

Ex ante evaluation agriculture and WFD

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Content

- Introduction
- Additional mitigation options
- Results
- Communication/application
- Conclusions

Ex-ante evaluation agriculture and WFD

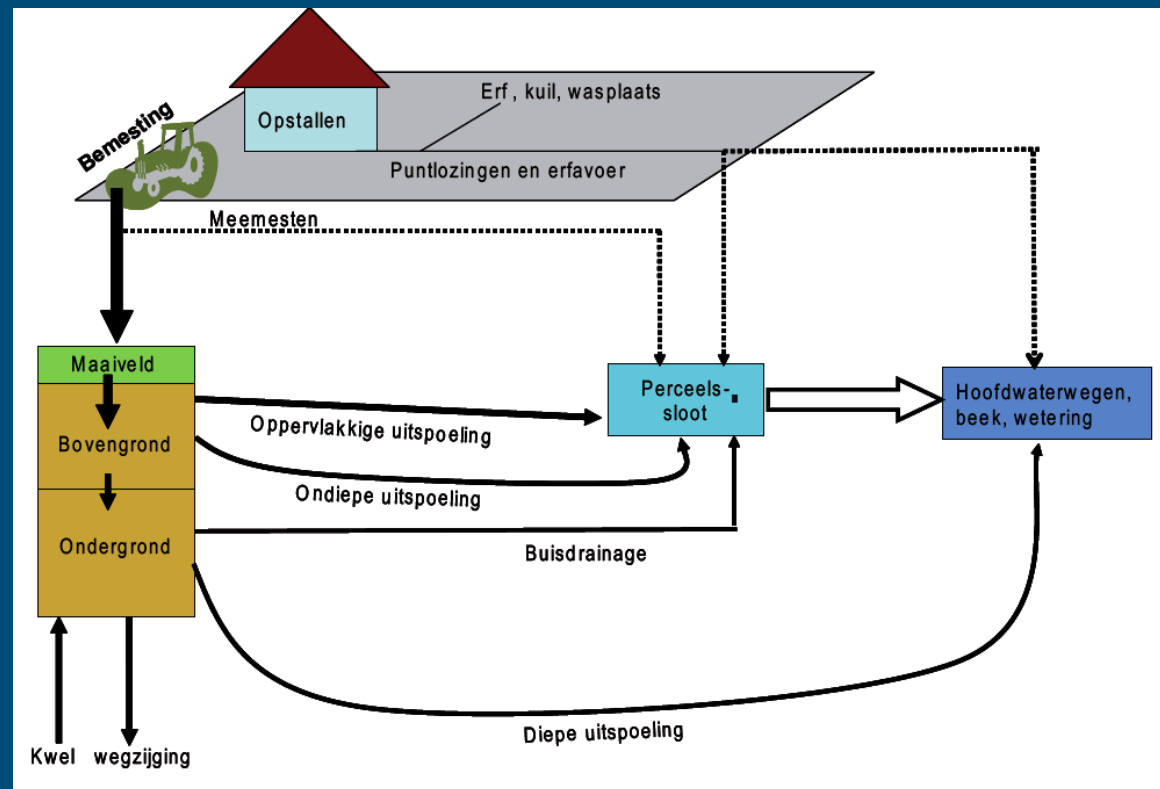
- To evaluate the effectiveness of mitigation options to achieve the goals of WFD on nutrients in 2015
 - Proposed national policy not sufficient to achieve environmental objectives
- Main goals
 - Evaluation of proposed measures
 - Evaluation of possible additional measures on the nutrient and heavy metal losses from agricultural land to surface waters
 - Different scales (national, regional)

Scenario's

- Proposed policy
 - Manure policy
 - First River Basin Management Plans (RBMP) as proposed by the water counties

- **Additional mitigation options**

- Farm level
- Field level
- Ditch level



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Scenario's

■ Mitigation options

- > 100 measures (total list)
- Selection of (potential) measures at different scales (national and regional) (potential = proposed effectiveness and acceptable for stakeholders). Approx. 40 measures
- However, for determining the effectiveness and costs of selected measures under different conditions (for whole regions), data and knowledge are limited

