



Using Integrated Advising in practice to reduce the nitrogen load of Norsminde Fjord at farm level

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Agwaplan konference in Herning, 14.-15. January 2009



A challenge to environmental authorities and agriculture.

- Need for further action in DK in order to meet the requirements in the WFD
- Different perspective and focus
 - Environmental protection
versus
 - Production and economy
- Need for control of nutrient loss from agriculture on catchment scale
- How do the state, municipalities and agriculture cooperate?

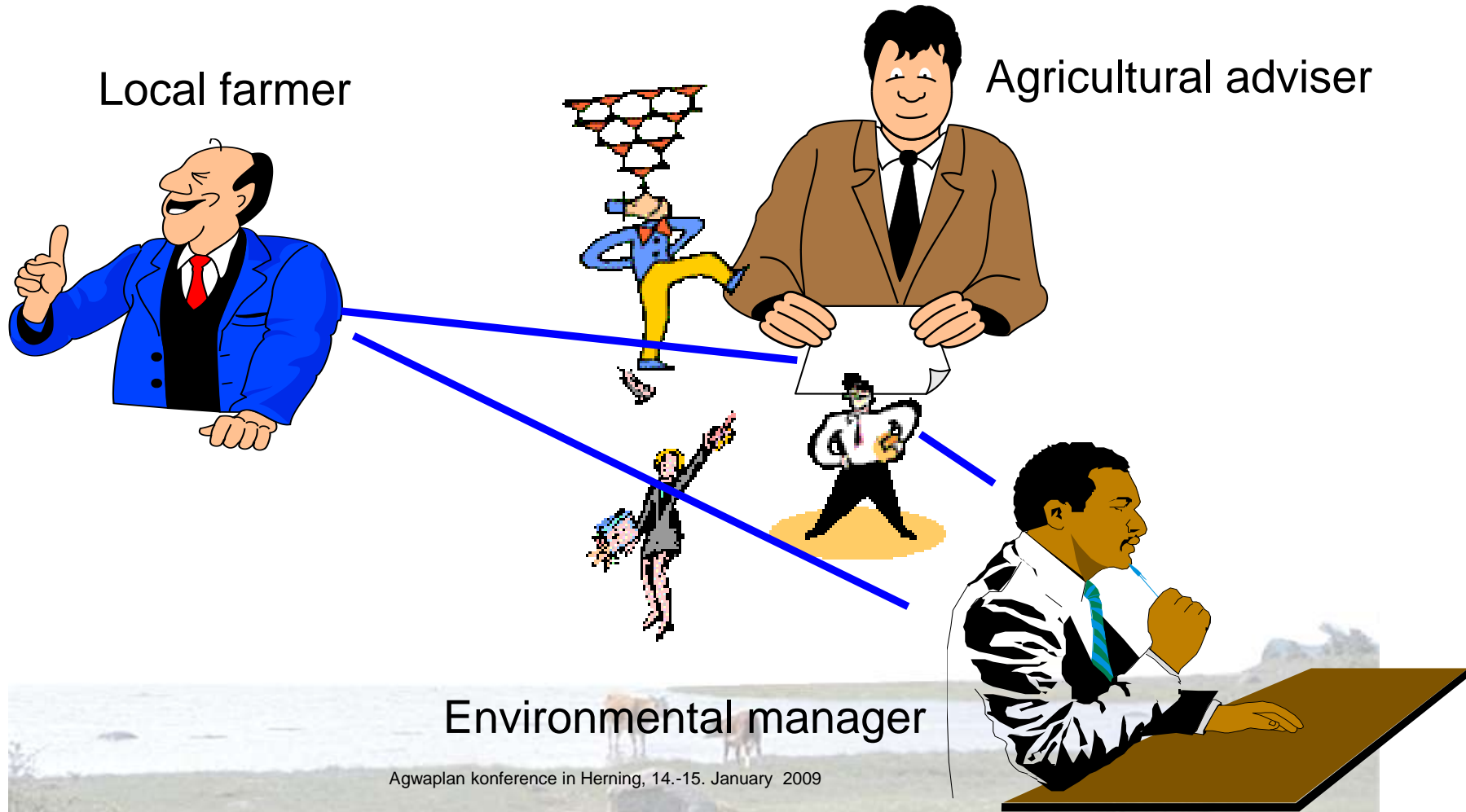
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Integrated advising

