Report of Workshop Drenthe

Zeegse (Drenthe), March 9th 2011

AQUARIUS
Farmers as water managers

European Union
The European Regional Development Fund

The Interreg IVB North Sea Region Programme
Investing in the future by working together for a sustainable and competitive region

provincie Drenthe

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Photos:

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Introduction

Chairman Jaap Jepma welcomes the participants to Zeegse in the province of Drenthe (The Netherlands). He invites us not to hold back because of language problems or due to formalities*: 'it's better to 'make mistakes'*. At the end the challenge is to *'try it at home'*. He asks the participants (Appendix 1) for a show of hands and concludes that approx. 2/3 are working for a governmental organisation/water board; 1/3 is farmer or working for a farmer organisation.

Jaco Bartels, member of the Executive Water Board Hunze en Aa's and farmer in the area, opens the workshop on behalf of the Water Board and Province of Drenthe. He sees the Aquarius project as a perfect opportunity for sharing experience on an international level and gaining subsidies for innovative pilot projects with farmers. He wishes us a pleasant, informal meeting.

After a short introduction of the speakers (see Appendix 2), the workshop starts.

1. Climate Agriculture Project Northern Netherlands

Peter Prins is chairman of the (Dutch) project group Climate & Agriculture and is also Secretary of the Dutch farmer organisation LTO Noord in Groningen. He summarizes the approach and results of this project, initiated four years ago by LTO Noord, Wageningen University and Research Centre and Grontmij (see his presentation in Appendix 3).Central topic is how to adapt to climate change on a farm level. Farmers play a central role in this project. Objectives are to identify bottlenecks and challenges for the sector, draw up adaptation strategies and action plans and work out appliance of risk management towards climate change. A wide range of crops/products have been taken into account, such as potatoes, onions, grass, dairy cows, etc. Farmers are starting to experiment with new, more climate-proof crops (varieties) such as sunflower and grape. Sustainable soil and water management is crucial for improving the circumstances for (new) crops.

Apart from higher temperatures, heat waves form a climate factor with a direct impact (almost 50% crop loss per heat wave). Solutions must be found in wider rows *('will repay themselves'*), trickle irrigation *('equals the costs'*) and different varieties (crop improvements with high costs).
There are also several indirect climate factors, such as the increased chances of pests and diseases.

A general conclusion is that adaptation to climate change is natural for farmers. Awareness is growing, and climate data will play a role when making investments in the near future. Governments should facilitate, more research is needed. Peter ends with a call for programmatic approach, field experiments and exchange of best practices: *farmer organisations can connect!*

Question: Are positive effects of climate change taken into account (for instance CO2)?
Answer: Good question, not studied in depth in this project.

2. WaterSense project

Martha Buitenkamp is project leader of WaterSense, a project on innovation and optimization of water management with farmers that is financed by several governmental organisations and research institutes. Goals are to retain enough and clean water by sustainable water management and sprinkling/ fertilizing techniques on a farm level. The research project is mainly technology based, with about 46 farmers in the northern part of the Netherlands (Drenthe-Groningen) participating for three years.

Two main issues are: application of advanced sensor systems technology and development of an integral Decision Support System (DSS). The DSS system works on a farm level using data from sensors. A model, using soil and weather data, produces information to the individual farmer about the actual and predicted ground water level etc. With this information, advice could be given about good measures for the operation in the specific fields.
The DSS is mainly focussed on water quantity; water quality (nutrients and pesticides) might be an added aspect (with some efforts to be taken). Central question remains: '*will it work for farmers?*' – considering issues as cost-benefit and water management on a farm level.

Dirk Jan Beuling is a potato farmer in the area ('peat colony') and an active participant of the WaterSense project from the beginning. He shares his experiences on this technology and DSS in daily practice. He was one of the first farmers using sensor technology (2-3 sensors) for irrigation (2005). There are pros (higher yield, quality, adaptation) and contras (labour, costs) using irrigation machines. Even the length of his summer holiday depends on the techniques he uses..
He now has a better view of the effects of irrigation on growth. Due to these insights, several measures could be taken: control dams, improvement of the (ground)water situation in the fields. In the near future, other measures, such as optimizing the nutrient management, crop-free zones and water services could be taken into account. Important note with these measures is: *who will pay?*'. And: Will the primary agricultural production and the rest not be endangered?

Question: Do you have problems with legislation by taking these measures?
Answer: In this area there is no shortage of ground water (not an issue for government and no specific permits are needed).

3. Catching the nutrients: the Swedish pilot

John Strand gives a presentation of the wetlands-based pilot in Sweden. The project is an advisory and information project with a focus on nutrients. In the last 150 years the rural parts of southern Sweden have been drained to a situation with deep ditches and less wetlands. Mainly as a result of agriculture, combined with nutrient leaching, the sea, rivers and lakes suffer severe eutrophication. Strategy followed in this project is to take measures on farm level (e.g. when and how to fertilize) combined with measures to deal with the nutrient run-off that still leaves the fields (wetland construction and buffer strips).
So far approx. 7,600 hectares of wetlands have been constructed or re-constructed in southern Sweden since 1995. In these wetlands processes take place which contribute to reducing the level and the effects of nutrients, of which N is the most relevant: *'Wetlands as cleaning systems'*. Main processes to be studied are denitrification, sedimentation and plant uptake of nutrients.

N output can be reduced (around 1.000 kg N/ha/year) on a cost-efficient basis. These measures are relevant for drainage areas from 100 ha with more than 70% ploughed/tilled fields. Relevant instruments for further wetlands construction are free advisory for farmers and subsidies for construction and management.

Henrik Olsson is a Swedish farmer and participant of this project. He is introduced by Arne Joelsson who would like to see a more 'holistic' approach to sustainable water management. In this project 10 representative pilot farms participate (10%). Henrik runs a pig and crop farm (2 crop rotations) surrounded by several water bodies with a specific ecological status. All grain and slurry is recycled on the farm. A wetland is one of the main water sources for the farm. Extra water/ irrigation is needed in June for growing crops. Surplus and leaching of nutrients have been monitored on the pilot farm level, giving insights about which crop rotation is the most sustainable. There are several incentives to tackle the loss of N in particular: reducing the level of leaching up to 30-40% without loss of harvest. Central question is (again)*: 'who is willing to pay the costs?'*. Till now the overall project costs, approx. € 10 mln/ year, are subsidised (50% EU).

