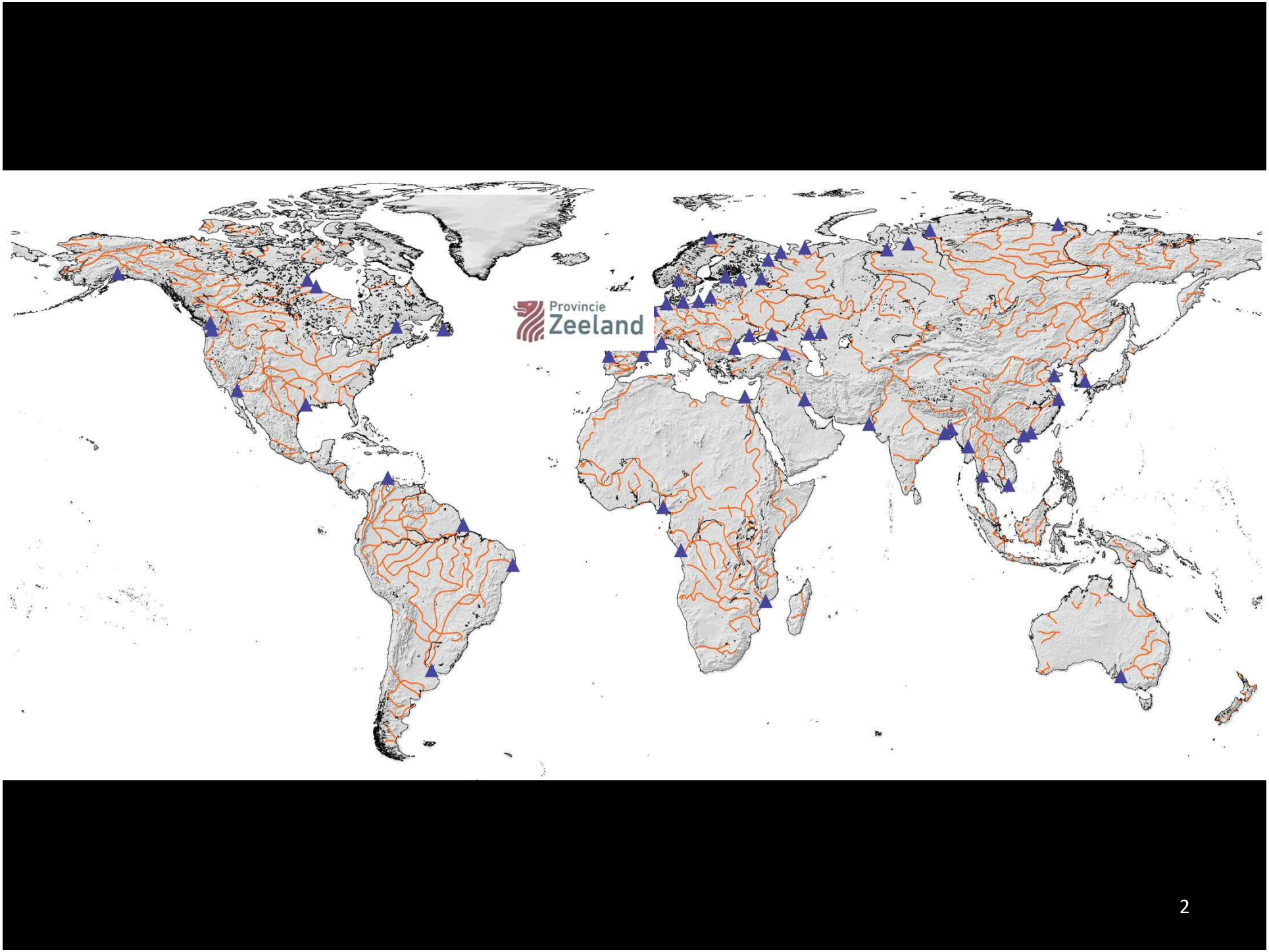
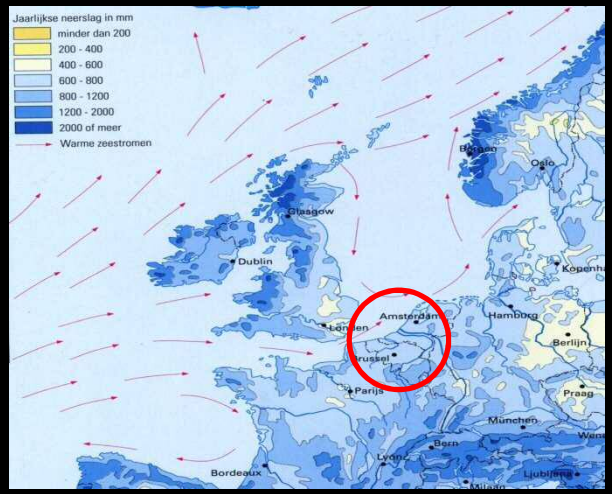
# Delta of Southwest Netherlands
## *past, present and future*