Local farmer

Agricultural adviser



Environmental manager

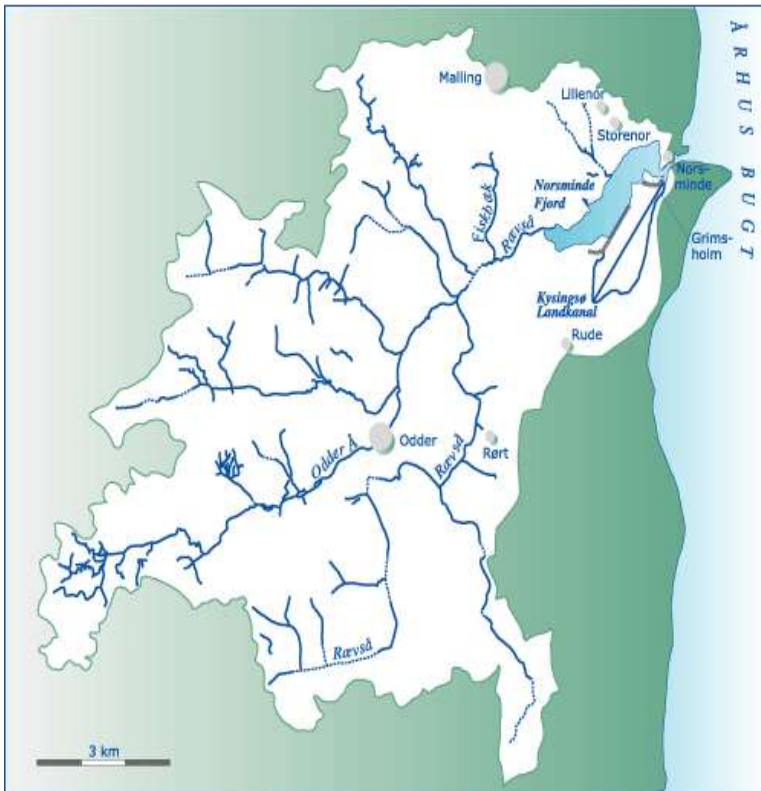
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Pilot area Norsminde Fjord

Area: 1,90 km²

Catchment area: 101 km²

Land use: 80% agriculture





Meetings with farmers: Role of the environmental authorities.

- The Water Frame Directive and environmental status
- Address the environmental challenges
- Get an impression of the farmer and his reality and future plans
- Discussions on demonstration projects and focused monitoring
- Meetings on catchment scale with farmers, NGO's and politicians



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The Process

■ 8 farmers

Data needed at farm scale

- EM38
- Soil mapping at field scale using EM38
- Detailed advice concerning data for Daisy
- "Green Account" for each farm
- Different model-setup for farm scale, river basin scale and for the "fjord"
- Good Agricultural Practices (GAP)
- Data-Information-System (DIS)

■ Integrated advising

- Preparing data for the farm
- Advising on the farm conducted by authority and adviser
- Result



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Environmental SWOT

Internal Strengths on the farm

- Very good soil
- Drain water already passing through a wetland
- The farm has many nature elements

Internal Weaknesses on the farm

- One part of the farm is situated in a village
- Streams on the farm go directly to Norsminde Fjord

External Opportunities on the farm

- Well-situated. Neighbours and the village are a good distance away
- It is easy to take advantage of nature in the area
- Its possible to buy more farmland

