



LIFE Project Number  
**LIFE05 ENV/DK/000155**

## **TECHNICAL INTERIM REPORT**

Reporting Date  
**30/04/2007**

LIFE PROJECT NAME  
**Integrated Protection of Surface and Groundwater in  
Agricultural Regions**

### Data Project

<b>Project location</b>	Denmark
<b>Project start date:</b>	01/11/2005
<b>Project end date:</b>	01/11/2008 <b>Extension date:</b> 01/03/2009
<b>Total Project duration (in months)</b>	36 months <b>Extension months</b> 4 months
<b>Total budget</b>	€ 1.992.051
<b>EC contribution:</b>	€ 990.877
<b>(%) of total costs</b>	49,74
<b>(%) of eligible costs</b>	50

### Data Beneficiary

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## LIST (I) KEY-WORDS AND (II) ABBREVIATIONS

### *Keywords*

- GAP-manual : A site specific manual containing different kinds of tools for implementing Good Agricultural Practice
- Integrated advisory service : A system which integrate production and environmental goals.

### *Abbreviations*

- AAC : Aarhus County
- AGWAPLAN : Project acronym. (AGriculture and WAter PLAN)
- AU : University of Aarhus (in Danish: Aarhus Universitet)
- DAAS : Danish Agricultural Advisory Service
- DIAS : Danish Institute of Agricultural Sciences
- DIS : Data Information System
- ECA : Environment Centre Aarhus
- GAP : Good Agricultural Practices
- LAC : Local Advisory Centre
- PC : Project Coordinator
- PG : Project Group
- PMG : Project Management Group
- PSG : Project Steering Group
- SME : Small and Medium-sized Enterprises
- WFD : Water Framework Directive

## EXECUTIVE SUMMARY

AGWAPLAN is a project addressing the implementation of the Water Framework Directive (WFD) in an integrated approach combining environmental and production goals to create a sustainable farming system at farm level as well as at catchment level. The specific objective of the project is *to develop and test an integrated participatory advisory approach for the implementation of Good Agricultural Practices (GAPs) and to demonstrate and quantify the impact of GAP on N and P in surface and groundwater in relation to expected achievement of established tolerance limits in three agriculturally intensive pilot areas in the Mid-eastern part of Jutland, Denmark*. The integrated approach is based on participation of environmental authorities, agricultural advisory service, agricultural research, and farmers.

New technologies or methodologies are being developed in relation to all three phases of the project:

- Phase I: Models for assessment of N and P tolerance limits and reduction targets
- Phase II: Integrated approach and decision support system for GAP at farm level
- Phase III: Integrated system for evaluation of the impact and potential of GAP

The project is progressing well and is achieving results as planned. Minor delays have occurred in some of the activities partly due to some of the start-up activities being more time-consuming than expected and partly due to the delay in the EU inter-calibration of the environmental goals of the WFD. At this mid-term stage Phase I has been completed, Phase II is well-underway with a high level of activities being implemented. Some activities of Phase III have been initiated, but the majority of the activities are to be started shortly. Overall the project expects to be able to achieve its planned results: models for establishment of tolerance limits and reduction targets of N and P; evaluation of the potential of GAP, an integrated advisory system and improved DIS for implementation of WFD; and the project results documented and disseminated in Denmark and the European community.

The project has been received well in the pilot areas by farmers as well as by other stakeholders. The pilot farmers and the local advisory service are highly engaged in the implementation of the project and the four involved municipalities are active in the project. The Danish Agricultural Advisory Services (DAAS) has established a well-functioning project management in cooperation with its major partners, the University of Aarhus (AU) and the Environmental Centre Aarhus (ECA), as well as a collaborative working environment has been created among the project partners for the technical implementation of the project.

The project has received much attention and interest from other WFD stakeholders and has been very active in terms of dissemination activities. The project anticipates much interest towards the end of the project when the impact of the integrated approach and the potential of the GAPs for achieving the goals of the WFD will be estimated.

Project activities and expenditures correspond well and there are no major deviation from the plans.

## 1. INTRODUCTION

**Background:** The economy has traditionally been the sole focus in farming, and only since 1987, when the first water management plan was launched in Denmark, have farmers been forced to consider the environmental impact due to national regulations. Implementation of the WFD will demand farmers to balance the financial and environmental conditions and furthermore, to consider not only the environmental impact at farm level, but at the level of river basins or sections thereof. This is a new approach because the N and P contribution from agriculture is at present mainly regulated on a national level, not taking regional and local conditions into consideration. It is assumed that the environmental objectives for the aquatic ecosystem, set by the environmental authorities in accordance with the WFD, can be achieved through farmers' voluntary implementation of GAP with improved and coordinated support by the Danish agricultural advisory system and by environmental authorities.

**Problem:** Loss of nitrogen (N) and phosphorous (P) to the aquatic environment from fields in intensive farming areas contributes significantly to the degradation of the quality of surface and groundwater. The resulting depletion of our natural resources and loss of biodiversity is a major problem addressed by the EU Water Framework Directive (WFD). Therefore, the overall objective of AGWAPLAN is *to facilitate implementation of the WFD and reduce the contribution of N and P from farming to the aquatic environment.*

A range of sustainable practices, referred to in the following as Good Agricultural Practices (GAP), is continuously being developed. GAP includes considerations to farm economy as well as environmental sustainability and is developed through research and field level testing. However, the degree of adoption of GAP in general in the agricultural sector is not satisfactory. The underlying problems have been identified as insufficient cooperation and coordination between environmental authorities and agricultural advisory services as well as lack of on-farm demonstrated and quantified effects of GAP.

**Project objective:** The objective of the project is *to develop and test an integrated participatory advisory approach for the implementation of GAP and to demonstrate and quantify the impact of GAP on N and P in surface and groundwater in relation to expected achievement of established tolerance limits in three agriculturally intensive pilot areas in the Mid-eastern part of Jutland, Denmark.* The integrated approach will be based on participation of environmental authorities, agricultural advisory service, agricultural research and farmers.

**Methodology:** Four main fields of work have been identified:

- Development and testing of models for establishing tolerance limits for N and P to sustain good ecological status of the water body in question, for estimating N and P loss from agricultural activities, and for establishing reduction targets for farming areas (excluding, e.g., point sources)
- Development and testing of an integrated approach between project participants in which farmers will participate actively in establishing the strategy and procedures for support and advisory service and in the development of decision support systems for implementation and evaluation of costs and benefits (environmental and financial) of GAP at farm level.
- Development and testing of an integrated system for monitoring, assessment and quantification of impacts of GAP on N and P levels in surface and groundwater.
- Documentation and dissemination of project results and experience in Denmark and the European community.

The demonstration and quantification of impacts will be conducted with respect to the WFD's requirements on river-basin water management plans for 2009 and fulfilment of the environmental objectives in 2015. Three different catchments with intensive farming and critical levels of N and P in either surface or groundwater have been selected as pilot areas.

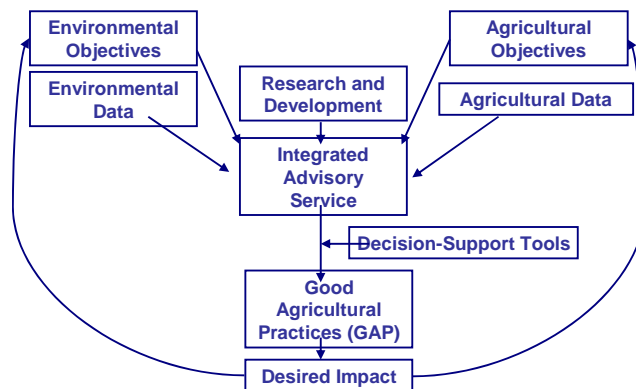
**Expected Results:** Models and methods developed and tested for establishment of tolerance limits and reduction targets of N and P; the potential of GAP, an integrated advisory system and improved DIS for implementation of WFD evaluated; and the project results documented and disseminated in Denmark and the European community.

## 2. LIFE-PROJECT FRAMEWORK

The national centre and three local centres of the Danish Agricultural Advisory Service (DAAS), the Environment Centre Aarhus (ECA) (previously participating in the project as Aarhus County (AAC)), and the Faculty of Agricultural Sciences (DJF) of University of Aarhus (previously participating in the project as the Danish Institute of Agricultural Sciences (DIAS)) have joined forces and are combining existing expertise, databases and advisory tools. 22 farmers in the 3 pilot areas participate in the project through their local agricultural advisory centres (LACs) that are partners in the project.