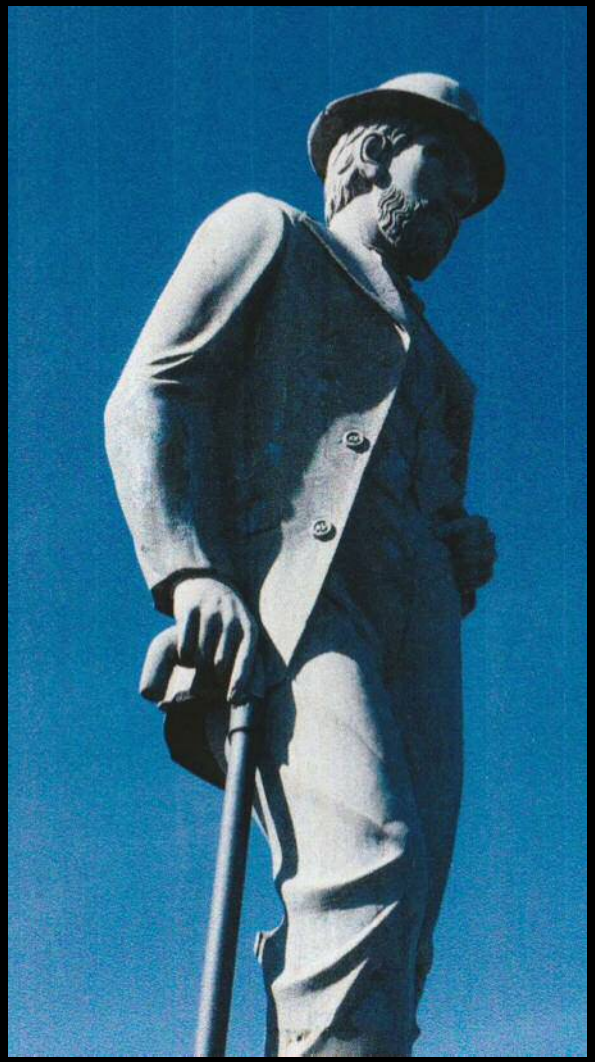

Provincie
Zeeland

# Delta of Southwest Netherlands



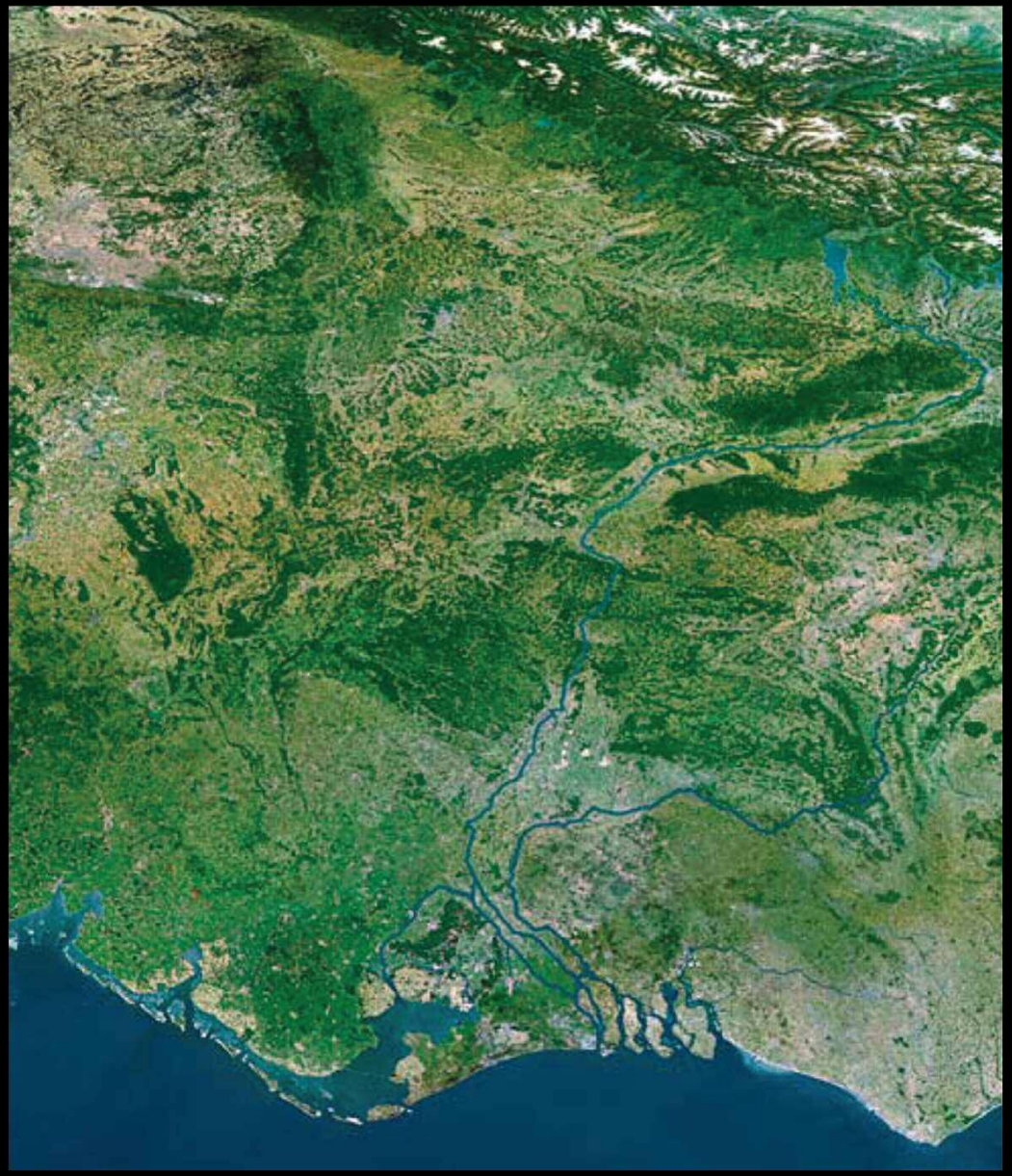

# Delta of Southwest Netherlands

# Johannis de Rijke

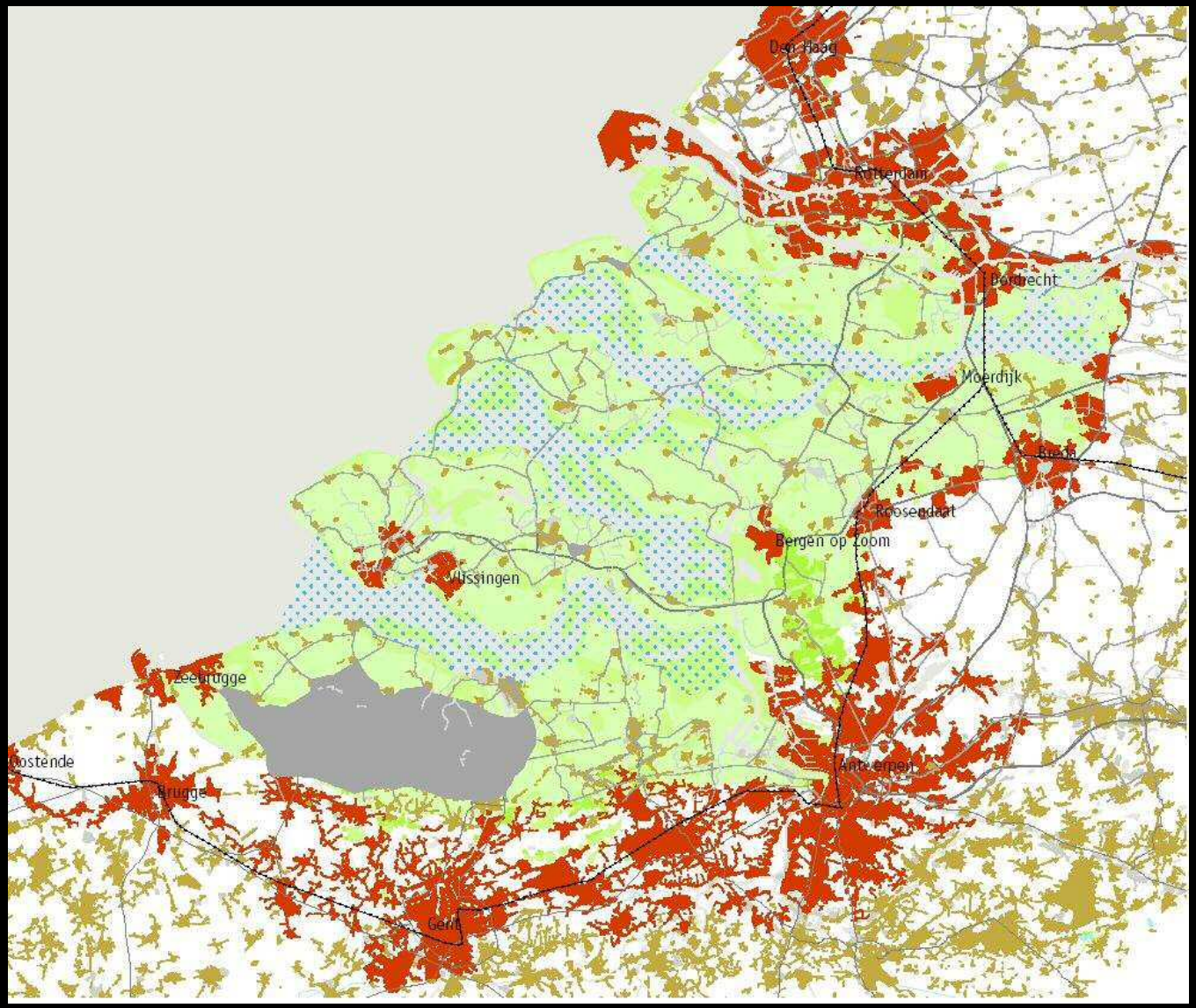


# Delta of Southwest Netherlands

# Rivers Rhine, Meuse and Scheldt

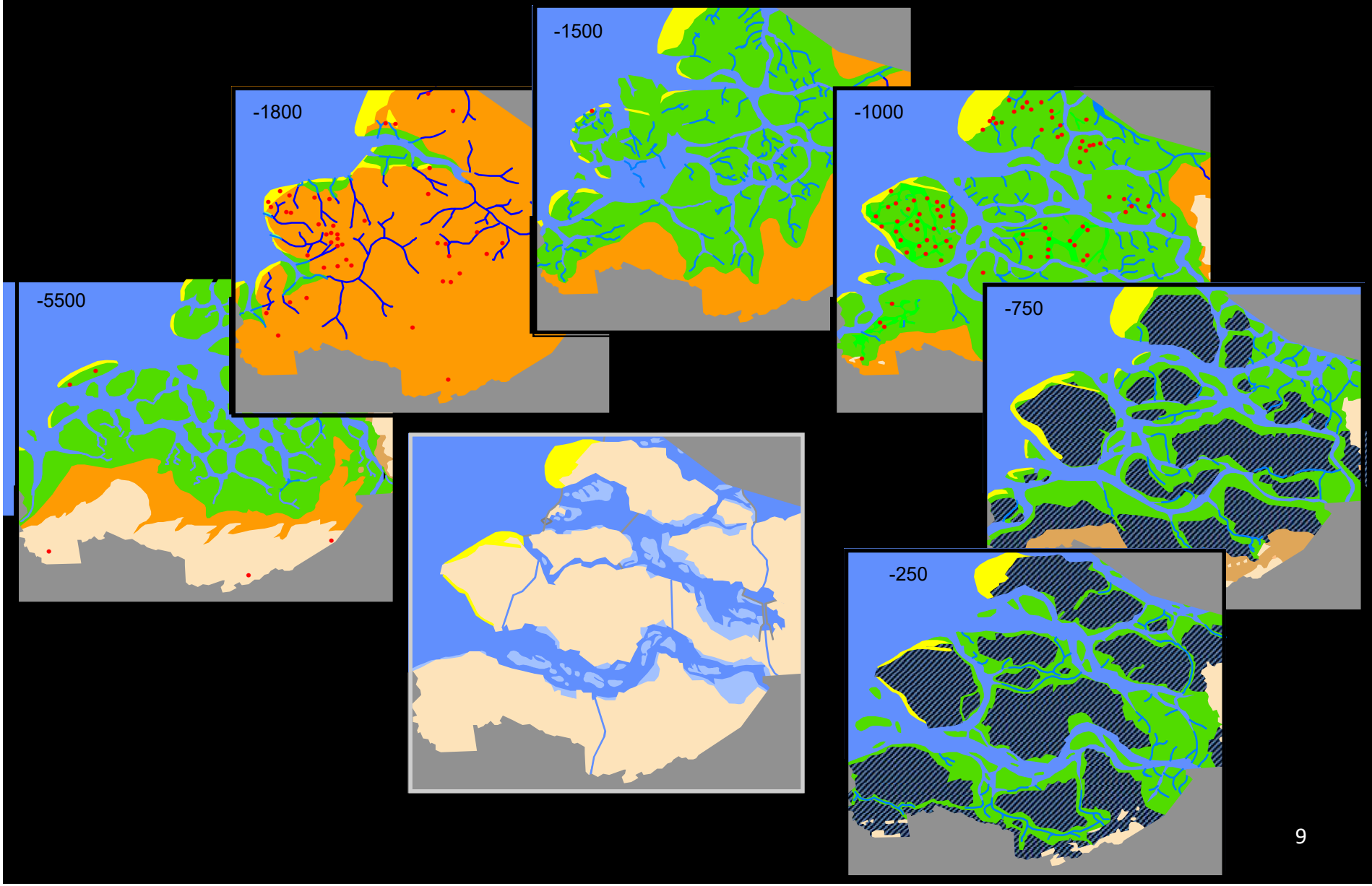