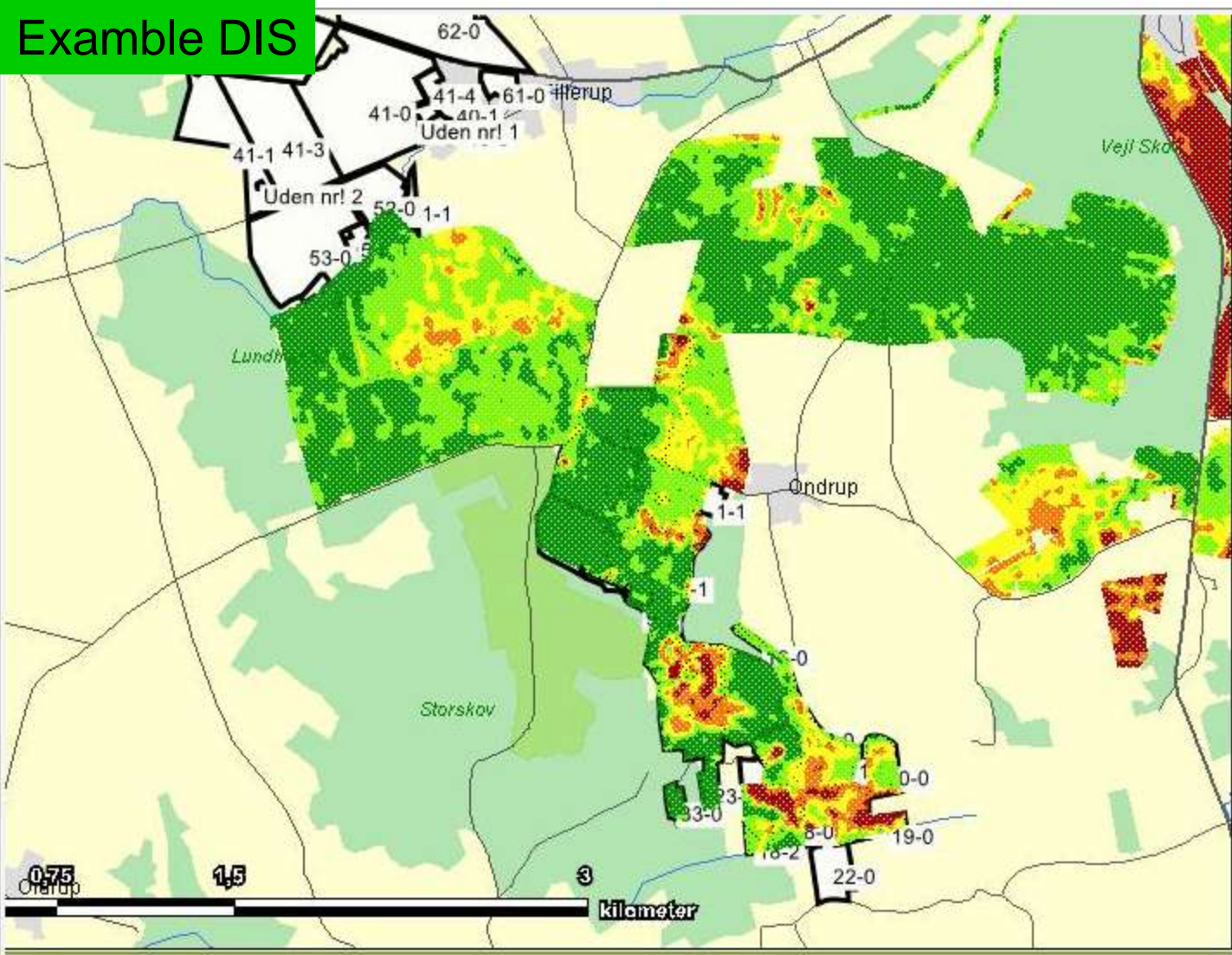
External threats on the farm

- A sensitive wetland close to the farm
- River basin to Norsminde Fjord
- Area for drinking water
- WFD – we don't know the consequences yet?



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Kort og data



Examble DIS

Data

AGWA-Plan

d

- Ny teksturklassificering A horisont ?
- Ny teksturklassificering B horisont ?
- Ny teksturklassificering C horisont ?
- Rodzonekort A-horisont ?
- Rodzonekort B-horisont ?
- Rodzonekort C-horisont ?
- Jordtypekort (EM38) ?
- Forbedret jordartskort - overjord ?
- Forbedret jordartskort - underjord ?
- Lavbundsjarde ?

ø- og reduktionsmål

- Miljø- og reduktionsmål N ?
- Miljø- og reduktionsmål P ?
- Kildeopsplitning ?

ogørelser

- SkepDaisy 2003 ?
- CTTtools 2003 ?
- CTTtools 2004 ?
- Daisy 2005 - Udvalskning N/ha ?