### Description of project approach

The fundamental project idea of joining environmental and agricultural interests and combining the knowledge of environmental authorities, agricultural advisory services and research in one approach in order to achieve the desired impact on the environment is illustrated in the figure aside. AGWAPLAN can in broad general terms be divided into three main phases that are consecutive in time, however overlapping as illustrated below.



Task 4.1 (Dissemination) and Task 4.2 (Project Management) are undertaken throughout the project duration. For a more detailed overview please see section 8.

	Year 1	Year 2	Year 3
<b>Phase I (Task 1.1, 1.2, 1.3)</b> <b>Models for N and P tolerance limits and reduction targets</b>			
<b>Phase II (Task 2.1, 2.2)</b> <b>Integrated approach and decision support system for GAP at farm level</b>			
<b>Phase III (Task 3.1, 3.3)</b> <b>Integrated system for evaluation of the impact and potential of GAP</b>			

### Presentation of Beneficiary and partners

*The beneficiary:* The Danish Agricultural Advisory Service (DAAS) ([www.landscentret.dk](http://www.landscentret.dk)) is a private not for profit company owned by the organisation Danish Agriculture, which is the largest association of Danish farmers. Approximately 80% of the full time farmers are members of Danish Agriculture.

*Partner 1:* The Faculty of Agricultural Sciences (DJF) of the University of Aarhus undertakes research in agricultural sciences and is responsible for the provision of advice and services to the Danish Ministry of Agriculture. The Faculty has a long tradition of collaboration with DAAS, ECA and the agricultural sector in general.

*Partner 2:* The Environment Centre Aarhus (ECA) is, as a national authority (part of the Danish Ministry of Environment), responsible for the implementation of the WFD as well as national acts on surface and groundwater in one of the four water districts in Denmark. ECA is responsible for environmental planning and for monitoring the surface and groundwater quality and the protection plans of catchments areas for drinking water and other sensitive water bodies in the geographic region of East Jutland.

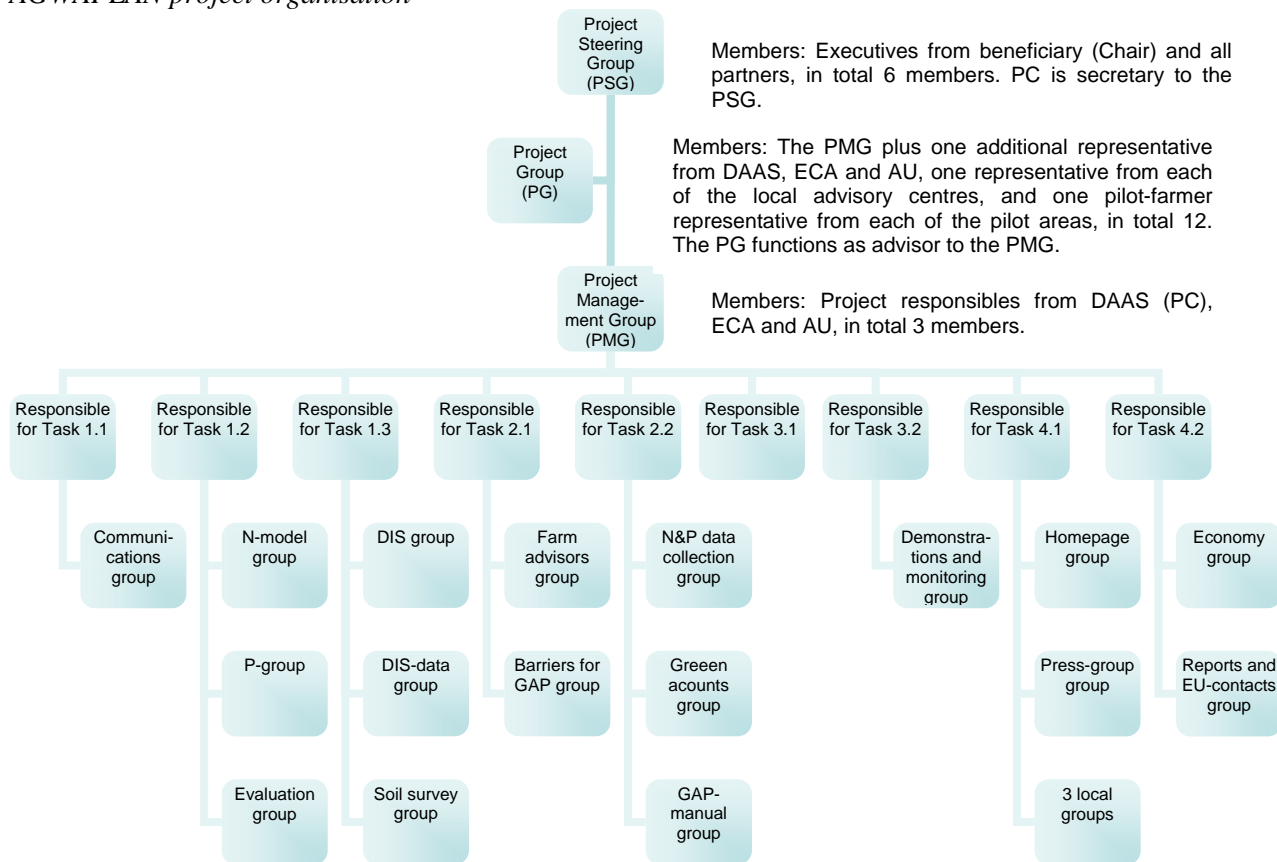
*Partner 3-5:* The three local advisory centres (LAC) are private non-profit organisations; owned and run by farmers in the three pilot areas. Each LAC provides agricultural advisory services to farmers in their own area on a regular basis and is, therefore, familiar with the individual farmers and farm units.

*Co-financer:* The Danish Environmental Protection Agency of the Danish Ministry of Environment co-finances the project.

## Presentation of project- organisation

The project organisation with Project Steering Group, Project Group, and Project Management Group is illustrated in the below figure together with the groups established for implementation of specific activities related to the project tasks.

### AGWAPLAN project organisation



## 3. TECHNOLOGY

Two innovative processes run parallel in the project:

- the development and testing of **new technological approaches**, and
- the development and testing of an **integrated advisory approach**.

### New technological approaches

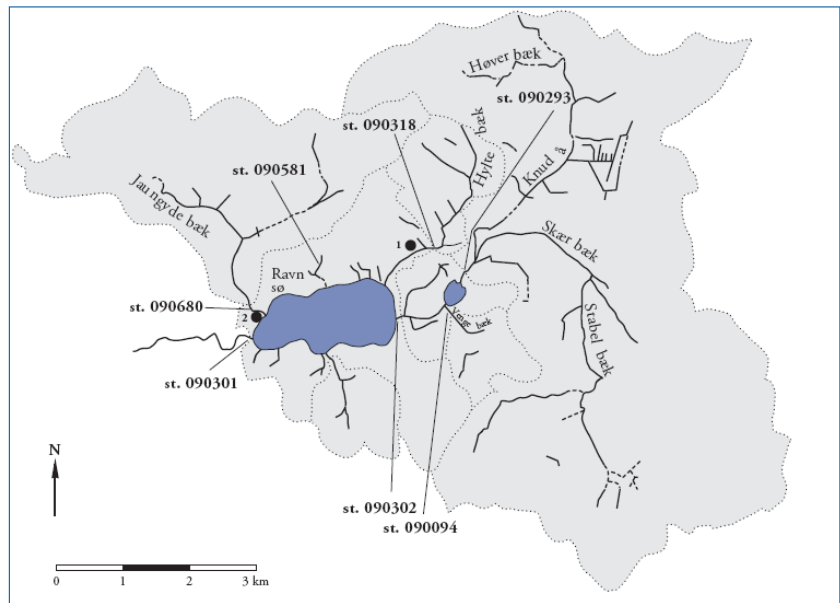
The use of environmental objectives as a key for the management of the quality of the aquatic environment, without a framework of regulations, is new. In Denmark, the environmental impacts of agriculture have traditionally been regulated through limitations on the use of agricultural inputs and resources (framework regulation), such as the amount of fertiliser and animal units per ha. Implementing an approach based on specified environmental goals requires detailed environmental data at catchment level and at farm level as well as modelling of potentials and effects. In response to this, AGWAPLAN will develop new technologies in relation to the establishment of tolerance limits, assessment of reduction targets, data-analysis, monitoring, and assessment of the effects of GAP and decision support for farmers.