# Blue green heart

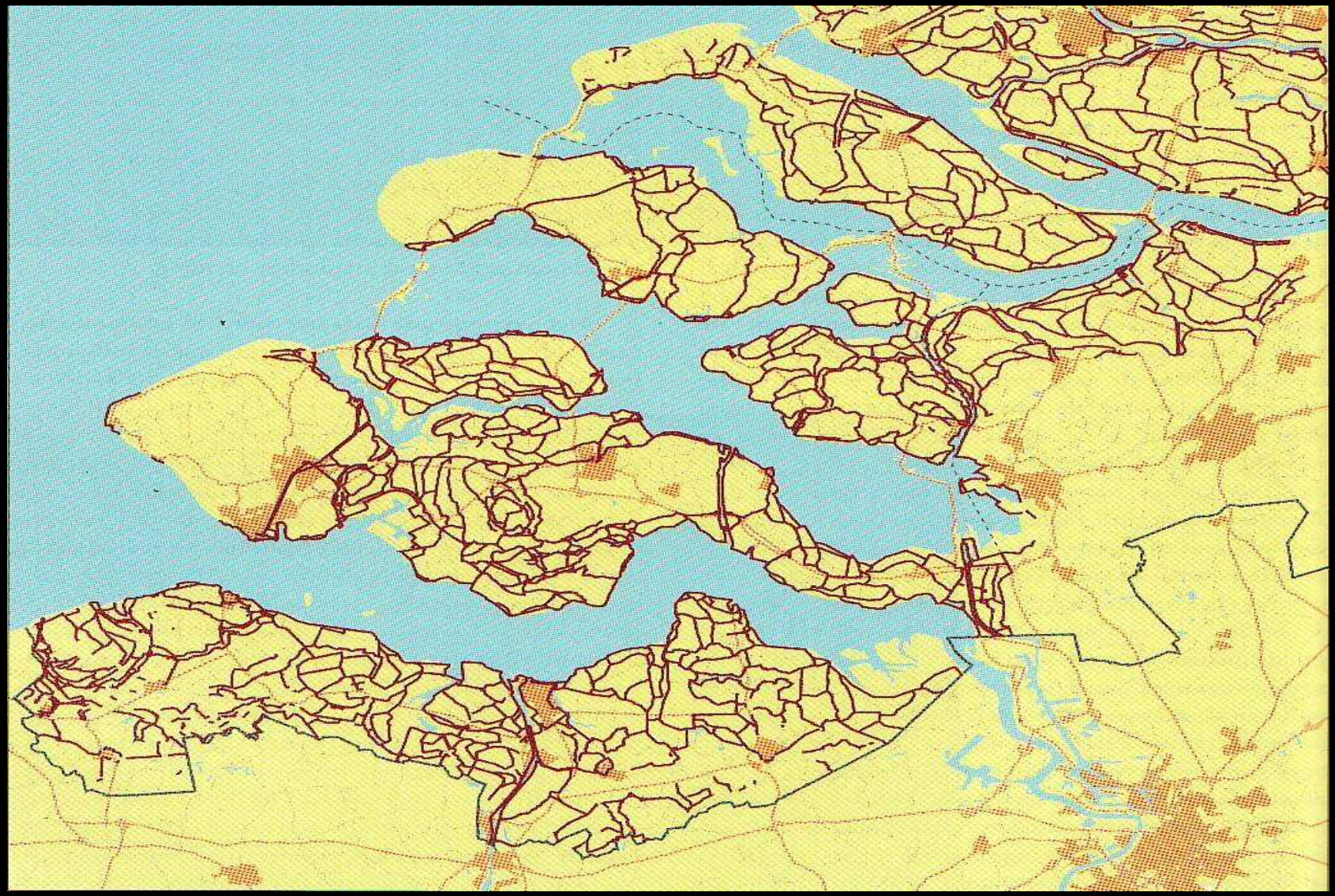



Blue-green heart of a vital urban delta of 20 million people and 2 world harbours (Rotterdam and Antwerp) plus several smaller harbours

# Genesis of the Delta Area



# Network of dikes



# Flood disasters

838 Dutch coastal area completely flooded
1404 First St. Elizabeths Flood
1421 Second St. Elizabeths Flood
1530 St. Felix Evil Saturday
1570 All Saints Flood
1574 Holland and Zeeland flooded
1682 161 Polders in Zeeland flooded
1808 Floods in Zeeland and Flanders
1906 Large parts of Zeeland flooded
1916 Zeeland and North-Holland flooded

