

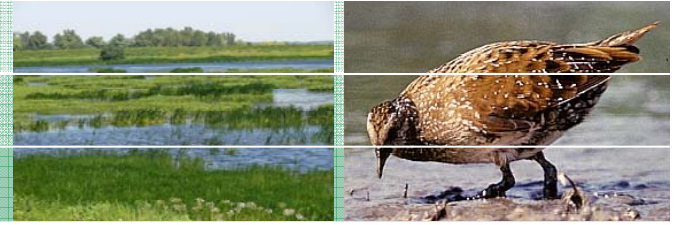


# **WFD Explorer and the challenges of climate change**

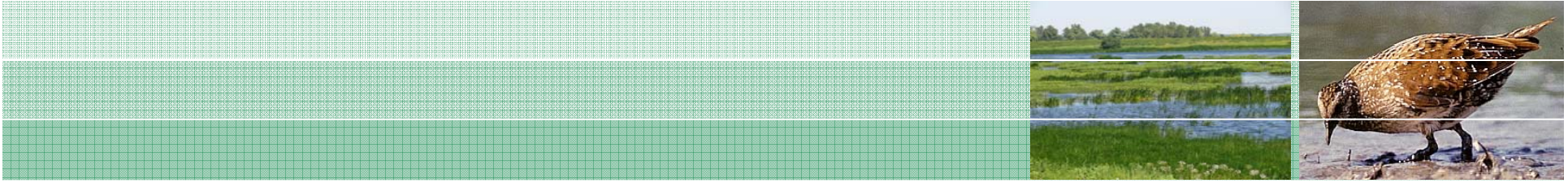
Joost Icke and Harm Duel

EurAqua Oslo, October 24, 2008

# Contents

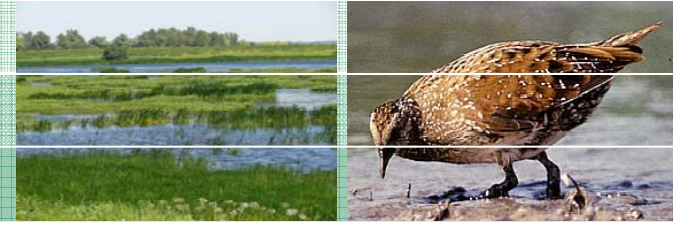


1. The WFD Explorer and the implementation of the WFD
2. Climate change
  - a. Impact of [climate change](#) on aquatic ecosystems
  - b. Impact of [climate adaptation strategies](#) on aquatic ecosystems
3. Implementation of climate adaptation strategies for Lake IJssel area



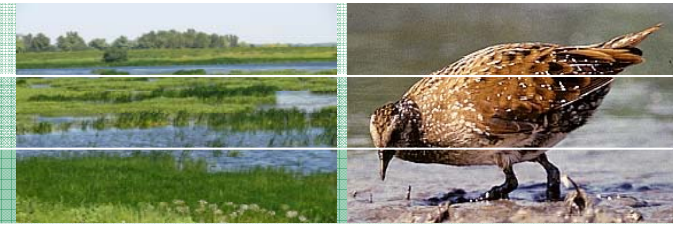
“The WFD Explorer triggered the discussion about  
our knowledge of ecosystem restoration”

# Objective of the WFD Explorer

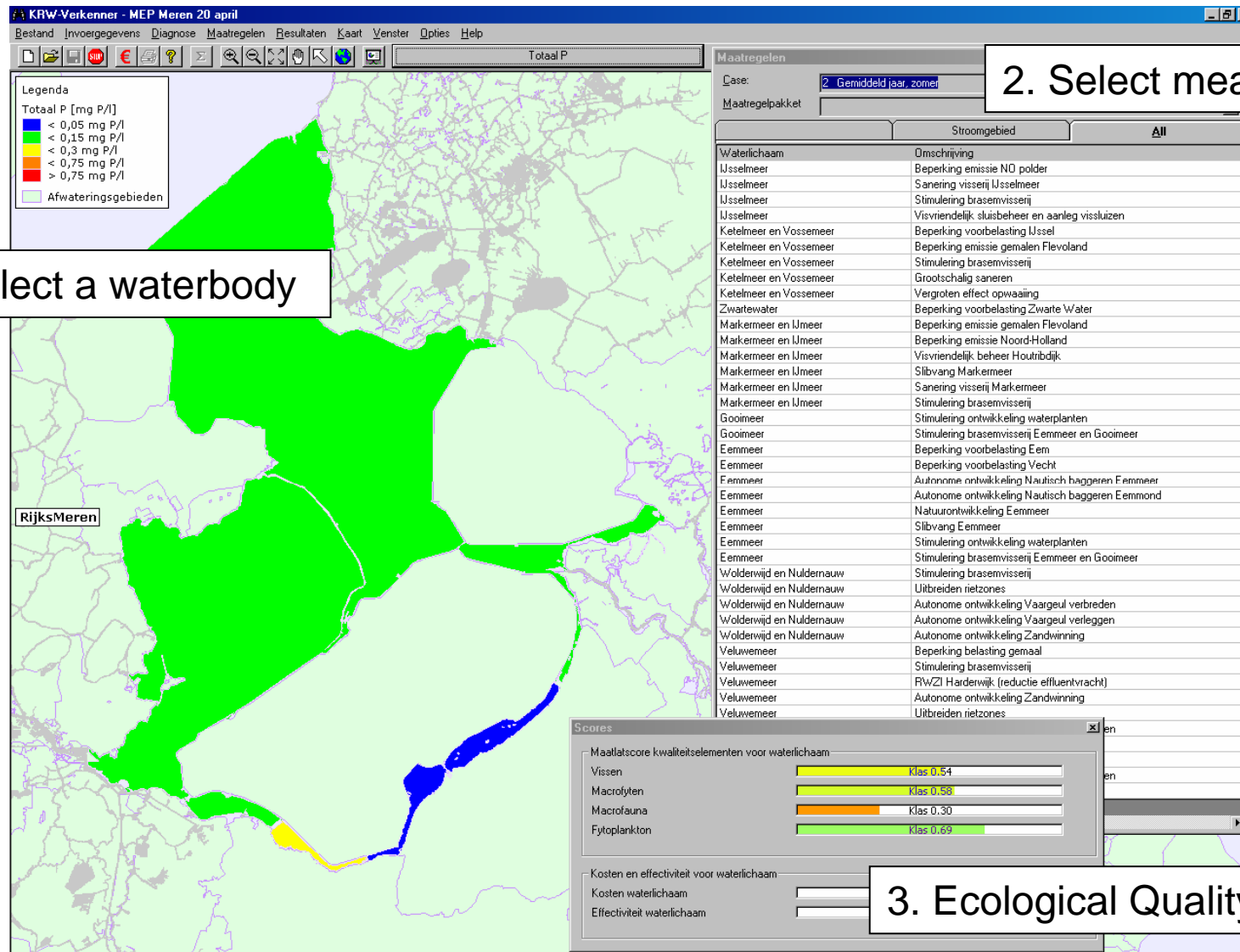


- Support the drafting of River Basin Management Plans
- Select the (most cost effective) measures for the RBMPs
- Determination of the good chemical and ecological status / potential of our waterbodies
- Stimulate the communication with stakeholders
- Encourage uniformity in the knowledge that is being used
- Harmonisation in designing programmes of measures