Factsheets

- For each mitigation options (similar as for the COST action!!)
 - Detailed description of the measure
 - Applicability
 - Effectiveness
 - Costs
 - Investments costs
 - Maintenance costs
 - Underpin / reliability / uncertainty
 - Expert Judgement
 - Literature
 - Field experiments
 - Model calculations

1) Example buffer strips

■ Unfertilised buffer strips

● Definition

- Unfertilised buffer strip of 5 m along ditches
- Max 5% of the agricultural area out of production

● Applicability

- Non-drained agricultural soils

2) Example buffer strips

■ Effectiveness

- Fertiliser effect
 - Area fraction of buffer strip
- Additional effect
 - Land use: arable land > grassland
 - Geohydrology : impermeable layer > well drained
 - Slope : hilly > flat

3) Example buffer strips

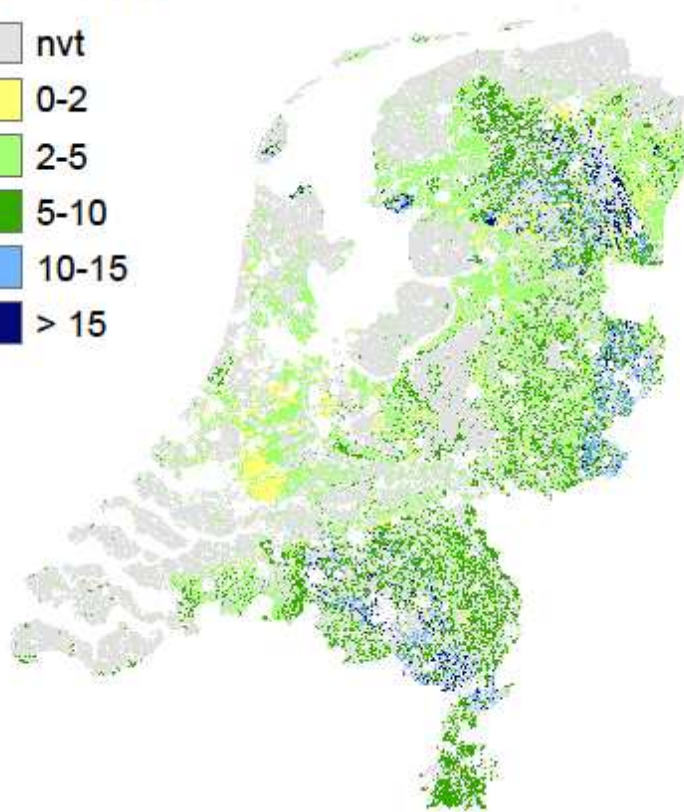
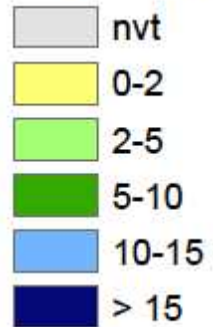
Expected effectiveness of buffer strips
(literature and expert judgement)

Spatial variation				
Land use	Arable land	Arable land	Arable land	grassland
Geohydrology	Impermeable layer	Well drained	Well drained	Impermeable layer
Slope	Slope	Slope	flat	Slope
Effectiveness phosphorus (%)	30	20	10	10