*Tolerance limits:* In relation to the implementation of the Danish law on water supply, action plans for drinking water areas are presently being prepared by the Danish authorities (previously the counties). The existing experience has been applied in the development of methods for assessment of tolerance limits and reduction targets for the surface water pilot areas. Development of tolerance limits for the surface water pilot areas has required substantial modelling work, which is included in the project. Based on long time-series of monitoring data from the National monitoring programme (NOVANA) and regional data collected by Aarhus

County in the pilot areas hydrodynamic and eutrophication models have been set up. After a thorough calibration and validation process the effect on the ecosystem of various scenarios of external loads of nitrogen and phosphorus from the catchment can be modelled.

Preliminary environmental objectives in the pilot areas have been used as a baseline for maximum loads that will fulfil the objective of good ecological status according to the WFD.

Since the definition of good ecological status using biological indicators haven't been agreed yet (delayed process in the EU inter-calibration network under article 21) expert judgement and regional environmental objectives have been used. When the environmental objectives are published in the beginning of 2008 maximum loads of nitrogen and phosphorus will be recalculated and adjusted if necessary.



Lake Ravn and catchment area. Present and former monitoring stations in the streams are shown on the map. Environment Centre Aarhus carries out monitoring in the stream and in the lake 19 times annually.

**Reduction targets:** Methods for assessment of N and P contributions from farmland to the aquatic environment are focus research areas for AU, and new methods for model application have been tested at farm and catchment level in relation to the assessment of reduction targets. Based on these results and new project data, e.g. the detailed local soil mapping, further model improvements will be applied for the final quantification of the effects of GAP.

**Data analysis / Data Information System (DIS):** ECA, DAAS, and AU each hold large amount of environmental and agricultural data in various databases.

These databases have been combined and developed into a common database, a Data Information System (DIS). In addition a detailed soil mapping of the pilot farms has been undertaken and included in the database. The DIS makes it possible to combine environmental and agricultural data sets for advanced data analysis and modelling. The DIS forms the foundation for the integrated approach and the decision-making of what kind of GAP is relevant in the different areas.

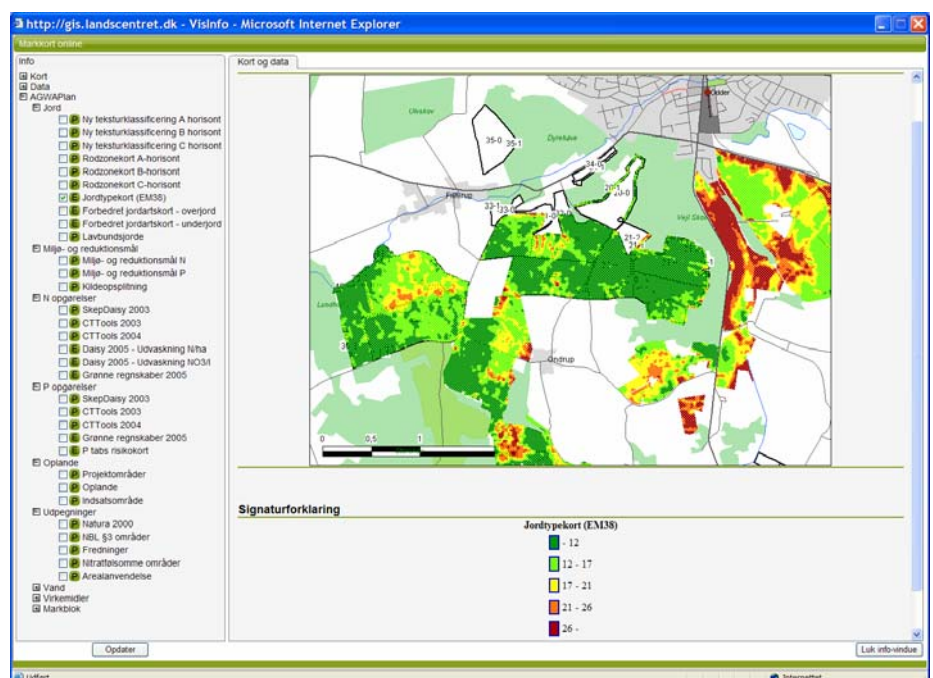


Figure of the DIS illustrating some of the different environmental and production maps available on the DIS.

*Soil mapping:* The field is subdivided using a classical soil map method. The map units are delineated on the basis of the EM38 survey, a number of soil soundings, interpretations of the landscape and aerial photos. To each of the mapping units a soil type is assigned, giving information of the soil in three depths; 0-30 cm, 30-70 cm and 70-120 cm. Each of the three layers has the characteristics defined by the diagnostic properties.

Soil series are distinguished from one other by differences in one or more of the diagnostic properties in one of the three layers.

The diagnostic properties are of equal importance and are as follows: geology, drainage, presence of CaCO<sub>3</sub>, simplified pedology, and soil texture. The system simplifies the soil, and the system suppresses thin horizons or layers. The attributes to each diagnostic layer are not data from a specific representative profile, but a result of a statistical analysis of the Danish Soil Profile Database.



*Picture of EM38 direct sampling at a pilot farm field*

*Monitoring:* For decades, environmental authorities have been monitoring the aquatic environment. Compilation and analysis of monitoring data at catchment level which can be a tool for an integrated approach and be used by environmental authorities as well as farmers to achieve a specific reduction target and the environmental objective will, however, require re-thinking of the monitoring approach. National monitoring programmes fulfilling the requirements of the WFD have been reported to EU in 2006. When the number of waters not (or at risk of not) fulfilling the environmental objectives are known the monitoring programmes may be revised and the necessary numbers of monitoring stations adjusted ensuring a proper geographic monitoring network. However the size of the catchment must also be taken into account for economic reasons. Agwaplán can be used as pilot project for future monitoring programmes in Denmark.

*Assessment of the effects of GAP:* Quantification of the effects of GAP on the aquatic environment on farm and catchment level will be the first initiative of its kind in Denmark. The methods will take place in the remaining period of the project and will be based on a combination of recent research results from AU and existing practical experience in ECA.

*Decision-support tools:* In cooperation with research, DAAS and ECA have developed a decision support tools for farm management, which are being used in the Integrated Advisory at farm level.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Navn												
2	Nedbørszone												
3	Brugstype												
4	Mark												
5	Nr.	Jordtype	Areal	Tiltag									
6		JB	Ha			Effekt pr. ha			Effekt i alt				
7						N-udv.	Amm. ford	Udbytte		N-udv.	Amm. ford	Udbytte	Omkostn.
8						Kg N/ha	Kg N/ha	hkg pr. ha		Kg N/ha	Kg N/ha	hkg pr. ha	Kr/ha
9	Field	1		Tool	Placer	1,5		2,5		15		25	-
10		1		Gødningsspredning	Ammonium- i stedet for nitratgødning	6	0	1,6	0	60	0	16	0
11		1	10		Ammonium- i stedet for nitratgødning				0	60	0	16	0
12	3	1	10		Optimeret behovsfastsættelse	0,9		0,75	5	9	0	7,5	50
13	4	1	10		Positionsbestemt plantedyrking	1,5	0	1,5	250	15	0	15	2500
14	5	1	10		Nedfældning af gylle	-3	10	2	142,5	-30	100	20	1425
15	6	1	10		Biogasbehandling af gylle <sup>1)</sup>	4,5	0	2	0	45	0	20	0
16	7	1	10		Separering af gylle	0	0	0	1500	0	0	0	15000
17	8	1	10		Forsuring af gylle	-10	14,5	1,25	750	-100	145	12,5	7500
18	9	1	10										
19	I alt på ejendommen for gødningssudbringning			90						69	260	132	26475
20	Mark												
21	Nr.	Jordtype	Areal	Tiltag									
22		JB	Ha			Effekt pr. ha			Effekt i alt				
23						N-udv.	Amm. ford	Udbytte	Omkostn.	N-udv.	Amm. ford	Udbytte	Omkostn.
24						Kg N/ha	Kg N/ha	hkg pr. ha	Kr/ha	Kg N/ha	Kg N/ha	hkg pr. ha	Kr/ha
25	1	1	10	Afrøder	Tidlig såning af vintersæd	4	0	0,5	-	40	0	5	-
26	2	1	10		Øget anvendelse af efterafgrøder	25	0	-	145	250	0	-	1450
27	3	1	10		Øget anvendelse af efterafgrøder	25	0	-	145	250	0	-	1450
28	4	1	10		Efterafgrøder med dyb rodvækst	22,5	0	-	-	225	0	-	-
29	5	1	10		Senere nedmulning af efterafgrøder	10	0	-	0,5	100	0	-	5
30	6	1	10		Efterafgrøde i majs	37,5	0	-	-	375	0	-	-
31	7	1	10		Efterafgrøde året efter nedpløjning af kløvergræs	37,5	0	-	-	375	0	-	-
32	8	1	10		Bedre afgræsning på kvægbrug/forbedret rådgivning	-	-	-	-	-	-	-	-
33	9	1	10		Bedre afgræsning på kvægbrug/forbedret rådgivning	-	-	-	-	-	-	-	-

Figure: Example of tool used when deciding which GAPs to use on different fields at the farm.