# The WFD Explorer



## 1. Select a waterbody



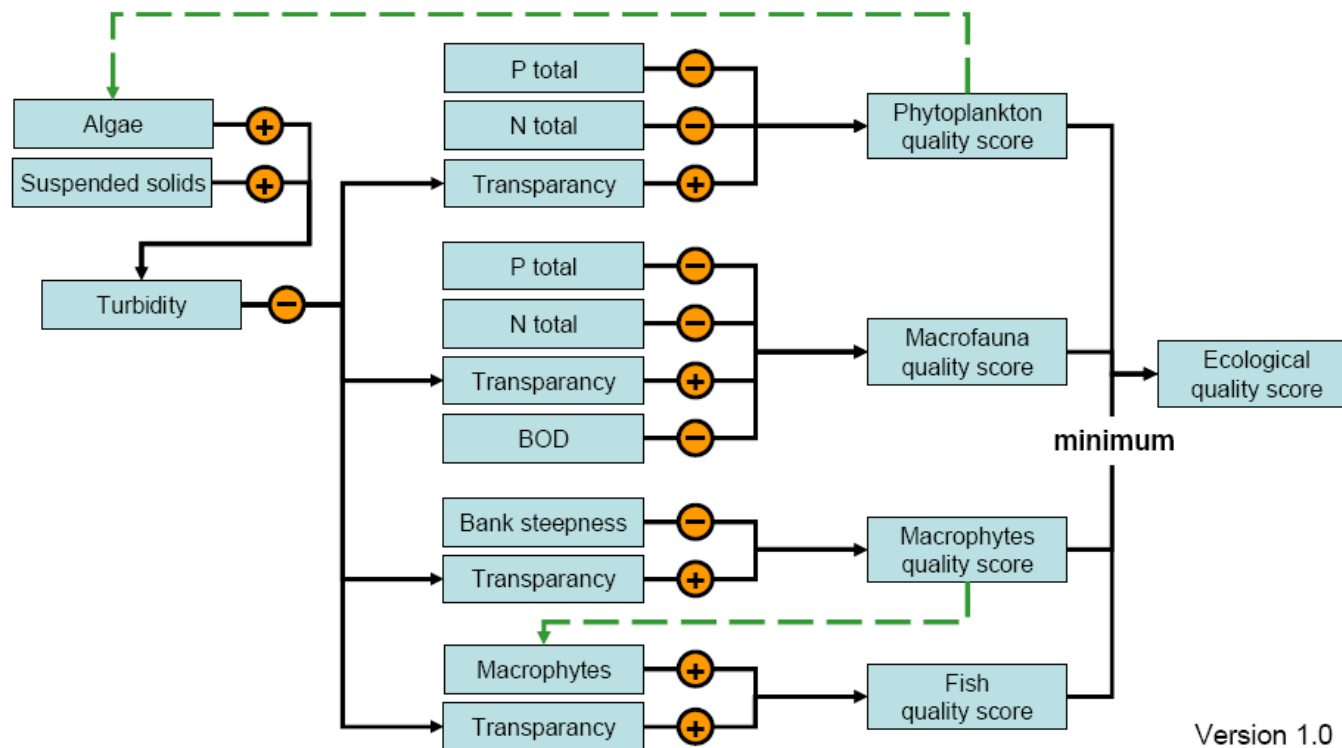
## 2. Select measures

## 3. Ecological Quality Ratio

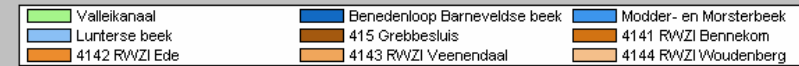
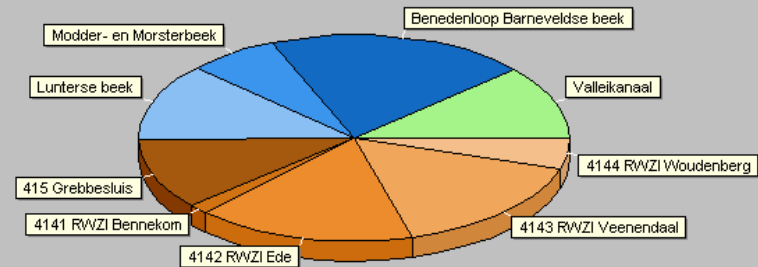
# The WFD Explorer

## 4. Analyse in more detail

### Ecology in lakes



Inflows for P  
into NL1004 (Valleikanaal)

