisory organisations, nature conservation groups, and environmental organisations and so on. In some countries these groups play a vital role and have a clear added value in the network because of their practical knowledge and bonding with farmers. In some countries there is a strong tradition of individualistic farmers. In other countries farmers are quite recently organizing themselves with the main purpose of maintaining nature and water banks. These newly organised farmers' groups are motivated for participating in sustainable projects about water management.

### Individual farmers

It depends on the regional setting whether individual organised farmers or farmers' advisory services participate. Nevertheless there are some common critical aspects for individual farmers to participate

- Clear and workable water goals
- Authorities who explain conflicting goals and legislation
- The possibility of long term agreements about maintaining land and water





- Options for the farmer to connect the initiative with economic goals
- 'Win-win' solutions: some initiatives can combine agriculture with nature conservation better than others
- Trust in farmers as water managers. When farmers are only seen as 'polluters', there is an insufficient base for cooperation

Common understanding is crucial:

For the authorities it is crucial to find the farmer's interest.

For farmers it is crucial to understand and take the environmental goals seriously.

### Obstacles

- Implementation is often hindered by the impossibility of paying farmers for implementing initiatives that are due to European legislation.
- Conflicting interests of individuals, neighbouring farmers, and agricultural organisations often create difficulties.
- Too small networks as well as inconsistent policy making and slow project progress can create fatigue among the involved farmers.

### Methods

Success of a method depends on the local circumstances and traditions. In the working group the Aquarius group discussed some methods to work with farmers and farmer groups by setting up projects on farmers as water managers, esp. working with key persons and with 'kitchen table talks'.

### Approach

The pilot projects are based in local communities some of which are already defined as municipalities, villages or associations. Other projects need development of new communities in order to involve a reasonable number of stakeholders in a specific geographic area. Whether the situation is one or the other, involvement of local human resources is necessary to obtain results with limited economic means in projects where objectives and goals go beyond current legislation.

The approach described by John McKnight as Asset Based Community Development, ABCD, is a useful tool for efficient participatory involvement. The focus is on positive experiences and openness to all ideas, inspiring people to be engaged in contributing with possible solutions instead of concentrating on problems and restraints. The ABCD approach brings forward key persons, who can act as local drivers in connecting local stakeholders for implementing local initiatives.

### Key Persons

The right key person can be difficult to find. Other skills than technical knowledge are important. The key persons can be found within agricultural advisory organisations, private consulting firms, and farmer unions, but also in the network of policy makers, preferably retired.

A key person is involved as a sort of intermediate between authorities and farmers/farmer organisations. Characteristics of a key person are:

- Can work at a local scale
- Has an understanding of governmental issues and affinity with the farmer's practise
- Has good networking and communicating skills
- Can rely on some trust of farmers/ farmer organisations and of authorities as well



- Can be 'used' as an ambassador on different levels, even within government and local administration

### **Involving participants**

A specific tool in participatory planning is 'kitchen table talks'. This means that authorities, scientists and farmers meet at local level, for instance at a kitchen table at a farm, or on larger scale with a group of farmers in the local town hall or another meeting point with appropriate facilities.

### **Consulting and negotiation**

Other possible methods, such as consulting, negotiation and mediation, have not been dealt with in the group.

### **Opportunities**

Good practices are characterised by integration between the authorities' initiatives and agricultural projects in practice.

It is important to build and maintain a close relationship with farmers through key persons or key organisations. Clear goals from authorities with time schedules and well described funding facilities may help to get attention from the farmers.

There are already "best cases" within the regions. These can serve as examples for setting up new initiatives. Information about good practices should be spread within and between groups of stakeholders on local, regional, national and international level. Within the Aquarius regions a database of good practices should be set up to help other farmers find new ways as water managers.



## 2 The right mix of methods

The aim of this work package is to find the right mix of key methods for implementing the WFD plans under future climatic conditions. In Aquarius we have grouped the methods in three categories that have been discussed and dealt with in separate workshops:

- Technical methods
- Financial methods
- Participatory planning

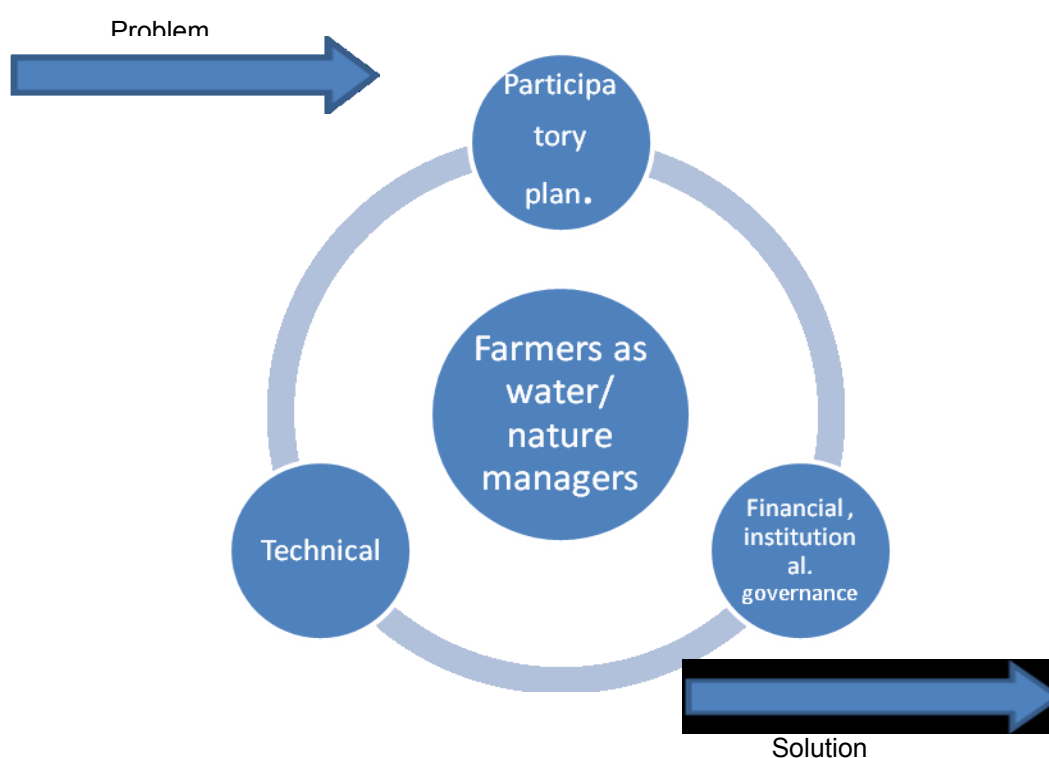
We have organised the three methods in what we call the Problem Solution Wheel - see below.

### 2.1 Objectives

- That all pilots obtain an understanding of how participatory planning, technical solutions and financial solutions interrelate to one another/ in any single project phase
- That all project partners are able to demonstrate to the others by way of relatively detailed descriptions of one or more cases from their own pilot how this is the case
- The challenge will be to show how a particular technical solution fits with a particular way of financing, organising, etc.

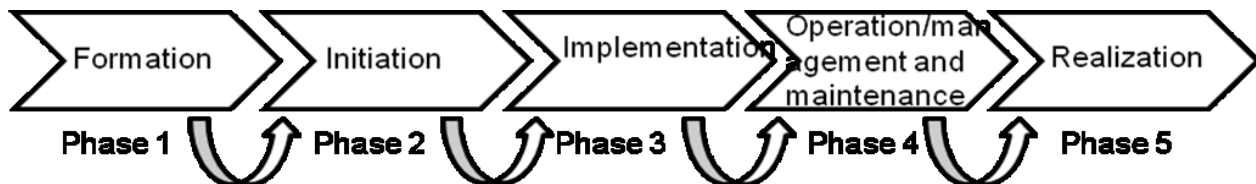
### 2.2 Method

Searching for a tool to help find the right mix between technical, financial, and institutional methods we came up with what turned into the Problem Solution Wheel. The wheel focuses on the farmer as water manager under changing climatic conditions. The wheel is meant as a process-tool that can be used during the different phases, while dealing with problems and how to solve them. All partners worked together in a workshop to test and improve the Problem Solution wheel.



## 2.3 “Case-stories”

We worked with actual cases from the various pilot areas. The cases were described and prepared by each pilot before the workshop through answering a set of questions. In order to maximize our possibilities of learning from one another we decided that a high level of detail was necessary. Each pilot described activities that had, in fact, taken place in the pilot areas – activities that had at least reached phase 2 (cf. below). Being aware of different phases in the implementation of an activity makes it easier to point to details and comparable activities.



In some pilots some activities have reached later phases than others. We found that this was enriching for the common learning

Identifying barriers makes it possible to pinpoint the necessary changes - participatory, financial, as well as technical.

In general we searched for win-win solutions. In case of problems in the functioning of interactions we tried to find recommendations on what to change and/or to develop in order to create the desired win-win solutions.

The preparatory questionnaire, the background information for WP 3, as well as “case-stories” from the pilot areas are attached as appendices.

### 3 Workshop activities

Participants from all pilots got together at a workshop in Norway where we used the wheel as a process tool for problem-solution. We had divided the participants into three groups, where each group worked with one of the following problems:

- Problems with flooding
- Water shortages
- Water quality

Each group started out with each pilot represented in the group presenting their case to the others.

The group selected one or more cases to work with, and for each project phase we discussed how participatory planning, technical solutions and financial solutions interrelated to one another. Where was the main focus in solving the problems occurring in this phase?

The groups also discussed if there were other questions that should be asked in order to pinpoint barriers and possible solutions. Main focus was: *“How do you find the right mix of key methods”*.

Each group used the case they worked with and the group's combined expertise to consider improvements to the model. To a great extent the problems were complex and multi-dimensional.

#### 3.1 Phase 1 – 2: Formation and initiation

It is important that all aspects (technical, financial, participatory) are dealt with almost at the same time. But participatory planning will be the most important in phase 1 and 2

##### Technical methods

To get engagement from the farmers you often need to prove that the problem exists. Evidence is needed to justify that the problem is related to agricultural practice

Different technical methods are also needed in order to find the right sites and in order to disprove myths and false ideas.

When working together with farmers to find solutions the main focus should be on what is important to the farmers, and then to try to find answers to their questions. In this phase we should look for technologies that:

- Solve the problem in an efficient way.
- Have high profitability
- Are understandable:
  - Uncomplicated
  - User friendly
- Are labour efficient
- Are stable, proven technologies



The technical methods chosen must be seen in context of restrictive government regulation aimed at promoting only the most cost effective solutions, i.e. money for schemes for flooding must protect people/properties from 1 flooding event within a 200 year period.

### **Financial, institutional, governance methods**

It is important not to be too focused on finances in this phase. But if we are looking for the right technology to solve a problem, the financial, institutional and governance issues must be paid attention to.

The farmers will want:

- Knowledge of investment costs.
- Knowledge of efficiency.
- Knowledge of financial options – possibilities – procedures.
- Public subsidies to act in the interests of society. Non-profit services.
- Investments which are able to capitalize in the form of needed items like more water, use of more nutrients on stable areas for increased production.....
- Stable and “fair” rules in order to run a profitable enterprise. Too many restrictions will make the farmer stop farming. Transparent rules and regulations and political /environmental priorities.
- Confident in long term planning of public priorities in different regions and areas. Large scale and small scale. “Agricultural zones”.
- Flexible solutions which involve the farmer’s knowledge
- Cost efficiency of the initiative

### **Financial barriers**

There are two major aspects which should be taken into consideration:

- How to get started
- How to ensure long term continuation

Experience from the pilot projects shows how much influence the local economic conditions have on the possibility of initiating and implementing activities.

Often government money comes with very prescriptive regulation and from a demanding application process. Local benefit schemes vary from one municipality to another. This creates a barrier for replicating activities and for creating widespread activities. This effect is very clear in the Scottish project site Tarland, where there are huge financial differences between sister areas.

In Sweden there are examples of mature projects. The first wetlands will soon be 20 years of age and by then the contracts have run out and new ones must be made. Criteria for renewing contracts and new subsidies are being considered. Interviews with farmers in the pilot area about what makes them interested in wetlands will hopefully lead to improvement of the wetland subsidies that could be used nationwide as well. However this objective hasn’t been reached yet

### **Financial opportunities**

There might be opportunities for creating win-win solutions if farmers get paid for *different* services. Not necessarily double pay or triple pay for his efforts, but being remunerated for making visible services provided for the benefit of the public and for himself.

## Participatory planning methods: How to engage and involve

It is important that the problem is recognized both by governmental organisations and other stakeholders and that there is a shared understanding of how to tackle the problem. It is important to recognize that the problem exists at a local level. The farmers should be actively involved from the start. They can contribute with for instance collecting information about the problem. Farmers are the local specialists, and they might have suggestions for how to solve the specific problem.