The project will to the extend possible develop a prototype of a decision-support tool based on the information available in the DIS. Inclusion of environmental aspects into a decision support tool will be a significant improvement and will enable farmers to manage their farms in accordance with the WFD.

### Integrated advisory approach

At present, collaboration between project participants takes place when needed in relation to specific problems or tasks. However, it is the first time information and experiences are pooled to combine production objectives and environmental objectives. The integrated approach has a two-fold purpose, one being improvement of communication between farmers, the advisory service and the authorities on catchment level the other an actual integrated Advisory at farm level where production and environmental goals are linked.



Picture of environmental authorities and local advisors discussing use of GAP's in the catchment of Hinnerup

## 4. PROGRESS, RESULTS

### **Task 1.1 Assessment of tolerance limits of N and P contributions from farming in the pilot areas.**

*Objectives:* To identify environmental objectives and determine model calculated tolerance limits to N and P for surface water and to N for groundwater in accordance with the requirements of the Water Framework Directive (WFD)

*Deliverables and status:*

- Final Report on tolerance limits for N and P in pilot areas. (Finalised 1 April 2007. The report will, however, be updated when final tolerance limits according to the WFD are agreed on in the EU. The Report is enclosed as Appendix 6).
- Guidelines for assessment of tolerance limits (due June 2007).

All actions performed by Aarhus County until 1 January 2007 and Environment Centre Aarhus (Danish Ministry of the Environment) after 1 January 2007.

*Action 1.1.1: Establishment of a hydrodynamic and eutrophication model for pilot area 1 (Norsminde Fjord).* The advanced hydrodynamic and eutrophication model for Norsminde Fjord are in place (pilot area 1) and the monitoring programmes in the estuary are finalized. The streams are still being monitored. The results and methods have been presented in a report in Danish.

*Action 1.1.2: Establishment of ecological models for pilot area 2 (Ravn Soe).* The ecological model for Lake Ravn (pilot area 2) is implemented and the monitoring programmes in the streams and in the lake are still in operation. The results and methods have been presented in a report in Danish.

*Action 1.1.3: Establishment of tolerance limits for N and P to surface water from the catchment in pilot areas 1 and 2* In pilot area 1 it has been calculated that in order to achieve good ecological status approximately 50% reduction of the total nitrogen load is required. In pilot area 2 it has been calculated that in order to achieve a good ecological status a 50% reduction of the total phosphorus load is required. Effect on biological parameters indicating the ecological status of pilot area 1 and 2 can be calculated using eutrophication part of the dynamic model setup.

*Action 1.1.4: Review and adjust if necessary the recently established tolerance limits of N from farmland to groundwater in pilot area 3 (Hinnerup).* The acceptable impact of nitrate on the waterworks in Hinnerup has been determined and reviewed as to the quality of drinking water and there is no need to adjust the tolerance limits.

*Action 1.1.5: Communicate the established tolerance limits to farmers in the pilot areas through the integrated advisory service.* The established tolerance limits in the three pilot areas have been presented and discussed with the farmers in the pilot areas and project partners. Draft tolerance limits and the models behind were presented for the first time at a PG-meeting in 2006 and at a meeting in each pilot area in June/July 2006.

*Action 1.1.6: Report on results, methods applied, and guidelines on their implementation.* The finalisation of the action including guidelines is awaiting the final inter-calibrations of the environmental objectives in the WFD in different watercourses. Apparently the inter-calibration results from the working groups under article 21 are delayed. This situation will cause delay of finalizing task 1.1 because recalibration of our models with the results from the EU inter-calibration network may be necessary.

### **Task 1.2 Estimations of N and P baselines as well as reduction targets for the pilot areas**

*Objectives:* To establish the initial loss of N and of P from farming in the pilot areas in kg per year, and to assess the need for changes to agricultural practices to reduce the N and P contributions to the water bodies in the pilot areas.

*Deliverables and status:*

- Final Report on estimations of N and P losses from agricultural activities and the resulting assessment of the reduction targets for loss of N and P (Submitted on 31 October 2006).

The actions have been implemented by AU and ECA in cooperation. The DAAS have followed the work closely.

The initial leaching losses of N at field, farm and catchments level has been discussed among project partners on the basis of different model results in order to get a reliable results as possible. Likewise the estimations of P losses to the aquatic environment has been discussed

**Action 1.2.1:** *Assessment of the overall contribution of N and P from farming activities in the pilot areas.* The overall contribution of N and P has been estimated.

**Action 1.2.2:** *Estimation of the initial leaching losses of N at field, farm and catchment level applying various methods.* Models have been set up for the three catchments areas in order to model baseline surplus N and leaching of N from the root zone. Surplus N and nitrate leaching has been modelled for each field in all three catchments.

**Action 1.2.3:** *Estimation of the N-reduction taking place during transport from root zone to watercourse.* A more accurate estimation of the distribution and of the N reduction during the transport from root zone to watercourses has been worked un and discussed.

**Action 1.2.4:** *Estimation of initial losses of P to the aquatic environment and P balances by available methods.* All data set up and model validation is finished. P surplus is calculated for each catchment.

**Action 1.2.5:** *Relating actual and acceptable N and P loads to the aquatic environment.* Reduction targets are calculated.

**Action 1.2.6:** *Summarise and evaluate findings on P and N losses from farming in the pilot areas in a report.* No activities scheduled for the reporting period

As anticipated the model discussions have been very complex and a continued issue for discussion between the key institutions (AU and ECA). Although delaying the process, it is found to be valuable to investigate all complexities thoroughly and identify how the different handling and interpretation of certain aspects and factors will affect the results, as the complexity is a problem that likewise will arise in relation to implementation of the WFD in other regions.

There are no critical consequences for the whole project on the delays in this task.

### **Task 1.3 Establishment of a data information system (DIS) combining and developing existing databases and new data on the pilot areas**

*Objectives:* To establish a structure, accessible for all project partners, that will provide an adequate foundation of information for planning and implementation of GAP and for assessments of the impacts of GAP

*Deliverables and status:*

- Data Information Systems (DIS) prototype (due July 2008)
- Report on the structure and functions of the DIS prototype (due July 2008)

DAAS has been overall responsible for this task. There has been close cooperation in the working group where AU and ECA have participated. In the testing period the LAC's have had an important role telling what's working and what could be done in more convenient ways.

**Action 1.3.1:** *Establish and document the structure of a data information system (DIS) for environmental and agricultural data.* The structure of DIS was outlined and agreed on in time.

**Action 1.3.2:** *Compile and transfer data from existing data registers (including geo-data) and data on hydrogeology to DIS.* Relevant data have been compiled and transferred to the DIS.

**Action 1.3.3:** *Store data from pilot farms, including N and P accounts in DIS.* The results have been filled in the prepared tables.

**Action 1.3.4:** *Undertake mapping of soil types and development of digital elevation models on demonstration farms.* Measurements with the EM38 system and soil profile descriptions at targeted points over the catchments have been finalised by the AU. From these data an optimized soil map has been drawn for the whole project area.

**Action 1.3.5:** *Include soil survey data in DIS.* AU has provided the data from the soil survey to the DIS working group. The data are now in the system.

**Action 1.3.6:** *Include soil survey data in DIS.* The soil survey was delayed which has caused that the data will be included in the final model works but not in the first.

No activities are scheduled for the reporting period.

## **Task 2.1 Integration of environmental regulation strategy and agricultural advisory for the implementation of GAP**

*Objectives:* To develop and test an integrated advisory system for the implementation of GAP based on cooperation between environmental authority, agricultural advisory service and the involved farmers.

*Deliverables and status:*

- Report: An evaluation of barriers to integrated advisory and GAP in practice (Part I and II) (due 1 October 2008).
- Report on the structure and functions of an integrated advisory system for the implementation of GAP and the experiences gained during the project (due 1 October 2008).