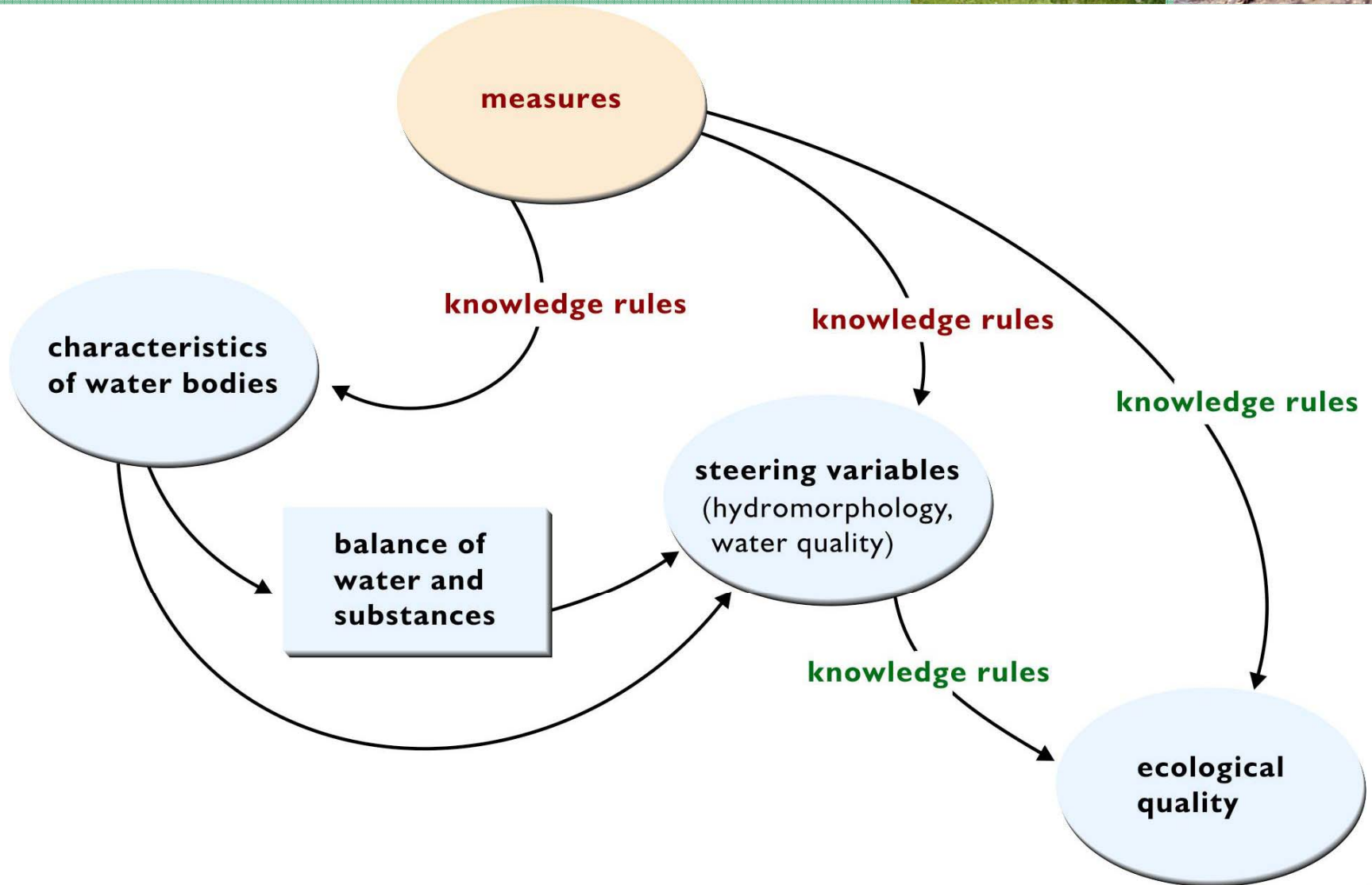


Version 1.0  
7/17/2007

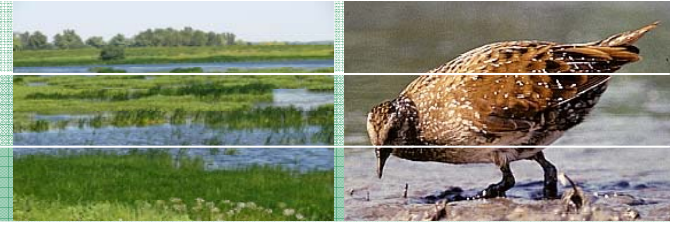
Deltares



# How it works...



# Pre-defined set of 47 measures



## Hydrology

Water conservation

Water level fluctuations

Restoration of flow dynamics

## Water quality

Reduction of point sources

Reduction of diffuse pollution

Manure policy

Waste Water Treatment Plants

## Hydro-morphology

Nature friendly river banks

Restoration of meanders

Construction of sediment traps

## Ecology

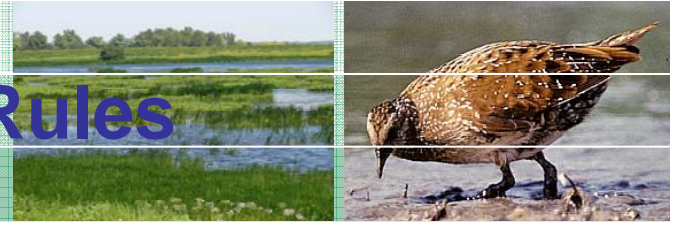
Biomanipulation (fishing)

Nature friendly mowing

Helophytes / wetlands



# Ecological Models and Expert Rules



Database with (statistical) models and expert rules for ecology

Description of reference situations:

- Several (but not all) water types
- Algae, Macrophytes, Fish and Macro Invertebrates
- Associated 'Ecological Quality' for abundance and diversity of species

Information on habitat requirements of indicator species

- Publications, literature
- Statistical analysis of field data
- Expert judgement

Linking variables such as depth, flow velocity, water quality to habitat preferences

# Knowledge database on the web





KRW-Verkenner Kennisregels - HABITAT - Ecologische Kennisdatabase - Confluence - Mozilla Firefox

Bestand Bewerken Beeld Geschiedenis Bladwijzers Extra Help

http://habitat.wildelft.nl/display/HBTDB/KRW-Verkenner+Kennisregels

Dashboard > HABITAT - Ecologische Kennisdatabase > Home > KRW-Verkenner Kennisregels

Space Log In Sign Up Search

 **KRW-Verkenner Kennisregels**  Tools


Added by [Marijoliin Haasnoot](#), last edited by [Gerben van Geest](#) on 01-08-2008 ([view change](#))


[Actielijst](#) [Home](#) [Overzicht Dosis-Effect relaties](#)


## Kennisdatabase KRW-verkenner


In deze wiki is informatie opgenomen die ten grondslag ligt aan de ecologische kennisregels van de KRW verkenner. Via de onderstaande links kom je bij een overzicht van de ontwikkelde kennisregels voor de respons van de biologische kwaliteitselementen.

## KRW-Biologische kwaliteitselementen

 [Fytoplankton](#)

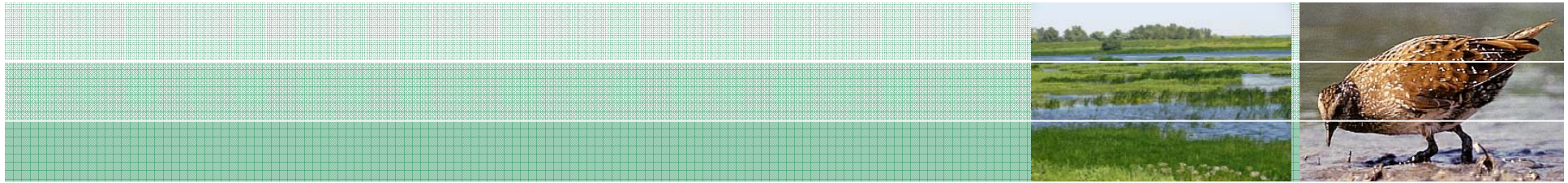
 [Macrofyten en fyto benthos](#)

 [Macrofauna](#)

 [Vissen](#)

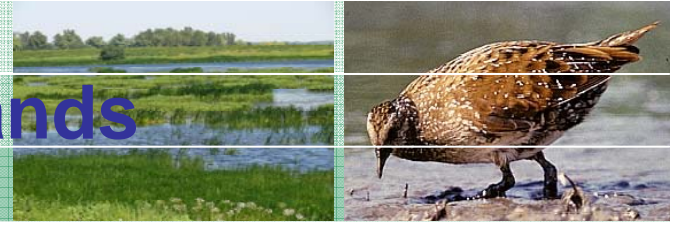
Achtereenvolgens wordt in de tekst van de biologische kwaliteits indicatoren de volgende onderwerpen behandeld:

1. Inleiding;
2. Rekenregels;
3. Maatregel - effect relaties;
4. Kwaliteit rekenregels en validatie;
5. Toepasbaarheid;
6. Voorbeeldprojecten (indien beschikbaar);
7. Literatuur.