# Flood disaster of 1953

# original Deltaplan

# Haringvliet sluices

# original Deltaplan

# Storm Surge Barrier Oosterschelde

# original Deltaplan

# Brouwersdam

# Situation after completion of Deltaworks

# Integrated watermanagement better than sector focussed watermanagement

Water Enemy

&

Water Friend

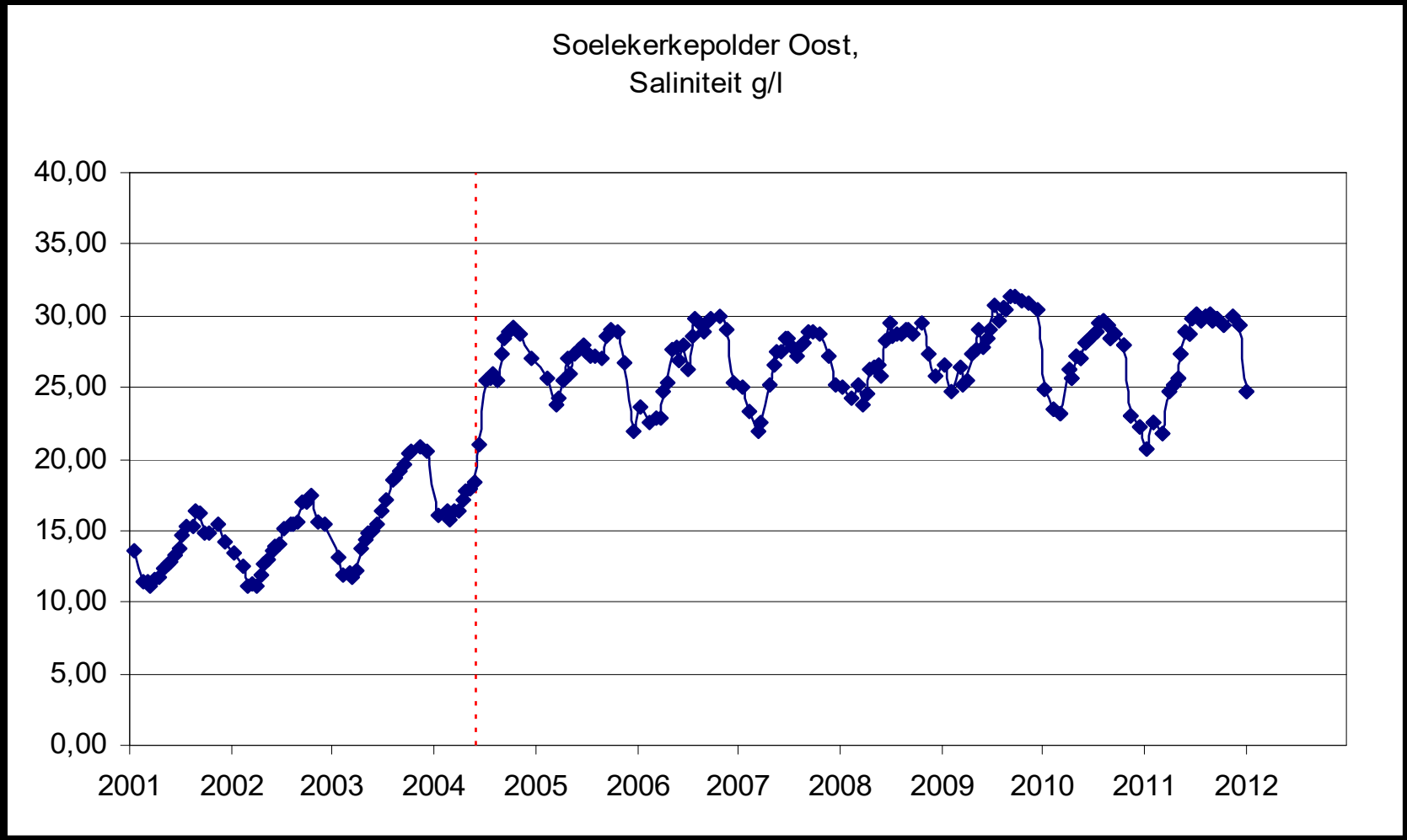
# Aspects of estuarine dynamics

- Nutrient dynamics
- Hydro morphological dynamics
- Vertical mixing of water
- Salinity gradients

# Nutrients: Lake Veere

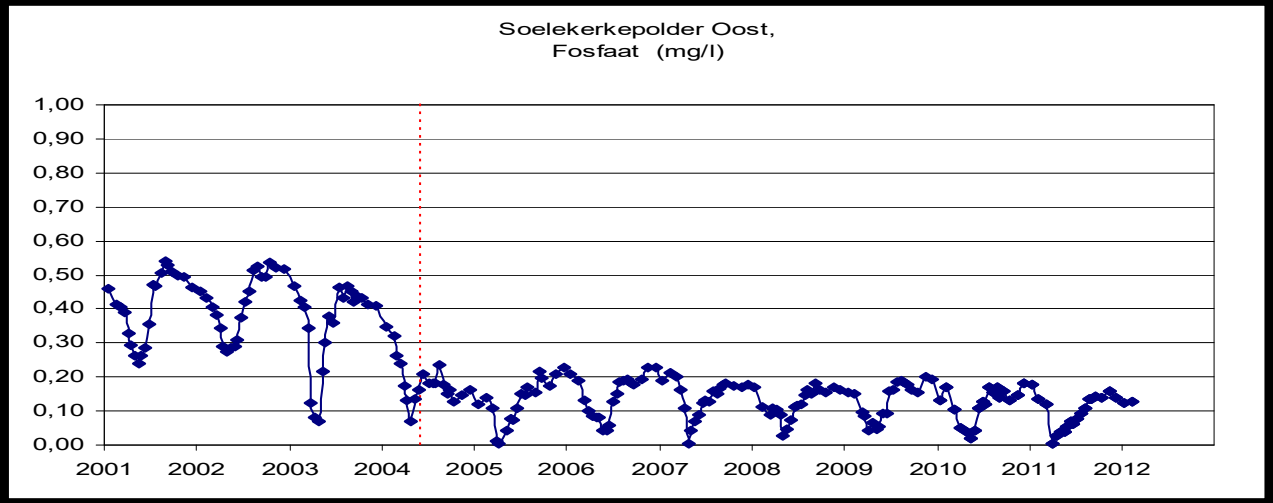
# Lake Veere

# Salinity (g/l)

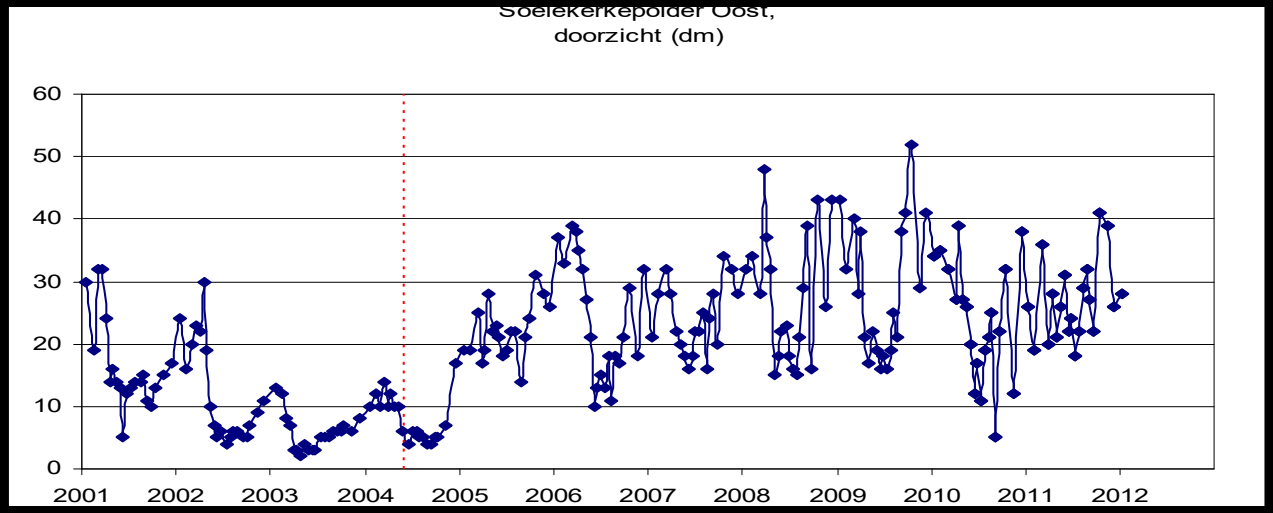

Soelekerkepolder Oost,
Saliniteit g/l
40,00
35,00
30,00
25,00
20,00
15,00
10,00
5,00
0,00
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