Arealanvendelse

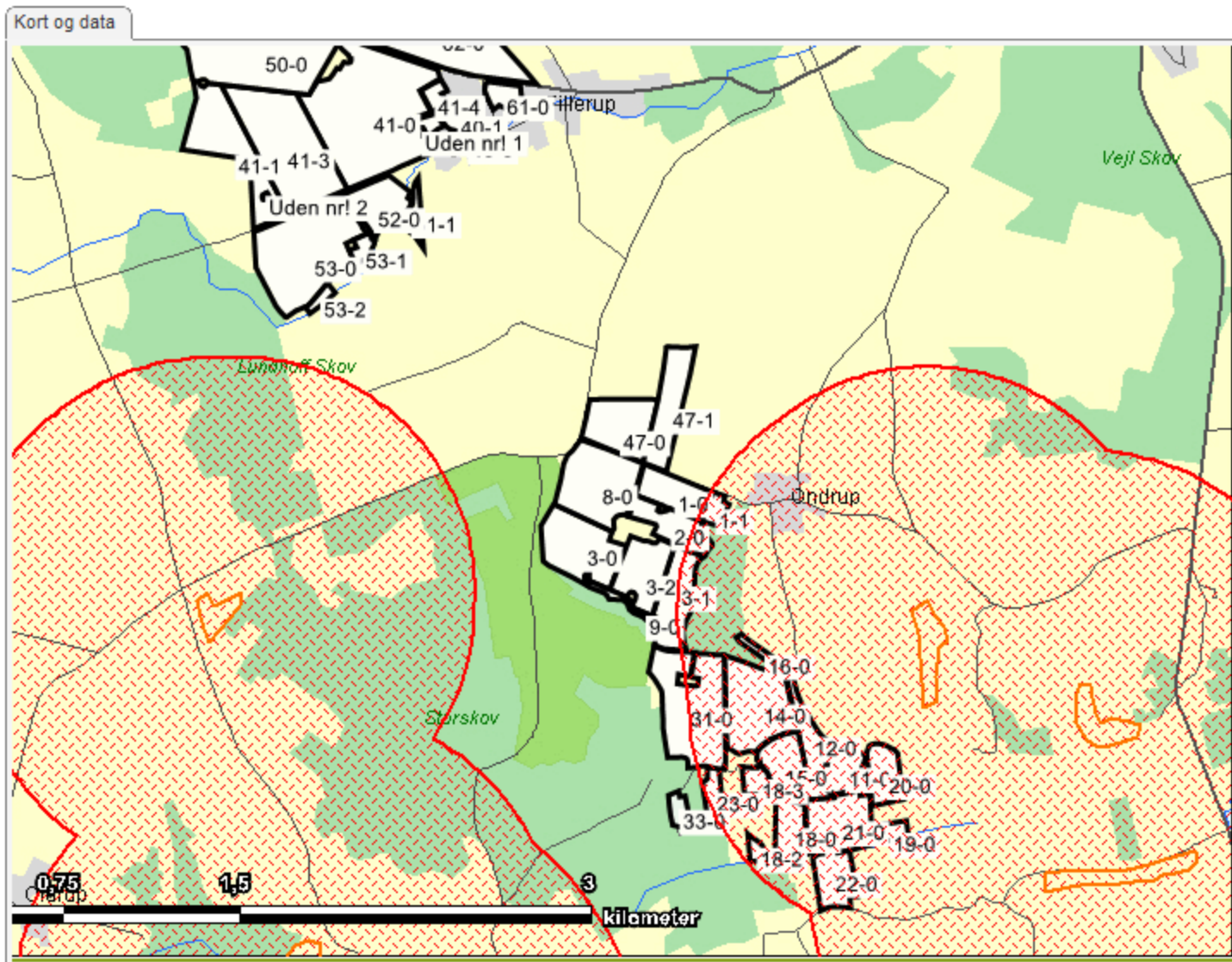
Opdater

Luk info-vind

BR Markkort - En del af PlantelIT

- Data
- AGWA-Plan
- Arealanvendelse**
- Å-beskyttelseslinier
- Beskyttede vandløb
- Fredede områder
- Beskyttet natur
- Natura 2000
- Krav om gyllenedfældning, Vejledende

Example
DIS



Opdater

Luk info-vind

Example GAP-manual

		Relevans	Effekt pr. ha				Effekt i alt			
			N-udv.	Amm. ford	Udbytte	Omkostn.	N-udv.	Amm. ford	Udbytte	Omko
			Kg N/ha	Kg N/ha	hkg pr. ha	Kr/ha	Kg N	Kg N	Hkg	Kr
Jordbeh.	Forårsplojning af græsmarker	Meget relevant	37,5	0,0	-	-	375	0	-	-
Gødning	Ammonium- i stedet for nitratgødning	Meget relevant	6,0	0,0	1,6	0,0	60	0	16	0
Gødning	Placeret handelsgødning	Ikke relevant	-	-	-	-	-	-	-	-
Gødning	Nedfældning af gylle	Meget relevant	-3,0	10,0	2,0	100,0	-30	100	20	100
Jordbeh.	Forårsplojning forud for vårafgrøder	Meget relevant	17,5	0,0	0,0	0,0	175	0	0	0
Afgrøde	Tidlig såning af vintersæd	Meget relevant	6,0	0,0	0,5	-	60	0	5	-
Gødning	Optimeret behovsfastsættelse	Meget relevant	0,9	0,0	0,8	5,0	9	0	7,5	50
Afgrøde	Efterafgrøde i majs	Meget relevant	37,5	0,0	-	-	375	0	-	-
Afgrøde	Senere nedmuldning af efterafgrøder	Meget relevant	25,0	0,0	-	315,0	250	0	-	315
			<i>I alt i område</i>			1	1274	100	48,5	420



How far did we get with integrated advising on farm level?