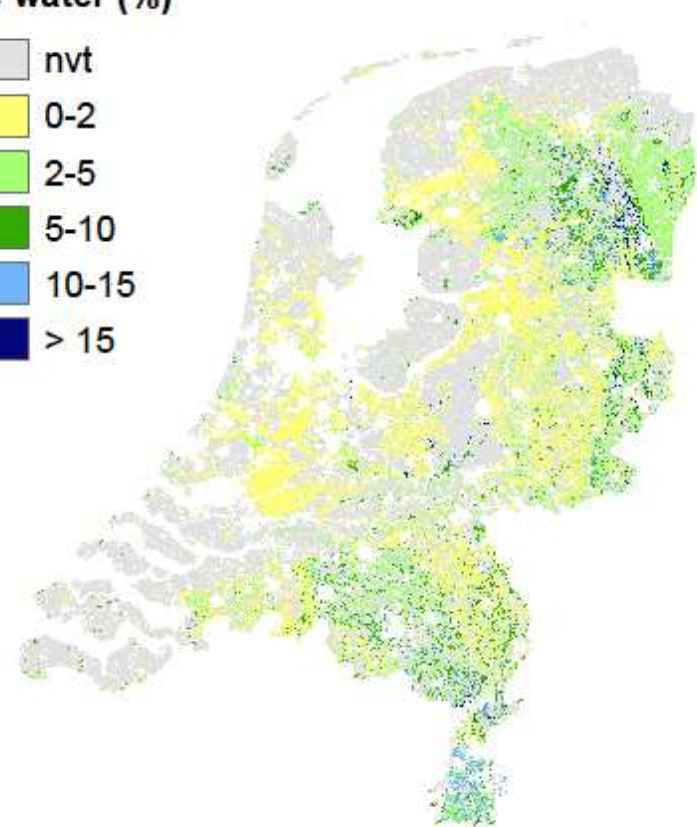
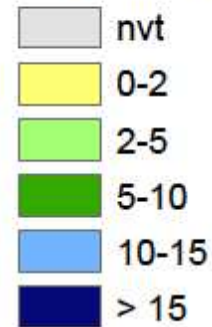
- Research has started to improve the reliability of the effectiveness of buffer strips in flat areas in the Netherlands

4) Example buffer strips: regional effectiveness

**Reduction N-losses
surface water (%)**

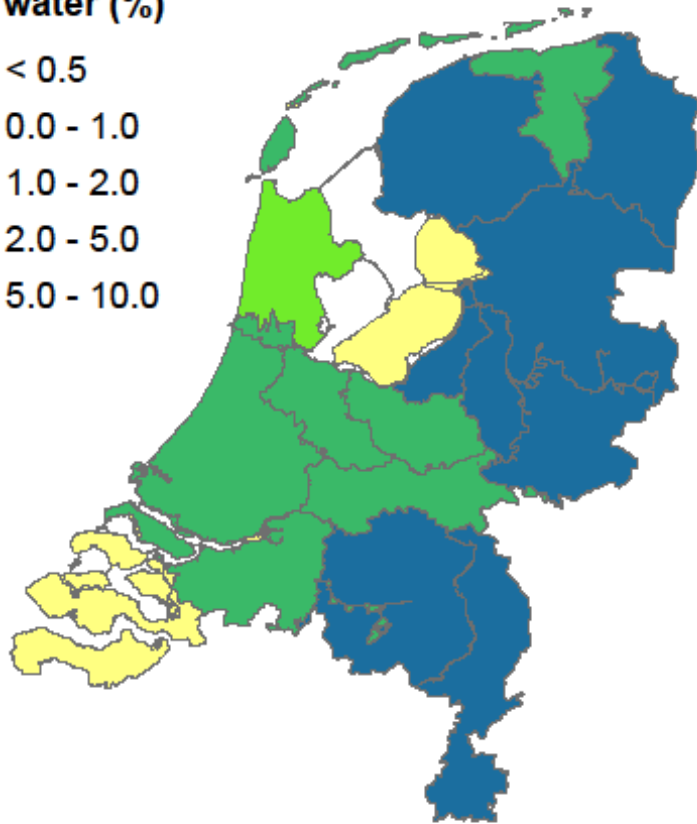
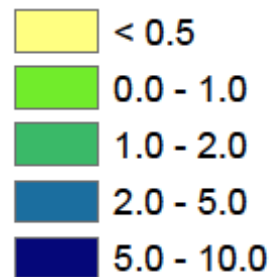