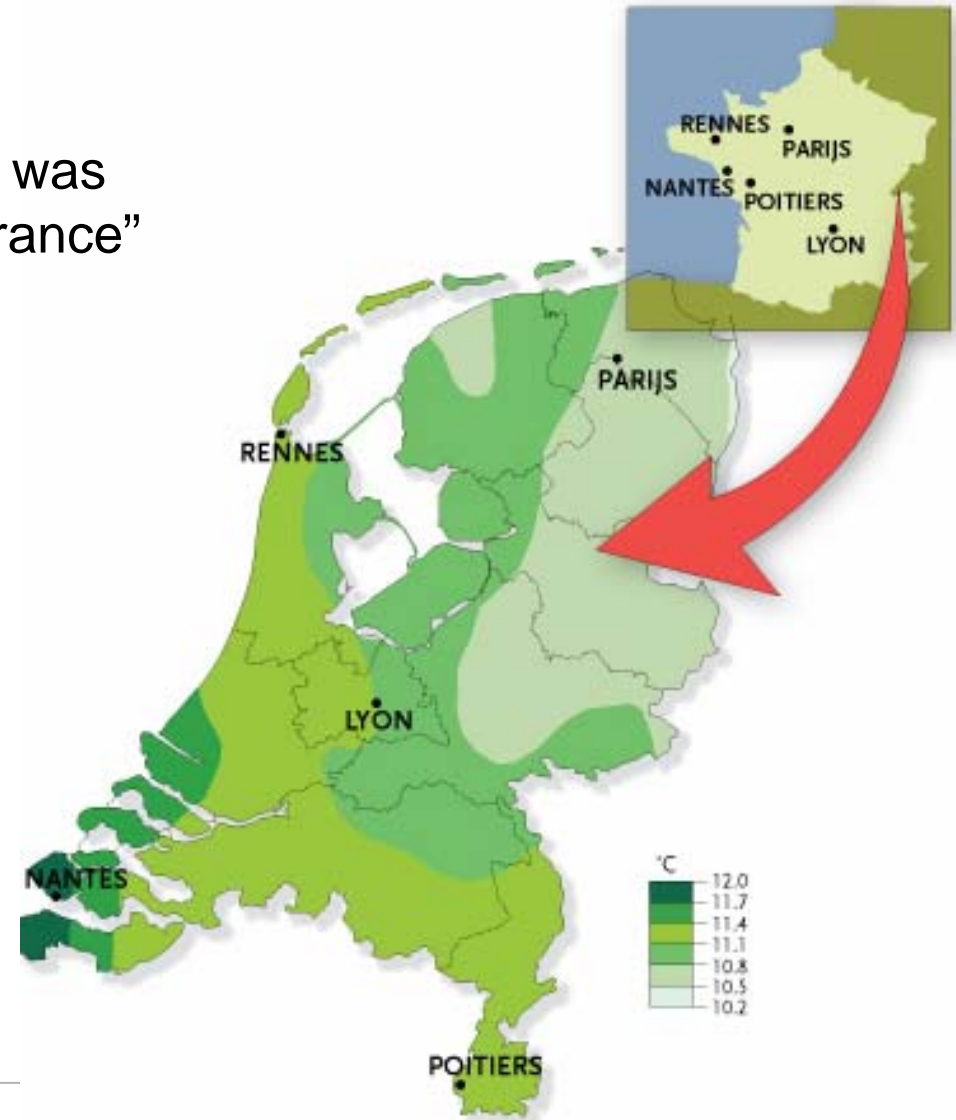


“The climate has changed in the Netherlands”

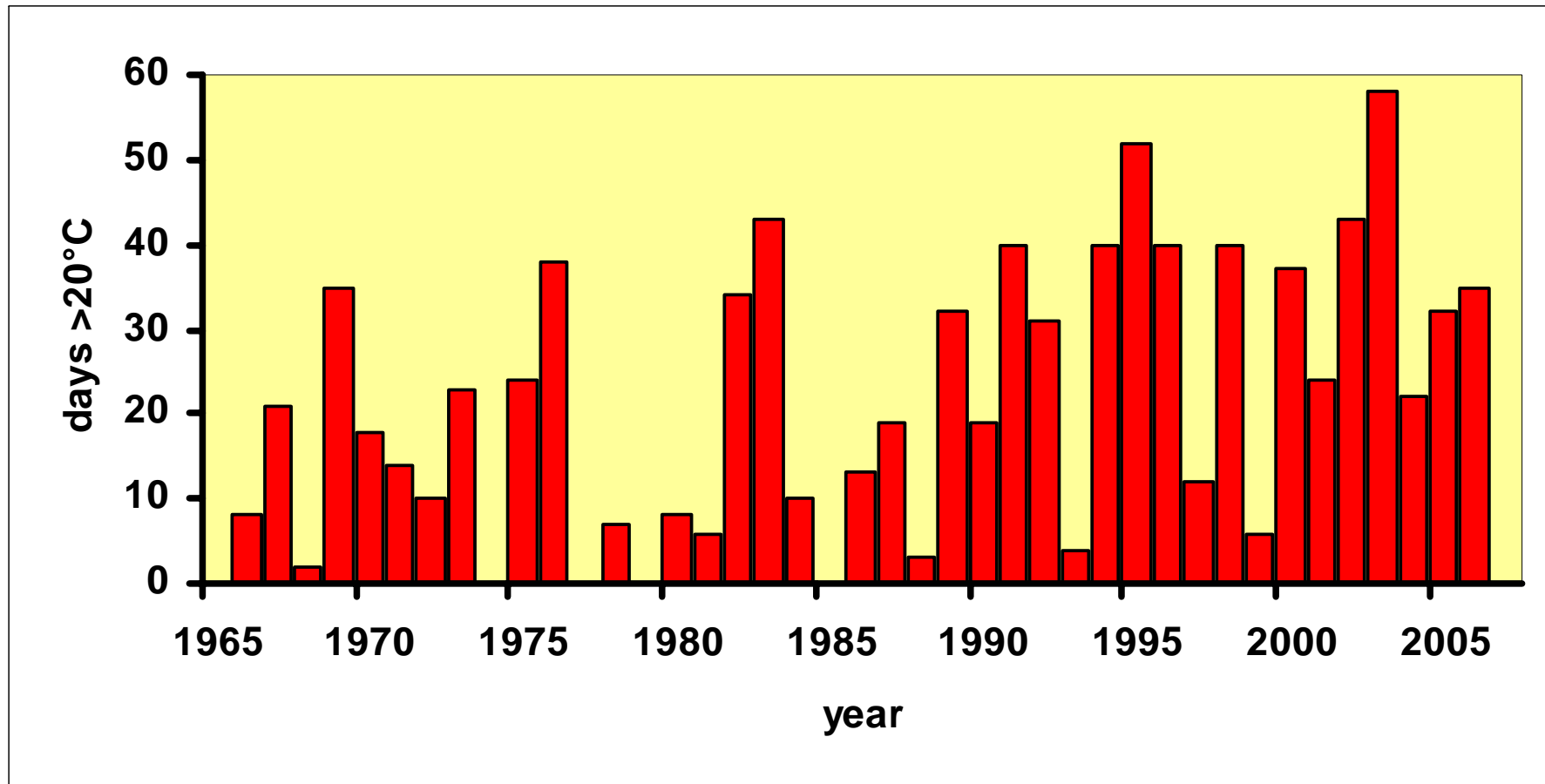
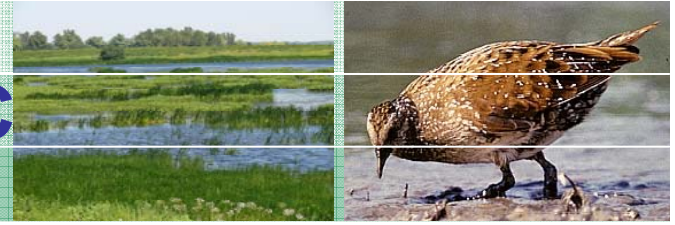
# Climate change in The Netherlands



“The temperature in 2006 and 2007 was comparable to the temperature in France”