Question: How is the cooperation working between farmers-government-researchers?
Answer: These actors are working very well together.

4. The European perspective

Robert Schröder is representing the Dutch National Union of Water Boards and the Union of Drinkwater Companies in 'Brussels'. Central theme in his presentation is the new European Common Agricultural Policy (CAP) and the strategy of the water sector towards the CAP reform.

'The CAP is currently in a crisis of legitimacy': who, what and how much do you pay for farming? Reforming the current CAP (to be ready by the end of 2013) is a big issue for the EU, for agricultural organisations and the water sector. The first pillar deals with direct income support with 'cross compliance'; the second pillar is about programmes on Rural Development (co financing). Since 2008, water management and climate change are key challenges. It's a challenge to attain sufficient water of good quality (N!) and an economically viable agricultural sector. The water sector is working out realistic alternatives as input for the discussion about the new CAP. Principle subjects as food production, water quality and water quantity must be taken into account and the water and agricultural sector must work together to face regional differences.

The new strategy is making a distinction between general direct income and extra direct income for farmers executing measurements above the legal requirements (both pillar 1). As extra income, measures that generally fit in the agricultural enterprise (such as the use of technology) could be considered as a top-up of income while taking these measures. In this way farming-related water goals could be achieved by farmers in a rather direct way. Pillar 2 (rural development programmes) is more complex. For this pillar regional and national programmes with co-financing could be taken into account (mainly public goods), with regional plans as a base.
There are still a lot of questions to be answered. Therefore a legislative process (2011-2013) will take place with the cooperation of governments, NGOs and farmers.

Question: What about 'the polluter pays' and legal requirements?
Answer: A quite difficult aspect to be faced while implementing the pillars. Are there alternatives?

5. Forum discussion

With the title 'Vision on future sustainable water management in farming' a forum discusses several statements made by the audience. Forum members are: Peter Prins (Dutch farmers organisation LTO), Robert Schröder (Union of Dutch Water Boards), Alex Datema (Dutch farmer and member of Water Board), Jürgen Grocholl (Landes Wirtschafskammer Niedersachsen) and Erik Jorgensen (Farmers organisation Denmark). Chairman Jaap Jepma leads them through the discussion. This report is limited to the main statements and remarks per subject.

<u>Can farmers take active measures to anticipate on periods of droughts?</u>
All members say yes. The level of knowledge and ability to adapt by farmers is present. Water Boards could be more flexible and give more incentives to farmers (*'but you can't please every individual farmer'*).

<u>Organisations should not focus on general agricultural politics but on the regional scale</u>
Not everyone agrees to this statement. It depends on the role the organisation can and should play and how to cooperate. Especially the role of the (mainly regional) agricultural organisations, consultants and Water Boards should be taken into account - 'advisor' or 'mediator' (sometimes free but usually paid). It's important to make bridges and to speak each other's language while focussing on cooperation and not only on agricultural issues.

Does the EU have enough power to enforce the Water Framework Directive?
Different opinions (yes/no) on this statement. Robert Schröder says that success depends highly on the ability and willingness of the individual farmers. The regional agricultural organisations have faith in the sector, stating that it depends mainly on the practical possibilities, flexibility and cooperation when working out the framework on farm level.

Is legislation necessary or not?
Participants agree that a bottom line in legislation with clear EU goals is needed. Important aspects to be looked at are the public acceptance of the (mainly) ecological driven goals (will they pay?) and finding flexible solutions.

What kind of measures can farmers take?
'No regret' measures that farmers can easily take are, for instance, improving the soil, creating wetlands and irrigation.

What can we say about the effects of climate change?
In general there is still a lot of uncertainty about this subject, especially when talking about nutrients and ecological effects. It's a bit early to make hard statements on this subject. Support from the EU in the coming years is still needed when looking for answers. Authorities will also take into account the position of the EU globally, food production in crisis and discussions about effects. Robert Schröder states that the regions should send clear messages when addressing the EU (*'What do we need?'*).

Are there more specific questions/subjects to address to EU?
EU should support techniques and methods. Also continued support for the exchange of practices in the different countries (as in Aquarius).
The EU should not work out the goals in too much detail; flexibility and finding solutions with farmers is needed.
Robert Schröder, supported by Alex Datema, repeats his statement that he would like to focus on pillar 1 (see previous).
In 2013 EU financing and programmes should be clear, also regarding water measures executed by farmers (which is a relatively new approach). This means that preparation of regional programmes should anticipate on the future approach before 2013. Some aspects are important, such as plain objectives, clear water-related measures and enough means for cooperation and active sharing of practical experiences.

6. Excursion

In the afternoon, a bus brings us to several pilot projects of the Water Board Hunze & Aa's and the Province of Drenthe in the area. Explanations are given by Rinke van Veen (Province of Drenthe), Emiel Galetzka, Uko Vegter and Jan den Besten (Water Board Hunze & Aa's). The bus goes through an old agriculture landscape in the catchment area of the 'Drentsche Aa', where the area is currently being transformed into a more natural water conservation area.

Then we visit the River Hunze where several measures have been taken to improve the water quality, mainly in order to reduce the influx of nutrients into the Lake 'Zuidlaardermeer' and to restore the old river branches. The first steps in reducing nutrients are taken by closing/improving wastewater treatment plants. There are some mixed experiences with buffer strip management (5 metres wide here). These measures serve several goals. Reducing the nutrients in surface water is not the easiest target and there has been no significant improvement of the water quality so far. In the future a more integral approach (also with regard for farmland birds) will be worked out.

Near the village of Spijkerboor a restoration of the Hunze-valley area has been underway since 2003 (including restoration of old meanders and creating a water inundation area for extreme rainfall). It was assumed that these measures would also contribute to a reduction of N and P in the river and lake. But, it's been concluded that the flooded area did not function as a sink for nutrients but as a source of nutrients. Due to long periods of inundation, P has been 'washed away' to the river and lake. Important new measures include top soil removal and removal of biomass.

In the project area 'Tusschenwater' (500 ha) the land use is begin transformed from agriculture to a drinking water reservoir, nature and surface water catchment area. Improving the water quality of the Zuidlaardermeer is again one of the goals.

At the Zuidlaardermeer we talk briefly about the 'end of pipe' measures in the lake itself. Experiments with reduction of 'white fish' have been worked out to reduce periods of troubled water with algae. Conclusion is that a combination of source and end of pipe measures is necessary to reduce the (blue) algae situation in the lake. In addition, more natural banks and a more natural water regime will be carried out in the near future.