# Lake Veere

Phosphate (mg/l)



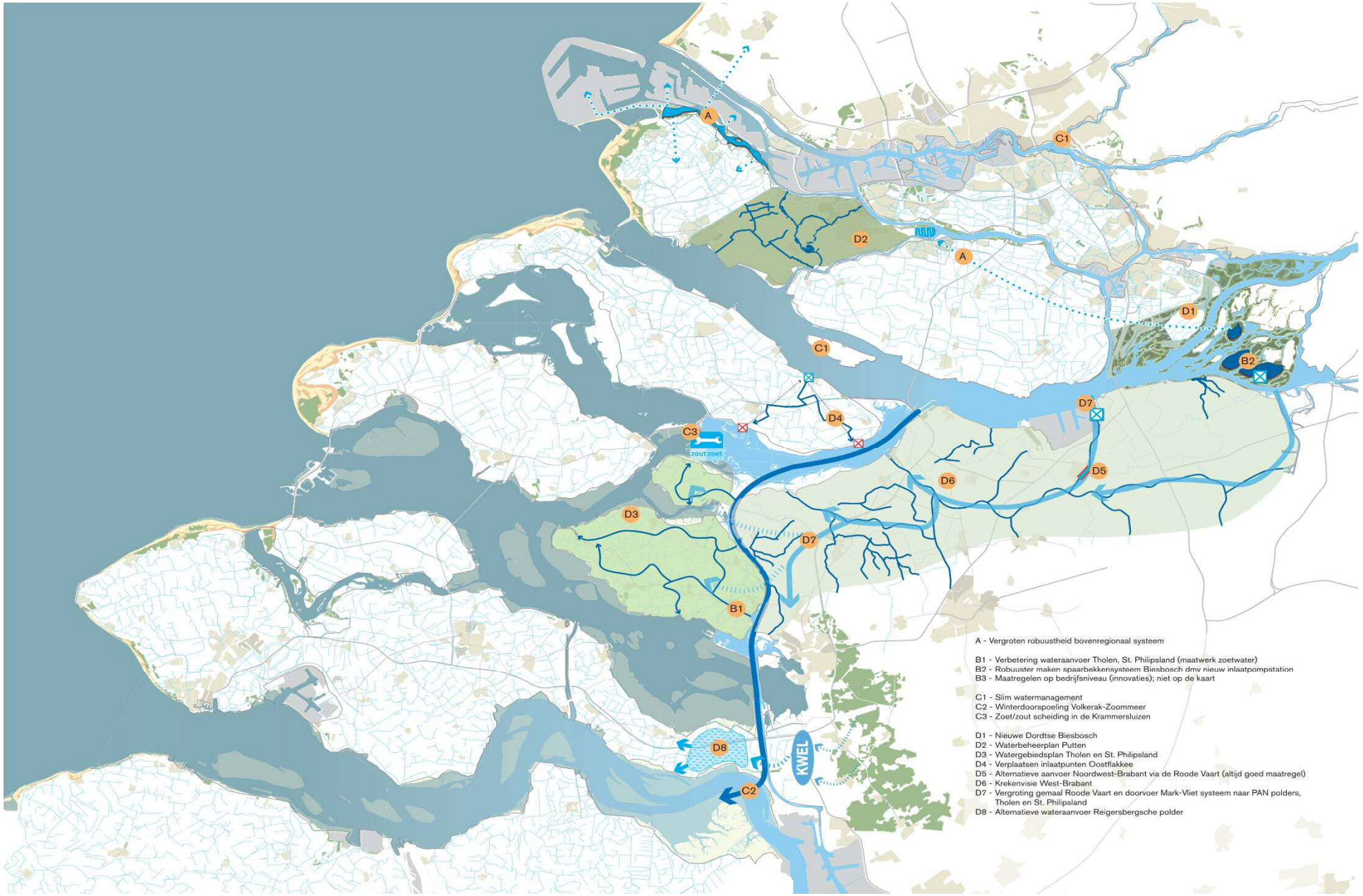

Transparancy (dm)