**Action 2.1.1:** *Assessment of barriers for the implementation of GAP.* The study on the barriers to integrated advisory has been presented and discussed at project group meeting.

**Action 2.1.2:** *Development of an integrated advisory approach* The integrated advisory tool has been developed in close cooperation between DAAS and ECA. The concept has been developed in a process where action 2.1.2 and 2.1.3 have worked in interaction. The approach consists of a tool for Integrated Advisory on farm level and a tool for Integrated Advisory on catchments level. The GAP-manual and the DIS are key tools in the advising system.

**Action 2.1.3:** *Implementation of the integrated advisory service.* A training programme about the integrated approach including two workshops for LACs has been held. The training programme has included discussions on how different advising methods could be used to best approach different kinds of farmers.

**Action 2.1.4:** *Evaluate the effect of integrated advisory service.* No activities scheduled for the reporting period.

**Action 2.1.5:** *Describe the approach and summarise the lessons learnt in a report.* No activities scheduled for the reporting period.

## **Task 2.2 Application and development of a decision support tool for GAP**

*Objectives:* To plan and implement GAP through the use and further development of GAP decision support tools.

*Deliverables and status:*

- GAP-manual (submitted 31 October 2006)
- Final version of prototype of user-interface of the AGWAPLAN data information system (due 1 October 2008)

DAAS are overall responsible for this task. LAC's have collected relevant data and created N and P accounts at farm level. AU has on basis of the data and on basis for the data for EM38 created a P-index. The GAP-manual have been created in close cooperation between DAAS, AU and ECA.

**Action 2.2.1:** *Compile farm level data in cooperation with farmers.* Relevant data has been collected.

**Action 2.2.2:** *Create N and P accounts at farm level.* N and P accounts at farm level have been created, evaluated, and included in the DIS.

**Action 2.2.3:** *Identification of fields most vulnerable to P loss in the pilot areas.* P index for pilot farms have been created. A modified version of the Pennsylvania P index has been applied. The P-index was delayed due to the delay of the EM38 monitoring. However, the P-index is now accessible in the DIS.

**Action 2.2.4:** *Create a site-oriented GAP manual.* The GAP-manual is available in paper format and in CD-rom format. Further more a calculation sheet where N, P and yield and economic consequences of using different GAP's are visualized.

**Action 2.2.5:** *Plan and implement GAP for individual pilot farms and assess the cost at farm level.* No activities scheduled for the reporting period.

**Action 2.2.6:** *Develop and test a prototype of a user-friendly internet-based decision support tool for GAP.* No activities scheduled for the reporting period.

### **Task 3.1 Assessment of the effect of implemented GAP on N and P balances in pilot areas**

*Objectives:* To quantify by modelling the loss of N and P after implementation of GAP and the effectiveness of GAP to achieve the environmental objectives for the specific pilot catchment areas as well as for catchment areas in general.

*Deliverables and status:*

- Report on the potential and effectiveness of using GAP for implementation of WFD (1 October 2008)

No activities scheduled before April 2007

### **Task 3.2 Development and implementation of a combined demonstration and monitoring programme for N and P levels in the pilot areas.**

*Objectives:* To monitor the quality of the water bodies in the pilot areas according to the requirements of the WFD and demonstrate the actual effect of GAP on the aquatic environment measured as estimated reduction in loss of kg N and P per year in order to strengthen the understanding of GAP among stakeholders.

*Deliverables and status:*

- Report: Evaluation of demonstration methods (due September 2008)
- Report: Description of monitoring programme for the pilot catchment areas and guidelines for the development of a monitoring programme for catchment areas in general (due September 2008)

A combined demonstration and monitoring programme has been initiated by ECA in close cooperation with the DAAS.

*Action 3.2.1: Planning of the monitoring methods and programme* A plan for a monitoring programme has been created and agreed between DAAS, ECA and AU. Monitoring requirements of hydromorphological, physical-chemical and biological parameters in the WFD (Annex 5, Operational Monitoring) have been taken into account when planning the programmes in Norsminde Fjord (pilot area 1) and Lake Ravn (pilot area 2). The standard is higher than the minimum requirements in WFD (Annex 5). First priority of the monitoring programme is to run a system for data collection, analysis and presentation of results for use in the project and facilitate implementation of the WFD. The monitoring programme in Norsminde Fjord was terminated by the end of 2006, but monitoring in the streams is still being carried out

*Action 3.2.2: Planning of the demonstration programme.* A demonstration programme have been discussed and agreed between partners. First priority of this programme is to collect a sufficient amount of data to answer questions on environmental issues raised by the project partners and farmers in the pilot areas, demonstrate effect of GAP in the pilot areas, and a resource for dissemination of the project. An ISCO sampler for intensive sampling of surface water in the main stream feeding into Norsminde Fjord has been in operation since January 2006. Water samples from drainage systems, pumping stations and water basins along highways have been analyzed (nitrogen and phosphorus) and results will be sent to farmers in the pilot areas, who are very much interested in contributions and sources of pollution with nitrogen and phosphorus on a very local scale. Results will also improve the dataset and support the decision tools for implementation of GAP.

*Action 3.2.3: Establish the monitoring system and install the monitoring equipment.* Infrastructure for monitoring has been set up and is running. Discussions has taken place on further actions particular with regard to the inclusion of measurements of nitrogen pools in the soil in the pilot areas before and after implementation of GAP. It is a low budget method for the determination of the amount of accessible nitrogen in the autumn. This method can give an indication of the potential leaching of the coming winter and may detect changes from year to year. If it will be possible to establish small ponds on drainage systems in the pilot areas it is intended to run a monitoring programme in order to quantify the denitrification rate.

*Action 3.2.4: Implement the monitoring programme.* Most of the monitoring programmes are implemented but further dissemination of the results is needed. This will take place in the coming reporting periods.

**Action 3.2.5: Implement the demonstration programme** Most of the demonstration programmes are implemented but further dissemination of results is needed. This will take place in the coming reporting periods.

#### **Task 4.1 Documentation and dissemination of project results and experiences**

Please see section 5 Dissemination activities and Deliverables.

#### **Task 4.2 Project Management**

*Objectives:* To ensure timely implementation of the project, good cooperation among project participants and quality assurance of the deliverables.

*Deliverables and status:*

- 1<sup>st</sup> Progress Report and a GO/NOGO – Report (Submitted 1 May 2006)
- 2<sup>nd</sup> Progress Report (Submitted 31 October 2006)
- Interim Report including Statement of Expenditure (the present report - due 30 April 2007)
- 3<sup>rd</sup> Progress Report (due 31 October 2007)
- 4<sup>th</sup> Progress Report (due 30 April 2008)
- Final Report including Statement of Expenditure (due 31 October + 3 months (31<sup>st</sup> January 2009))

The project management is functioning well. The project coordinator and the project management group are in touch very often and meetings are held at least once a month. All important decisions about the project are discussed in this group.

Agreement for procedures for project implementation, communication and cooperation were agreed on in the beginning of the project period. In the project handbook the internal as well as the external communication are described which make the communication clear for all project participants. Quality assurance is an important issue in the internal communication.

The project group functions as a dialogue group where progress and constraints are discussed. The farmers in the three areas have pointed out one representative from each area. These farmers are highly engaged in the project.

The contact to the European Commission through the contact to the monitoring team is functioning well.

## **5. DISSEMINATION ACTIVITIES AND DELIVERABLES**

One task of the project is focussing on dissemination as well as documentation (Task 4.1) 'Documentation and dissemination of project results and experiences'. Therefore, the issue of dissemination activities of the project is being addressed by describing the progress of this specific task.

*Objectives:* To ensure that project findings are disseminated and discussed among stakeholders locally, nationally and at EU level; and to facilitate multiplication of applied methodologies in other counties or regions.

*Deliverables and status:*

- Proceedings of National Workshop (due 31 October 2008)
- Proceedings of International Conference (due 31 October 2008)
- Layman's report (due 31 October 2008)

The project experiences a high level of interest for the project, its activities and results from the public in general and from the agricultural and environmental sectors in particular. The interest for the project is very high due to the timing in relation to the implementation for the WFD and the level of interest and featuring in the media have been much higher than anticipated at the proposal stage. The project estimates that there is a high potential for reproduction and transferability at public level as well as at farm level (advisory system and farm unions).

The feed-back on the projects dissemination activities is visible in the amount of inquiries the project receives from interested parties and the amount of contacts being established.