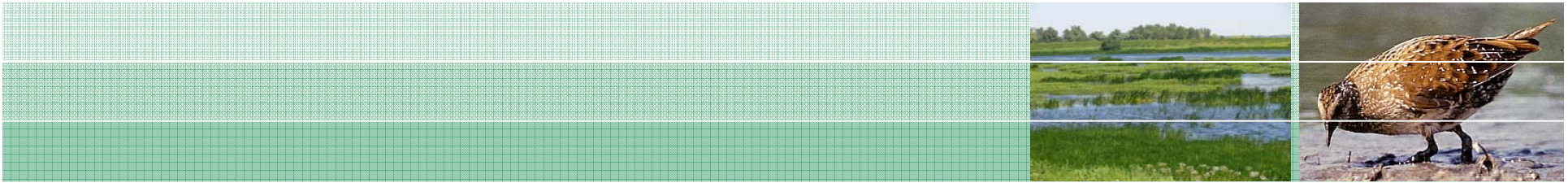
# Water temperature, days > 20°C



Water temperature in Lake IJssel

October 24, 2008

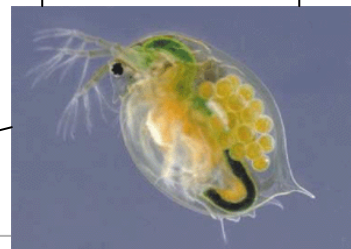
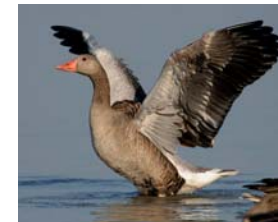
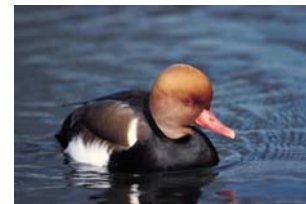
**Deltares**



“The aquatic ecosystem of Lake IJssel and Lake Marken is deteriorating due to climate change, among other factors”