# Nutrients: Lake Volkerak-Zoom

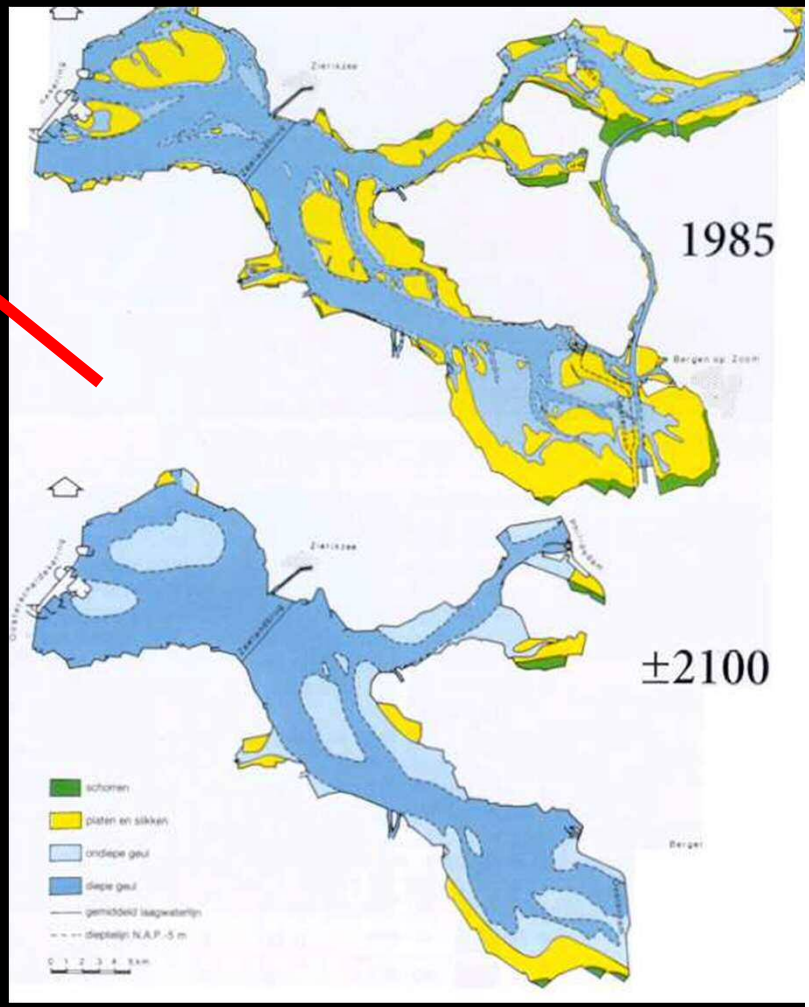
# Blue green algae in Lake Volkerak

# Alternative freshwater supply



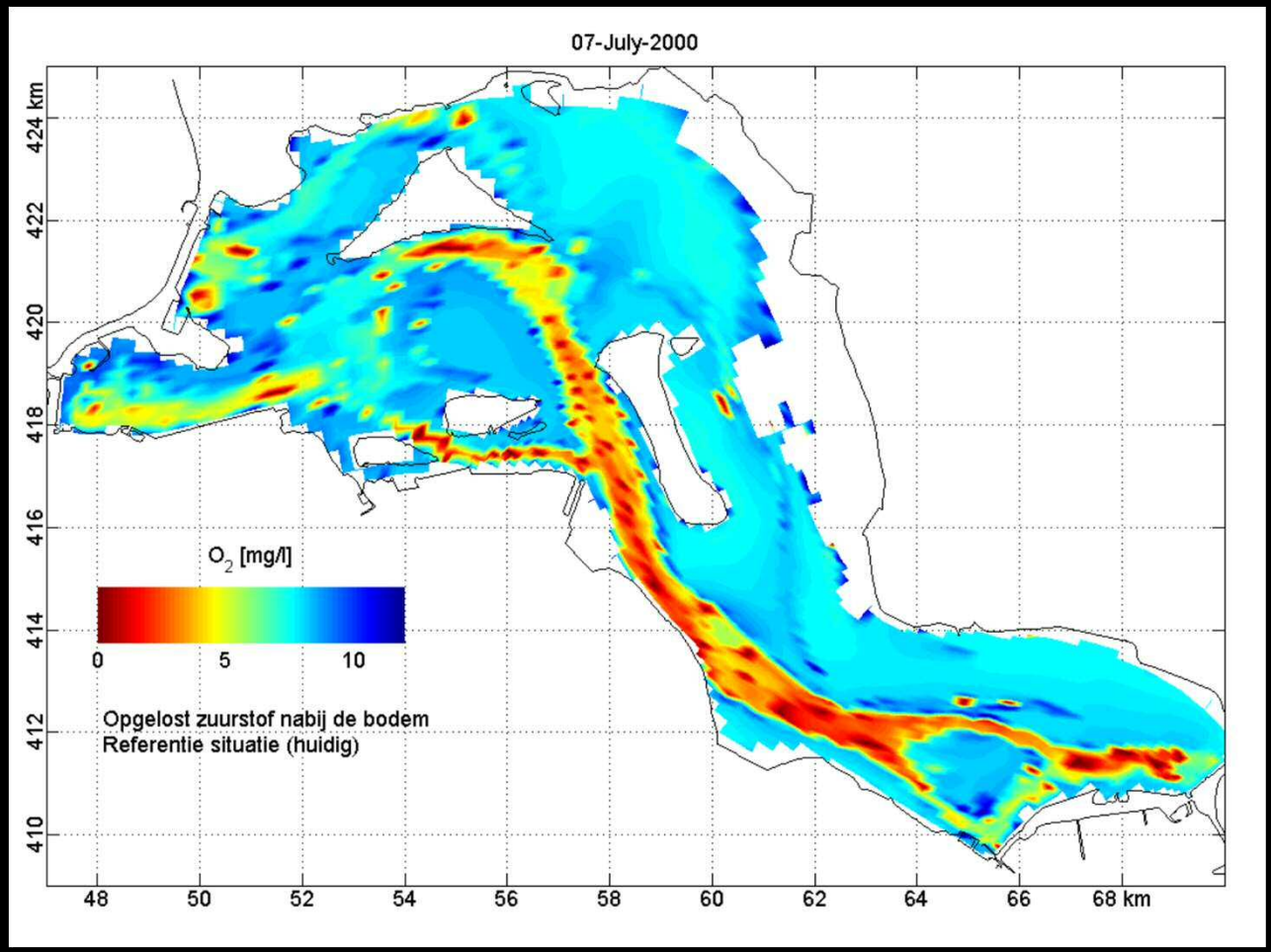
# Hydro-morphology: Oosterschelde

# Oosterschelde: Hydro morphological processes out of balance

# Vertical mixing of water: Lake Grevelingen

# Current situation

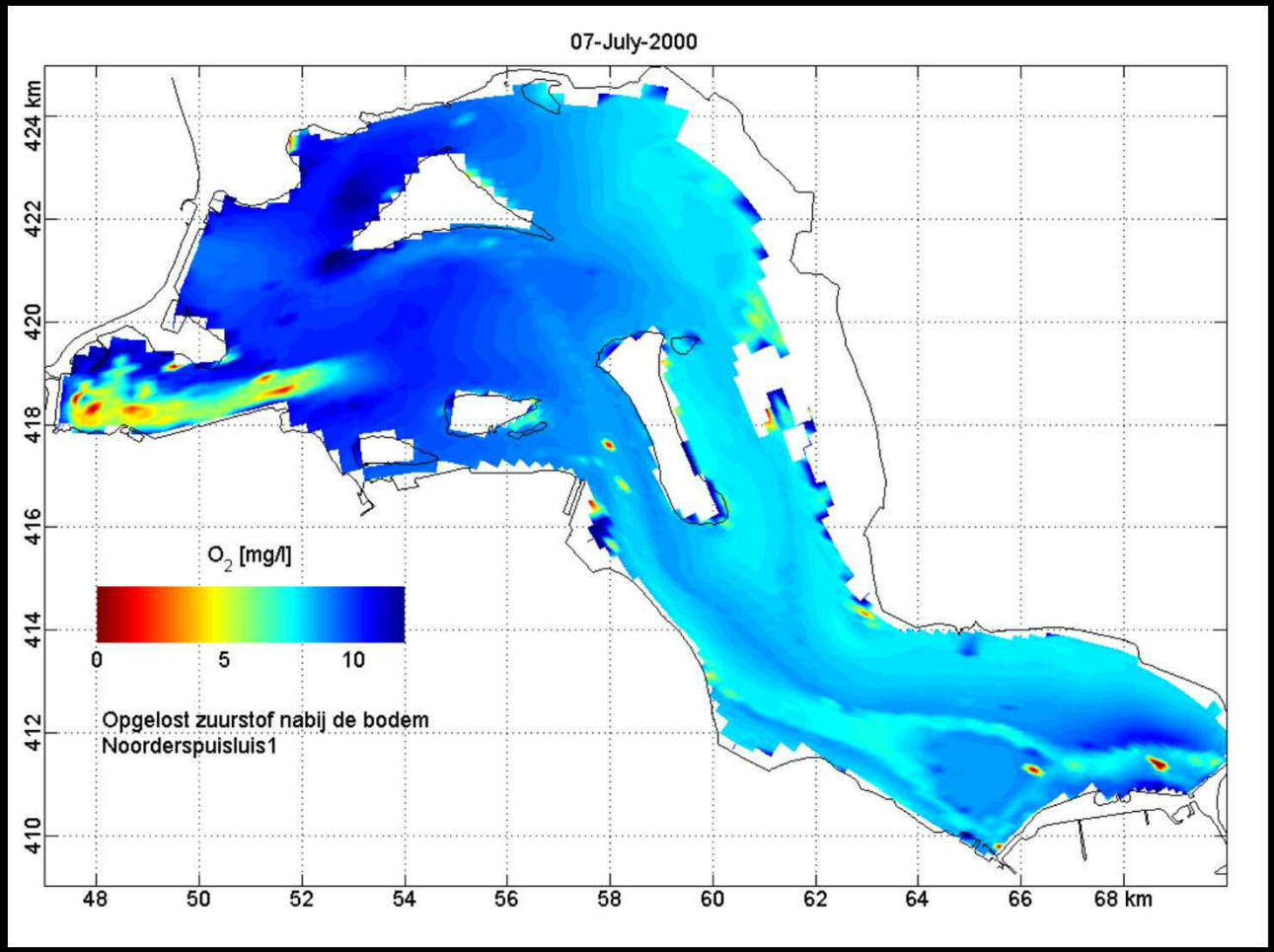


# Anaerobic bottomlayers

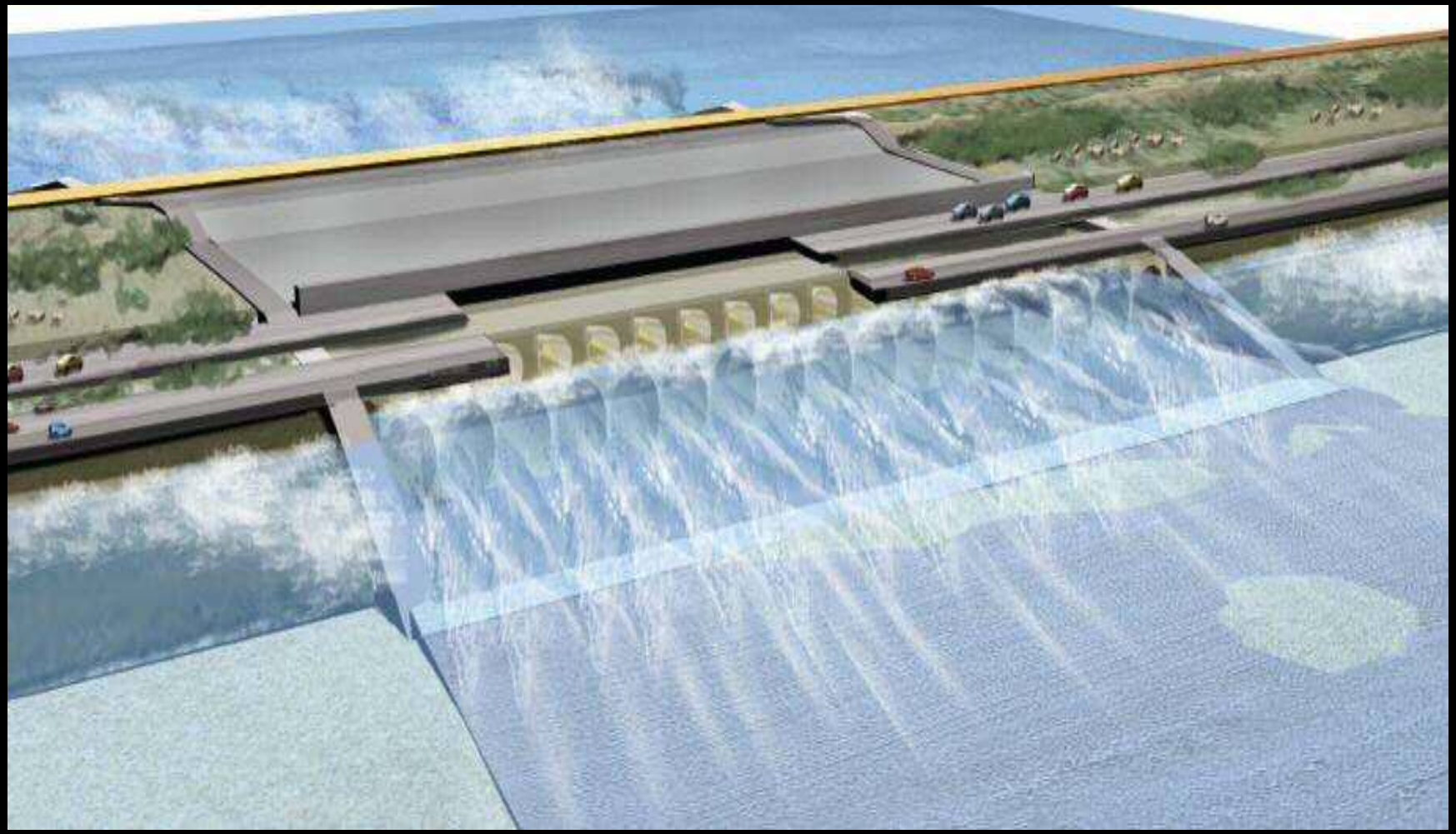
**< 4 m**

**> 4 m**

# Reopening the dam with 50 cm tidal difference



# Tidal energy plant Brouwersdam



# Salinity gradients: Haringvliet

# Haringvliet sluices

# Freshwater Supply

# Implementation period

- Step-by-step testing
- Learning by doing by learning by….

- Salt distribution ⇐⇒ Sluice Management
- Ecological monitoring

# The frontdoor to River Rhine and  River Meuse open!

# Lessons learned in The Netherlands

- Bring back the tides!
- With integrated water management instead of sector-focused water management drawbacks of the Delta works can be avoided
- Ecosystems are complex

Nature is the best engineer

Think twice before you interfere

(Henk Saeijs)


Thank you