## 5.1 Dissemination plan

The overall dissemination plan for the project is focusing on three levels on dissemination:

- local (farmers, advisory service and waterworks in pilot areas and the rest of the county),
- national (environmental authorities and advisory centres outside the pilot areas) and
- international (national environmental and agricultural authorities of other EU countries).

**Local:** farmers receive information and support for decision-making from the advisory service, experience from other farmers, the farmers' journal and local mass media as well as courses at DAAS are important for a large number of farmers. The same media and measures have, therefore, been chosen for the Project's dissemination at local level.

**National level:** National level dissemination takes place through conferences and scientific journals, as these media are commonly used for sharing new information.

**EU level:** the dissemination of information will take place through knowledge exchange meetings with similar EU-LIFE-projects and through the existing network of contacts of the involved parties, as well as a conference will be organised at the end of the project with participation from other EU countries, mainly from Northern Europe.

An interactive website has been established and newsletters regularly address all target groups.

The responsible person for each task informs the Coordinator when there are results or milestones relevant for dissemination activities. The Project Management Group coordinates the dissemination activities with the communication group and the press group.

A complete list of dissemination activities divided into 'Features in public medias' and 'Other dissemination activities' has been enclosed as Appendix 1. In addition a collection of selected photos from project events has been enclosed as Appendix 2.

There has been no need to revise the dissemination plan.

### 5.1 Activities and Output presented per task

Most often the dissemination activities relates to several tasks, e.g., the result from Task 1.1 on tolerance limit for a catchments becomes more interesting when this tolerance limit are compared with the results of Task 1.2, namely the leaching losses from the farms in the catchments area. In the following it has, however, been attempted to group the dissemination activities according to the specific tasks.

**Task 1.1:** ECA has presented the tolerance limits for the pilot areas to the project partners including pilot farmers and the different scenarios have been discussed among project partners and pilot farmers. Reports on tolerance limits for nitrogen and/or phosphorus were finalized in April 2007. The main conclusions of the reports have been presented at various seminars and conferences in Denmark and once in Sweden. The reports in Danish will as well as summaries in English will be available on the project homepage no later than 1. June 2007. Power-Point presentations are also available on the project homepage.

**Task 1.2:** AU and ECA have presented the assessment of the overall contribution of N and P from farms and the estimated losses of N and P from root zone to the aquatic environment in a report which is available on the homepage. The results have, furthermore, been presented to the project group, in meetings with the Water Agri Pro on Funen, and with local authorities, scientists, and consultants in Southern Sweden. In June 2007 the modelling results will be included in a presentation at the Nordic Agricultural Scientist congress in Copenhagen.

**Task 1.3:** DAAS has in cooperation with the ECA presented the DIS system for farmers in the three catchments and at meetings for farmers and local advisers in other catchments. Furthermore, the concept has been presented to DAAS-leaders in order to discuss how the prototype can be designed in a way which makes it useable on nationwide scale.

The tool EM38, used for mapping of soil types, has been presented in regional TV and radio.

**Task 2.1:** The Integrated Advisory Approach consists of a system handling the integrated advisory at farm level and a system concerning the catchment level. The integrated advisory system at farm level has been used at the project farms. Furthermore, has the concept been used at 12 farms in Ringkøbing County. DAAS are in cooperation with other local advisory centres in the process of transferring the idea of Integrated Advisory into a project where the overall

strategy for the farm and the environmental strategy are interrelated.

DAAS and ECA have presented the integrated advisory system in a report which has been sent to the group under the Danish Environmental Agency working on how to implement the WFD at national level in Denmark. The concept has been presented in a meeting for Chairmen of the local farmers unions. The concept has also been presented at a number of conferences for environmental authorities and local advisors. In addition to the project activities, DAAS has established a 'travelling team' of farm advisors and representatives from the farmers union who introduces the concept to the local advisory centres.

**Task 2.2:** The GAP-manual has been presented as a tool to be used in the Integrated Advisory Service at farm level. The manual are usually presented as a tool when presenting the Integrated Advisory Service (task 2.1).

**Task 3.1:** No activities scheduled before April 2007

**Task 3.2:** The monitoring programme has been presented in the Newsletter. The results are being presented as they produced. This will include monitoring in the streams with traditional and intensive sampling (Isco and Doppler samplers), sampling in drains, measurements of nitrogen pools in soil, biological sampling in Lake Ravn and Norsminde Fjord. The monitoring data provide information of the environmental status before implementation of GAP and is widely used for demonstration purposes. Other demonstration projects like establishments of small ponds and wetlands in the pilot catchments may be carried out.

**Task 4.1:**

*Action 4.1.1: Establish and maintain a website exclusively for the project (Danish and English).* The project webpage is established and in function. Improvements of the English site are presently being considered.

*Action 4.1.2: Local level dissemination.* 'Experience exchange structure' at pilot area level has been established in each pilot area – three meetings (one in each pilot area) have been held for pilot farmers. Likewise, the advisory service partners have met regularly. News items for local newspapers, radio, and television have been prepared and distributed in the three pilot areas. Regular meetings with the four municipalities covering the pilot areas are taking place. After the public reform the municipalities play an important part in the planning process of the WFD, since they will be responsible for the implementation of the national water plans after 2009. Four municipalities sharing pilot catchments in Agwaplan are now part of the reference group and former employs from Arhus County are still active in Agwaplan thus ensuring good cooperation between the two environmental authorities. We believe that the municipalities will have the closest contact with farmers in the future planning processes related to implementation of the WFD.

*Action 4.1.3: National level dissemination.* At national level the project has been discussed with other Counties as well as the Ministry of Environment have received information about the project. Meetings have been held with the Farmers' Union and information on AGWAPLAN has been provided to the Union at local and at central level. The Farmers' Union has a keen interest in the experiences from the project and its broader application in order to ensure the involvement of the farmers in the WFD process.

The advisory service in the Ringkøbing area and the previous County of Ringkøbing have been very interested in the ideas of AGWAPLAN. They have been introduced to the GAP manual and have followed the developments of the project closely. Meeting for the 4 Municipalities involved in the project was held in August and March as well as a meeting for the local waterworks in Hinnerup has taken place.

The project has been presented in a number of articles and at several conferences - for local and national dissemination (please see Appendix 1).

*Action 4.1.4: EU level dissemination.* At EU/national level the Project has corresponded with the project management group in the LIFE-project Odense PRB-agri. The project has been presented at the "Wetland Restoration and Management Conference", a LIFE Natura project, in April 2006.

The project has, furthermore, been presented at a CIFAS stakeholder seminar in DG Agriculture and the European Parliament in Bruxelles in March 2006 (see presentation in Appendix 3).

*Action 4.1.5: Produce generic information material, conduct press campaign and ensure quality of dissemination.* The journalist team has followed the press strategy in order to optimize the dissemination at all levels. Newsletters are published. The first project signpost has been produced and is in place at Norsminde Fjord. Two other signs at the Lake Ravn and at the drinking water catchment in Hinnerup will be produced and placed at the pilot sites later this year. Name cards and bookmarkers have been designed and printed (presented in Appendix 4).

## **6. EVALUATION AND CONCLUSIONS**

### **6.1 Project implementation**

The project is progressing more or less according to the plan. Activities of Task 1.2 and Task 1.3 are slightly behind schedule. However, bottlenecks that will have a major impact on other tasks have been avoided and alternative solutions been found when necessary.

#### **a) The process**

A process of creating a common platform for sharing knowledge and ensuring a common understanding of the problems involved for all the parties in the project has been fundamental in the project. It has proved very important and beneficial in order to create ownership among all involved parties for the common challenge it will be to implement the WFD and at the same time aiming at continued agricultural productivity and an acceptable socio-economic situation for the farming community.

In this integrated process taken by the project it has been important to involve farmers in the project from the beginning to ensure their participation in the planning and decision-making of project activities. This has been perceived very positive by the farmers. It has, however, also created situations where motivation among the farmers of participating in the project has turned into impatience to get involved in the 'real actions' while waiting for the researchers or the environmental authorities to finalise the knowledge platform upon which the project would act.

A major challenge for the project has been to overcome barriers in relation to the development of, and communication of the model calculated tolerance limits (although, still subject to the EU inter-calibration and recalibration of models) and the estimated reduction targets for the pilot areas. In spite of being a very sensitive area politically, particularly for the local farmers, the project participants have managed to maintain the cooperative and innovative atmosphere amongst all participants focussing on finding potential solutions.