**Reduction P-losses
surface water (%)**

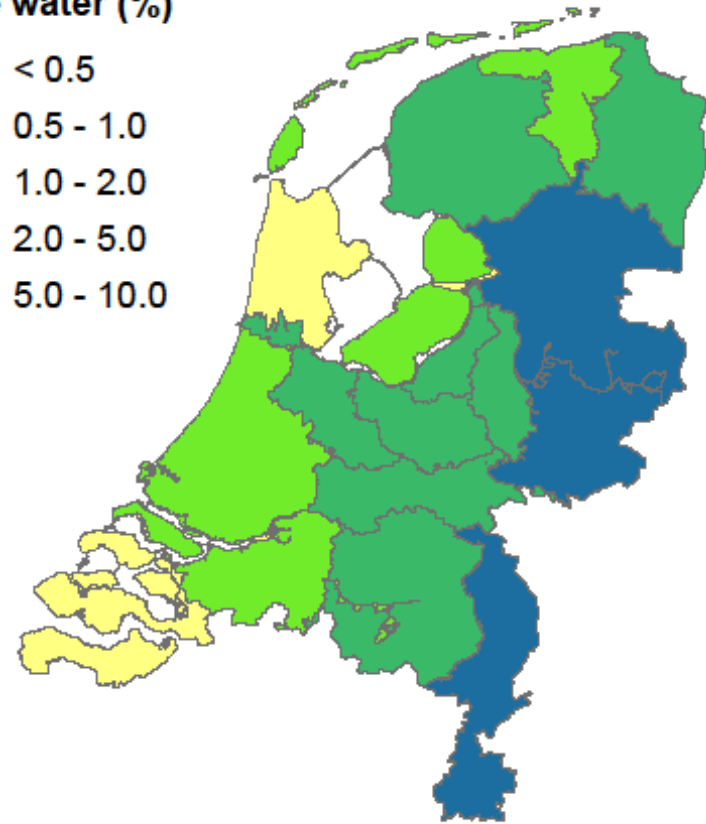
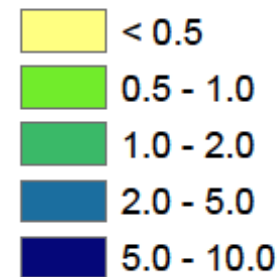


5) Example buffer strips: effectiveness at catchment scale

**Reduction N-losses
surface water (%)**



**Reduction P-losses
surface water (%)**



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1) Selection of additional measures

■ Farm level

- No application of P fertilizers on agricultural soils
- Increase N-efficiency of manure and fertilisers
 - Increase manure capacity
 - No application of animal manure in autumn on clay soils
 - Fertilizer placement near crops
 - Choose crops with higher P- or N-uptake