Attachment 1 Participants of Workshop

Zeegse, March 9th 2011

Irene Asta Wiborg (DK)
Jorgen Bidstrup (DK)
Leif Raun (DK)
Erik Jørgensen (DK)
Flemming Gertz (DK)
Troels Praest Andersen (DK)
Hans Roust Thysen (DK)
Kirsten Broch (DK)
Jürgen Grocholl (DL)
John Strand (SE)
Gert Erlandsson (SE)
Arne Joelsson (SE)
Henrik Olsson (SE)
Torsten Kindt (SE)
Anna Hansson (SE)
Angela Riedel (DE)
Egil Holmsen (NO)
Peder Ulrum (NO)
Keith Matthews (UK)
Kirsty Blackstock (UK)
Jan den Besten (NL)
Marco Arts (NL)
Alex Datema (NL)
Robert Schröder (NL)
Geertje Enting (NL)
Albert Siebring (NL)
Janjo de Haan (NL)
Dirk Jan Beuling (NL)
Peter Prins (NL)
Henk van Norel (NL)
Bram Kuiper (NL)
Jacob Bartels (NL)
Jan den Besten (NL)
Harrie de Lang (NL)
Jaap Jepma (NL)
Miriam Klazenga (NL)
Erik Jolink (NL)
Daniël Edzes (NL)
Helen Hangelbroek (NL)
Karin Tromp (NL)
Miriam Klazenga (NL)
Rinke van Veen (NL)
Ben van Os (NL)
Deirdre Buist (NL)
Tineke Smegen (NL)
Roelie van Guldener (NL)
Carin Patty (NL)
Martha Buitenkamp (NL)
Arnout Venekamp (NL)
Charles Hussels (NL)
Rienk Schaafsma (NL) facilitator

Attachment 2 Programme March 9th

Aquarius Transnational Seminar

09.00 – 09.30	**Registration and coffee**
09.30	Introduction to seminar programme Chairman - Jaap Jepma
09.35 – 09.45	Welcome by Executive Water Board Hunze en Aa's
09.45 – 10.10	*Climate change and farming: Vision on the future from a North Sea Region and a regional perspective*
10.10 – 10.35	*WaterSense: Innovation and optimatization water management for farmers* - - Martha Buitenkamp

10.35 – 10.50 *Water sensors in the daily practice at the farm*
- Dirk Jan Beuling, Farmer

10.50 – 11.15 *Catching the nutrients: the Aquarius Swedish Pilot*
- John Strand, Sweden

11.15 – 11.30 *Experience of farming in the Swedish Pilot*
- Henrik Olsson Sweden, Farmer

10.35 – 10.50 *Water sensors in the daily practice at the farm*
- Dirk Jan Beuling, Farmer

10.50 – 11.15 *Catching the nutrients: the Aquarius Swedish Pilot*
- John Strand, Sweden

11.15 – 11.30 *Experience of farming in the Swedish Pilot*
- Henrik Olsson Sweden, Farmer

11.30 – 11.50 Coffee break

11.50 – 12.30 *Vision on future sustainable water management in farming*
- Robert Schröder, National Union of Water Boards

12.30 – 14.00 Lunch

14.00 – 15.00 *The future of sustainable water management in farming*
Forum discussion with experts and audience
Forum leader: Jaap Jepma

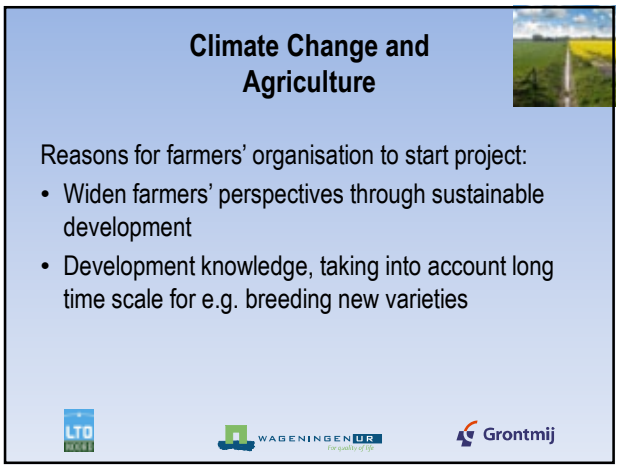
- Peter Prins, LTO Dutch Agricultural Organization
- Robert Schröder, National Union of Water Boards
- Alex Datema, Farmers-Nature and member of Water Board Noorderzijlvest
- Jürgen Grocholl, Landes Wirtschaftskammer Niedersachsen
- Erik Jørgensen, Farmers organization Denmark

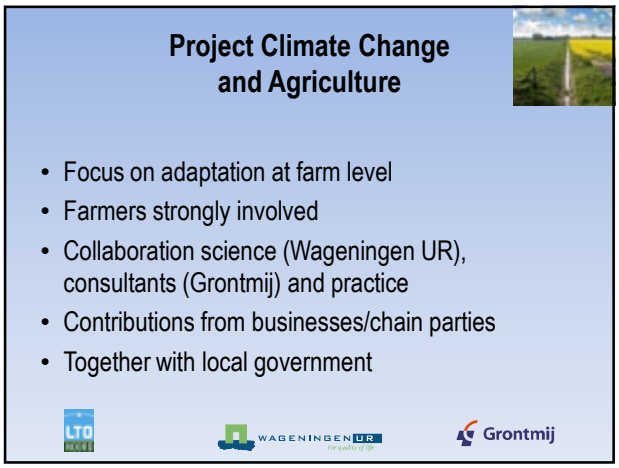
15.00 – 15.15 Coffee break

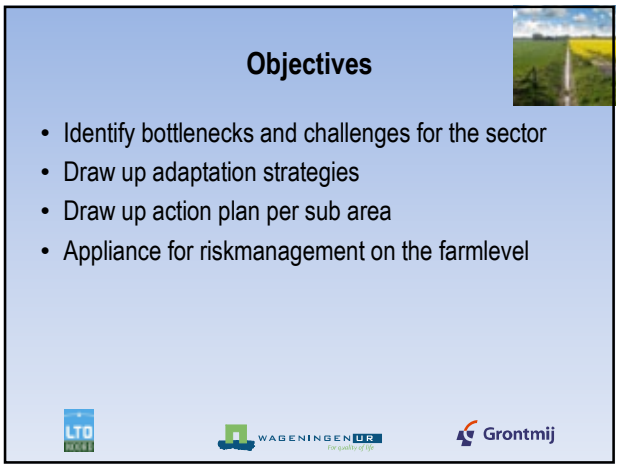
15.15 – 18.00 Bus leaves for excursion:
Improving water quality: different methods and approaches in the river Hunze / lake Zuidlaardermeer system