To succeed with the participatory planning approach it is important to get the farmers interested in contributing to solving the problem. Farmers involved in Aquarius claim the motivation factors for them to contribute was 1) to be seen as actively addressing the problem, 2) to personalize and take ownership for the problem. They want to return the water quality too how they remembered it from their childhood (and want their children to be able to swim, fish, etc.) The farmers may very well be those who see the problem right from the beginning

Farmers are often needed to solve the problem for instance in the reconstruction area Midden-Delfland, where the authorities in the project have had the following reflections: "Farmers are not always the problem, so one shouldn't automatically point fingers at them. When working with farmers we must be aware that obviously their primary objective is the ability to cultivate and make profitable use of as much of their land as possible.

Farmers may be preoccupied with different aspects of a multidimensional problem compared to authorities or researchers - or they may have a different time frame for addressing a problem (a 3-5 year basis rather than 50 year basis). What needs to be done in order to achieve the national targets may differ from making improvements in a 3-5year perspective. There are two parts to this – first is timescales where authorities are being encouraged to plan long term flooding strategies – farmers businesses are run on shorter timescales. Second is return period of flood events. High probability events can affect farmers more whereas it's the lesser return periods – 1 in 20 or greater that cause widespread flooding to property/homes which we are trying to deal with."

Different approaches to the wheel:

- Sweden, having "technology" and "finance", but lacking the land for implementation, started with bottom up meetings with farmers: What will lead to increased use of wetlands?
- Scotland, having institutional, scheme barrier (prescriptive regulation in 100 yr. perspective), started with: analytic mapping, screening, multicriteria matrix narrowing possible sites down to 3. In Scotland the technology exists but there is a requirement to "prove" effectiveness in cost terms, which means that sites suggested from the bottom up are rejected as ineffective. The new Flood legislation removes the barrier which is the need to achieve protection against the 1 in 100 years event as a minimum (to attract funding) but the need to demonstrate cost effectiveness upfront prevails.

## Challenges necessary to overcome to proceed in this phase

- Recognition that the problem exists
- Making people interested, but not too interested too early. Important to quantify the effect before too many of the initiatives are implemented.
- Getting the right incentives in place. Sometimes this may require changes at various levels (local, regional, national) on financial and legal aspects.

- Multi-functionality - the current initiatives in most countries are too fragmented. The scheme options tend to be aimed at single issues. Packages in the national/regional schemes do not always fit the local situation.
- Ideas for how to get people together.
- Keep local, and try not to be drawn onto a regional or national level as this may make you lose local buy in.
- Don't ask people to solve other people's problems
- Farmers are central for moving ahead, but are looking for immediate gains.
- Know to what extent farmers are willing to act as water managers (bid proposal)

## 3.2 Phase 3: Implementation

### Technical methods

It is important to take people seriously. Look into issues that are raised by stakeholders and, if required, provide technical information to prove that the situations are correct. Field experiments could be a good way to make the farmers feel secure that a changed practice will not have a negative effect.

When choosing technology it is important that it:

- Solves the problem in an efficient way
- Is profitable for the farmers
- Is understandable, uncomplicated, and user friendly
- Is labour efficient
- Consists of stable, proven technology

### Financial, institutional, governance methods

In this phase the financial methods are becoming more important. A good idea could be to have a financial coordinator who takes care of the synergy of different financial flows.

These are factors concerning financing, institutional and governance methods that are important for the farmer when choosing technology:

- Knowledge of investment costs
- Knowledge of efficiency
- Knowledge of financial options – possibilities – procedures
- Official subsidies to act for interests of society. Non-profitable services.
- The investment must be able to capitalize in the form of needed items like more water, use of more nutrients on stable areas for increased production, etc.
- Stable and "fair" rules in order to run a profitable enterprise. Too many restrictions will make the farmer stop farming. Transparent rules and regulations and political /environmental priorities.
- Confident in long term planning of public priorities in different regions and areas. Large scale and small scale. "Agricultural zones".
- Flexible solutions. Involve the knowledge of the farmer.
- It is important to bear in mind that agricultural schemes will change and the initiatives will also change.

Structural development can be an enabling factor or a barrier:



- Bigger farms make some land distribution procedures like buying and swapping land easier.
- Bigger farms may also take out land more easily
- Bigger fields however may mean increasing run off and bigger damage
- Methods depend on the kind of farmer we are dealing with

### **Participatory planning methods: How to engage and involve**

This is the starting phase. Here we must look for possible win-win situations. If we can find solutions that benefit farmers as well as the environment, the implementation will be much easier.

In some situations win-win solutions may be easier to find for a group of farmers than on an individual basis. Other situations make for win-solutions on individual farms – for instance changing the use of an area from actual farming to hunting or to providing other services that may generate an income.

It is important that the involved organisations all tell the same story. A catchment level approach may help to secure that all organisations bring the same message to the farmers and that they understand the situation.

Farms are different and farmers have different interests. Some are business oriented, some are more environmentally driven. This is why we need a whole range of different approaches, - one size doesn't fit all. The authorities, including governmental organisations, need to understand the many different conflicting interests under which the farmers have to operate for a better approach. The farmer has to feel safe to change his practice, but the encouragement may take different forms.

Good advice is to be quick to respond to the stakeholders own ideas. You should start small with quick results and then move on to other things. Waiting for money and agreement from Brussels usually takes too long. It is also important to know that it takes time for people to realize they should change practices. You can't expect the farmers to buy in straight away. In most cases it is necessary to repeat the message again and again. Building trust takes time.

It can be a good idea to have key persons, for instance financial coordinators, who are responsible for the synergy of financial flows and who are trustworthy. It may be a farm adviser who can pull together the relevant groups.

Demonstrations can be used to illustrate or test a technology for better or for worse. In addition to acquiring knowledge, demonstrations also improve close and direct cooperation among stakeholders. They can also improve motivation to take up new initiatives.

### **Multiple messages as barriers**

Farmers sources of information are multiple - different local officials may communicate different things and projects with different results may be carried out in other places. And farmers may legitimately expect you to explain the differences. For instance, in Scotland farmers are being encouraged to grow more to make the country self sufficient with food (and forestry grants for carbon purposes) but at the same time encouraged to set aside land for flooding / wetland habitat purposes.

#### **Example: A need to improve the constructing of wetlands (Sweden)**

A lot of money is spent – not all on effective wetlands. Next time, be sure to construct efficient wetlands as well as to restore only efficient wetlands. (If this has a parallel with the current situation in Scotland it may be that the sites brought forward for wetlands from the farmers don't match with the technically more efficient sites?)

The following dilemma was pointed out in connection with the termination of the wetland contracts in Sweden: It turns out that the "old" wetlands are not as suitable for water storage as thought before. So the authorities want to terminate the contracts, but the farmers are not able to use the old wetlands as farm land because of new regulations.

That could pose a risk for the new contracts that are to be made elsewhere. The point was made that this may either be something to be concerned about in advance or it could be solved by using short term contracts so it would be easier to return to the old situation

#### **Challenges necessary to overcome to proceed in this phase**

- Sometimes farmers propose uses of the wetlands that may not be appropriate, e.g. the introduction of invasive species
- Some practices may mean added costs for the farmers, e.g. importing fertilizer (Norway)
- Finance and governance issues can be difficult for the farmers to overcome in the implementation of some of the initiatives, e.g. where the requirements for planning and regulatory control (Scotland – controlled activities and regulations) can be time consuming and complicated

### **3.3 Phase 4: Operation, management and maintenance**

Not many of the project initiatives have reached this phase.

#### **Technical methods**

The technical methods must be flexible enough to allow adjustments during operation, management and maintenance.

#### **Financial, institutional, governance methods**

To keep the initiative going we need to develop schemes/subsidies for maintenance.

- Communication between the Aquarius pilot and the Swedish agricultural board designing the scheme provided. (This basically has to do with participatory planning just on a different level not directly involving farmers.)

Financial continuity is important as well.

#### **Participatory planning methods: How to engage and involve**

As the initiative reaches this phase it is still important to have regular consultations with farmers and other stakeholders and to supply the farmers with information about the activity. A lot of the initiatives supplied by farmers have to be reconsidered, and the farmers may

change their practice due to other factors. To keep the initiative going it could be a good idea to use the media and show concrete results.

#### **Challenges necessary to overcome to proceed in this phase**

- Keeping the farmers engaged in the activity
- Schemes/subsidies for maintenance
- Financial continuity

### **3.4 Phase 5: Evaluation and realization**

Complex problems are forever changing and in most cases a final solution is never reached. Therefore, among other things, beware of evaluation criteria: public awareness raising may be a perfectly acceptable success criteria.

#### **Technical methods**

In this phase the technical methods could be for instance:

- Instruments to analyse cost benefits
- Instruments to evaluate and validate the results (pilot project)
- Instruments for the valuation of services and results

As for the initiatives implemented it may be that a low technology approach is easier to implement and integrate with existing procedures and mean that they will still be working in 15-20 years. Anyway it is important to evaluate and look for better methods continuously. Learn from the bad experiences. For instance from creating a wetland that doesn't work.

#### **Financial, institutional, governance methods**

We find that there is a need to find methods to stretch subsidies. Subsidies lifting the environmental obstacles in for the Water Frame Directive, Flooding Directive and Habitate Directive. When initiatives help to reach different goals and in this way are multifunctional it should be possible to pay more for the initiative. There is a need to look for right win-win situations. Win-win solutions are not all inclusive. No one fits all.

There may also be a need to focus on how to improve chances that development of our solutions to problems will win in the competition with other problems. Other factors to hold on to attention could be:

- Subsidies are not always bad
- Market forces e.g. insurance companies may influence methods for tackling flooding (in Scotland).
- (Social) cost benefit analysis
- Economic valuation of services
- Update of Catalogue of Agri-environmental schemes and Regional schemes
- Synergy of European policies and financial flows to achieve a sustainable society.

#### **Participatory planning methods: how to engage and involve**

In order to realize projects, participatory planning on other levels is needed:

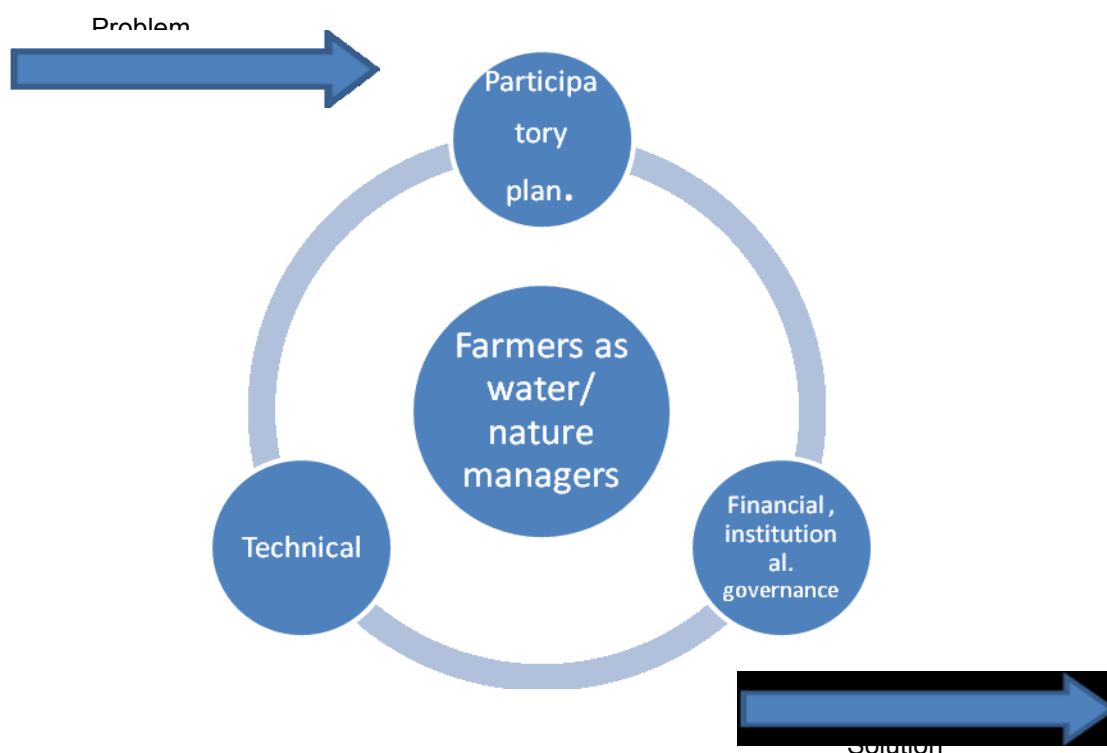
- In Denmark targeted regulation on a local basis needs to be a possibility (providing political negotiations among stakeholder organisations)
- Participatory planning including the public will lead to e.g. land stewardship as another pathway.