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Main data (1)

Norsminde Fjord catchment area

- Catchment area, total 10.100 ha
- Farmland (82 %) 8.282 ha
- Daisy-computed (15 %) 1.272 ha
- N to Fjord in 1980: ca. 350.000 kg N
- N in average per year 1996-2005: 129.000 kg N
- WFD-directive **"preliminary"** goal (50%): 65.000 kg N




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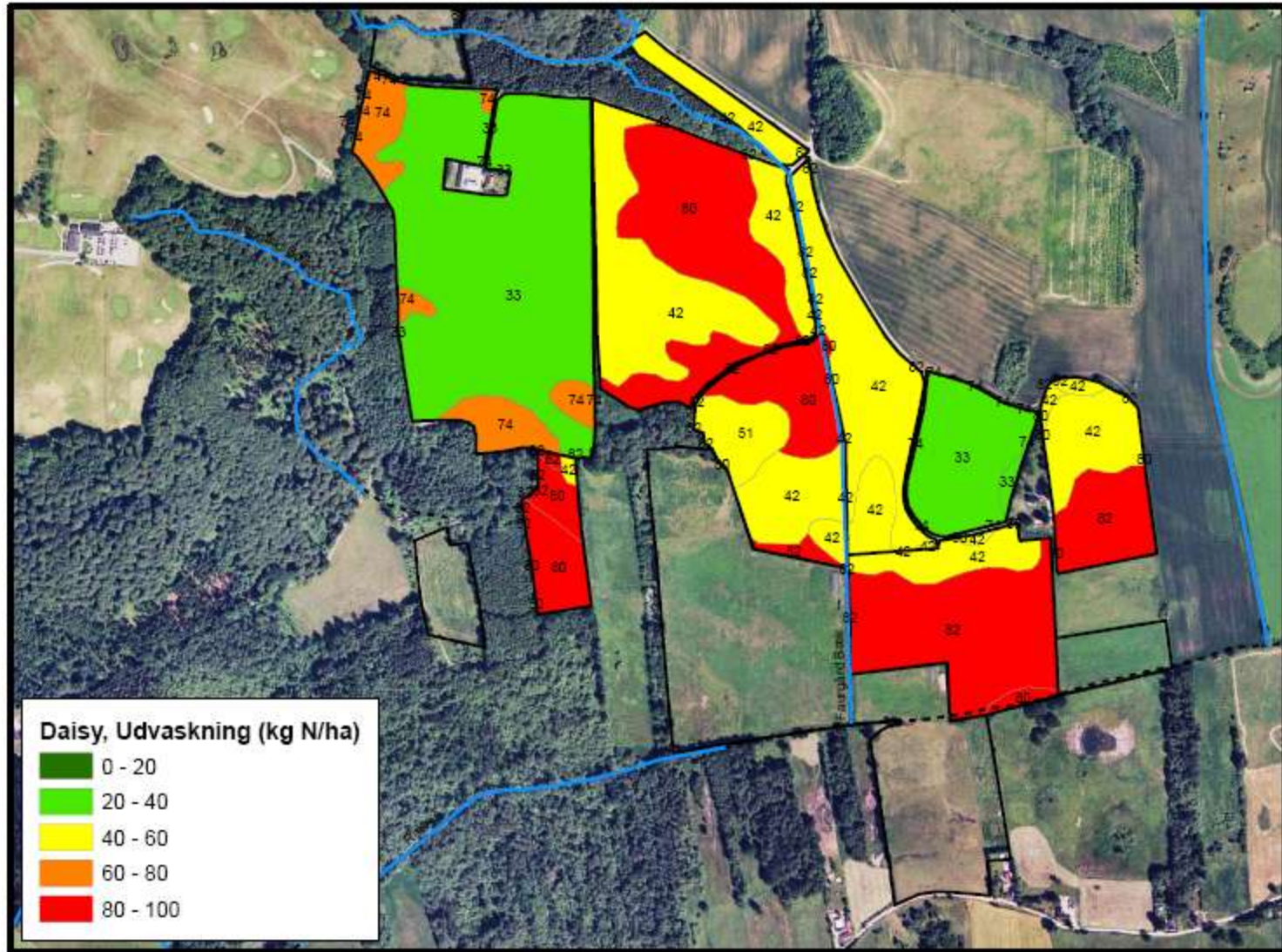
Main data (2)