Attachment 3 Presentations March 9th

Peter Prins







Climate Change and Agriculture

Climate facts, starting points

- Higher temperatures (summer and winter)
- Long periods of drought
- Heavy precipitation

Accept uncertainties

Method

- Selection existing and new crops
- At which moments vulnerable to weather extremes?
- Changing frequency weather extremes?
- Consequences for crops
- Possible adaptation measures

Crop / product selection

Traditional:

1. Seed potatoes
2. Grass
3. Winter wheat
4. Starch potato
5. Onion
6. Winter carrot
7. Sugar beet
8. Lily

Energy:

9. Willow
10. Oilseed rape

New crops:

11. Sunflower
12. Artichoke
13. Grape
14. Fruit tree (stone fruit)

Glasshouse horticulture:

I. Tomato / cucumber

Products:

A. Dairy cows
B. Free-range chicken/pork

Seed potatoes

Area in 2008

Northern Netherlands:	**23 600 ha**
Groningen:	8 200 ha
Friesland:	6 500 ha
Drenthe:	1000 ha
Flevoland:	8 000 ha

Characteristics of cultivation

Planting:	March-April
Harvest:	July - Sept
Yield:	33 000 kg/ha

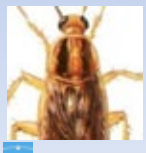
Rows at 75 cm.

Climate events with direct impact on crops

Climate factor	Period	Impact on crop	Damage %	Indicated damage €
Heavy precipitation	May - Sept.	Tuber rot	25 - 75%	- € 5 000 per ha
Heat wave	July - Sept.	Secundary tuber growth	25 - 75%	- € 5 000 per ha
High day temperature (3 weeks) and high precipitation	July - Sept.	Erwinia	10 - 50%	- € 3 000 per ha
High temperature (> 40 C, 2 days)	June - Aug	Leaf death	100%	- € 7 000 per ha
Wet period (> 4 weeks, every day rain)	May - Aug	Plant protection is impossible	50 - 100%	- € 7 000 per ha
Frost (-2 C), 2 days	May - July	Tuber freezing	25 - 75%	- € 5 000 per ha
Warm winter (>10 C)	Dec - March	Storage	25 - 75%	- € 5 000 per ha

Climate factors with indirect impact

- High temperature and high humidity wil cause new pests and diseases
- Higher sea level will increase salination
- Flooding

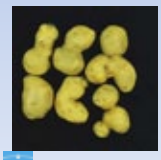


W + Changing climate events (2026 - 2055)
indicated damage (= maximum costs measures)

	Month												Management costs (k€/ha)	Investment (1000€/ha)
Climate factor	J	F	M	A	M	J	J	A	S	O	N	D		
Heavy precipitation					0	0	0	-1	+1				0,5 – 0,7	10 - 15
Heat wave							+12	+12	+3				3 - 5	60 - 100
High temp and rain							+6	+6	+2				1 - 2	20 - 35
Very high temp (>40 C)						0	0	0					-	-
Wet period (> 4 weeks, every day rain)					-2	-4	-5	-3					-	-
Frost (-2 C), 2 days				0	0	0							-	-
Warm winter	+2	+3	+8									+1	1 - 3	20 - 60

Potential damage due to increase in heat waves

- Extra heat waves until 2040 : 1 / YEAR
- Damage per heat wave 50% crop loss
- Yield per ha approx. € 8.000,=




Heat wave measures

Measures are aimed at:

- Reduction of heat penetration (shade netting)
- Cooling of crops (misting)
- Cooling of rows (trickle irrigation)
- Insulation of potatoes (wider rows)
- Reducing heat sensitivity of the potato (crop improvement)

Heat wave measures

- Trickle irrigation

» Costs € 800 – € 1000 per ha/year

Heat wave measures

- Wide rows

» Costs € 0.- per ha/year


Heat wave measures

- Crop improvement

» Cost several million Euros
» For approx. 26.000 ha seed potatoes per year in hotspot


Conclusions heat wave measures

- Wide rows and crop improvement will definitely repay themselves
- Trickle irrigation roughly equals the cost
- Farmers choice: “first try a different variety”

Pests and diseasess

- Damage hard to calculate
- Crop improvement generally considered as most appropriate measure
- Knowledge gap (e.g. aphids)


Other crops

- Sustainable soil management (structure, organic matter) important
- Green manure crops are binding extra CO2
- Water management crucial
- Stimulation innovation economical water use and local water storage
- Crop improvement required (less water sensitive, salt tolerance)

Conclusions (1)

- Awareness among farmers and agricultural advisors is growing
- CC Information will be playing a role in investment decisions
- Farmers have a natural adaptation ability

Conclusions (2)

- Governments can facilitate adaptations (e.g. water management)
- Climate resilient food production demands adequate scientific research
- Strong cooperation between practice and science ensures knowledge transfer and attainable solutions

Follow up

- Programmatic approach required for coherence (adaptation and mitigation)
- Adaptation measures: field experiments
- Int. Farmers’ networks: exchange of best practices
- Farmers’ Organisations can connect!

provinsje fryslân
provincie fryslân
provincie groningen
provincie Drenthe
Reest en Wieden
Velt en Vecht
Hunze en Aa's
Zuiderzeeland
Waterschap Noorderzijlvest
Wetterskip Fryslân
landbouw, natuur en voedselkwaliteit
Wageningen UR
LTO Noord
Grontmij

Martha Buitenkamp

watersense

Why WaterSense

- Sustainable watermanagement: How to keep enough and clean water?
- Farmers: sprinkling, fertilizing
  - Drinking water supply: clean source
  - Waterboard: compliance European Waterdirective , watermamagement