In this phase it is still important to focus on communication between the involved stakeholders. There must be trust among the stakeholders and a continuity of schemes. It is also time to identify who is to control or monitor the results. Other good advice could be:

- Don't oversell before it is proved that the initiative works
- Get the right motivation factor and stick to it
- Find a leading person
- Make it clear who is responsible

## 4 The improved wheel

As earlier mentioned the wheel is a process tool developed by the Aquarius project partners – a process tool to be used when working with farmers on identifying and implementing solutions to various issues related to farming and the current/potential effects of changing climatic conditions.



### Trying to understand the wheel - graphics and concept

Connectivity within the wheel: Where are the spokes connecting the farmer to the wheel? What should we see as constituting the spokes? Communication?

Good communication is essential in order to find the right solutions and agree on them. We discussed if this could be emphasized more in the model. For instance the framing of the wheel: where to (graphically) place community-relations?

- Should community relations be illustrated as a circle around the farmer?
- Should community relations be included as another tire along with “technical”, “financial” and “participatory planning”?
- Another thing that was discussed was whether farmers primarily see themselves as parts of communities or as food producers. We concluded that the degree to which farmers see themselves as one or the other may vary country wise.
- In fact the wiki-definition of a farmer doesn't include environmental or sustainability services.

It is important to be aware that the wheel may have multiple scales:

We discussed how to make practical use of the wheel. An important question in this respect is practical use to whom? The wheel doesn't necessarily appear to farmers' as a practical tool.



It does not have to but we 1) need to be cautious that farmers are not alienated by “academic” concepts and 2) still need to be able to make our models operational and turn them into something useful for practice and practitioners.

We discussed how to make practical use of the wheel, and we had trouble in seeing the wheel turning with regard to environment friendly production. The group found it much easier to see the wheel turn if focus is on food production, in which case it almost turns automatically.

### **What makes the wheel turn?**

- Should we connect all actions to food to keep farmers to the food track i.e. to the automatic turning of the wheel? Should we phrase water quality issues in the following way: Better quality grass → better milk quality → higher price. One reservation to this suggestion is that such links between food and water issues are not always possible.
- In order to turn the wheel needs a slope i.e. some kind of incitement
- What if one tire has a puncture? Does the wheel stop? How do we ensure that it keeps moving?
- When financial opportunities for the farmer equals the production of food then the wheel will start to turn, and that is when environment friendly production becomes profitable to the farmer
- Business opportunities improve the “farmer-to-farmer spreading of the word” will improve as well.
- What is the connection between energy and water issues? Energy willow may be both profitable and provide environmental results.
- In the near future even nutrient economy may end up being profitable. We may as well not have found the right way to communicate the advantages of nutrient economy yet.
- Our conclusion will be that the wheel turns easier if the farmer continues to be, as well as to be regarded as a PRODUCER

We suggest that the main drivers to engage and involve the farmers are:

- Reliability of authorities and mediators
- Continuity in funding
- Fair price for initiatives
- Awareness of the social impact of their effort
- Involvement (bottom up ideas taken seriously)

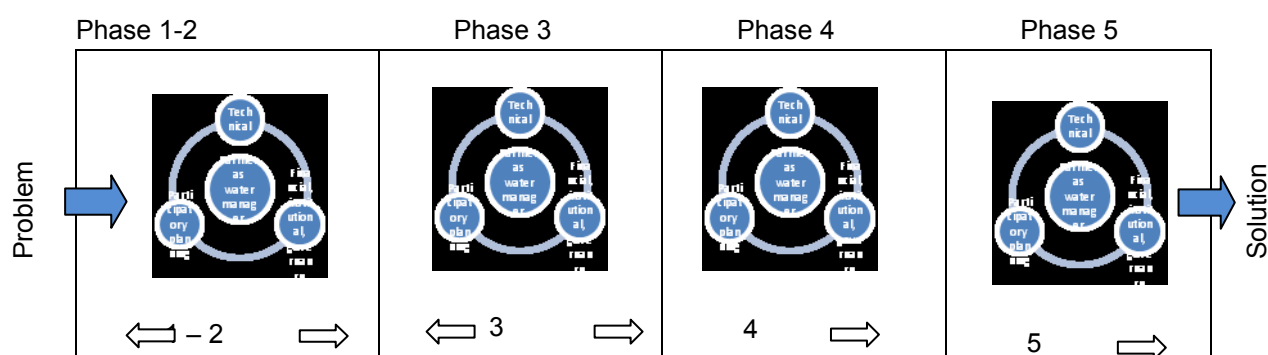
## 5 How to use the wheel

The wheel should be used as a method to test possible innovative solutions to a given problem. Obviously it is important that all parties, including the farmers agree that there is a problem and that the farming community is involved in identifying and delivering a solution.

It is important that all aspects (technical, financial, participatory) are dealt with almost at the same time. This should be remembered in all 5 phases, although some aspects will be more important in some phases than in others.

We have proposed one goal for each phase in the process, and have also suggested some checkpoints for each phase. The checklist is not complete for all situations, but is meant to be a help to implement a good process when searching for the good solutions.

How the wheel can be used is graphically presented as follows:



It is important that all aspects (technical, financial, participatory) are dealt with almost at the same time. In the first three phases it will often be wise to move back and forth as you try out new ideas. When the initiative is chosen, the focus will be on how to roll it out and make it run.

### 5.1 Phase 1: Formation

**Goal for phase 1: Finding the right people and agreeing on the problem**

**Checklist for phase 1: (T=Technical, F=Financial, PP=Participatory Planning)**

T	Need to have evidence that the problem is at least in part due to agriculture.
T	Need to have information available to be able to convince the farmers that there is a problem and that they are part of the problem. If possible, what percentage of the problem is related to farming activities?
T/F	Cannot approach the farmers unless there is possible option to solve the problem/ + finances. Finances are usually the most difficult area to address. Knowledge of the financial possibilities and instruments (financial coordinator).
T/PP	Evidence does not have to be part of the case/project. Evidence could be found from existing works/studies but need to be able to present this clearly to farmers.
PP	What is the problem? Need to find consensus – different views – need to get full agreement as to the approach to the problem/solution. Collect information about the problem in cooperation with farmers – experts. It should not be a finger pointing exercise.
PP	Important that during Phase 1 all the right people are present, including, governmental people for them to understand the (local) situation/problem better.



	(incl. a financial coordinator responsible for synergy in financial flows, incl. entrepreneurs who have an interest. Private sector investments and payments for the benefits that the ecosystem provides them)
PP	It is important to visualise/recognise that the problem exists at a local level
PP	Need to find someone whom farmers trust and who is reliable to get them to buy in to finding a solution.
PP	Find ways to give good information to the farmers. The more the farmer knows the more he/she will want to know.
PP	Support farmers in organising themselves

## 5.2 Phase 2: Initiation

**Goal for phase 2: Finding possible initiative – solutions to the problem**

**Checklist for phase 2:**

PP/T/F	Authorities also need to buy-in – technical, financial support. (That's why governmental organisations need to be involved for a better understanding of the local "problem")
F	Find entrepreneurs for private sector investments and payments for the benefits that the ecosystem provides them
PP	Brainstorm the options that can address the problem.
PP	Refine the options until you find consensus on the initiative/solution.
PP	Need to be able to sell the idea to the farmers and key organisations so that initiative can be more widely implemented to resolve the problem. Ask farmers for their ideas (bottom up approach).
PP	Find key persons in different organisations that are trusted from all sides, and willing to fight for the idea. Often drivers need to come from more than one organisation to be successful.
PP	Need to take idea out to the farmers to see if they feel the initiative is a possible solution.
PP	Is there a need for individual policies/regulation adjusted to local conditions

## 5.3 Phase 3: Implementation of the idea

**Goal for phase 3: Implementation of the idea**

**Checklist for phase 3:**

T	Initiative has to be acceptable to all parties, particularly the farmer, win/win if possible, e.g. other benefits to the farmer/community - hunting/skating/recreation (that's why entrepreneurs who benefit need to be included)
T	Multi-functionality – most important, more avenues to source funds e.g. entrepreneurs who benefit are needed for private investments and payments.
T/F	If new initiative – consider spending more to ensure it provides flagship/demo project(s). You should start small with quick results and then move on to other things. Waiting for agreement and money from Brussels takes time.
F/T	Ask farmers to draw a bid proposal of services and needs. (Contract with

	farmers).
F	Finance important but need to be careful not to let financial solution drive the process as initiative may not be the best solution. (Continuity in funding and reliability of the private and public investors/authorities are important motivators, not only the price of the initiative)
F	Initiative has to be deliverable – funding needs to be available for implementation & management/maintenance. Need to ensure it also fits with legal & governance guidelines. (financial coordinator, entrepreneurs, bid proposal farmers, State aid test, flexible clusters of single initiatives in Catalogue GBS, CAP directives and money, non flexible packages of initiatives in AES)
F	Need to ensure that the right incentives are in place. (Incentives inventories in Phase 2)
F	Bad if you raise expectations and then cannot deliver for legal/governance reasons e.g. continuity in funding, reliability. Take care – conflict with State Aid (financial coordinator, Catalogue GBS)
PP	Need to work with farmers to identify ways of delivering the initiative. Must be a initiative that farmers feel they can implement (bid proposal?)
PP	Consider demonstrations to illustrate or test a technology for better or worse. Demonstration improves close and direct cooperation among stakeholders improves motivation to take-up new initiatives
PP	The farmers need knowledge of investment costs.
PP	The farmers need knowledge of efficiency.
PP	The farmers need knowledge of financial options – possibilities – procedures.

## 5.4 Phase 4: Operation, management and maintenance

**Goal for phase 4: Get the initiative to work over a long period of time**

**Checklist for phase 4:**

T	Flexibility to make adjustments during operation, management and maintenance
T	Farmers Capital
T/F	Initiative(s) need to be tested/assessed and fine-tuned as required – at times wheel will need to be rolled back and forth till best solution is found.
T/F	Plans for technical maintenance of the initiative and how to finance the maintenance
F	Financial continuity
PP	Any fine-tuning/modifications need to be shared with the farmers/authorities. Regular consultations. Start with quick results.
PP	Show concrete results, use the media

## 5.5 Phase 5: Evaluation and realization

**Goal for phase 5: Workable and transferable recommendations**

**Checklist for phase 5:**

T/F	Funding/expertise/instruments need to be made available to monitor and
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	evaluate the initiative (economic valuation of initiatives and results, (social) cost benefit analysis, evaluation of results).
T/F	Get initiative into national/regional agri-environment scheme or update of National Catalogue of Green Blue Services.
PP/T	Does it solve the problem? Need to provided evidence of this?
F	More synergy in European policies and financial flows
PP	If initiative proves to be successful try to get local/national/regional delivery and implementation (That's why governmental organisations need to be represented in the local pilot as well).
PP	Who takes the lead, responsibility? Who is to control or monitor the results

# Appendix 1- Preparatory material and questionnaire for WP 3

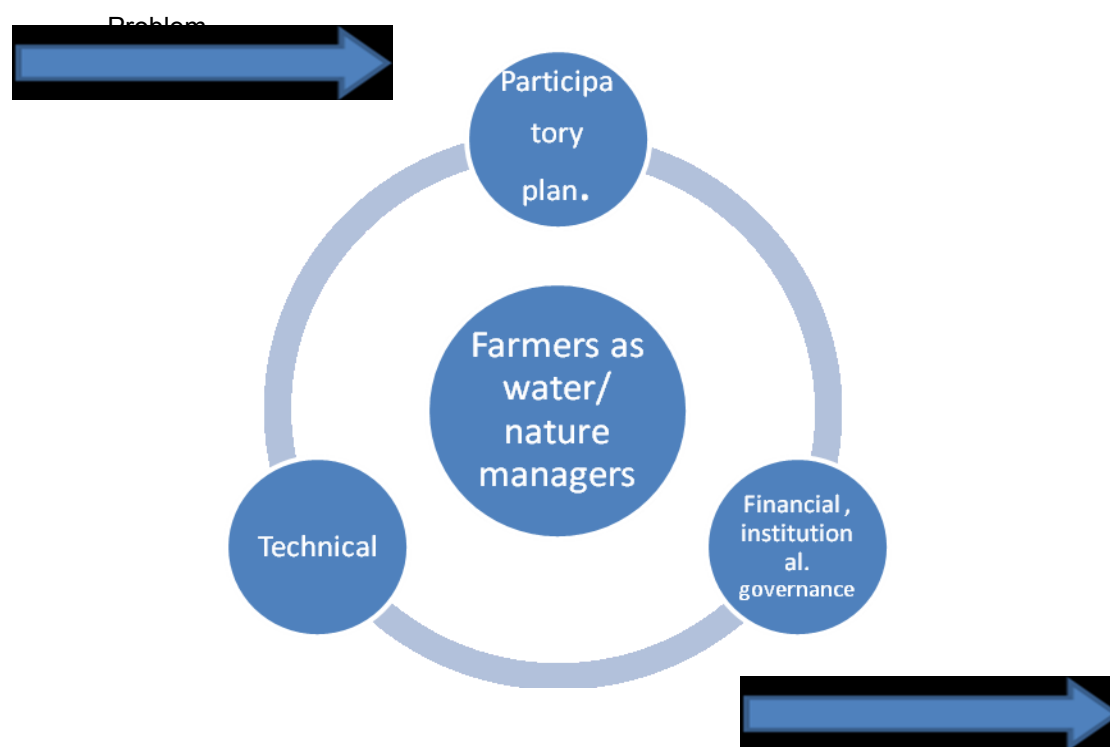
## Preparations for the Norwegian workshop

