




Research Group  
Ecosystem Management  
University of Antwerp



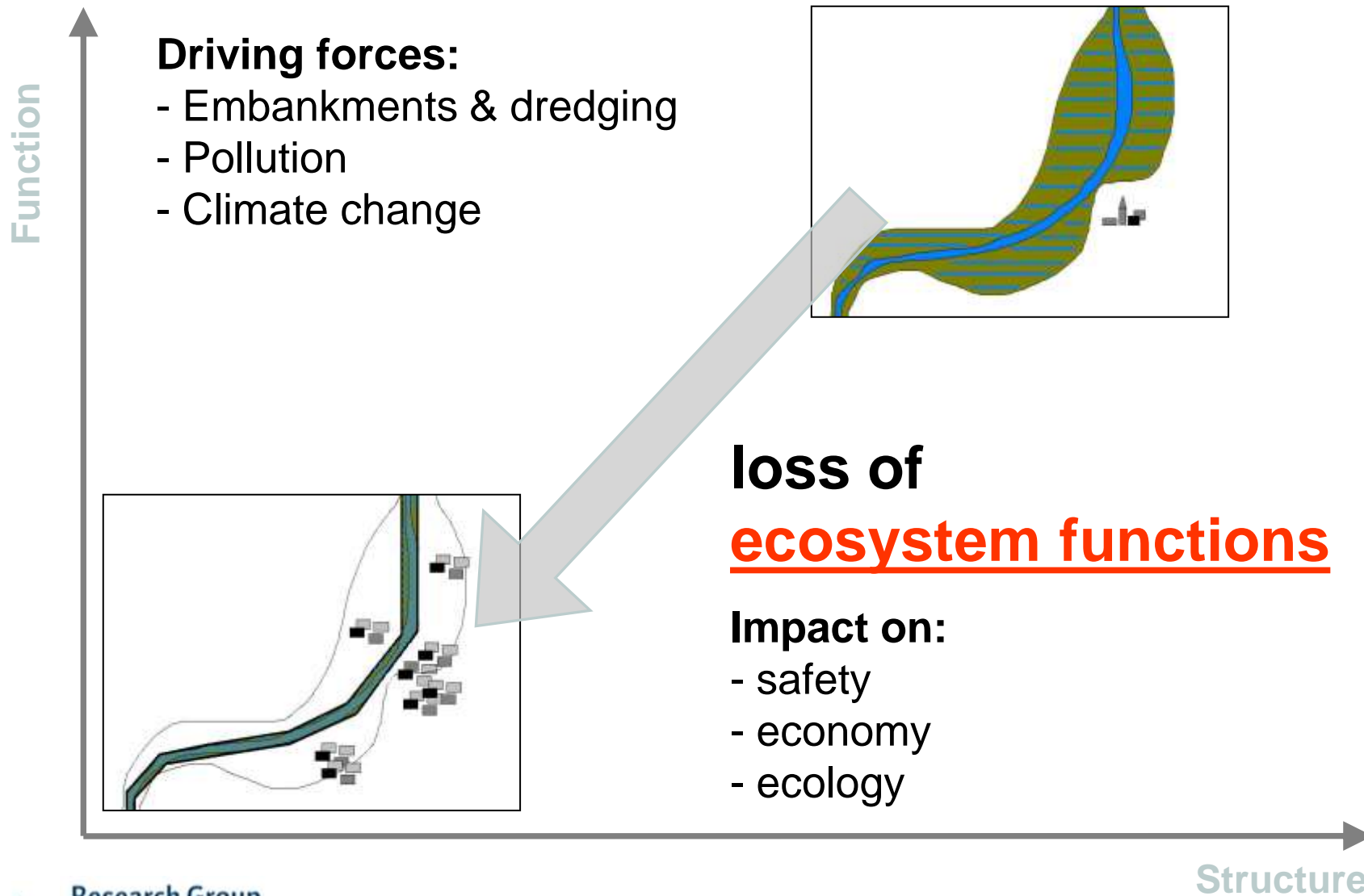
# Lippenbroek: restoring ecosystem functions