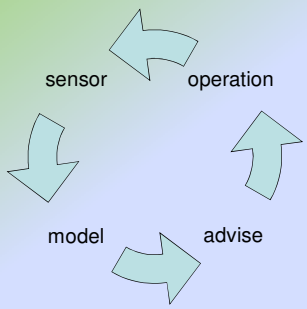
watersense

Project WaterSense

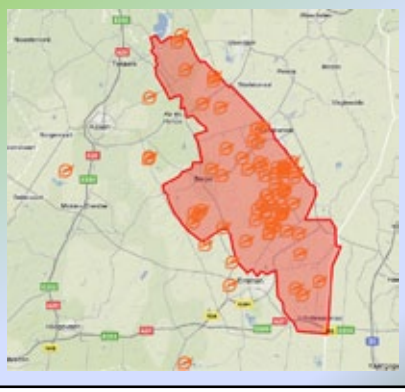
- Application of advanced sensor systems technology to the agricultural and water sectors
- Development of an integral Decision Support System (DSS)
- Research project 3 years

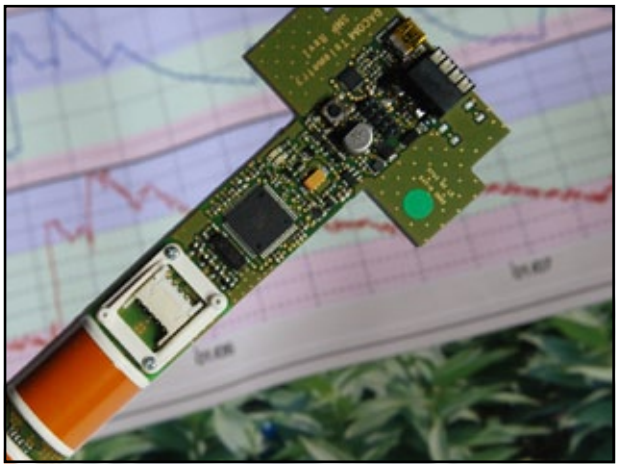
watersense

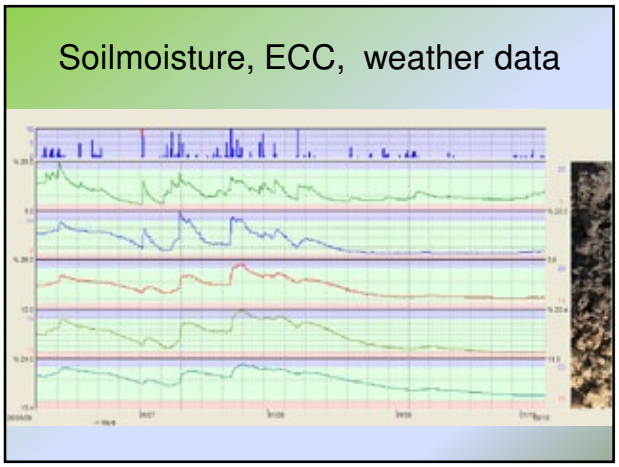
DSS

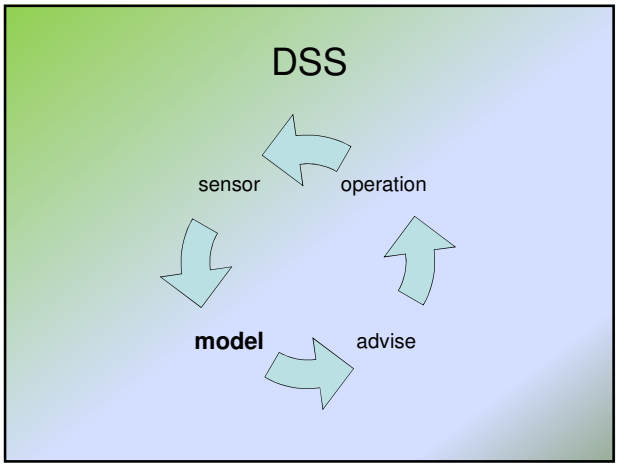


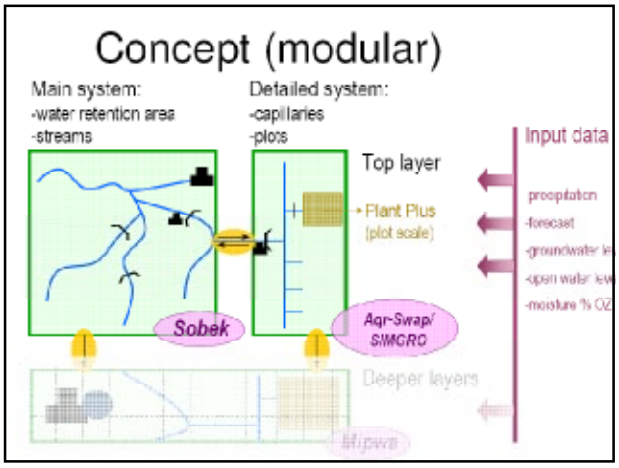
100 sensors in 20.000 ha

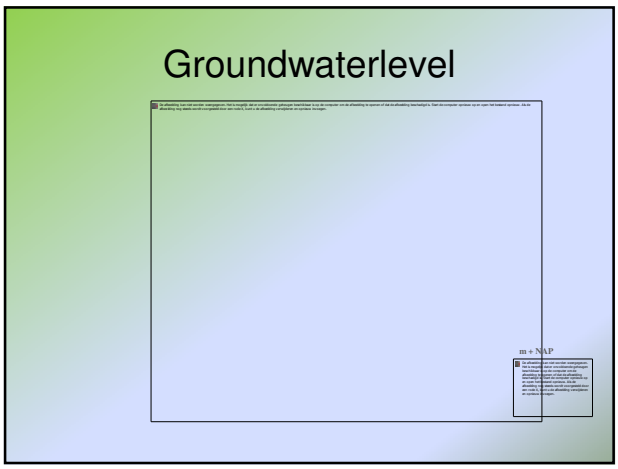


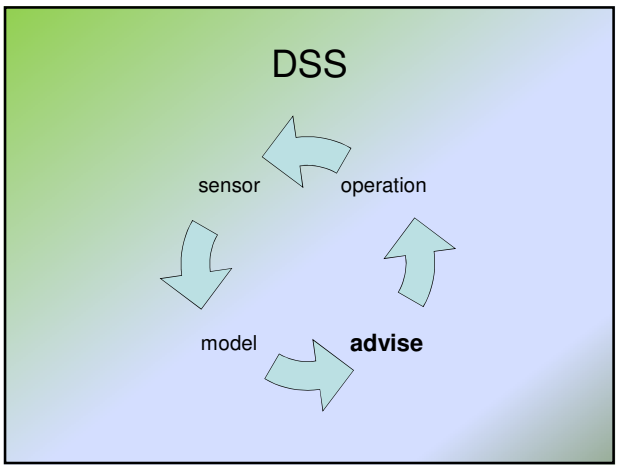



Soilmoisture, ECC, weather data


DSS
sensor
operation
model
advise

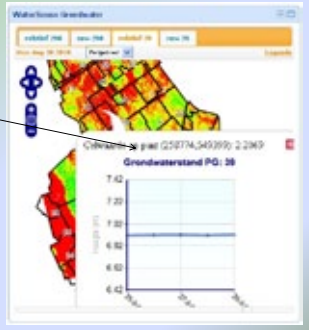

Concept (modular)
Main system:
-water retention area
-streams
Detailed system:
-capillaries
-plots
Top layer
Plant Plus
(plot scale)
Sobek
Aqr-Swap/
SIMGRO
Deeper layers
Input data
precipitation
-forecast
-groundwater le
-open water lev
-moisture % O2


Groundwaterlevel
m + NAP


DSS
sensor
operation
model
advise

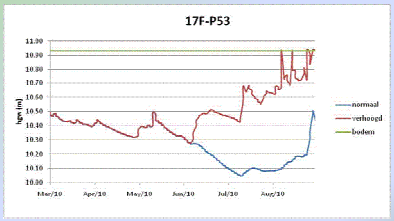
DSS

Diagram shows groundwater level at point 39

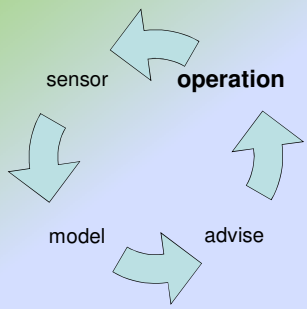


Prediction results model

- Groundwaterlevel changes different measurements



DSS



Issues

- DSS developed for waterquantity issues
- Next: waterquality nutrients and pesticides
- Local information for local operations: Cost-benefit for farmer and waterboard?
- Strategic water management issues easier to tackle

watersense

Projectpartners

THE NORTHERN NETHERLANDS PROVINCIES (SNN)