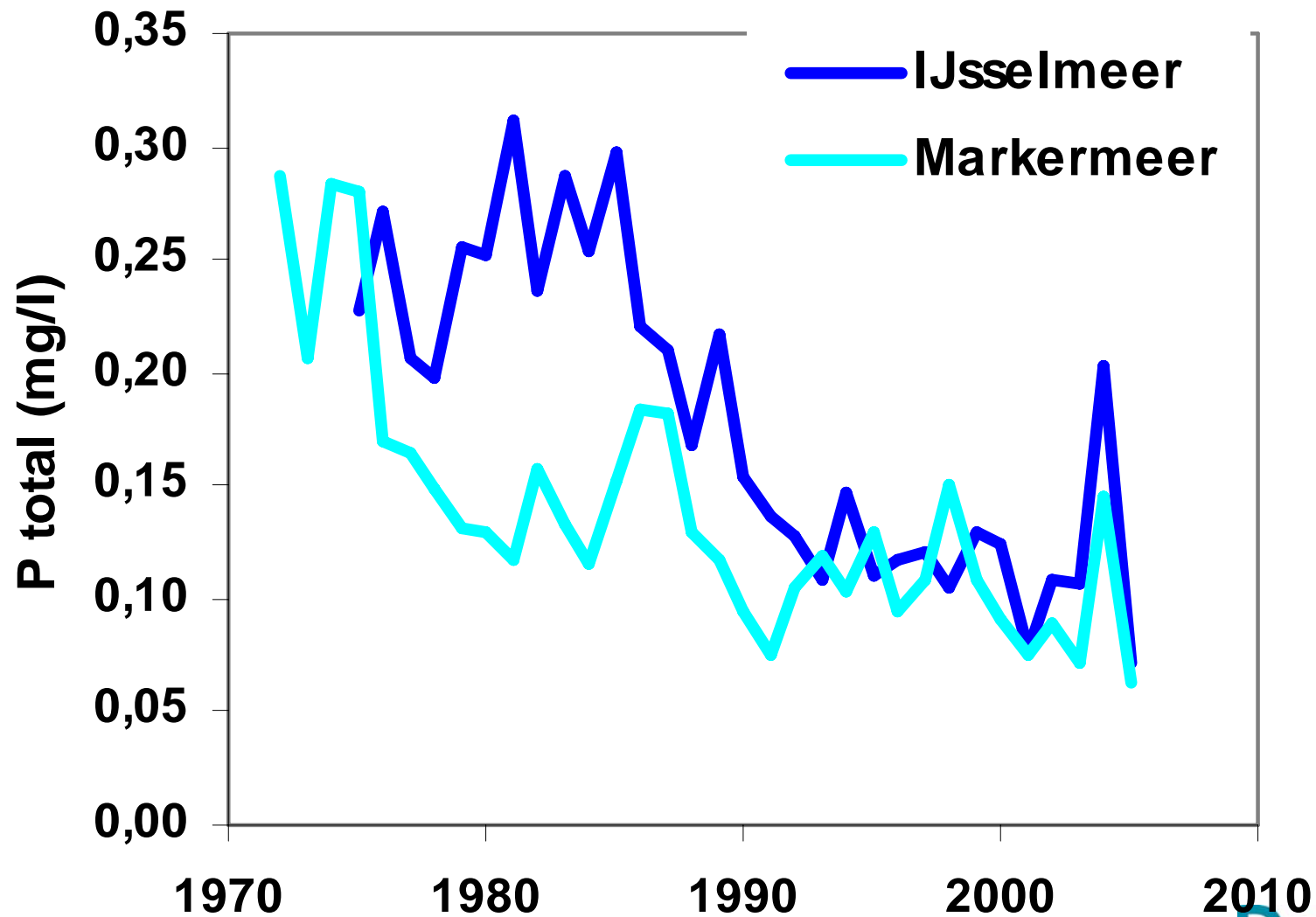
# Lake IJssel Ecosystem



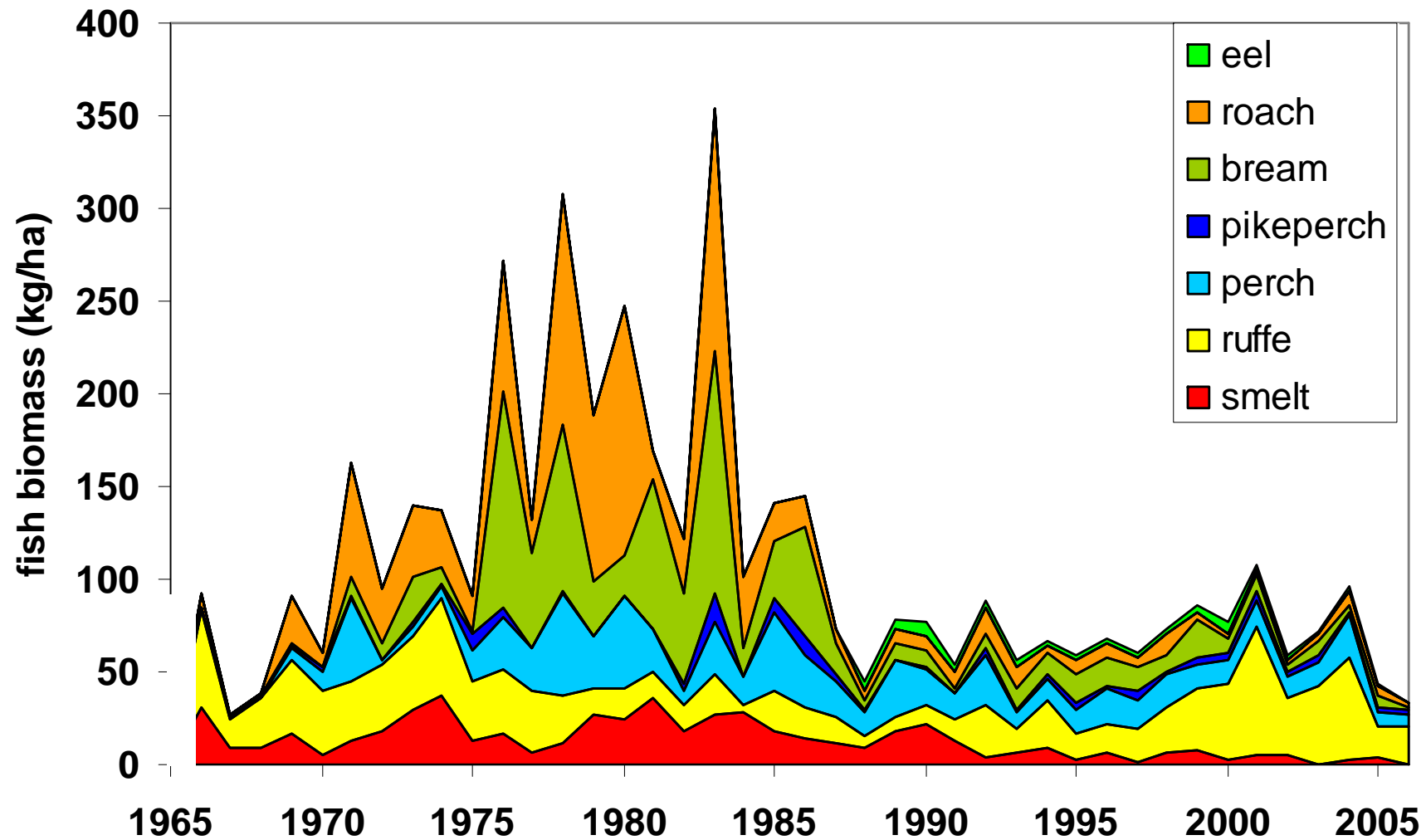
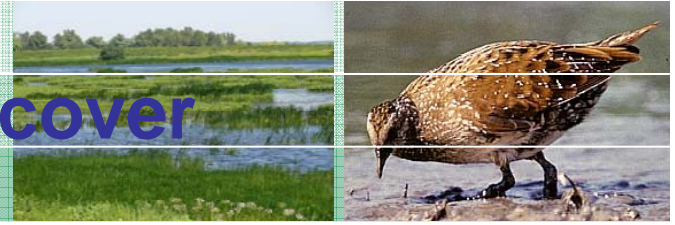
Deltares

October 24, 2008

# Eutrophication problems have been solved...



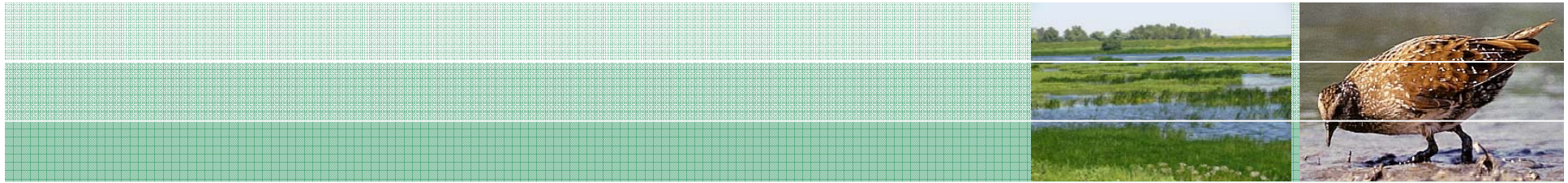
... but fish populations don't recover



# Impact of climate change on Lake IJssel



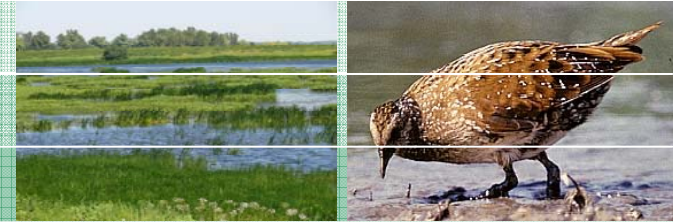
- Filter feeders continue filtering the water during warm winters, even if phytoplankton concentrations are very low
- Filter feeders are declining, due to lack of food during the winter
- As a result, molusc eating birds are declining as well
- The smelt population – a cold water species – is declining
- As smelt is staple food of the predatory fish and fish eating birds, those populations are under threat as well



“Climate adaptation strategies will have a bigger impact on aquatic ecosystems in The Netherlands than climate change in itself”



# The Delta Commission



**DELTA**  **COMMISSIE** 2008

[www.deltacommissie.com](http://www.deltacommissie.com)