#### **b) The project management, the problems encountered, the partnerships and their added value**

The project management centred around the project management group (PMG) consisting of one member from each of the largest partners, DAAS, EAC, and DJF has functioned well. There is a close contact between the three representatives led by the Coordinator from DAAS as well as with the other partners in the project group.

At the beginning of the project a Consortium Agreement as well as a Handbook was prepared laying down the project rules and guidelines for organisation, management, internal and external communication. These agreements at an early stage has clarified many issues and facilitated the management of the project.

The PMG put much effort into the mobilisation of all partner in the beginning of the project which turned out to be more time-consuming than expected and caused some delays in getting certain activities started. A contingency plan for these activities was then made and followed. This has ensured that the project was kept on track.

A range of technical working groups were established at the beginning of the project which has resulted in collaboration among the project partners at several levels and among a range of persons in the partner organisations. This network of contacts as well as the collaborative character of the majority of the actions contributes to a highly satisfactory level of communication and flow of information in the project.

#### **c) Technical and commercial application (reproducibility, economic feasibility, limiting factors)**

The integrated approach in the project attempts to combine environmental interest with the productive agricultural interest, thus finding solutions that are acceptable financially to the farmer, but at the same time economic from a broader environmental perspective. Only towards the end of the project it will be possible to evaluate if the implementation of GAPs can be financially and economically feasible, and at the same time result in sufficient reduction of the contribution of N and P to ground and surface water.

The project has at this early stage collaboration with environmental authorities in other areas who want to learn from the project's experience or to use its set-up or parts thereof. This is facilitated by the fact that the project is based on several of the tools being used by the environmental authorities and the advisory services nationwide and can, therefore, easily be incorporated in similar situations.

The project is not expected to have a commercial application.

#### **d) Comparison against the project-objectives**

The objective of the project is expected to be achieved in due time. The development of an integrated participatory advisory approach is well underway and has so far been received very positively. For the demonstration and quantification in the three pilot areas there are at present no unforeseen problems to be addressed, but the majority of the activities are still to be implemented. At this time it is, however, too early to make more detailed evaluations on the expected results of the project and thus the fulfilment of the project objectives.

#### **e) Effectiveness of dissemination activities**

The project has received much more attention from local, national as well as international level than originally expected. The project has featured in various media several times sometimes with much focus on the project itself and its objectives sometimes with less focus on the project and more local or farmer-related issues being in focus. The project has also been presented in numerous forums and it is the impression of the PMG that it is known to the most relevant decision-makers locally, regionally and nationwide amongst stakeholders of the WFD.

The Coordinator is regularly contacted by interested parties who would like to learn more about the project and its activities. The project finds that this is a proper measure on the effectiveness of its dissemination activities.

#### **f) The future: continuation of the project + remaining threats**

The first phase of the project is almost finalised – only waiting for the results from the EU inter-calibration network which may require a recalibration of the models developed by the project for assessment of tolerance limits and the resulting reduction targets.

A range of activities of the second phase of the project has been initiated and their implementation will continue as planned. A major challenge of the project in the second phase is to ensure that the many discussions, planning and preparations for implementation of GAPs will materialise into real actions in the field. In this way that the integrated advisory approach will be taken to the test, although other factors may also influence to which degree GAPs will be implemented. The project may achieve its objectives in any case, but will only be really successful if the farmers decide to realise the majority of the planned GAPs.

The project hopes to be able to demonstrate if or to which degree GAPs can contribute to the realisation of the objectives of the WFD. For this to be based on a sufficient amount of information, the farmers will be to continue their present dedication to the project. This also means that the project and its management will have to maintain their high level of information flow and communication.

## **6.2 Analysis of long-term benefits**

### **a) Environmental benefits**

The project is expected to have direct environmental benefits in the form of reductions of the contribution of N and P from farming to the aquifers in a catchment. An aim of the project is to develop methods for quantification of the reduction and to quantify the resulting reduction in the three pilot areas.

The results of the project will be highly relevant for the environmental policies such as the WFD and the Nitrate Directive. The quantification of the effects of GAP will provide an important input to the discussion on how and if farming can continue in relation to the implementation of these directives.

#### **b) Long-term sustainability**

Long-term qualitative environmental benefits are obvious as the impact of the reduced levels of N and P in the ground and surface water will rise as GAPs are being implemented. There will be a time-lag between implementation of GAPs and measurable effects on the various water-bodies. However, when the impact starts to take effect and the status of the lakes and streams will improve.

The long-term qualitative economic benefits will foremost be that farming operations may continue in areas where more traditional agriculture would no longer be possible after implementation of the WFD. It is likewise to be expected that high quality of ground water resources can be secured which will be of high economic value.

Long-term qualitative social benefits is also to be expected in the form of improved communication between farmers and coordination of their farming activities for the benefit of water-management in the catchment their farms are located in.

#### **c) Replicability, demonstration, transferability, cooperation**

The project has a high potential in terms of reproducibility as the models and the integrated approach developed by the project as well as the experience gained in the process of establishing reduction targets and planning and implementing GAPs can be almost directly reproduced in other water catchments in Denmark. Likewise, the decision support tool that the project that the project will develop (in a prototype version) will be directly applicable in other areas of Denmark through the services of DAAS. It also expected that it will be possible to apply the models and the integrated approach in other parts of Europe, however, taking due considerations to the local structures, organisation, traditions and culture.

Although GAPs may result in lower yields from the field it is still expected to be cost-effective to other solutions to reducing the N and P levels in the surface water or to remove N and P from groundwater used for drinking water or alternatively stop farming operations completely in vulnerable catchments.

The Project does not have a commercial approach and it is not expected that the results derived from the project will have a commercial potential.

#### **d) Innovation**

As mentioned in Section, 3 two innovative processes runs in parallel in the project, namely development and testing of new technological approaches and the development and testing of an integrated advisory approach. The innovation is focussing on national level, but has potential for international level as well.

Phase I of the project is focussed on the development of new technological approaches for assessment of tolerance limits and reduction targets, as well as the formation of a Data Information System (DIS) for which new methods for detailed soil mapping is included.

Phase II consist of the development and testing of the integrated approach, which also includes the further development of the DIS into a decision support system.

Phase III is the final phase of the project where models are developed and tested for assessment of the impacts of GAP.

The innovations of the project are linked to existing environmental models and advisory systems and bring these models and systems a large step forward towards a more holistic approach to balancing production and environmental needs.

## **7. AFTER-LIFE COMMUNICATION PLAN**

At this interim stage a number of after-LIFE activities for 'after-life communication' have been discussed in the PMG.

Of the results achieved so far several elements/tools could be of a high value in the future implementation of the WFD which will take place from 2009. It is expected that it will be of interest and value to communicate the following results to other stakeholders in Denmark and in the rest of the EU after the completion of the project:

- **Models for assessment of environmental objectives and reduction targets.** The project has now a model which is working satisfactory and which can be used when trying to assess and demonstrate the effects of different scenarios. The model and the experiences of applying the model could be valuable for assessment of environmental objectives and reduction targets for other catchments in the EU. It will be relevant to communicate the experiences of the model work and the model discussions with other participants (stakeholders, farm advisers, and local authorities) to other countries and regions where similar model work needs to be undertaken and communicated to more local involved parties. In order to ensure a satisfactory after life communication on this subject external support would, however, be necessary to identify the EU-parties and areas where such inspiration and knowledge gained by the project would be useful.

- **The integrated approach at farm level.** The farm family receives advice on how to combine environmental issues relevant for the specific catchment with the families more strategic wishes for the farm. When the environmental goals are understood and accepted by the farm family they become an integrated part of the decision-making at farm level. This new advisory method where environmental and production goals are integrated are in the project communicated to environmental authorities and to farm advisers.

However, the understanding of the need to integrate the goals in order to secure an optimal implementation is weak in other areas of Denmark than the pilot areas. It is expected that when the implementation of the WFD becomes a reality for all farmers in Denmark, there will be a general need for tools such as the ones developed by the project in Denmark as well as in other European areas. Dissemination and communication on how to use the tools will be very relevant from the end of 2009 in Denmark as well as in other EU countries. A possibility would be to form a 'travelling-team' of farm advisors and environmental authorities with experience from the project that can inspire other regions to use the integrated approach at farm level. Specific financial support would, however, be necessary in order to put up such a team.

- **The integrated approach at catchment level.** The environmental authority and the farmers in cooperation create plans where the environmental issues (WFD-goals) and the production goals are combined in order to achieve sustainable use of the catchment. The idea has been communicated to relevant parties in Denmark. It is expected that this will be a central issue in the coming years and the project expects a high level of communication with the regional environmental centres who need ideas on how to reach the environmental goals in the WFD (June to December 2007) at catchment level of. The work of the regional environmental centres will continue after the life of the project and the experience of AGWAPLAN would be important to transfer to the relevant stakeholders. It could be relevant to use the above mentioned travelling team to secure the communication of the concept.