The workshop in Norway should be a **Transnational Concluding Workshop** – finding the ‘right mix’ of key methods for WFD plans under future climatic conditions

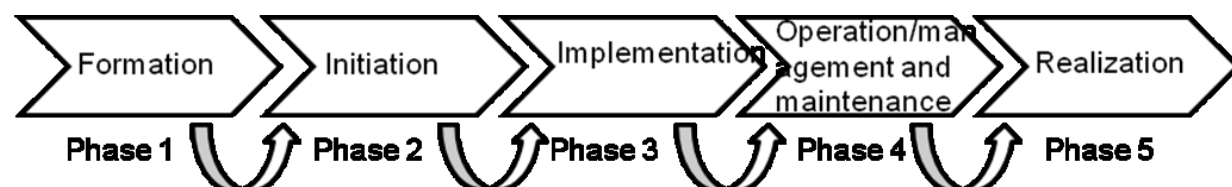
### Objective:

- That all pilots obtain an understanding that participatory planning, technical solutions and financial solutions interrelate to one another/ knit together/ are interwoven in any single project phase
- That all project partners are able to show to the others by way of relatively detailed descriptions of one or more cases from their own pilot how this is the case.
- The challenge will be able to show to the partners, how one has managed to knit together a particular technical solution to a particular way of financing and organizing etc.

To search for the right mix between technical, economic and institutional methods we will use a **“Problem-Solution wheel”** that focuses on the farmer as water managers under changing climatic conditions. On this workshop we will focus on actual problems from the different areas.



To do this we will work with actual cases from the different pilot areas. **The cases should be described and prepared by each pilot before the workshop**, by answering a set of questions listed in this memo. In order to maximize our possibilities to learn from one another we believe that we need a high level of detail. We therefore ask that you describe activities that do in fact take place in your pilots – and that have at least reached phase 2 (cf. below). By being aware of different phases in the implementation of an activity, it becomes easier to reveal details and comparable activities when you construct the story-line of your project.



We believe that it is just enriching for the common learning that some activities have reached later phases than others.

When the barriers are identified it will be possible to pinpoint the necessary changes needed (participatory, financial, and technical).

Output could be a win-win solution. In case there are problems with making the interactions function we should try to find recommendations for what to change and/ or to develop in order to create the desired win-win solutions.

**At least one case for each pilot:**

**Choose an activity that you are carrying out in your pilot area in order to**

- a) improve water quality**
- b) reduce the risk of flooding**
- c) reduce water consumption**

<b>Describe the activity – what do you do and how does this activity contribute to a) b) or c)</b>
<b><u>Phase 1 and 2: Formation and initiation</u></b>
<b>How did the idea for this activity arise?</b>
<b>Describe when the idea was mentioned for the first time:</b>
<b>a) Where did it happen?</b>
<b>b) Who got the idea?</b>
<b>c) What did you do in order to qualify the idea?</b>
<b>i. Did you do any research/analyses? – Which? (Field research? Desk research? Did you visit comparable projects? Get literature on the subject? (Etc.)</b> <b>→ Did you make use any concrete methods of</b>

analysis? Which?
ii. Did you gather/contact more people to evaluate the idea? Who and why?
→ Were there any concrete methods in use? Did you develop methods for gathering people which you think may be used again? Which methods/ways? Describe the method and its strengths and weaknesses?
→ how did you convince important contributors to participate in the project
iii. What cost money in this phase? Where did the money come from and how did you get it?
→ Were there any concrete (application) procedures or did you develop a method for providing means that you may reuse? -
<b><u>Phase 3: Implementation</u></b> Could the idea be implemented in the pilot area at once? (Did you have the means, the people and the technology to make it happen?)
a) If not, what was missing?
i. Research/analyses? Which?
ii. Did you have to find some people before the idea could be put into practice? Who were they and how did you find these people? And how did you convince them to participate?
iii. What cost money in this phase? Where did the money come from and how did you get it? ....
Could you then implement the idea in the pilot area?
<b><u>Phase 4: Operation, management and maintenance</u></b> Do you have the means, the people and the technology to operate and manage the activity over time?
a) If not, what is missing?
<b><u>Phase 5: Evaluation and realisation</u></b>
a) At present, how do you evaluate the effect of the activity in the pilot area?
b) How does the activity contribute to a) improving the water quality b)



<b>reducing the risk of flooding c) reducing water consumption in your pilot area?</b>
<b>c) Is this sufficient to achieve the objectives?</b>
<b>d) If not, what more needs to be done?</b>
<b>i. More people? – who, how?</b>
<b>ii. Improved technology? – who, how?</b>
<b>iii. Better financing? – for whom and how?</b>
<b>iv. Will it take other and new activities?</b>



## Appendix 2 Germany

As a preparation for WP 3, the German pilot group elaborated answers to the questionnaire

### German case description of using the „Problem-Solution-Wheel“

#### „Rainharvesting“

Identify barriers and pinpoint changes:

##### Aim:

Obtain more water for irrigation to handle changing climatic conditions.

Those are:

- 1) Faster evapo-transpiration of water from rainfall
- 2) Longer duration of droughts
- 3) Higher frequency of droughts

##### Strategy:

Idea for solution: “Rainharvesting”.

What: Make use of high-water events in the local water courses.

How: Retain high-water and drainage-water in the area rather than let it flow rapidly into the North Sea.

Bypass the water of the water courses above a defined level.

Use it instead for:

- 1) active seepage in order to increase the local ground water – recharge. This additional groundwater can later on be extracted
- or
- 2) for storage in artificial ponds to be emptied (up to some leftovers) during irrigation period.

##### Problems:

- Technical:  
In order to seep into the groundwater body rather than into the creek again, the seepage has to happen some kilometres far away from the creek. In addition, the local landscape is hilly, which requires lifting the water between 10 - 20 meters up in order to transport it to qualified sites for seepage. Technical systems should work without electricity, as this usually isn't provided in the fields.
- Institutional and financial:  
The benefit of more groundwater helps the area as a whole. It is very difficult or very expensive to determine, where exactly the seepage will flow to in the underground. For a single farmer or a single irrigation-board (those usually are organized at the size of 1-3 villages) the benefit can only be estimated very roughly. Neighboring areas would be “free-riders”.  
Local Irrigation boards can only do the necessary investment, if they profit from it in terms of higher water-permits.



Therefore external financing has to be found for the beginning.

- Participatory planning:  
For the long-run, a mode of compensation of the investment (and the running cost) with water-permits as a “currency” has to be developed. This needs a new way of applying the water-laws. Legal consequences will have to be clarified. The degree of how much hydrogeological estimation is acceptable, has to be agreed upon by the authorities (technical authorities on hydrogeology and executive authorities on water)

Phase 1 and 2

### **How did the idea arise?**

It arose through the various discussions during the first year of AQUARIUS with different stakeholder. It became clear, that the amount of water that a plant needs in order to achieve good yielding, cannot be reduced; it is a biologically defined amount.

Therefore in order to reduce the consumption of (irrigation-) water:

- 1) You could change the varieties. This only produces little effects though.
- 2) You could change the cultivated fruits.

However this is only acceptable at a very small extent (for example from summer grain

to winter grain), because the farmer needs to produce, what renders high financial yields.

Otherwise other farmers will take over his land (as they can pay more for it) or – on a whole-region scale - the entire regional cluster of agro-food business will have

to extensify. This means loosing a lot of economical welfare in an economically low developed region.

- 3) You can try to lower the technical losses of irrigation water. But best practise is pretty much achieved at this moment.

Result:

1 - 3 have permanently been realized and adapted up to the economically acceptable extent.

Therefore the solution can only be, to discover new / additional sources for water supply. (Besides “importation” of water from other areas, which we checked on during No Regret) this could be retention of local water. It also became clear, that the existing very fast discharge of the rainfalls has been achieved by technical means installed during the past century.

In NoRegret we had started to systematize the possible measures to deal with watershortage. But we had given up the idea of “Artificial Seepage”, as the running costs seemed to be overwhelming. The depictions of the Swedish partners of decentral water storage and of windmill pumping brought a new view.

**When was the idea mentioned for the first time?**  
**Who got the idea?**

From the beginning we asked during AQUARIUS – meetings, which included farmers (Kick off, Round Table, Presentations) for their ideas to retain water (“harvest water”) based on their specific local knowledge. 6 Farmers contacted us for local ideas, 2 other irrigation-boards were contacted specifically by us. After the excursion to the Swedish partner we had a meeting for irrigation boards to do reporting and inspiration (hopefully).

### **What did you do in order to qualify the idea?**

At the moment we are working on 3 specific ideas.

We had on the spot-meetings an almost every indication, in cases people from the specific authority joining.

We took experts from the water authorities and responsible chiefs of irrigation-boards to Sweden to have evaluation and further research of the ideas on the spot and also to get further insights on a common basis. We discussed our expert meeting at Sweden with local irrigators.

We did research (expert-interviews, internet) on technical methods. In one case we have the offering of a provider.

We informed the authorities, that farmers would not invest without benefits. And we discussed the idea of compensation with them.

We asked our hydrological external expert, who is working on a hydrogeological model yet, about the possibilities to assess the benefits of measures for the groundwater body and for the possibilities to allocate the benefits to a special areas. With the answers to this, we will know better, if we can develop repeatable, low cost strategies for identification of the benefiting area for the time when AQUARIUS is finished.

We had a meeting with the hydrological authority of Niedersachsen on compensations. We organized a meeting with the Ministry of Environment for December to discuss the legal and practical aspects of a possible method on the basis of compensation (“water for investment”) and of programmes for financial support (ELER).

We contacted an important environmental foundation and the leadpartner to discuss the financing of specific local pilots (= material investment, budget change).

### **Phase 3-5 Implementation, Operation, Management, Evaluation**

We clearly see the planned small pilots on “Rainharvesting” as first steps. It proves to be essential to have “real objects”. (Only) on that basis you can effectively do the research on and the development of technical, institutional and financial solutions. And on that basis you can deal with the communicative and demonstrative challenges.

We will continue turning “the wheel” in terms of remaining obstacles in technology, Patterns for dealing with compensation and allocation and achieving congruence between investor and beneficiary.

At the end we want to achieve a system of stimulation, which covers all the aspects of “the wheel” without the help of INTERREG.

As climate change will continue, the need for irrigation in the North sea – Region will increase.

Our solution should be interesting for all areas with future problems to provide that future amount of needed irrigation water.  
Increasing food prices could severely accelerate that process.

## Appendix 3 Netherlands, Delfland

As a preparation for WP 3, the Midden-Delfland pilot group elaborated answers to the questionnaire.