THIS PROJECT IS CO-FINANCED BY THE EUROPEAN UNION, EUROPEAN FUND FOR REGIONAL DEVELOPMENT AND THE MINISTRY OF ECONOMIC AFFAIRS.

Water Sence - Daily Practice

Dirk Jan Beuling
Farmer

Introduction

- Dirk Jan Beuling (1964), married, 2 kids
- Study High Agriculture School (1987)
- Work as potatoplantbreeder assistant (AVEBE)
- Farm with parents (1992)
- Owner farm (1998)

Peatcolony

Farm

Development:
- 80 ha 1991
- 120 ha 1998

Present:
- 150 ha owner
- 40 ha hire

Labour: 2 persons ,wife working at

Soil type

- Digged peat land
- Sandy dry soil (5-10% organic)

Crops

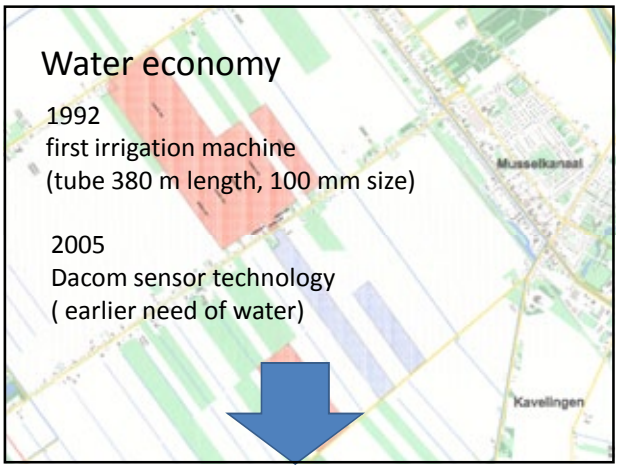
- Starch potato 102 ha
- Sugar beats 34 ha
- Winter wheat 23 ha
- Summer wheat 15 ha
- Teff 4 ha
- Onions 6 ha
- Carrots 6 ha

Storage 2500 ton

Water economy

1992
first irrigation machine
(tube 380 m length, 100 mm size)

2005
Dacom sensor technology
(earlier need of water)



Irrigation machine

With:
- More work
- More costs
- Higher yield
- Better Quality
- Climate change

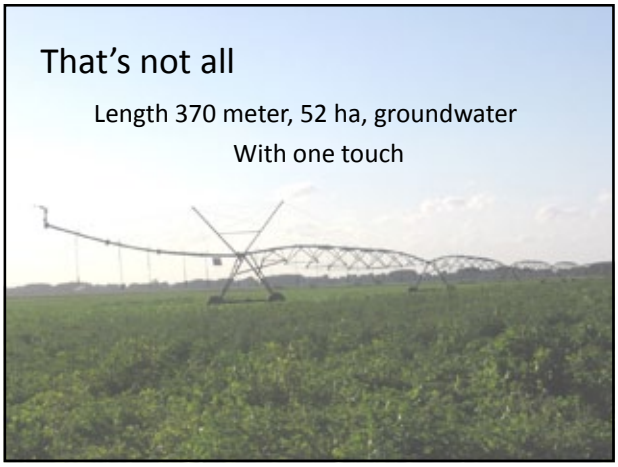
Without:
- Less work
- Lower costs
- Lower yield
- More time for summer holiday

Conclusion

- Tube length 750 m , size 125 mm
- Capacity 6,5 ha/day, 25 mm

That's not all

Length 370 meter, 52 ha, groundwater
With one touch



Project

- Sensors in the field
- Better view on what irrigation does for the growth
- Irrigation time (yield quality)
- Advice system
- 3 flood control dams

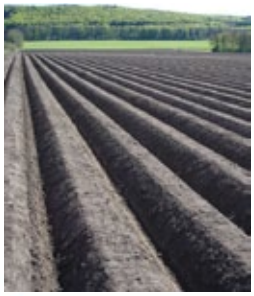
Advice system

Future

- Nutrient management
- Crop free zones
- Water services by farmers

John Strand

Catching the nutrients: the Swedish pilot
(wetlands and other environmental tools)