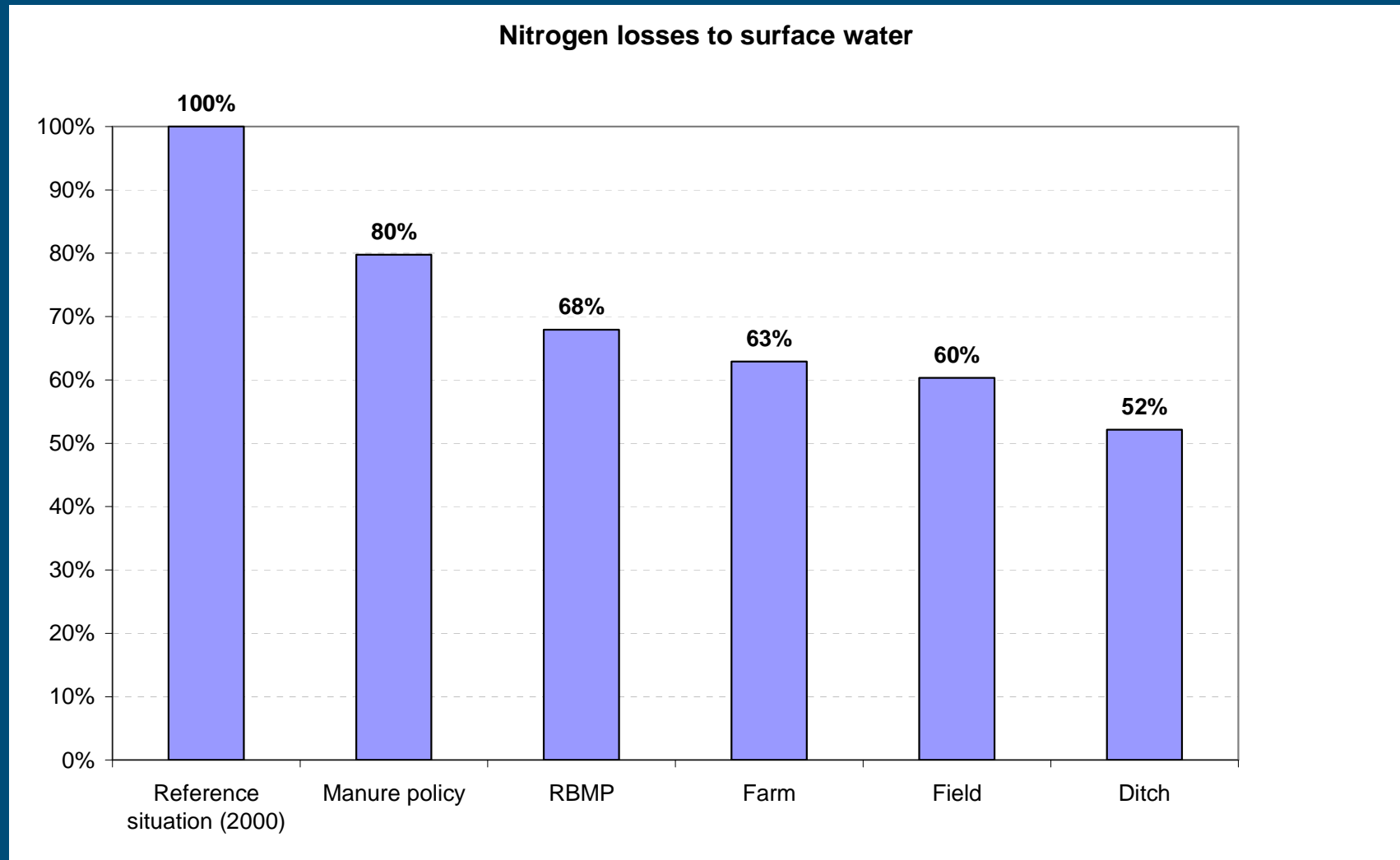
■ Field level

- Unfertilised buffer strip
- Soil P-depletion
- Drainage with controlled water level