<p><b>Describe the activity – what do you do and how does this activity contribute to a) b) or c).</b></p>
<p><b><u>Phase 1 and 2: Formation and initiation</u></b>  <b>How did the idea for this activity arise?</b></p>
<p><b>Describe when the idea was mentioned for the first time:</b>  <b>d) Where did it happen?</b>          During “Reconstruction Midden-Delfland” nature friendly banks were constructed to strengthen the ecological continuity in the area. These nature friendly banks were to be taken care of by the Water board Delfland. The idea arose to let farmers take care of the nature friendly banks.</p>
<p><b>e) Who got the idea?</b>          The Netherlands is pioneer in the concept of green blue services. The Ministry of Agriculture and Fishery (LNV) started to investigate the concept. Midden-Delfland is one of the pilot areas to investigate the concept in practice.</p>
<p><b>f) What did you do in order to qualify the idea?</b></p>
<p><b>iv. Did you do any research/analyses? – Which? (Field research? Desk research? Did you visit comparable projects? Get literature on the subject? (Etc.)</b>  <b>→ Did you make use any concrete methods of analysis? Which?</b>          The results obtained from the pilots, concerning the concept green blue services, were evaluated. Recommendations were made to facilitate the implementation of green blue services in the pilot areas: Create and maintain nature friendly banks as measure to reach WFD goals, the Catalogue of green blue services and the preparation of bid proposals.</p>
<p><b>v. Did you gather/contact more people to evaluate the idea? Who and why?</b></p>
<p><b>→ Were there any concrete methods in use? Did you develop methods for gathering people which you think may be used again? Which methods/ways? Describe the method and its strengths and weaknesses?</b>          Implementation in a bottom up approach. For example: organizing meetings with farmers during low season, in the evenings when farmers have time, organizing the meeting at the location nearby farmers, involving farmers organisations, involving the board member of the Water board (to show farmers that they are been taken serious), let farmers prepare a bid</p>



proposal so it's clear what farmers want. Keep the process going time wise.
<p style="text-align: center;"><b>→ how did you convince important contributors to participate in the project</b></p> <p>Communication: be transparent and reliable and listen. Share motives to understand each other.</p>
<p><b>vi. What cost money in this phase? Where did the money come from and how did you get it?</b></p>
<p style="text-align: center;"><b>→ Were there any concrete (application) procedures or did you develop a method for providing means that you may reuse? -</b></p> <p>Public money and European grants. Methods: Catalogue green blue services, invite public tenders for green blue services, green fund Midden-Delfland.</p>
<p><b><u>Phase 3: Implementation</u></b></p> <p><b>Could the idea be implemented in the pilot area at once? (Did you have the means, the people and the technology to make it happen?)</b></p>
<p><b>b) If not, what was missing?</b></p>
<p><b>i. Research/analyses? Which?</b></p> <p>Missing: a local based catalogue green blue services, so that it is known to every local party which measures are exempted from state aid, what maximum compensation for services is allowed, which simplified procedure has to be followed to get the approval of the EC, which other measures are locally needed.</p>
<p><b>ii. Did you have to find some people before the idea could be put into practice? Who were they and how did you find these people? And how did you convince them to participate?</b></p> <p>Implementation in a bottom up approach. For example: organizing meetings with farmers during low season, in the evenings when farmers have time, organizing the meeting at the location nearby farmers, involving farmers organisations, involving the board member of the Water board (to show farmers that they are been taken serious), let farmers prepare a bid proposal so it's clear what farmers want.</p>
<p><b>iii. What cost money in this phase? Where did the money come from and how did you get it? ....</b></p> <p>Public money and European grants.</p>
<p><b>Could you then implement the idea in the pilot area?</b></p> <p>Hopefully.</p>
<p><b><u>Phase 4: Operation, management and maintenance</u></b></p> <p><b>Do you have the means, the people and the technology to operate and manage the activity over time?</b></p>
<p><b>b) If not, what is missing?</b></p> <p>It appeared to be time consuming to manage the work with all the farmers separately. A solution could be having an intermediate, such as a farmers organisation (cooperation).</p>



Another instrument missing is a catalogue green blue services that fits the local needs.

More possibilities for financial compensation, not only production loss but for instance devaluation of land because of changed land use.

Still some questions to be answered, such as who is responsible for monitoring and controlling the measure.

#### **Phase 5: Evaluation and realisation**

##### **e) At present, how do you evaluate the effect of the activity in the pilot area?**

Visit farmers to interview about working together, effects and suggestions. In future it's needed that we also evaluate the impact on costs and time.

##### **f) How does the activity contribute to a) improving the water quality b) reducing the risk of flooding c) reducing water consumption in your pilot area?**

Instruments (catalogue, bid proposal) facilitate the implementation of green blue services that are needed to reach the WFD goals (water quality).

Water quantity and water consumption are not included in this case study. But we are looking into water storage possibilities on farmland.

##### **g) Is this sufficient to achieve the objectives?**

Our objectives are to realize water management goals in this case study to reduce the cost and increase the efficiency for the water board by farmers as water managers. On the other hand the objectives are to keep the rural area open (cultural historic heritage) and prevent the area for complete urbanization. Farmers as water managers keep the farmers in the area and help them to create other activities than food production to keep a stable farmers income.

##### **h) If not, what more needs to be done?**

Pls note: we are not yet in this phase and the below answers are what we expect.

##### **i. More people? – who, how?**

?

##### **ii. Improved technology? – who, how?**

Adjusting the catalogue green blue services that fit the local needs more.

##### **iii. Better financing? – for whom and how?**

Adjusting the catalogue green blue service that allow measures (executed by farmers) to be compensated or paid for more appropriately.

##### **iv. Will it take other and new activities?**

?





## Appendix 4 Netherlands, Drenthe

As a preparation for WP 3, the Drenthe pilot group elaborated answers to the questionnaire.

**Describe the activity – what do you do and how does this activity contribute to a) b) or c).**

### **Phase 1 and 2: Formation and initiation**

#### **How did the idea for this activity arise?**

The idea : package of measures to cope with dryer climate:

- conserve Water with small and little weirs
- use groundwater more effectively by sprinkling from groundwater
- use efficient irrigation techniques (pivots)

The ideas are follow up activities of a previous interregproject “No Regret” and a running project “Hotspot Climate change and agriculture in Northern Netherlands”. Hotspot Climate and Agriculture in the Northern Netherlands is a research project studying the development opportunities for the agrarian sector in this region as a result of climate change.

#### **Describe when the idea was mentioned for the first time:**

##### **g) Where did it happen?**

Preparation of aquarius pilot in 2007/2008 with province of Drenthe

##### **h) Who got the idea?**

Rinke v.Veen, Ben v. Os, Jan den Besten

##### **i) What did you do in order to qualify the idea?**

Looking for partners (Interreg, prov. PPO , farmer group of former interreg project, farmers organisation, knowledge institutes, engineering (Grontmij))

##### **vii. Did you do any research/analyses? – Which? (Field research? Desk research? Did you visit comparable projects? Get literature on the subject? (Etc.)**

#### **Did you make use any concrete methods of analysis? Which?**

We discussed (in previous project) with farmers what solution were preferable as a solution for a dryer climate. Two of the three present measures have been studied already with groundwater model, field visits with farmers to neighbouring country, and demonstration tests on research farm. Conservation measures are studied for the first time in Aquarius.

The research on climate change was question-driven, in other words, involved entering into dialogue with researchers and knowledge institutes such as Alterra and PRI under the supervision of LTO-Noord and Grontmij researchers in the agrarian sector, district water boards and provincial government organisations in order to answer the practical questions on climate change.

##### **viii. Did you gather/contact more people to evaluate the idea? Who and why?**



<p>Yes : - Research farm, to demonstrate the idea to farmers - consultancies to study the solutions</p>
<p>→ <b>Were there any concrete methods in use? Did you develop methods for gathering people which you think may be used again? Which methods/ways? Describe the method and its strengths and weaknesses?</b></p> <p>Actively looking for research minded farmers to use time as “front runners” to brain storm about potential solutions and later on to test the ideas.</p>
<p>→ <b>how did you convince important contributors to participate in the project</b></p> <p>- in small groups or in 1 to 1 discussion/argumentation with key persons (of research farm, province, and companies in the region).</p> <ol style="list-style-type: none"> <li>Representative of province of Drenthe; One of the goals of the province Drenthe is to stimulate projects with sensor innovation. Our project made a connection between water management and sensors. In this way we got political support for the idea (and money).</li> <li>representative of the water board: convincing by making a connection between policy water board and expected project results</li> </ol>
<p><b>What cost money in this phase? Where did the money come from and how did you get it?</b></p> <p>Little money. But a lot of time in meetings. Money came from the authorities (province) to invest in describe a project plan and for funding before the official start of the project. Main source of time (=money) comes from governmental parties that have interest in solving the problem of climate change (province, water authority, drinking water company), but also small amounts come from companies involved.</p>
<p>→ <b>Were there any concrete (application) procedures or did you develop a method for providing means that you may reuse? -</b></p> <p>no formal procedures; except procedures around subsidies</p>
<p><b><u>Phase 3: Implementation</u></b></p> <p><b>Could the idea be implemented in the pilot area at once? (Did you have the means, the people and the technology to make it happen?)</b></p> <p>Yes, We used our existing network of relations with farmers, researches, other governments</p>
<p><b>c) If not, what was missing?</b></p>

<p>i. <b>Research/analyses? Which?</b> Groundwater model, to study results of potential measures and to get arguments to change policy (on ground water extraction). Analyse of climate change on crop growth and measurements.</p>
<p>ii. <b>Did you have to find some people before the idea could be put into practice? Who were they and how did you find these people? And how did you convince them to participate?</b></p> <p>1. We started testing promising solutions activities together with farmers (front runners), preferably also on their fields.</p> <p>2. After two years we started with a bigger group of farmers (next to “front runners” also “followers” are in now).</p> <p>General: in a previous project we created sphere in our intentions/goals and professional qualities. We needed more farmers to participate; We found them by our network and phoning them personal. Thanks to previous activities (with a small group of farmers) a lot of farmers in the region knew of the idea and were easily willing to participate and even to pay a yearly amount (250 euro/year for use of sensors).</p>
<p>i. <b>What cost money in this phase? Where did the money come from and how did you get it? ....</b></p> <p>Sensors, weirs and study cost money. Main source of money comes from governmental parties that have interest in solving the problem of climate change (province, water authority, drinking water company), but also small amounts come from farmers and companies involved. Creative use of subsidies (interreg, “koers Noord”)</p> <p>iii.</p>
<p><b>Could you then implement the idea in the pilot area?</b></p> <p>yes</p>
<p><b><u>Phase 4: Operation, management and maintenance</u></b></p> <p><b>Do you have the means, the people and the technology to operate and manage the activity over time?</b></p> <p>Yes, most things, small weirs not immediately.</p>
<p><b>c) If not, what is missing?</b></p> <p>Policy on financing small weirs for the farmers</p>
<p><b><u>Phase 5: Evaluation and realisation</u></b></p>
<p><b>i) At present, how do you evaluate the effect of the activity in the pilot area?</b></p> <p>Sensor: good, enough commitment</p> <p>Weirs: commitment ok, policy is missing</p>
<p><b>j) How does the activity contribute to reducing water consumption in your pilot area?</b></p> <p>Efficient planning of sprinkling and conservation of water.</p>



<p><b>k) Is this sufficient to achieve the objectives?</b></p> <p>We will know at the end of the project.</p>
<p><b>l) If not, what more needs to be done?</b></p>
<p><b>i. More people? – who, how?</b>  <b>More years with field experiments on sprinkling</b></p>
<p><b>ii. Improved technology? – who, how?</b></p> <p>Linking to soil improvement.</p>
<p><b>iii. Better financing? – for whom and how?</b></p> <p>No</p>
<p><b>iv. Will it take other and new activities?</b></p> <p>Yes, Follow up activities/projects to continue the activities.</p>



## Appendix 5 Scotland

As a preparation for WP 3, the Scottish pilot group elaborated answers to the questionnaire.

**Describe the activity – what do you do and how does this activity contribute to a) b) or c).**

Reduction of flooding risk is our main objective with water quality as a cobenefit, as the Tarland is likely to fail to reach GES by 2015 on water quality and morphological grounds. Our project is to work with farmers to reduce flooding impacts on villages of Tarland and Aboyne. We are at stage 2, hoping to move to phase 3 very shortly. This project therefore builds on earlier work with framers to improve ecological status via managing diffuse pollution.

See <http://www.macaulay.ac.uk/aquarius/index.html> for more information.

**Phase 1 and 2: Formation and initiation**

**How did the idea for this activity arise?**

Flooding occurred in Tarland in 2002, initiating the Tarland Flood Prevention Scheme (TFPS). The new Flood Risk Management Act requires sustainable flood management processes so it was an opportunity to explore these techniques. A demonstration site should encourage farmer participation.

**Describe when the idea was mentioned for the first time:**

**j) Where did it happen?**

During the NOLIMP project, flood prevention was considered and an initial demonstration site was built at Mill of Gellan (2005). However, this did not engage working farmers, so the Aquarius project gave an opportunity to work on a further demonstration site and flood risk modelling with land managers.

**k) Who got the idea?**

Pursuing a sustainable flood management demonstration site arose during the initial RUBENS project discussions with Aberdeenshire Council (AC) and Macaulay. However, the need was flagged up by local stakeholders and also by Scottish policy makers.

**l) What did you do in order to qualify the idea?**

Proposal developed in meeting with AC and MLURI and then taken to the initial Aquarius meeting where the idea was worked up with the Aquarius Consortium. We also built on feedback from liaison between AC and landowners at a local meeting in Aboyne (the negative feedback informed us that we needed much greater



engagement with people before we could find sustainable solutions). By involving the Macaulay and Landcare North East (LNE) in the Aquarius partnership, AC were able to increase their engagement with farmers and find a more innovative, cost-effective and acceptable solution for the TFPS (avoiding expensive compulsory purchase/lease options).