The problem: eutrophication of sea, rivers and lakes



Våtmarker
för havets skull

The cause: the agriculture (not only, but to a large extent)

...in combination with:




> 100 years of draining the landscape

Wetlands are the kidneys of the landscape


Southern Sweden 150 years ago


Southern Sweden today

The solution: decrease leaching and increase landscape retention

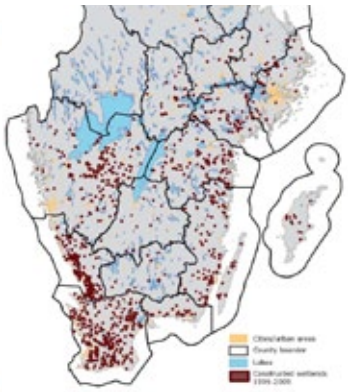
"*Focus on Nutrients*" (advisory/information project)

Measures on the farms to decrease nutrient leaching

Manure handling
Timing of ploughing/tilling
Fertilisation plans
Catch crops
Etc, etc

Measures to handle the nutrients that still leave the fields

Wetland construction on arable land
Buffer strips

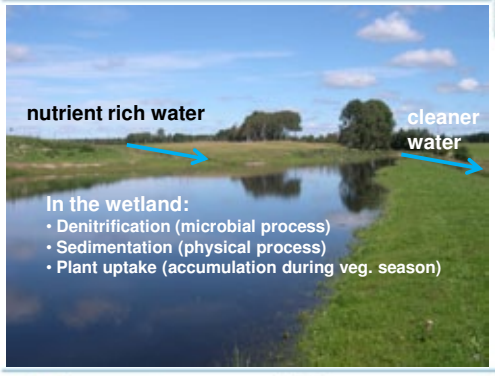


Environmental goal

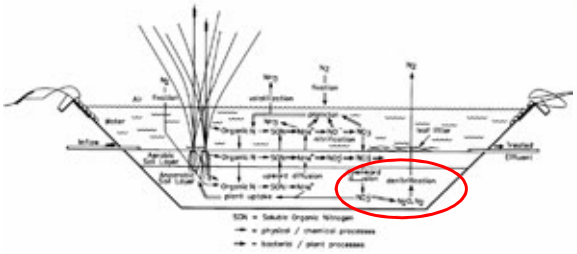
12 000 ha constructed wetlands in the agricultural landscape 2000-2010

The result : ca 7 600 ha

How do wetlands work?



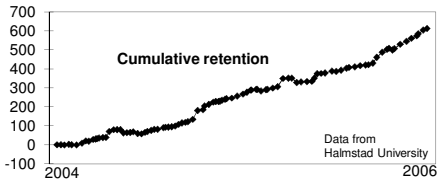
How wetlands work presented in a more complicated way...



Anaerobic microbial conversion of water soluble nitrate to nitrogen gas

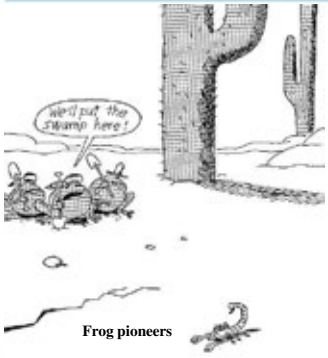
How efficient are wetlands?

Nitrogen retention measured with continuous flow proportional sampling for 2 years in a constructed wetland. Wetland area = 0.28 ha.



Yearly retention
Y1=910 kg N/ha
Y2=1136 kg N/ha

Cost efficiency
2-3 €/Kg N
catch crops and spring tilling = 13 €/Kg N



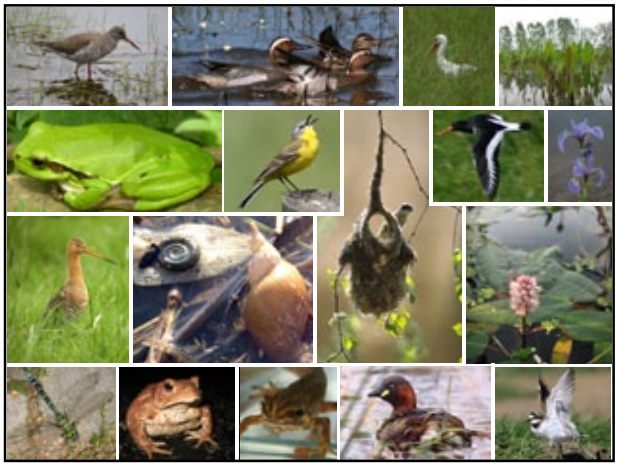
Important aspects:

Location, location, location!
>100 ha drainage area
>70 % ploughed/tilled fields
Close to the recipient

Management
Yearly water level changes
Vegetation removal (cutting/mowing)

Instruments for wetland construction

Information and free advisory services to farmers ("Focus on nutrients")
Subsidies for wetland construction (10 000 – 30 000 €/hectare)
Subsidies for yearly management for 20 years (400 – 800 €/hectare*year)



Water management plan at farm level

Develop a farm scale water management plan for 10 pilot farms based on the current production and predicted climatic conditions

Aim: Good ecological status in the affected water bodies
A cooperation body for abstraction of irrigation water
Prevention of flooding of arable land

2011-02-22 1

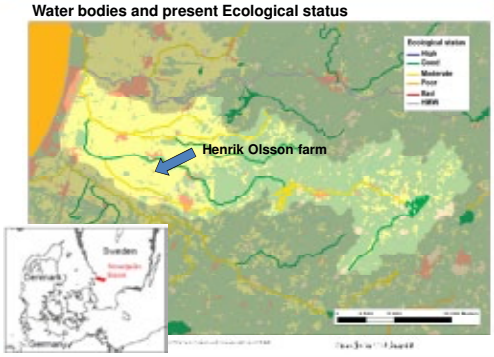
10 representative full time pilot farms

- Dairy production, ley and grain, mainly for own fodder
- Pig production, grain mainly for own fodder
- Crop production (no animals), wheat, malt barley, fodder barley, sugar beets
- Specialized potatoes and vegetables, with irrigation

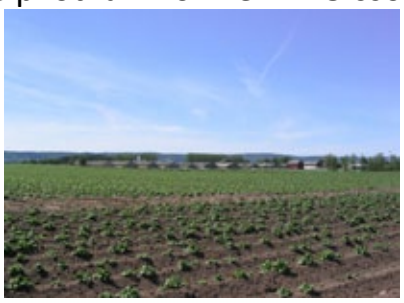
2011-02-22 2

River Smedjeån catchment

Water bodies and present Ecological status



The pilot farm of Henrik Olsson



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Henrik Olsson – farm production