## Samen *werken* met **water**

Een land dat leeft, bouwt aan zijn toekomst

Bevindingen van de Deltacommissie 2008

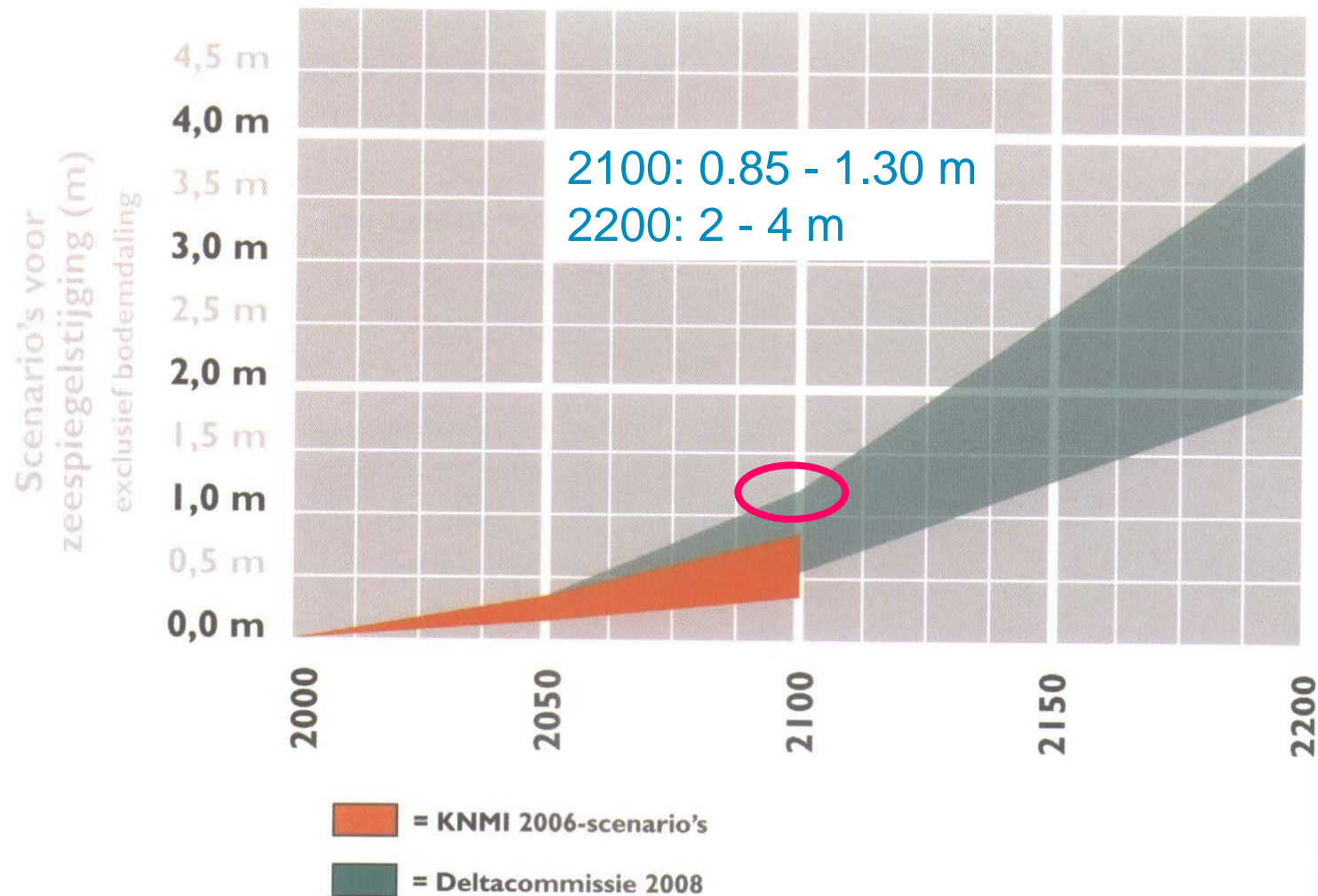
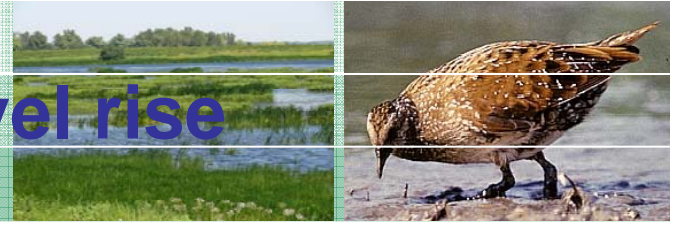


**Deltares**

October 24, 2008



# Worst case scenario for sea level rise



# The Delta Commission: basic principles



## 1. Moral decisions

- we remain collectively responsible for water safety;
- define safety levels in relation to people, economy, environment

## 2. Aspirations

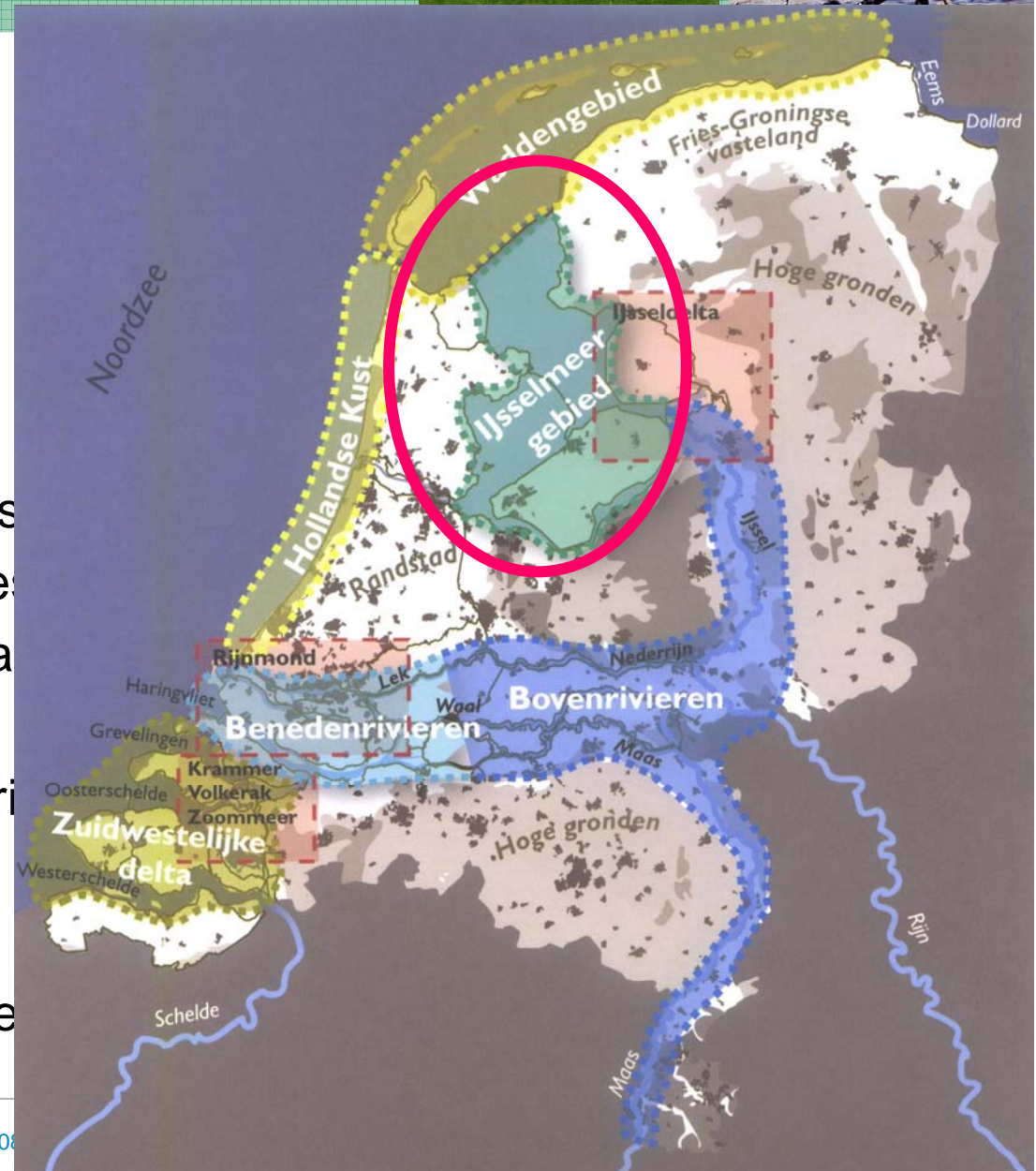
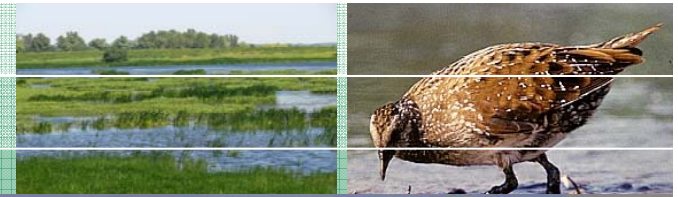
- the Netherlands retains its attractive living environment,
- sustainability as a guiding principle,
- safeguard the availability of quality of surface and drinking water

## 3. Implementation processes

- safety as a central objective
- integrated and multifunctional solutions
- flexibility