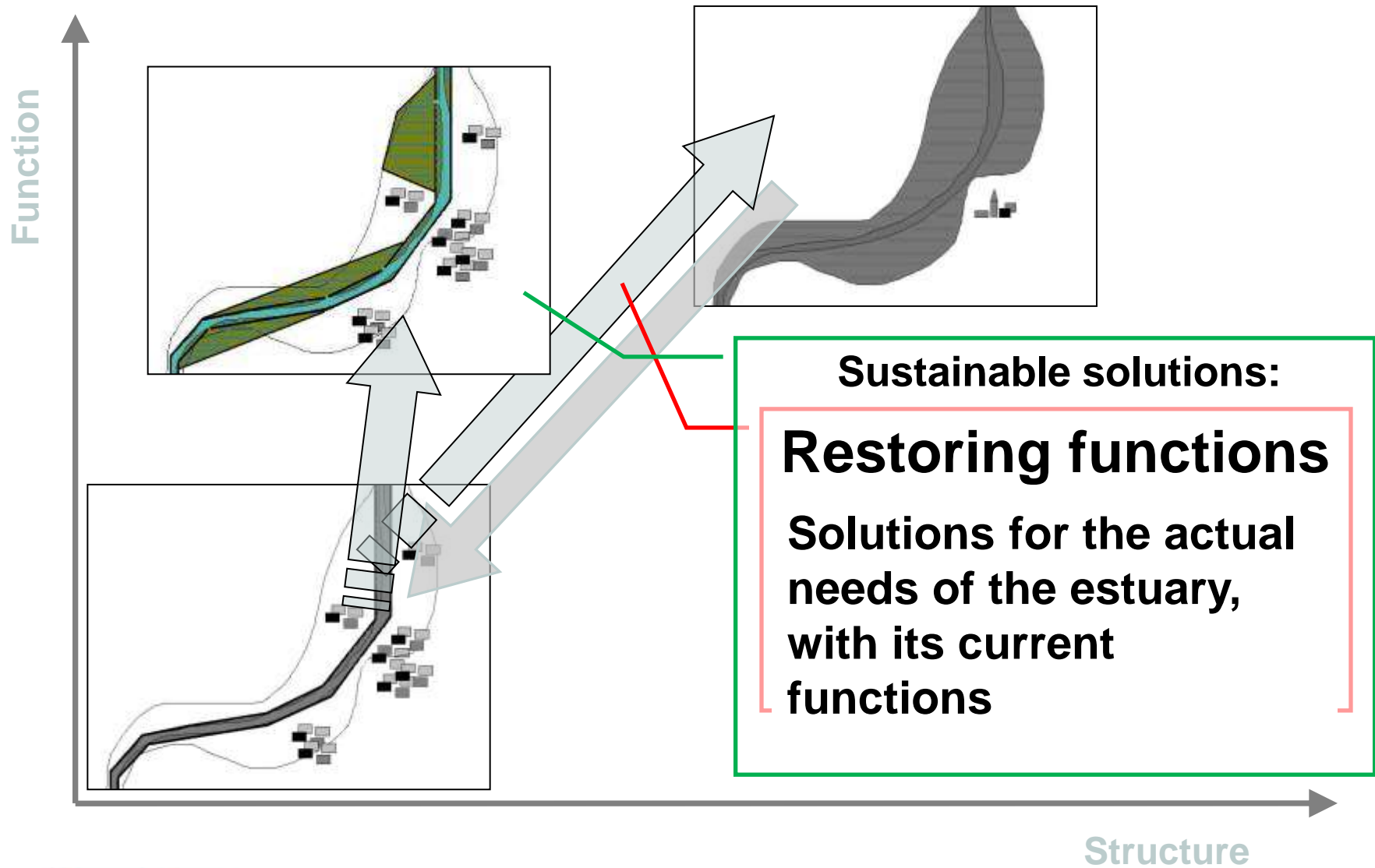
CWE, 3 July 2014

Tom Maris, Lotte Oosterlee & Patrick Meire



**Lippenbroek: constructed tidal wetland  
with sluice system: Controlled Reduced Tide  
Freshwater part of Schelde estuary  
experimental site of 10 ha  
restoring ecosystem functions**