Norsminde Fjord catchment area

- Loss root zone upland model, average 45 kg N/ha
- Loss root zone, Daisy, average 43 kg N/ha
Variation on field scale 16-91 kg N/ha
- Loss root zone total
8.282 ha x 43 kg N/ha  356.126 kg N
- $129.000/356.126 \times 100\% =$ **36 % ?**
- How do we reach WFD-goal? 65.000 kg N?
- Max. loss root zone: $65.000/36 \times 100 = 180.555$ kg N?



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Example of N reduction on farm level by using integrated advising

- 38 ha placed fertilizer x 1kg N/ha = 38 kg N
- 162 ha ammonium instead of nitrate x 6 kg N/ha = 972 kg N
- 57 ha early sowing of winter cereals x 4 kg N/ha = 228 kg N
- 38 ha with catch crops x 25 kg N/ha = 950 kg N
- 7 ha spring plowing of grassland x 37,5 kg N/ha = 263 kg N

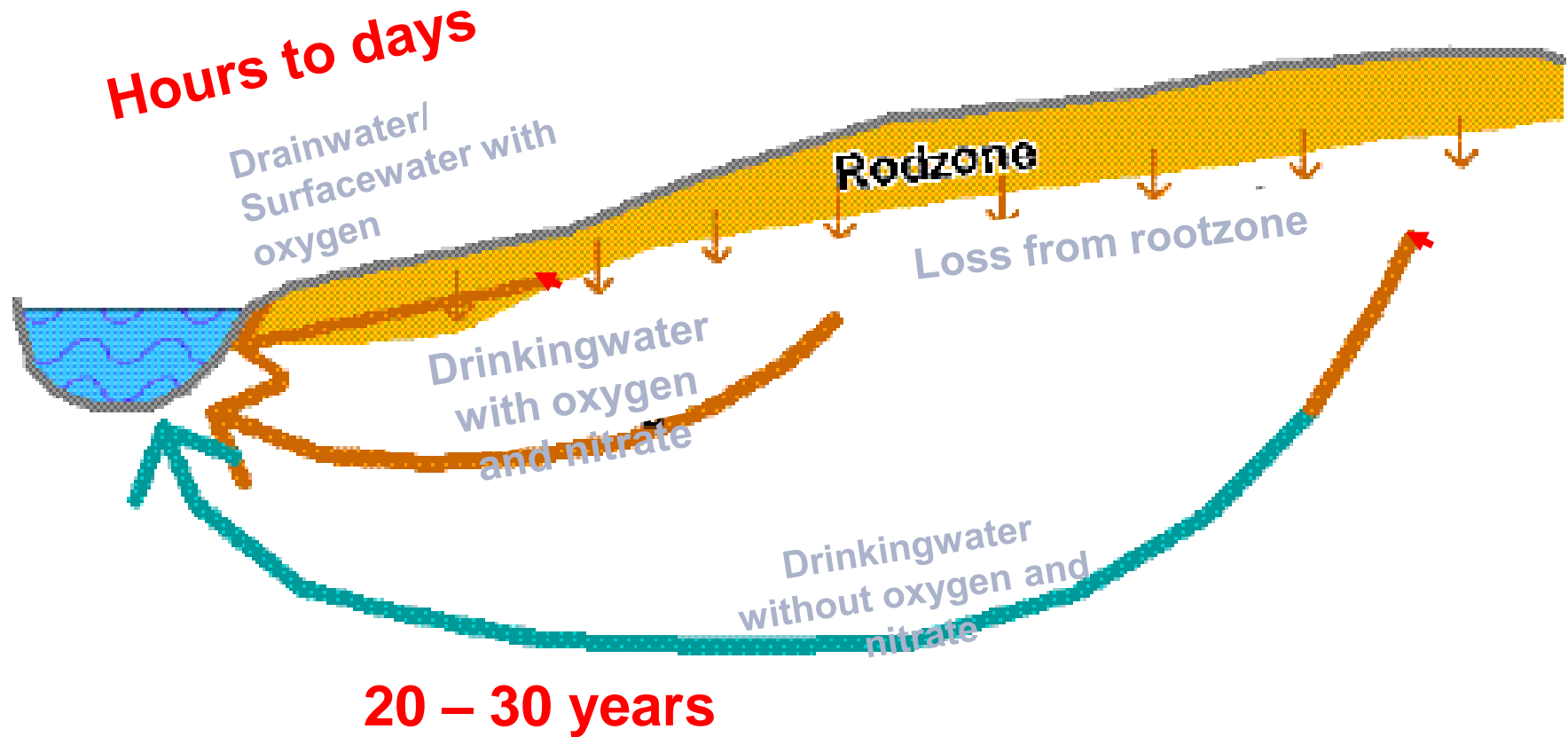
- Farm level reduction (26 % of total N leaching) **2.451 kg N**