**ix. Did you do any research/analyses? – Which? (Field research? Desk research? Did you visit comparable projects? Get literature on the subject? (Etc.)**

**→ Did you make use any concrete methods of analysis? Which?**

AC had commissioned preliminary evaluation based on field surveys to identify potential storage sites (2006-7); then a aerial survey was carried out to improve mapping of relief in the catchment (2004-5); consultants (Halcrow & Envirocentre) developed a model of the sub-catchment flood dynamics (with fly through visualisation) (2005). In 2007, Young Associates (consultants) completed a desk and field based environmental assessment of 101 potential storage areas. In August 2008 Atkins (consultants) did a desk based data assessment of all previous information collected for the Tarland Catchment. This has been extended by Atkins who produced a hydraulic model for the catchment, completed in 2009. This model was used to assess the flood alleviation benefits of the potential storage areas. The model has suggested the total amount of storage required. The Macaulay has ongoing monitoring of both water quality and water depth, data is available in real time on the website. We also used data from SEPA and AC monitoring points and these data were used to calibrate the model.

All the research is reported in the Scottish Baseline (see <http://www.macaulay.ac.uk/aquarius/documents.html>). This was used to inform the development of the project (e.g. economics, land use, climate scenarios, biodiversity, water quality, whether meeting WFD and Habitats objectives etc). The climate scenarios showed that peak rainfall may flip with wetter springs and drier autumns in the future, meaning the livestock will have to be kept in longer over winter.

A team visited the Swedish case study in October 2009 for more information on wetlands flood storage and their approach to engagement (including incentivising farmers to learn about climate change). The simple techniques for managing water levels in water storage areas and wetlands were very interesting. We also got more insight into flood storage during the Delft field trip in June 2010.

Currently, we need to identify suitable demonstration site, bringing together technical, financial and socio-cultural issues. Five individuals (owners and tenants, including one non-farmer) have expressed an interest in flood mitigation measures on their land; and we are going to walk the farm with them and discuss what they are seeking. Good news: all match flood storage areas the consultant engineers have identified. Challenge: the preferences of the land owners/managers might not match what is need for Tarland Flood Prevention Scheme. Also, we need to be clear about what we can offer farmers and what the measures look like, how they function



and the incentives available, before walking the farm – or we might give confused messages. Raising expectations but not delivering will destroy trust.

We have developed a matrix to evaluate the short list of sites against a series of criteria. Steve provided a draft that we all discussed at a meeting in August 2010 (AC, MLURI and LNE) and we then have been filling it in using the available data. There are 10 sites. These were mainly identified from the Atkins modelling work that went from 101 sites to a 25 site long list. 7 are the ones that provide the best potential for the Tarland Flood Prevention Scheme and a further 3 added as they seemed valuable for demonstration purposes.

The criteria include terrestrial and aquatic environmental impacts; economic costs and benefits; land owner/manager attitudes; and potential to deliver the objectives of the scheme and our project. We are going to discuss the scoring of the matrix in another meeting to finalise our top choice(s). The landowners and managers will be approached and implementation procedures will start. Until the site is selected, it is hard to be sure the exact measure to implement. Whatever measure selected will need developing with the land manager/farmer in order to maximise the benefits (bio-diversity, water quality and aesthetics/recreation) and minimise the impacts on farming.

**x. Did you gather/contact more people to evaluate the idea? Who and why?**

Initially, we did a face-to-face farmer questionnaire with the 18 respondents (from a total of 24 relevant land managers) in the catchment (August 2008), which consisted of the baseline questions plus some additional questions

[<http://www.macaulay.ac.uk/aquarius/documents.html>]. We then held three workshops. The authorities and advisors workshop was held in October 2009 to assist with the baseline and introduce them to the flood and climate information. It was well attended by a range of public and private individuals. We held a farmer workshop in March 2010 (rescheduled from January due to snow). This was attended by 7 farmers and a farmer union representative; and we discussed the flood maps, climate metrics and future possible options. After this meeting, some individual farmers expressed an interest in a demonstration site. We also held a workshop with two estate owner/managers in April 2010, looking at the same topics as the farmers. They highlighted issues regarding legal and financial arrangements regarding tenancies (rented farms). Again, they signalled their willingness to be involved.

We realised that the missing information was the financial information about the costs and benefits of flood alleviation on farmland. We decided to visit Scottish demonstration sites to try to learn more about what had been done, and the costs involved, particularly payments to farmers.

As work on the Tweed has been signalled as innovative pilot schemes, we visited two sites (Eddleston Water and Long Phillip Burn in Selkirk). The Eddleston scheme was looking at a catchment approach to develop washlands, riparian planting in buffer strips etc to protect the village from flooding. They have a 'flood resilience' hut





with sand bags, barriers etc for the residents to use in an emergency. Unfortunately, the engagement with farmers was at an early stage and facing the same issues as us with regard to financial incentives. They had yet to instigate any monitoring, and had just started visiting the individual farmers - they had not had any meetings. Like us, the most interested parties in demonstration sites are not farmers.

Selkirk involved the council building a sediment trap due to overgrazing in the upper catchment, mobilised by extreme events, and leading to flooding by sediment blocking under bridges. The council had negotiated a 10 year lease for the land required for the sediment trap. Initially, the land owner was prepared to accept a low figure, but once a land agent was involved, the price increased substantially (to a level not sustainable from our perspective – this is similar to the White Carts demonstration scheme in Glasgow where 75% of the land value was paid).

We visited Perth, which was badly affected by flooding in the late 90s, and had implemented one of the largest flood prevention schemes, which had additional aspects funded by Europe (environmental and recreational benefits). This had some good facts and figures on costs and benefits; and some of the upstream works were analogous to what we might implement. However, most works were on council owned land and they had had difficulties in purchasing the privately owned land – they had not had to work with farmers who would still farm their land.

Finally, we visited the River Devon demonstration site. This is a restoration project on forestry commission (Government) land. Originally they wanted to work on farmland but did not find a suitable site (there is some other work on a farm regarding riparian plantings). The site has monitoring to show changes in hydrology and ecology from creating a wetland using small scale interventions on stream morphology – particularly useful for summer storms but limited for winter flooding. There was limited data on the costs of the scheme.

See 4diii.

**→ Were there any concrete methods in use? Did you develop methods for gathering people which you think may be used again? Which methods/ways? Describe the method and its strengths and weaknesses?**

The project partners are the individuals from AC, MLURI and LNE (representing an authority, an advisory organisation and a research organisation). We manage the project, plan the project and frame the issues. Note that this is a small network, learning from NOLIMP where it was too difficult to meet project time tables using more organisations; and others (especially farmers) don't have time to spend on project management and planning. However, it does mean that others are excluded from influencing the project progress and are consulted rather than actively engaged.

Questionnaire required advisory/extension staff to find out contacts for farmers –





complex land ownership and management arrangements, difficult to cross – reference who to contact about which bit of land. Debate over whether to limit to farmer (how defined) or all land owners (hobby farmer might have land suitable for measure?). Asking questions was threatening to some farmers. We had some additional questions to make it more relevant to Tarland farming. The questionnaire was quite long and took over an hour to complete. Mostly done face to face, but some by post at request of farmers. How does this compare to other approaches (e.g. Sweden doing it as a group exercise?). We think that farmers in Tarland are quite individualistic and private, so we have captured more diversity than if we asked in a public meeting. It helped us understand the diversity of views; and to correct any mistaken assumptions.

The authority/advisor workshop was constrained by having to answer the set questions for the baseline as well as having to present the flood risk maps, climate change scenario and the project itself. We used a post-it exercise, so individuals answered the questions and then we grouped them onto the wall and discussed them. It was a bit rushed but worked quite well. We then discussed the climate indicators and flood risk maps in a round table process. It was a bit rushed, but people were interested in the indicators and maps. However, many of the regional level advisors and authorities did not know our pilot region very well so they could not make detailed comments. This group is interested in what we might achieve, but are probably frustrated as we have not got much more information to relay to them so have not been in touch again – we need to update them on progress and the institutional mix in autumn 2010.

The farmer and factors meetings were postponed due to the weather and also due to delays in getting the flood risk maps from the engineers. We tried to pick a suitable venue, date and time, based on advice from NFUS and other local contacts and this effort was appreciated. Both followed the same format, using A3 booklets presenting the data and having a round table discussion of what the information meant. We deliberately avoided a powerpoint presentation to give the impression that we were all equal. We presented the findings from the questionnaires; the development of the flood risk maps, the climate change indicators and some thoughts on flood mitigation measures – including showing photos of other measures in Scotland, Sweden and Norway. The factors were more confident and forthcoming than the farmers when presenting the results of analysis. However, the farmers became much more engaged when working in smaller groups and using their local knowledge to update our flood risk maps. We generated useful information to update our analysis. We also tried to build social capital and trust by:

- Noting that we didn't have the answers but needed input from others
- That we were trying to find win-win solutions
- Relating material to them – e.g. what does climate change mean for their management?
- Noting that it was an ongoing learning process
- Providing refreshments and thanking them for their time and input
- Going to the pub (some of us) after the meeting for more pub table talks.

Note we did not pay farmers for their time or travel costs. Do others?

Feeding back information – the reports from the workshops are/have been returned



to all the participants and put on the website. Hits to our website have increased as more reports are made available (from ~30 in Sept to ~500 in January). We presented selected results from the questionnaire at the farmer and factor workshops; as well as putting the results in the baseline report. We finally finished the full report on the questionnaire (it has taken a long time to go through all the data). Our baseline report has proved useful to those doing research in the Tarland as it the first holistic analysis that is easily available. Internal debates about when to send material (all at the same time or as soon as possible) and when to make material public (at once or after the participants have checked it?). We could have done a press release after the baseline workshop but others felt there was 'nothing to say' until we have identified solutions and have something concrete to put in the newspaper.

Overall, Farmers are still difficult to engage as they see their main role is to grow food and do not see their role is to manage flooding, unless paid to do so.

We had a checklist for our Scottish Tour that helped us focus our discussions and write up of the material we collected.

#### **→ how did you convince important contributors to participate in the project**

The important contributors are the farmers (land owners and managers) plus the agencies involved in providing permissions to build any measures required. The main methods used to convince people are providing more information about the cause of the problem and how the farmers can contribute to solutions. We have tried to engage farmers as soon as information was available and allowed them to verify and correct data presented. We have prioritised engaging farmers and tried to respond to their worries and needs, especially about financial compensation. Farmers are aware that the Flood Risk Management Act, the Flood Prevention Scheme and River Basin Management planning are changing the way that farming is being regulated and that they are increasingly expected to manage land to manage water. This project allows farmers to communicate their views back to policy. The good will of the local NFUS representative was very helpful here. This relates to trust – we have worked with local and regional stakeholders over time and have always tried to deliver on what we have promised.

#### **xi. What cost money in this phase? Where did the money come from and how did you get it?**

The overall flood prevention scheme costs to this stage has been in the region of £250,000 (€306,185) and the additional work for the Aquarius project has been in the region of £50,000 (€61,200). The cost has mainly been staff and consultancy time to assess the baseline conditions, identify the sites and develop the model. The stakeholder engagement and monitoring costs have been relatively modest beyond time to prepare and write up the workshops. So it has been time, not capital, that is important in these phases. The match funding has come from associated AC flood projects; MLURI research projects and LNE in-kind contribution. We approached Scottish Government for additional funds, but they have funded a workshop building on our baseline results, but not directly contributing to our project.