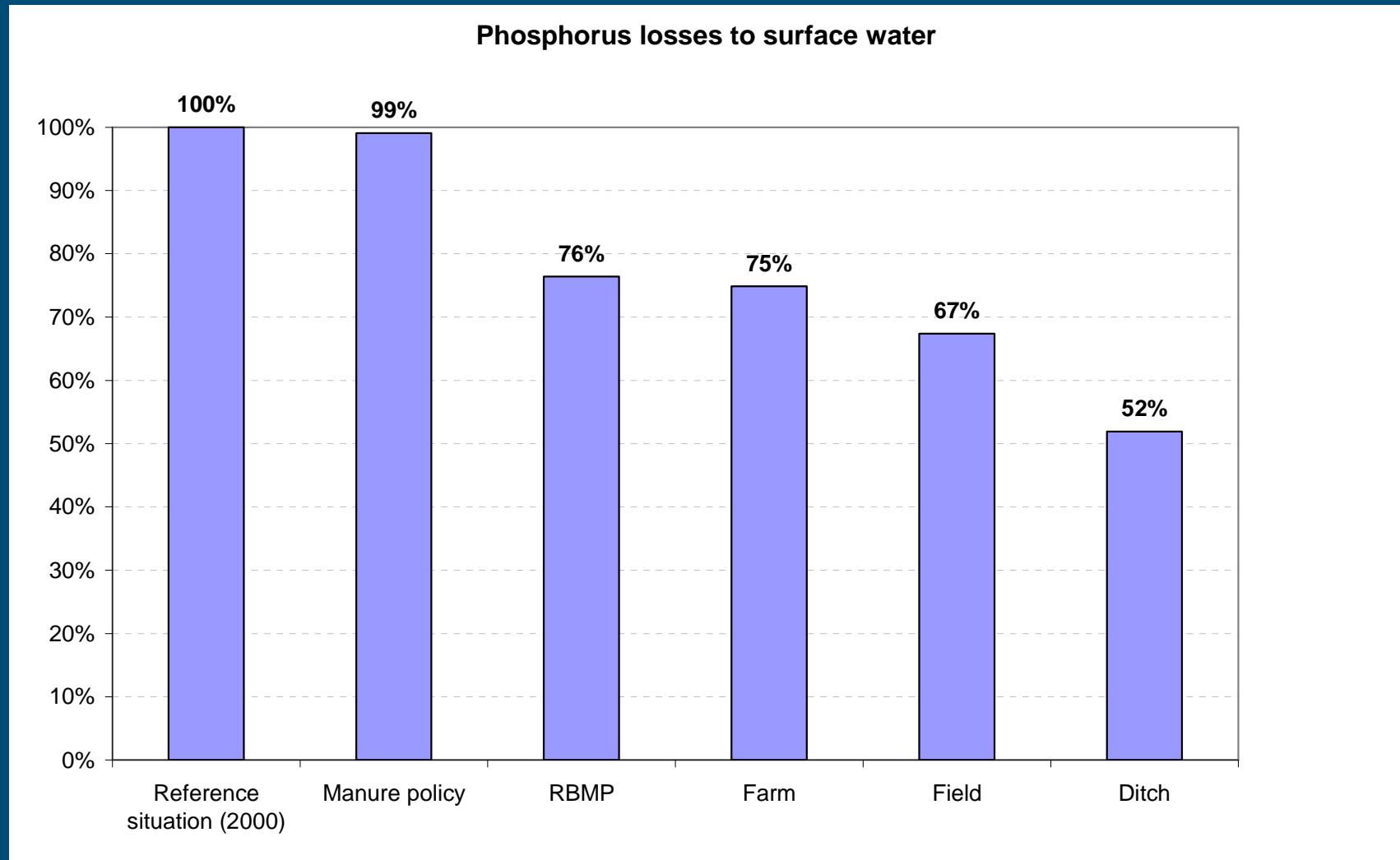
■ Ditch level

- Helophyte filters

Effectiveness on nitrogen losses to surface water in 2015



Effectiveness on phosphorus losses to surface water in 2015



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1) Example of a tool for counties: Hydrometra

- Select catchment area




The screenshot shows the 'Kennissysteem Hydrologische Maatregelen' (Knowledge System Hydrological Measures) software interface. The title bar includes window control buttons. Below the title bar is a progress bar with five steps: 'Hoofdkeuze' (selected), 'Gebiedsselectie', 'Maatregelen', 'Implementatie', and 'Resultaten'. On the left, there is a vertical green bar with a drawing of a dragonfly. The main content area is titled 'Stroomgebied' and contains the following text: 'Definieer het stroomgebied door een kaart of een tabel te openen. Alleen de plots die in het gebied voorkomen worden in de berekening opgenomen. Het aantal plots is nog te beperken door in de volgende stap selectiecriteria vast te leggen.' Below the text is a map of the Netherlands with several catchment areas highlighted in blue. To the right of the map, there is a section labeled 'indeling' (classification) with two radio button options: 'stroomgebiedsdistrict' (selected) and 'WB21 gebieden'. Below this is a list box containing the following items with checkboxes: Maas, Eems, Rijn-Noord, Rijn-Midden, Schelde, Rijn-Oost (checked), and Rijn-West (checked).

2) Example

- Select (critical) areas
 - Land use
 - Soil type
 - Drainage
 - Hydrologie

Kennissysteem Hydrologische Maatregelen

Hoofddeuze Gebiedsselectie Maatregelen Implementatie Resultaten



45 plots in huidige selectie; voorwaarde: "• (Bodem = 'klei') and ((Landgebruik = 'bouwland') and (Drainage = '0'))"

Bodem	Landgebruik	Drainage	GHG	GLG	GT
klei	bouwland	0	-48	-183	VI
klei	bouwland	0	-285	-342	VII*
klei	bouwland	0	-38	-216	V*
klei	bouwland	0	-120	-285	VII

Selectiecriteria:

en/of	kenmerk	waarde	
	Bodem	klei	+
X and	Landgebruik	bouwland	▲
X and	Drainage	0	▲