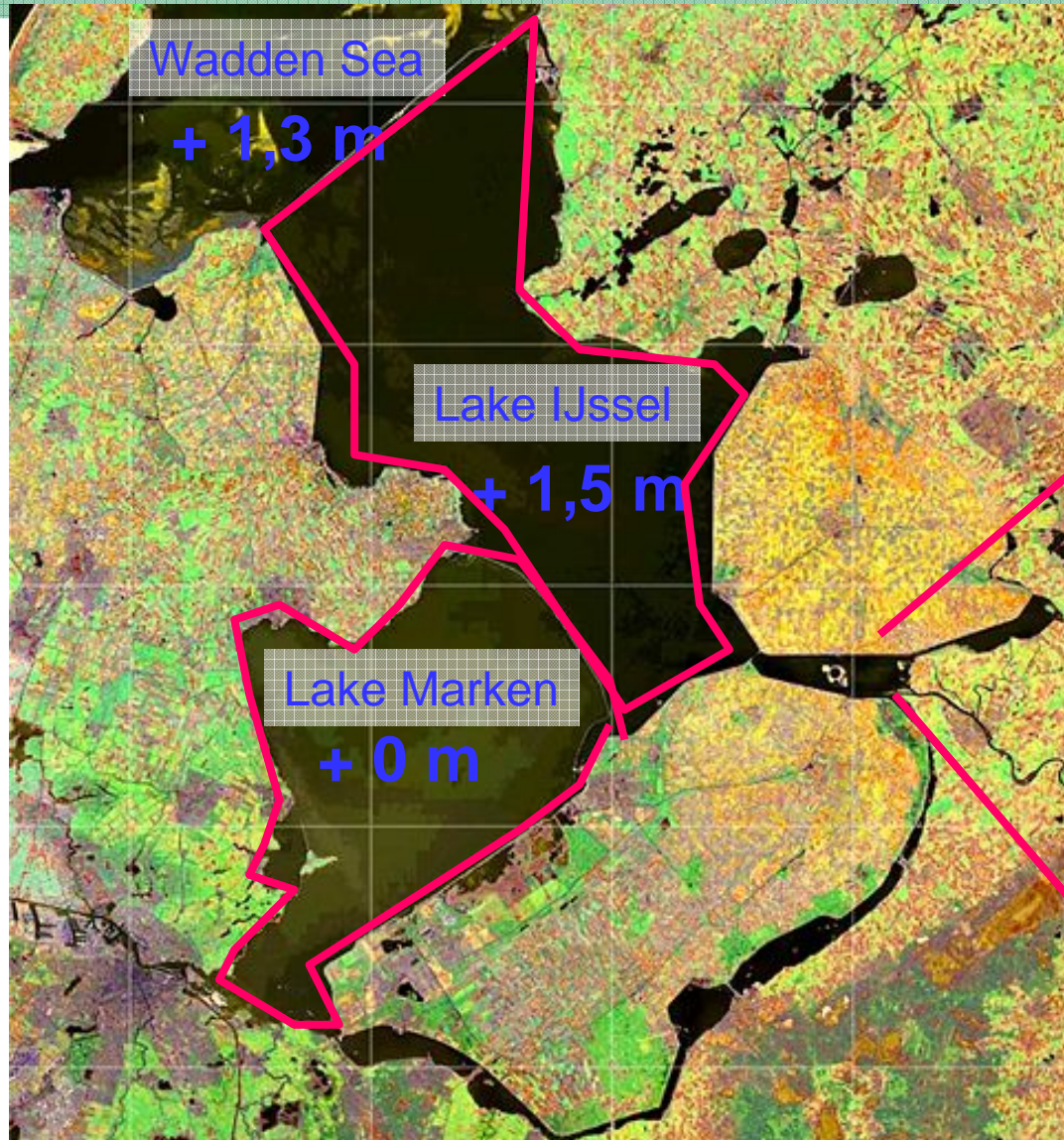
# Twelve recommendations

1. Flood protection level
2. New urban development
3. Areas outside the dikes
4. North Sea coast
5. Wadden Sea area
6. South western Delta: East
7. South western Delta: West
8. South western Delta: Kra
9. The major rivers area
10. Rijnmond (mouth of the ri
11. IJsselmeer area
12. Political administrative, le



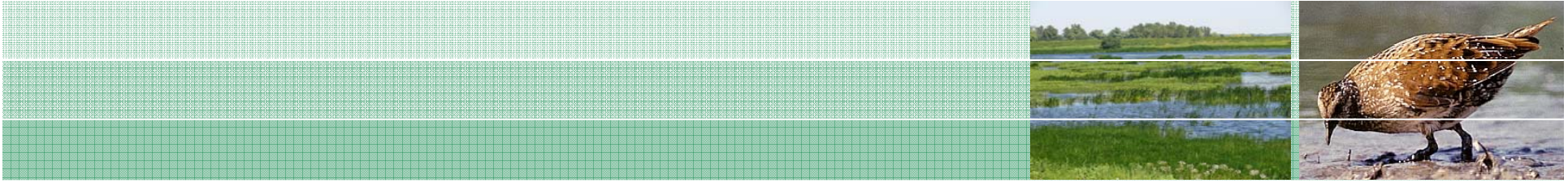


# Lake IJssel: fresh water reservoir, level +1,5 m



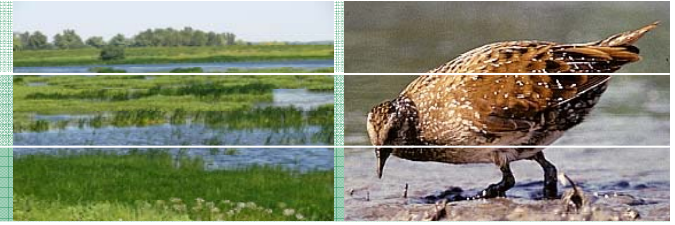
River IJssel  
(+ wetlands)  
**+ 1,5 m**

**Deltares**



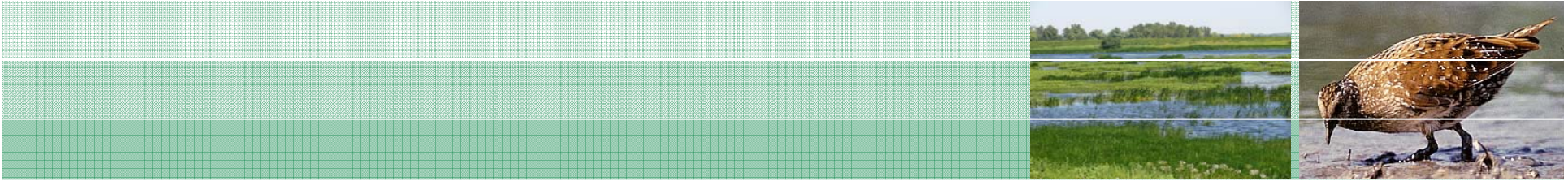
“Comprehensive tools will be needed to discuss the management strategies for Lake IJssel and Lake Marken”

## The next decade



- Several research programmes are initiated to study key lake ecosystem processes and the impact of climate change on those processes, on ecological functioning and the availability of habitats
- Many stakeholders will be involved in the development of an adaptation strategy that both enhances ecological restoration and safety against floods and fresh water supply
- An interactive tool is needed to discuss the different strategies with all stakeholders
- Our experiences with the WFD Explorer will be the starting point for the development of these new tools





**Thank you !**