<p style="text-align: center;"><b>→ Were there any concrete (application) procedures or did you develop a method for providing means that you may reuse?</b></p> <p>Not appropriate</p>
<p><b><u>Phase 3: Implementation</u></b></p> <p><b>Could the idea be implemented in the pilot area at once? (Did you have the means, the people and the technology to make it happen?)</b></p> <p>We have the budget available to build the measure and we have access to the technical expertise to design the measure. We are dependent on the goodwill of the land owner/manager to release the land. The biggest problem is to establish the correct level of incentives, and whether to purchase the land or reach another maintenance arrangement.</p>
<p><b>d) If not, what was missing?</b></p>
<p><b>i. Research/analyses? Which?</b></p> <p>Little existing research on incentive and ownership arrangements to guide us.</p>
<p><b>ii. Did you have to find some people before the idea could be put into practice? Who were they and how did you find these people? And how did you convince them to participate?</b></p> <p>We will approach the specific landowners/managers and hope that they will agree if the incentives are right; and they are not disadvantaged. We have identified who we want to approach.</p>
<p><b>iii. What cost money in this phase? Where did the money come from and how did you get it? ....</b></p> <p>AC budget is available, match funded with Aquarius.</p>
<p><b>Could you then implement the idea in the pilot area?</b></p> <p>We believe we will in Spring 2011. We need to find the best site that can be replicated across other sites in Tarland and beyond (demonstrating farmers as water managers for a wider audience). We have interest from Scottish Government to build on any methodology to find cost-effective approaches for NFM.</p>
<p><b><u>Phase 4: Operation, management and maintenance</u></b></p> <p><b>Do you have the means, the people and the technology to operate and manage the activity over time?</b></p> <p>Yes if we have a traditional approach if the council purchases or leases the land, however, we would prefer to have the farmer continue to manage the land for flood alleviation.</p>
<p><b>d) If not, what is missing?</b></p> <p>We need to identify incentives for uptake and ongoing maintenance that are cost-effective and ensures the long term viability of the measure beyond the life of agri-environmental payments (currently max 5 – 10 years).</p>
<p><b><u>Phase 5: Evaluation and realisation</u></b></p>
<p><b>m) At present, how do you evaluate the effect of the activity in the pilot</b></p>



<p><b>area?</b></p> <p>We have identified monitoring criteria for before, during and after the measure implementation including water quality and quantity monitoring; biodiversity indicators; recreational use of the site/area; attitudes of farmers and others; economic viability of farming; visit to the site; changes in policy; and lessons learnt on implementing the measure (legal, financial, technical). The key is whether there is reduced fluvial flooding in the villages (commensurate with the contribution of the demonstration measure) and increased interest in sustainable (natural) flood management measures by farmers. (However, there may still be problems with surface water and pluvial flooding).</p>
<p><b>n) How does the activity contribute to a) improving the water quality b) reducing the risk of flooding c) reducing water consumption in your pilot area?</b></p> <p>Will depend on the demonstration measure implemented.</p> <p><b>o) Is this sufficient to achieve the objectives?</b></p> <p>Will depend on the demonstration measure implemented. It will help with awareness raising and learning what works, but the measure itself may not be sufficient to prevent flooding in the villages.</p>
<p><b>p) If not, what more needs to be done?</b></p> <p>The project has been designed to help replicate the approach elsewhere in the catchment and in other agricultural areas in Scotland – so we would hope to put in further measures.</p>
<p><b>i. More people? – who, how?</b></p> <p>We have yet to engage the wider community in Tarland but we know the best way to do this is to work with schools and Tarland Development group. We hope to do this in 2011 when we have something concrete to talk to them about.</p>
<p><b>ii. Improved technology? – who, how?</b></p> <p>We would like to know more about cost-effective methods to move water in and out of the water storage areas. It would be great to have models that can integrate hydrology (surface water run off) with hydraulics of the catchments. Finally, the climate change element in the model is quite simplistic and doesn't distinguish between intense storms and winter flooding.</p>
<p><b>iii. Better financing? – for whom and how?</b></p> <p>This is our biggest problem for the project. Although we've done desk searches and site visits and talked to Scottish Government, we appear to be ahead of the game as there are few examples of existing large scale projects with affordable management incentives. The existing research tends to be hypothetical research on what payments should be. Most implementation projects have used capital payments that are not affordable in long term – the payments are variable but can be up to 75% of the land value. We understand the payments for flooding is something that is being explored by an expert working group by the European Commission. We are interested in relating the rate of payment to the actual loss of land production activities, not just land capital values. We also think we should explore insurance options to allow farmers to manage risk. Risk is an issue for the local authorities – often the local authority prefers a capital solution to minimise the risk that budgets are not sustained over time; or they are tied into a legal obligation without room for manoeuvre.</p>



**iv. Will it take other and new activities?**

Aquarius should lead into the full roll out of the Tarland Flood Prevention Scheme; provide a methodology for the Flood Risk Management Act implementation; provide co-benefits for meeting WFD and Habitats standards and improve the ability of farmers to manage the environment.



## Appendix 6 Norway

As a preparation for WP 3, the Norwegian pilot group elaborated answers to the questionnaire.

<p><b>Describe the activity – what do you do and how does this activity contribute to a) b) or c).</b></p> <p>Testing systems for reduction of phosphorus concentration in small streams</p>
<p><b><u>Phase 1 and 2: Formation and initiation</u></b></p> <p><b>How did the idea for this activity arise?</b></p> <p>The concept is not new, but because of expected high P losses from soil for still many years, the idea to test and further develop practical solution for implementation in the pilot arised during planning of the project.</p> <p>A calcium based filter (FiltraliteP) is already established in the outlet of a constructed wetland in the pilot, but because of low hydraulic capacity in the filter, most of the water passes in the overflow by medium to high water flow. More development and research are needed both regarding finding efficient filter types and regarding constructions of the filters.</p>
<p><b>Describe when the idea was mentioned for the first time:</b></p> <p><b>m) Where did it happen?</b></p> <p>During planning of the project</p>
<p><b>n) Who got the idea?</b></p> <p>The persons planning the project</p>
<p><b>o) What did you do in order to qualify the idea?</b></p>
<p><b>xii. Did you do any research/analyses? – Which? (Field research? Desk research? Did you visit comparable projects? Get literature on the subject? (Etc.)</b></p> <p>→ <b>Did you make use any concrete methods of analysis? Which?</b></p> <p>-Contacted Kemira regarding possible commercial iron based products suitable as filter material. Kemira gave in addition information about the soluble Ferix-3 product and the doser system developed in Finland.</p> <p>-Visited researchers at MTT Jokioinen, Finland to learn about the Ferix-3 doser system and their work on filter materials.</p>
<p><b>xiii. Did you gather/contact more people to evaluate the idea? Who and why?</b></p> <p>Colleague working with constructed wetlands and hydrotechnical installations was contacted</p>
<p>→ <b>Were there any concrete methods in use? Did you develop methods for gathering people which you think may be used again? Which methods/ways? Describe the method and its strengths and weaknesses?</b></p>



<b>→ how did you convince important contributors to participate in the project</b>
<b>xiv. What cost money in this phase? Where did the money come from and how did you get it?</b> Costs for travelling and working hours were paid from the western Vansjø project
<b>→ Were there any concrete (application) procedures or did you develop a method for providing means that you may reuse? -</b>
<b><u>Phase 3: Implementation</u></b> <b>Could the idea be implemented in the pilot area at once? (Did you have the means, the people and the technology to make it happen?)</b>
<b>e) If not, what was missing?</b>
<b>i. Research/analyses? Which?</b> - Before investments in filter systems in streams more knowledge about which filter material to be used must be collected. P sorption abilities and hydraulic capacity must be tested in small scale before implementing in full scale. Cost efficiency (costs per kg P removed) of different filters must be evaluated.  - Testing and experience with the Ferix-3 doser must be achieved before the system can be implemented. Further, the costs of using Ferix-3 must be evaluated.
<b>ii. Did you have to find some people before the idea could be put into practice? Who were they and how did you find these people? And how did you convince them to participate?</b> Colleague working with constructed wetlands and hydrotechnical installations participates in the research and development.
<b>iii. What cost money in this phase? Where did the money come from and how did you get it? ....</b>  Costs for working hours were paid from the western Vansjø project
<b>Could you then implement the idea in the pilot area?</b> More testing and knowledge are needed before the idea can be implemented in full scale.
<b><u>Phase 4: Operation, management and maintenance</u></b> <b>Do you have the means, the people and the technology to operate and manage the activity over time?</b>
<b>e) If not, what is missing?</b> Establishment and maintenance of filter systems and Ferix-3 dosage is expensive and future financing is missing. The costs are normally too high for the farmers alone and subsidies like those given for building constructed wetland are needed.
<b><u>Phase 5: Evaluation and realisation</u></b>





<p><b>q) At present, how do you evaluate the effect of the activity in the pilot area?</b></p> <p>The activity is still in the testing phase</p>
<p><b>r) How does the activity contribute to a) improving the water quality b) reducing the risk of flooding c) reducing water consumption in your pilot area?</b></p> <p>The activity will improve water quality.</p> <p><b>s) Is this sufficient to achieve the objectives?</b></p> <p>No, it is one of many mitigation measures for improving the water quality. To reduce P losses from agriculture, mitigation measures on fields (reduced tillage in autumn and reduced P fertilization) are probably most important. However, because of high P levels in soil in the area with vegetable- and potato production, the effect of reduced P fertilization is limited in short term. Mitigation measures in the streams are therefore necessary to reduce P transport to the lake in the short term.</p>
<p><b>t) If not, what more needs to be done?</b></p>
<p><b>i. More people? – who, how?</b></p>
<p><b>ii. Improved technology? – who, how?</b></p> <p>More development is needed to make filter solution to a cost efficient mitigation measure. How: Collaboration with an ongoing international research project.</p>
<p><b>iii. Better financing? – for whom and how?</b></p>
<p><b>iv. Will it take other and new activities?</b></p>





## Appendix 7 Denmark

<p><b>Describe the activity – what do you do and how does this activity contribute to a) b) or c).</b></p> <p><b>Creation of a Grazing Guild</b></p>
<p><b><u>Phase 1 and 2: Formation and initiation</u></b></p> <p><b>How did the idea for this activity arise?</b></p> <p><b>In the dialogue between farmers, authorities and advisors</b></p>
<p><b>Describe when the idea was mentioned for the first time:</b></p> <p><b>Where did it happen?</b></p> <p>At a demonstration event a farmer told an advisor and a person from the environmental authority that he saw no future for farming in the area. That was the opening remark. By asking a little bit more about the problem it was discovered that he was frustrated about the condition of a little watercourse where the cattle couldn't graze because there was a problem with access to water for the cattle.</p> <p>It was decided that a meeting should be arranged in order to discuss the problems on how to have the area grazed and how to provide access to water in an area with environmental regulations.</p>
<p><b>Who got the idea?</b></p> <p>The farmer from the demonstration event, his neighbour, a person from the municipality, and an advisor met at the valley of Lundgaard Creek.</p> <p>The cattle had no access to water in the valley of Lundgaard Creek and at the same time the municipality had the problem that the Natura 2000 site was in a poor condition.</p> <p>It was discussed how good nature conditions and access to water for the cattle could be combined without the creek banks being trodden down. If a grazing guild were to be established the whole area could be grazed, which would benefit the nature conditions as well as the cattle and thereby the farmers. So it was decided to either install some technical device that could make water available to the cattle or to strengthen the banks where the cattle were to go down to the creek to get water themselves.</p>
<p><b>What did you do in order to qualify the idea?</b></p> <p>The involved farmer contacted the other approximately 10 farmers in the valley in order to make sure that they were willing to work on a solution. The two farmers thought it was important that the idea was discussed among the farmers at first and presented as their idea.</p>
<p><b>xv. Did you do any research/analyses? – Which? (Field research? Desk research? Did you visit comparable projects? Get literature on the subject? (Etc.)</b></p> <p><b>→ Did you make use any concrete methods of</b></p>



<p style="text-align: center;"><b>analysis? Which?</b></p> <p>The key farmer from another project called Odderbaekken was invited to make a presentation for a number of people involved in the Aquarius project including the approximately 10 farmers interested in forming a grazing guild, - he told about his experiences making a grazing guild and gave hints to stakeholders on how to create win-win solutions.</p>
<p><b>xvi. Did you gather/contact more people to evaluate the idea? Who and why?</b></p> <p>The idea was discussed with different advisers and farmers who had different experiences with forming grazing guilds</p>
<p><b>→ Were there any concrete methods in use? Did you develop methods for gathering people which you think may be used again? Which methods/ways? Describe the method and its strengths and weaknesses?</b></p>
<p><b>→ how did you convince important contributors to participate in the project</b></p> <p>A meeting for the involved farmers was arranged. At this meeting the local adviser told about the possibilities for forming a grazing guild</p>
<p><b>xvii. What cost money in this phase? Where did the money come from and how did you get it?</b></p> <p>An application on forming a grazing guild was made. The costs were covered by the municipality. A local farm advisor made the application in close cooperation with the farmers.</p>
<p><b>→ Were there any concrete (application) procedures or did you develop a method for providing means that you may reuse? –</b></p> <p>The application was made for an environmental scheme – the process of having the municipality paying for making the application and the close cooperation between the adviser, the municipality, and the farmers was good and could be reused in other projects.</p>
<p><b><u>Phase 3: Implementation</u></b></p> <p><b>Could the idea be implemented in the pilot area at once? (Did you have the means, the people and the technology to make it happen?)</b></p> <p>The application for a grazing guild was not approved but as the project was good for the farmers (access to water for their cattle) and for the municipality (getting the Natura 2000 area in a better state), the farmers decided to implement the project at their own costs (in process).</p>
<p><b>f) If not, what was missing?</b></p>
<p><b>i. Research/analyses? Which?</b></p>
<p><b>ii. Did you have to find some people before the idea could be put into practice? Who were they and how did you find these people?</b></p>



<p align="center"><b>And how did you convince them to participate?</b></p> <p>The local advisors played an important role.</p>
<p><b>iii. What cost money in this phase? Where did the money come from and how did you get it? ....</b></p> <p>It was important that the local advisory service had the capacity to make the application as well as the ability to make the process run smoothly between the municipality and the farmers. In order to making them participate, money had to be raised to pay them for their efforts. When the money was available (from the municipality and from Aquarius) they were ready to act.</p>
<p><b>Could you then implement the idea in the pilot area?</b></p>
<p><b><u>Phase 4: Operation, management and maintenance</u></b></p> <p><b>Do you have the means, the people and the technology to operate and manage the activity over time?</b></p>
<p><b>f) If not, what is missing?</b></p>
<p><b><u>Phase 5: Evaluation and realisation</u></b></p>
<p><b>u) At present, how do you evaluate the effect of the activity in the pilot area?</b></p> <p>The activity is still in the testing phase</p>
<p><b>v) How does the activity contribute to a) improving the water quality b) reducing the risk of flooding c) reducing water consumption in your pilot area?</b></p> <p>Having a zone of grass in the riparian area of the watercourses prevent nutrients from ending in the watercourse by stopping erosion and leaching. Thereby the activity will improve water quality.</p>
<p><b>w) Is this sufficient to achieve the objectives?</b></p>
<p><b>x) If not, what more needs to be done?</b></p>
<p><b>i. More people? – who, how?</b></p>
<p><b>ii. Improved technology? – who, how?</b></p>
<p><b>iii. Better financing? – for whom and how?</b></p>
<p><b>iv. Will it take other and new activities?</b></p>

## Appendix 8 Sweden

### Activity description:

***Describe the activity – what do you do and how does this activity contribute to a) b) or c).***

The activity has a bottom up perspective and the aim to increase the number of wetlands constructed in the catchment by involving farmers.