- A special constructed small wetland xxxx kg N



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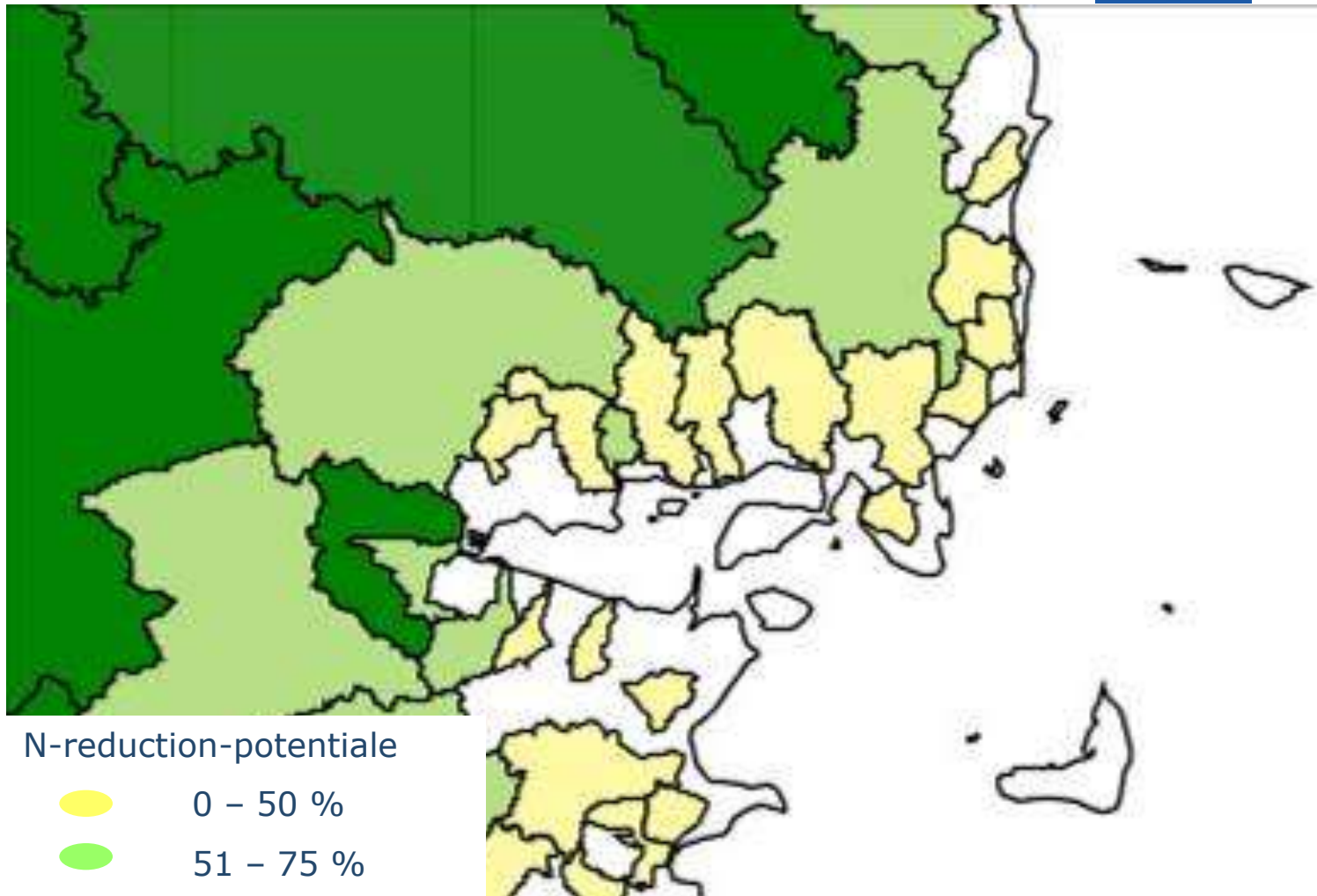
Reduction of N from rootzone to the fjord






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N-reduction-potential Horsens Fjord



N-reduction-potentiale

-  0 – 50 %
-  51 – 75 %
-  76 – 100 %

*Lisbet Ogstrup, Ministry of Environment ,
September 2008*

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Question on farm level:

Which farmers can reduce loss of N from root zone easily and cheaply for society?