# How restoring intertidal habitat functions?

# Restoring tidal habitat

## *Managed realignment*



*Lillo*

## *Controlled reduced tide*

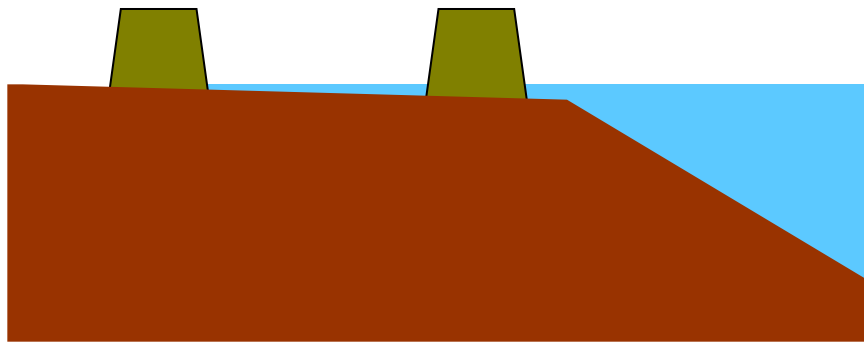


*Lippenbroek*

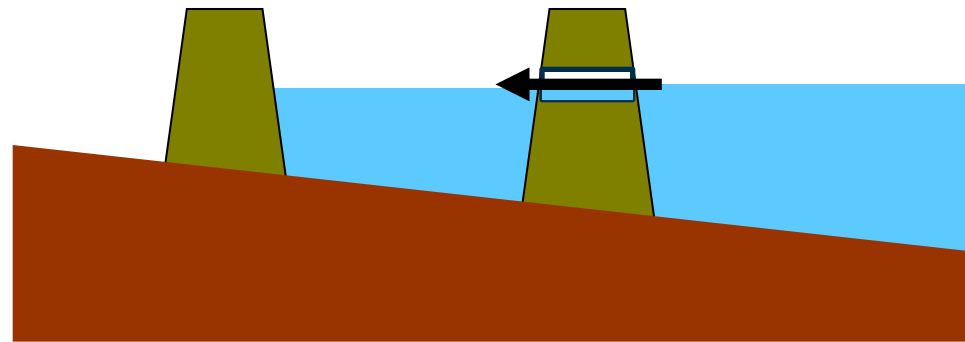
# Restoring tidal habitat

***Managed realignment***

***Controlled reduced tide***



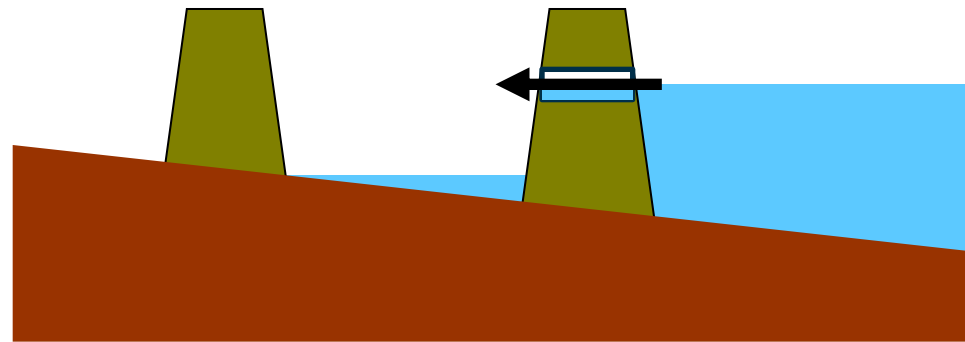
Area with high elevation  
suitable for marsh development