There are problems with droughts in the catchment that causes shortage of irrigation water for the farmers. On the other hand, there are also floods of arable land that leads to loss of production. The main environmental problems in the catchment are eutrophication of the coastal sea, eutrophication and deterioration of the aquatic habitats of the river and low biodiversity in intensive farming areas.

Wetlands could act as part of the solution in all three cases and this activity therefore contributes to both a (water quality), b (flooding) and c (water consumption). Win-win situations can be created with eased water management for the farmers along with nutrient reduction and increased biodiversity for the society as a whole.

There have been several wetlands constructed in the catchment thanks to financial support (subsidies) to the farmers for construction costs and wetland advisory services. Lately there have however been a decreasing interest from farmers and the rate of construction of wetlands has decreased, even though the financial support has increased. The decreasing trend is noticeable not only in the pilot catchment but nationwide, therefore the activity to increase wetland construction is preformed to suit outside the pilot catchment as well.

### Phase 1 and 2: Formation and initiation

#### ***How did the idea for this activity arise?***

The idea was formed from the pilots' collected knowledge about wetland creation so far. It was known that more wetlands are needed in the landscape and that the existing wetlands could be more effective; this is stated in the Environmental objectives, the base for Sweden's environmental policy. According to the objective 12000 ha of new or restored wetlands should have been created before 2010. Evaluations of the Environmental objectives showed however that the construction rate is decreasing nationwide and therefore the objectives were not reached in time. These results are supported by a report from the Swedish Agricultural board. Through the Wetland research centre, based at Halmstad University, partner in the Aquarius project, information about the present status in the catchment was obtained, and showed the same decreasing trend as nationwide.

In Sweden the construction of wetlands on private land is voluntary; therefore it is essential that the farmers, i.e. the landowners, are involved and interested in wetlands to reach the goals of the Environmental objectives. From this the idea of a new way to identify the problem did arise, a bottom up perspective with farmers in focus. To have the farmers in focus means to see them as the qualified experts and part of finding solutions to the problem. It is also important to study the functions of wetlands to make them function optimal, a factor thought to be crucial in getting more and more farmers interested. An optimal function is also

a key factor in making wetlands contribute to nutrient retention and biodiversity the way it is planned.

***Describe when the idea was mentioned for the first time:***

***p) Where did it happen?***

The idea with wetlands for nutrient reduction and biodiversity enhancement has been a well known, and used, environmental tool in Sweden for a long time (e.g. before the pilot project). The project has developed the tool to also include the specific environmental and agricultural problems in the pilot area (flooding and droughts). At a start-up meeting with delegates representing all partners in the Swedish pilot we presented the problem and suggested the use of (new) wetlands as a tool for reduce flooding and to use as irrigation ponds. At the first meeting we also handed out questionnaires where farmers could identify their personal ideas on obstacles, driving forces, what kind of measures they would like the project to investigate further, and what management tools they lack, want or need.

***q) Who got the idea?***

The idea came from the joint experiences in the pilot (including farmers) of what problems the farmers faced and what problems might be likely increase or arise during future climate change scenarios. The farmer's involvement and interest is an essential part of adopting the wetland construction tool.

***r) What did you do in order to qualify the idea?***

The idea was qualified through several studies all made to increase the interest for wetlands. Some studies were according to the original idea made with the cooperation with farmers, one asking farmers for their views on wetland creation and one asking farmers about their interest in actual wetland creation on their land.

Other studies were more technical/hydrological and about wetland nutrient retention and placement in the landscape together with a cost effectiveness analysis. Farming advantages with wetlands have been studied as well as the effect of wetland construction on the biodiversity (breeding bird surveys) in the area.

***xviii. Did you do any research/analyses? – Which? (Field research? Desk research? Did you visit comparable projects? Get literature on the subject? (Etc.)***

***→ Did you make use any concrete methods of analysis?  
Which?***

Farmers have been interviewed about their view on affecting and being affected by environmental issues when managing farmland and water. The interviews were performed with environment as the general topic but some questions also went deeper into the farmers' views on wetlands. The wetlands different functions were discussed, such as prevention of floods and draughts and nutrient leaking. The farmers were also asked to give their general view on wetlands.

Farmers who had previously shown an interest in wetland construction were contacted again. Some farmers now had wetlands on their land, some didn't. The farmers with wetlands were asked about function and how pleased they were with their wetland in general. Farmers without wetlands were asked if they still are interested and why, why not. Interested farmers

were offered help (advisory service) to proceed with the inventory and applications needed to construct a wetland.

Several studies have also been performed on wetland functions, their ability to increase biodiversity and decrease nutrient leakage. This have been done to obtain more knowledge about

how the wetlands should be placed in the landscape and designed for optimal function. Field surveys of the breeding bird population in the pilot catchment, in areas with or without constructed wetlands. The result showed a dramatic direct increase in bird species and individuals, not only of wetland birds but of all species.

**xix. Did you gather/contact more people to evaluate the idea? Who and why?**

**→ Were there any concrete methods in use? Did you develop methods for gathering people which you think may be used again? Which methods/ways? Describe the method and its strengths and weaknesses?**

No, although contact were continued and intensified with e.g. authorities responsible for subsidies (e.g. the Rural Development Programme) for wetland construction and wetland advisory services (at the County administration). Data on farmers previously interested in wetland construction were gathered from the County administration, the municipality and advisory organisations.

**→ how did you convince important contributors to participate in the project**

There will be a conference with main purpose to spread the results of the extensive studies. Participants at the conference will be farmers from the catchment but also decision makers. The intention is to make the conference an opportunity to discuss the results with the farmers and to spread the view of the farmers to the decision makers. Hopefully the farmers can confirm the results of the studies and give even more ideas of how to increase the wetland construction as a useful tool.

**xx. What cost money in this phase? Where did the money come from and how did you get it?**

The main cost, outside the baseline work done in the project, is for wetland construction and wetland advisory service. This is often covered by the Rural Development Programme, administrated by the County administration.

**→ Were there any concrete (application) procedures or did you develop a method for providing means that you may reuse?**

This is as far as the pilot have reached with this activity, results and conclusions from the studies are now to be analyzed in order to see what should be done in phase 3 and 4 with implementation, operation, management and maintenance from the given results. Hopefully the workshop and the conference mentioned will help to decide which steps would be the best to take in phase 3 and 4.

### ***Result and conclusions from studies:***

The interviews with farmers have led to results that focus on what is important, according to the farmers, to make them more motivated and interested in wetland construction. Farmers decision about how farmland should be used is made by rational considerations were the responsibility towards running the business is primary. There is a traditional value that productive farmland first and foremost should be used for cultivation of food. This value is connected with pride and heritage and only when farmland is considered less productive, or in other ways problematic, it will be considered for alternative use. The business is also the most important when alternative use of farmland is considered. But emotional aspects, experience and the actual need for wetlands are also important factors.

- Information about economical support and profits regarding wetlands is needed to make them a more commonly used alternative.
- Farmers have in general already a water management plan connected to their business and therefore focus should be on what other use wetlands could have.
- Personal motives are a determining factor, a genuine interest in nature and environment could be an encouragement to create wetlands that increase the possibility for natural experiences.
- Negative experience and rumours about wetlands is decreasing the interest. Information about technical matters and possible risks should precede the rumours.
- Farmers feel that they are being pinpointed as an environmental threat which could create a resistance against being the part to carry the costs and doing the adjustments. Feed-back on the wetlands positive effect on the environment should be provided.

All in all, the participating farmers have a large knowledge of farming and water management and realises the environmental impact farming has. A final remarkable result is that farmers do not consider climate change as a big enough reason to make any changes to their farming. They have yet to be affected by climate change and do not feel that their business is threatened.

So far over 20 of 70 contacted farmers have said that they are still interested in having a wetland on their land. The study will now continue with a site inventory phase and also support the farmers during application processes. The aim is to have created at least one new wetland in the catchment within the project and a base of interested farmers for the ongoing work.

Continuing work will also be done with the Pilot farms where previous in-depth interviews will be followed up.

### ***Phase 3: Implementation***

***Could the idea be implemented in the pilot area at once? (Did you have the means, the people and the technology to make it happen?)***

Since the concept of constructed wetlands is firmly established as a environmental tool both with the public, researchers and authorities and with many farmers it could be implemented at once. There is however still an important information task to increase the understanding of other functions that wetlands have, apart from nutrient retention and biodiversity, so that farmers realize that it may be a relevant tool for upcoming water management issues during climatic change (e.g. a larger focus on irrigation and flood prevention).

To be able to reach Swedish environmental objectives, with a large amount of new constructed wetlands in the landscape, more interested farmers are needed. The evaluation



and implementation of obtained results from our studies (listed above) could hopefully help towards this goal.

***i. Research/analyses? Which?***

Ongoing and continuing research on mechanisms of wetland ecology is necessary to further improve the function of wetlands as an environmental tool, particularly in light of the somewhat “new” use of wetlands (irrigation and flood prevention) and how multi-functionality can be achieved.

***ii. Did you have to find some people before the idea could be put into practice? Who were they and how did you find these people? And how did you convince them to participate?***

No, not apart from interested farmers, which were found as described above (data lists at County adm., the municipality and advisory organisations) plus additional articles in farmers magazines further explaining the idea.

***iii. What cost money in this phase? Where did the money come from and how did you get it? ....***

Advisory service. the cost is covered by the Rural Development Programme

***Could you then implement the idea in the pilot area?***

Yes.

***Phase 4: Operation, management and maintenance***

***Do you have the means, the people and the technology to operate and manage the activity over time?***

Yes, since the structures and personnel working with the issues is already existing (responsible authorities and advisory organisations).

***Phase 5: Evaluation and realisation***

***a) At present, how do you evaluate the effect of the activity in the pilot area?***

The only means of evaluating effects of wetlands is to use existing constructed wetlands. Further on we will evaluate in terms of e.g. number of constructed wetlands in the catchment and farmers opinions.

***b) How does the activity contribute to a) improving the water quality b) reducing the risk of flooding c) reducing water consumption in your pilot area?***

Wetlands are multi-functional and can be used as irrigation ponds and flood reservoirs at the same time it reduces the nutrient transport to the sea and increases the biodiversity in the area.

***c) Is this sufficient to achieve the objectives?***

No, wetlands alone cannot solve the problems completely.

***d) If not, what more needs to be done?***



It will also, for example, take further measures on the farm (in the production) in terms of increased use of catch crops reduced fertilization etc. Furthermore, buffer strips, better irrigation techniques, crop changes and other measures are included in the tool box.

***i. More people? – who, how?***

It is unlikely that personnel are a limiting factor here.

***ii. Improved technology? – who, how?***

Technical improvements is likely to increase the overall efficiency of the measures. It is however very difficult to predict in what areas the needs are largest.

***iii. Better financing? – for whom and how?***

Increased subsidies for wetland construction to the farmers will likely increase the farmers willingness to let up their land for wetland construction. At the moment the farmer get the total cost of construction covered (with a maximum amount of ca 20 000 Euro per hectare wetland area), and then economic compensation for management costs. It has been discussed that in addition to this, the farmer could get paid for the construction of wetlands and not only the construction costs covered.

***iv. Will it take other and new activities?***

It is likely that new activities will be needed to fully solve the problems in the future. It is also by no means certain what will be the future problems since there are large uncertainties regarding various climatic scenarios.