Furthermore, the responsibilities of the environmental authorities in Denmark include regulations of other water quality factors, e.g. pesticides and other chemicals. The reproduction potential and transferability of results and experience also include such areas. This reproduction potential will be dealt with in the after LIFE communication plan.

- **The Data Information System.** At the end of the project a prototype of the DIS will be available. The system will include relevant production and environmental data at farm level and at catchment level. The PC is at the moment working on an 'after LIFE planning' on how to make the system applicable nationwide. The challenge is to convince the top-decision-makers on the advantage of combining production and environmental data in the traditionally production orientated decision support tools. From an economic point of view, it will be costly but an obvious advantage for the individual farmer.
- **The GAP manual,** which today exists on a CD-rom, is well accepted by the pilot farmers, by the environmental authorities, and the farm advisers. The idea of the manual is being

communicated to farm advisors nationwide during the project period. In the after LIFE communication plan it is the idea to integrate the GAP manual into the DIS as an IT-application. This system will be useful to individual Danish farmers and for the planning of which GAPs to use at catchment level when implementing the WFD.

## **8. INTERIM REPORT: PLANNED PROJECT PROGRESS**

### **Task 1.1 Assessment of tolerance limits of N and P contributions from farming in the pilot areas.**

The planned final report on tolerance limits for N and P will be delayed due to delayed publishing of environmental objectives from the EU inter-calibrating groups under article 21 in the WFD. While the environmental objectives are published in the beginning of 2008, maximum loads of nitrogen and phosphorus will be recalculated and adjusted if necessary. The new binding environmental objectives will be disseminated in general as a departmental order, directly to project partners and maybe as articles in local and national media.

### **Task 1.2 Estimations of N and P baselines as well as reduction targets for the pilot areas**

Activities have been completed for this task, and knowledge obtained is being disseminated.

### **Task 1.3 Establishment of a data information system (DIS) combining and developing existing databases and new data on the pilot areas**

The DIS is functioning as a temporary system. In the second part of the project the system will be evaluated and further developed in order to create a prototype which could be adopted in the general agricultural advisory IT system.

A report on the structure and a prototype of the system will be available on 1 July 2008.

### **Task 2.1 Integration of environmental regulation strategy and agricultural advisory for the implementation of GAP**

The Integrated Advisory system has been developed as planned in the project proposal. In the second part of the project the system will continuously be used and in the end of the project period (due 1 October 2008) a final evaluation of the barriers to the system will be presented in a report. At the same time a report on the structure and function of the advisory system for the implementation of GAP will be presented.

### **Task 2.2 Application and development of a decision support tool for GAP**

The GAP manual and the DIS are now working and the tools have been used at the pilot farms. The local experiences of the use of the systems are collected in order to improve the systems and in order to make a prototype of the user –interface of the AGWAPLAN data information system (due 1 October 2008)

### **Task 3.1 Assessment of the effect of implemented GAP on N and P balances in pilot areas**

The work in this task is being initiated at present (starting 1 April 2007). The aim of this task is to assess the effectiveness of using GAPs for the implementation of the WFD. The results in this task will be reached by simulating, estimating, mapping, and screening for N and P losses and crop yield at farm level as well as at catchments level. Due 1 October 2008 a report on the potential effectiveness of using GAP for implementation of WFD will be presented.

### **Task 3.2 Development and implementation of a combined demonstration and monitoring programme for N and P levels in the pilot areas.**

The monitoring programme and the demonstrations programme are continuing in the remaining duration of the project time. Due 1 September 2008, a report evaluating the demonstrating methods will be presented, and so will a report describing the monitoring programme for the pilot catchment areas and guidelines for the development of a monitoring programme for catchment areas in general.

### **Task 4.1 Documentation and dissemination of project results and experiences**

It is expected and planned that the high level of dissemination activities will continue throughout the project period. In 2008 a national workshop will be arranged and later on in 2008 an

international conference will be hold. The final proceedings from the national workshop and the international conference will be finalised on 31 October 2008.

#### Task 4.2 Project Management

Project management will continue throughout the project period in its present set-up.

The municipalities have from January 2007 become part of the reference group and it is expected that they will continue to participate actively in the project.

The third Progress report will be delivered on 31 October 2007 and the forth on 30 April 2008.

The final report including statement of Expenditure was originally planned to be submitted on 1 November 2008 (+ 3 months). However, during the preparation of the contract four additional months were included in the project period as a 'reserve'. The project management expects at this time that there will be a need for these four additional months and thus postponing the date of delivery for the final report to 1 March 2009 (+3 month).

The actual project realisation is shown against the baseline implementation plan in the below Gantt chart.

AGWAPLAN Gantt Chart

Tasks		2005				2006				2007				2008			
				4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
Task 1.1	Baseline			xx	xx	xx	xx	xx	xx								
	Actual			==	==	==	==	--	--				--				
Task 1.2	Baseline			xx	xx	xx											
	Actual			==	==	==	==										
Task 1.3	Baseline			xx	xx	xx							Xx	xx			
	Actual			==	==	==	==					--	--				
Task 2.1	Baseline			xx	xx	xx	xx	xx	xx	xx	xx	xx	Xx	xx	xx	Xx	
	Actual			==	==	==	==	--	--	--	--	--	--	--	--		
Task 2.2	Baseline			xx	xx	xx	xx	xx	xx	xx	xx	xx	Xx	xx	xx	Xx	
	Actual			==	==	==	==	--	--	--	--	--	--	--	--		
Task 3.1	Baseline									xx	xx	xx	Xx	xx	xx	X	
	Actual									--	--	--	--	--	--	-	
Task 3.2	Baseline				x	xx	xx	xx	xx	xx	xx	xx	Xx	xx	xx		
	Actual				-	==	==	--	--	--	--	--	--	--	--		
Task 4.1	Baseline			xx	xx	xx	xx	xx	xx	xx	xx	xx	Xx	xx	xx	Xx	
	Actual			==	==	==	==	--	--	--	--	--	--	--	--	--	
Task 4.2	Baseline			xx	xx	xx	xx	xx	xx	xx	xx	xx	Xx	xx	xx	Xx	
	Actual			==	==	==	==	--	--	--	--	--	--	--	--	--	

xx in Baseline: planned activity

== in Actual: actual activity

-- in Actual: expected activity

## 9. COMMENTS ON FINANCIAL REPORT

The project's expenditures correspond to its activities and there are no major issues at present. The project costs incurred are summarised in the below table.

The reporting period includes 17 months corresponding to 47.2 % of the 'active' 36 months of the total 40 months project duration. The project costs incurred in the same period corresponds to 42.8 % of the total budget indicating a satisfactory balance in expenditures over time.

For the individual cost categories the percentage vary, however all cost categories seems reasonable. The cost categories travel (19.0 %) and consumables (9.3 %) continues to be below average as the majority of the activities with larger budgets still remain to be initiated. For

instance costs for exchange visits including travel and the final international conference will take place in the coming reporting periods.

Outside assistance is relatively high at 59.2 % due to the intensive activities of Task 1.1 in the first part of the project, as the majority of the budget for outside assistance is allocated to this task. The cost category equipment is relatively high (65.5 %), but it seems reasonable since the majority of the costs on this category have been planned to take place in the beginning of the project period.

*Project Costs Incurred:*

	<b>Cost category</b>	<b>Total cost according to the Commission's decision (1)</b>	<b>Costs incurred from the start date to 31.03.2007</b>	<b>%</b>
1.	Personnel	1.424.278	573.650	40,3
2.	Travel	59.875	11.382	19,0
3.	Outside assistance	313.929	185.715	59,2
4.	Durables: total <u>non-depreciated</u> cost	20.607	13.500	65,5
	- <i>Infrastructure sub-tot.</i>	-		
	- <i>Equipment sub-tot.</i>	20.607	13.500	65,5
	- <i>Prototypes sub-tot.</i>	-		
5.	Consumables	29.753	2.756	9,3
6.	Other costs	14.940	10.704	71,6
7.	Overheads	128.670	55.053	42,8
	<b>SUM TOTAL</b>	<b>1.992.052</b>	<b>852.760</b>	42,8

(1) Revised budget as accepted by Commission April 2007

## 10. APPENDICES