- 110 mother sows in production
- 550 places for fattening pigs

- Required acreage for manure spreading; 110 ha
- P_{AL}- class V (high), K_{AL}-class III (normal)

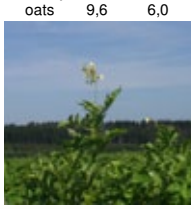
- Slurry storage capacity 1920 m3 ⇨ > 10 monhts
- Deep litter storage capacity 200 m2 ⇨ > 10 monhts

2011-02-22 5

Henrik Olsson – 104,5 ha arable land

Crop rotation 1

	ha	t/ha
triticale	9,6	9,0
s beets	9,6	65
barley	19,2	6,5
oats	9,6	6,0



Crop rotation 2

	ha	t/ha
potatoes	10,8	50
barley	21,6	6,5
parsnips	5,4	33
carrots	5,4	70
triticale	5,4	9,0
sugar beets	5,4	65

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Henrik Olsson – crops

- All grain is used as fodder
- Buy 100 ton barley/year
- All slurry is used on the farm
- Sell 40 t deep litter per year

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Henrik Olsson – farm- Irrigation

	Area ha	No times	mm	m3 tot./yr	Period
Potatoes	9,6	2	20	3834	Beg June
Barley	39,4	1	20	7881	Medio May
Triticale	16,0	1	20	3195	Medio May
Carrots	5,3	2	20	2130	
Ley	5,3	0	---	0	---
Sugar beets	16,0	2	20	6390	
Parsnips	6,4	1	20	1278	
Oats	7,5	0	---	0	---
Totally	105,4			24708	

2011-02-22 8

Irrigation conditions

- Water source: wetland/pond, 10 000 m3
- Connected to artificial pond: 2000 m3
- The water is not enough, lasts throughout June
- Need to start irrigation early in the season
- Lack of water limits the production of potatoes and vegetables

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Henrik Olsson farm

Current and adapted practices (fertilization, catch crops, spring tillage etc.):
• According to the recommendations of the Swedish Board o Agriculture
•Manure/slurry up to the recommendation, add min-N and min-K

	Surplus			Leaching	P use	Manure	
	N kg/ha	P kg/ha	K kg/ha	Leaching kg N/ha	Kg/ha	Tonnes DM/ha	Tonnes
Current practices						1,6	1891
Crop rot 1	-7	10	3	32	24		
Crop rot 2	3	17	-2	39	36		
Adapted practices						0,8	1048
Crop rot 1	0	0	7	29	14		
Crop rot 2	2	-1	-4	32	18		

2011-02-22 11

All pilot farms

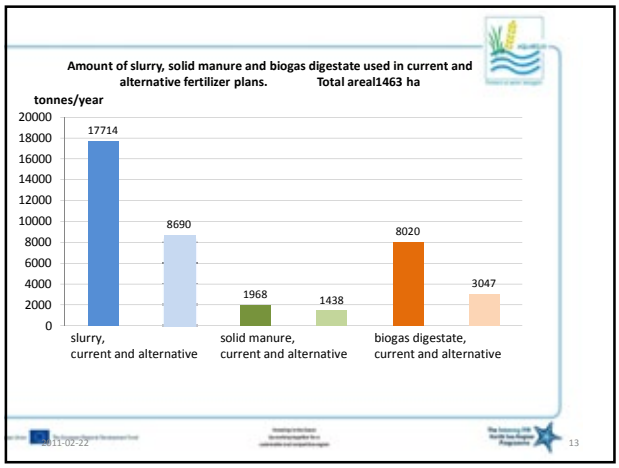
Adapted practices:
• According to the recommendations of the Swedish Board of Agriculture

• Manure/slurry up to the recommendation, add min-N and min-K

• Catch crops, spring tillage etc

	Surplus N	P	K	Leaching	P -use	Manure + biogas digestate	
	kg/ha	kg/ha	kg/ha	kg N/ha	kg/ha	T DM/ha	
Current	10	8	11	41	20	1,5	
Adapted	1	0,4	2	32	13	1,0	

2011-02-22 12


Amount of slurry, solid manure and biogas digestate used in current and alternative fertilizer plans. Total areal1463 ha
tonnes/year
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
17714
8690
1968
1438
8020
3047
slurry, current and alternative
solid manure, current and alternative
biogas digestate, current and alternative
2011-02-22
13

Robert Schröder

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Agriculture and sustainable water management
the European perspective

Robert Schröder
Aquarius - 9 March '11

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Development of the European Common Agricultural Policy

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Current situation CAP

- 1st pillar: direct income support with cross compliance – European disparity
- 2nd pillar: Rural development programmes, co-financing
- Health Check CAP 2008: Water management and climate change as key challenges

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CAP reform

CAP 2013

"The CAP currently is in a crisis of legitimacy" – Commissioner Ciolos

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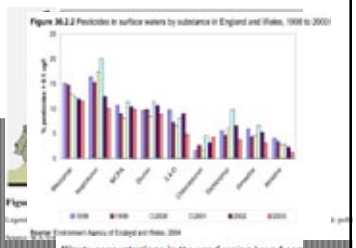
Challenges



Nitrate concentrations in the sand region have been corrected for confounding factors.

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Position

Sufficient water of good quality

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Principles:


Food production


Water quality


Water quantity

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Cooperation with agricultural sector

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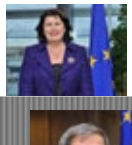
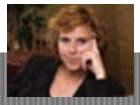
Integration





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Proposed model

1st pillar – direct income support

Directe income support

Application of cross compliance

Current situation

Top-up direct income support

Based on above-legal requirements

Directe income support

Application of cross compliance

Proposed model 2013

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Proposed model (2)

2nd pillar – Rural development

- Public goods

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Proces

- Legislative process 2011 – 2013
- National cooperation (Farmers, Ministries, NGO's)
- European cooperation (European associations)
- Lobby

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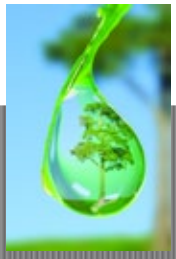
Thank you for your attention



Questions?