- We know the goals for the WFD
- The WFD objectives are made for the total river basin
- We know that quality of soil, **topography** and crop rotation have great impact on loss of N from the root zone
- Farm level loss of N from the root zone varies according to farming methods
- We **don't know** which fields with a high loss of N are the most important for nutrient load of the Fjord.





Conclusion(1):

We need a new method to reach the WFD Goals

- New soil mapping
- More Daisy modeling on farm level
- More research around Nitrogen's transport from root zone to recipient
- We need to map the most vulnerable fields taking the nutrient load of the recipient into consideration.
- =>Cost effective for the farmer
- =>Cost effective for society



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Conclusion(2):

What did the farmers learn from integrated advising?

The farmers involved:

- Have achieved a very good understanding of WFD objectives
- Have got the best soil mapping ever made in Denmark
- Know that the GAP-manual is a tool with many different solutions
- Have taken action in solving the problem of too big a loss of nitrogen from the root zone



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Conclusion(3):

What did the advisers learn from integrated advising?

The advisers involved:

- Have achieved a very good understanding of WFD objectives
- Have learnt a new subject area about integrated advising
- Have recognized, that advisers in plant production need to have further education to achieve the objectives of the WFD



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Implementation of integrated advising in the real action plans

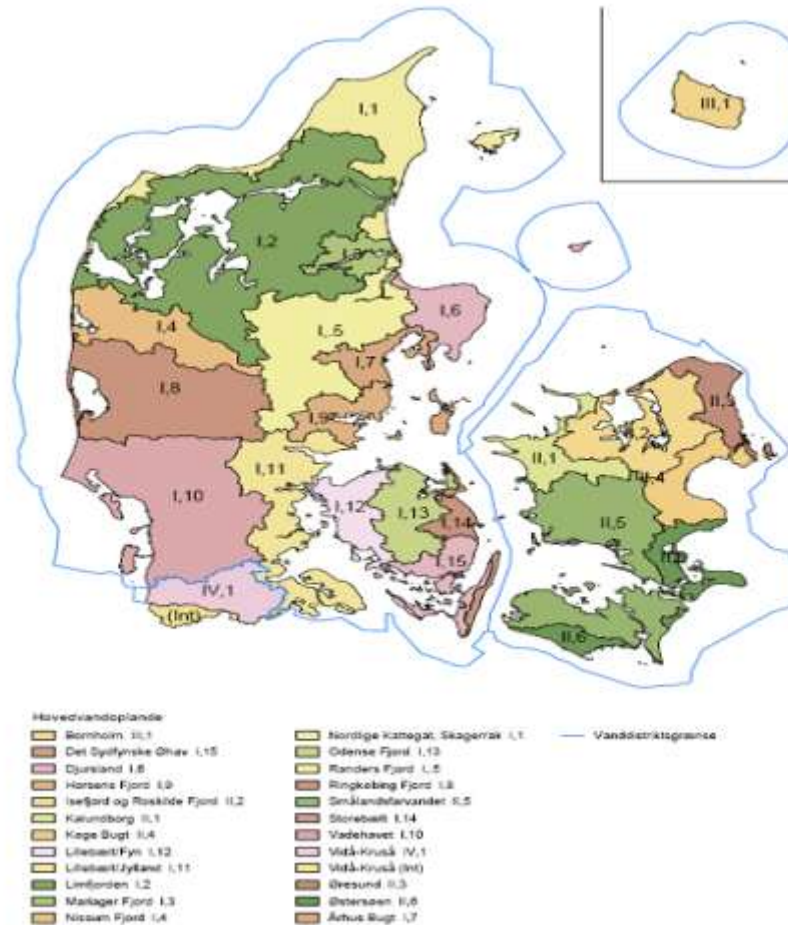
Possible barriers

- Unusual amount of knowledge and data in Agwaplan pilot areas.
- Are there enough resources for the integrated advisory system in all river basins?
- National consensus on data in the GAP manual is necessary.
- Are the farmers participating in Agwaplan more positive than farmers in general?
- Agwaplan is based on voluntary agreements, but programmes of measures are obligatory
- How will the dialogue be if GAP do not meet the reduction targets?



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Organization in main catchments



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