3) Example

- Selection of measures

Kennissysteem Hydrologische Maatregelen

Hoofdkeuze Gebiedsselectie **Maatregelen** Implementatie Resultaten

Berekenen effectiefste maatregelen
alle maatregelen worden doorgerekend en geordend naar effectiviteit

Evaluatie van de effecten per maatregel
de hieronder geselecteerde maatregelen worden doorgerekend:

<input type="checkbox"/>	A7.8	Bezinkgreppel
<input type="checkbox"/>	A7.9	Bezinkgreppel met dam
<input checked="" type="checkbox"/>	A7.10	Verleggen veeverzamelplekken naar perceelrand zonder sloot
<input type="checkbox"/>	A7.11	Kavelpaden aan/verleggen
<input type="checkbox"/>	A7.12	Looppaden verder van sloot af leggen
<input type="checkbox"/>	A7.13	Slechte plekken zoals kop/wendakkers uit productie, vee weren
<input checked="" type="checkbox"/>	A7.14	Greppels afdammen

B Hydrologische maatregelen

<input type="checkbox"/>	B1	Afvoer
<input checked="" type="checkbox"/>	B1.1	Draineren
<input checked="" type="checkbox"/>	B1.2	Drainage verdiepen, handhaven drainagebasis (onder water leggen)
<input type="checkbox"/>	B1.3	Drainage opheffen
<input checked="" type="checkbox"/>	B1.4	Greppels dempen
<input type="checkbox"/>	B1.5	ondiepe sloten dempen
<input type="checkbox"/>	B1.6	diepe sloten dempen
<input type="checkbox"/>	B1.7	zowel winter- als zomerpeil 30 cm verhogen, hellend gebied
<input type="checkbox"/>	B1.8	zowel winter- als zomerpeil 30 cm verhogen, polder, geen veengebied
<input type="checkbox"/>	B1.9	zowel winter- als zomerpeil 30 cm verhogen, veenpolder
<input type="checkbox"/>	B1.10	Peil oozetten in de zomer met 30 cm. hellend gebied

4) Example

- Result

Kennissysteem Hydrologische Maatregelen

Hoofdkeuze Gebiedsselectie Maatregelen Implementatie **Resultaten**

resultaat over: N P W e

reductie	ranking	maatregel	
3.2%	11.7	A2.3	Generiek pakket bemestingsmaatregelen 'maximaal'
27.6%	100.0	B1.1	Draineren
0.0%	0.0	B1.2	Drainage verdiepen, handhaven drainagebasis (onder water leggen)
13.1%	47.3	B1.4	Greppels dempen

B1.4 details voor P

- sterke afname
- afname
- lichte afname
- weinig verandering
- lichte toename
- toename
- sterke toename

ingang: Stroomgebied
(Bodem = 'Ide') and ((Landgebruik = 'bouwland') and (Drainage = '0'))
Evaluatie van maatregel(en): A2.3; B1.1; B1.2; B1.4;

Terug Verder

Communication/ application tools

So, Hydrometra is a tool to help counties to

- Locate critical soil areas (CSA) based on regional data and maps
- Calculate the effectiveness of source- and/or hydrological measures of N- and P-losses to surface water at different scales
- Evaluate mitigation options for reducing nutrient losses to surface water in critical source areas
- Compare effectiveness of different mitigation options
- Select preferred measures for local & regional situations

Communication/ application tools

However, more data is needed to assess the effectiveness of measures

There is a direct link to COST 869

- 1) We brought our information of the effectiveness of mitigation options into the factsheets of the COST action
- 2) From other countries we need information of the effectiveness of measures under similar circumstances

Therefore, (recently) the Dutch government became interested in an international intercomparison of mitigation options under flat condition (E.g. Denmark, North Germany, Belgium, West part of France, low parts of England and Ireland)

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Conclusions ex-ante evaluation

- Yet, the proposed national policy is not sufficient to achieve environmental objectives
- Additional measures seem to have perspective and a combination of measures is often needed!
- Pilot studies are necessary to improve the reliability of the (cost-) effectiveness of mitigation options to complete the database
- Knowledge on effect of measure must be shared, discussed and evaluated (COST please help!!!!)