Area with low elevation  
=> Adapting the tide to  
the level of the polder

# Restoring tidal habitat

***Controlled reduced tide  
=> restoring nature***

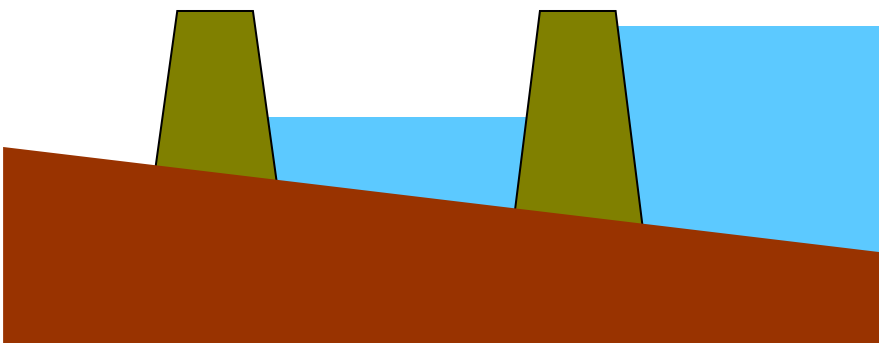


Area with low elevation  
=> Adapting the tide to  
the level of the polder



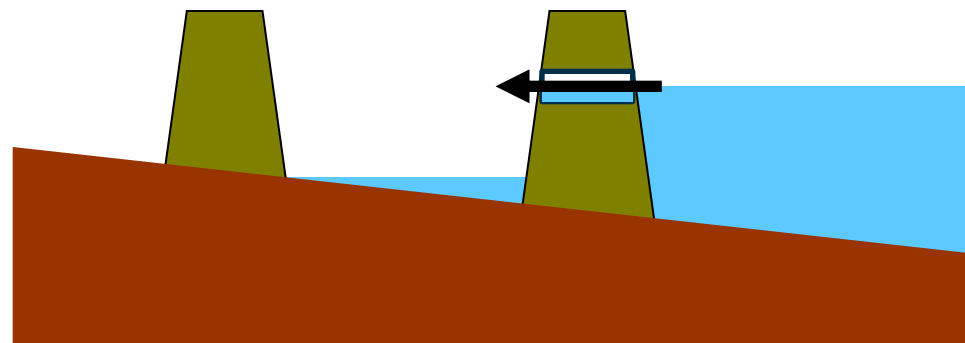
# Restoring tidal habitat

***Flood control area***  
***=> restoring safety***



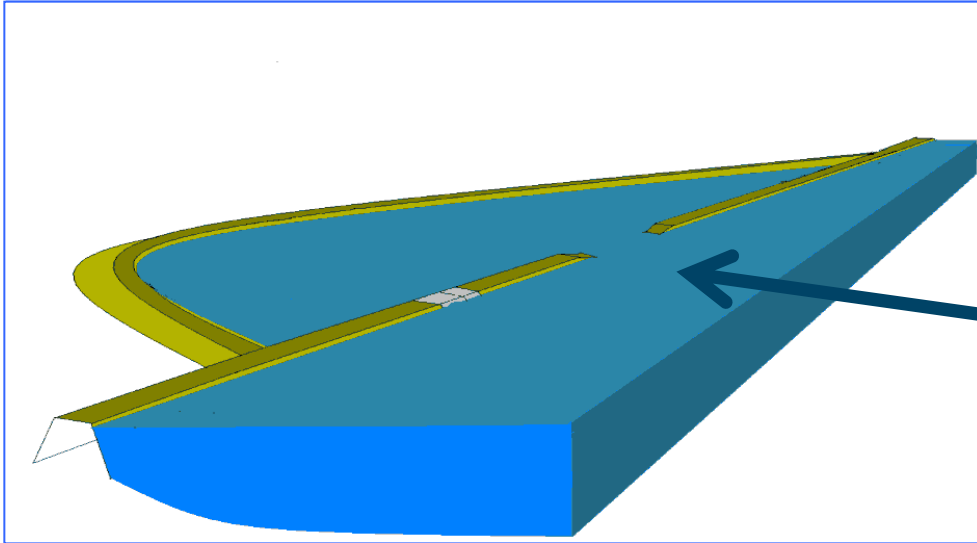
Area with low elevation

***Controlled reduced tide***  
***=> restoring nature***



Area with low elevation  
=> Adapting the tide to  
the level of the polder

# Combination: FCA - CRT



**SAFETY**  
During a storm  
(once a year)

**Overflow dike**



**SAFETY**  
**During a storm**  
**(6-12-2013)**

**Overflow dike**

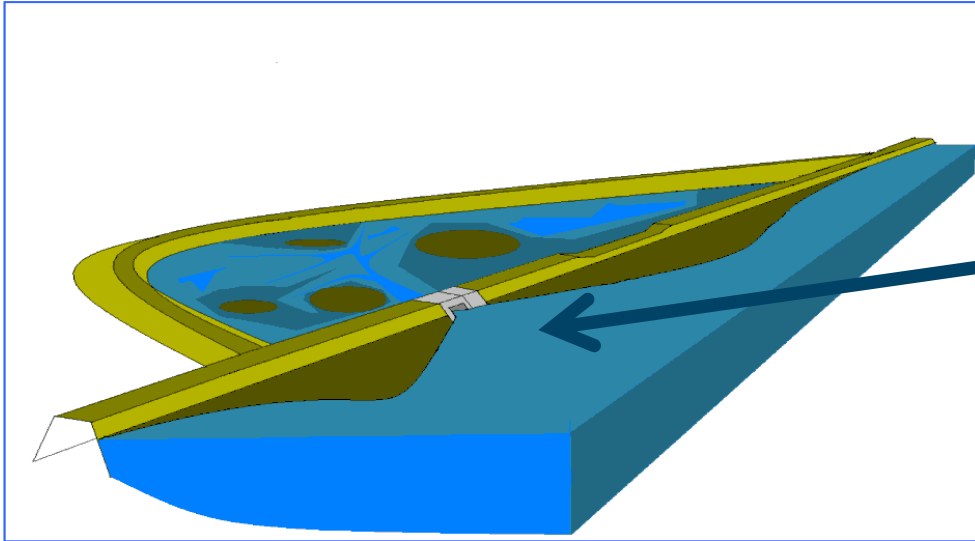


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# Combination: FCA - CRT



**Nature restoration  
Twice a day  
Inlet – outlet sluice  
spring tide**





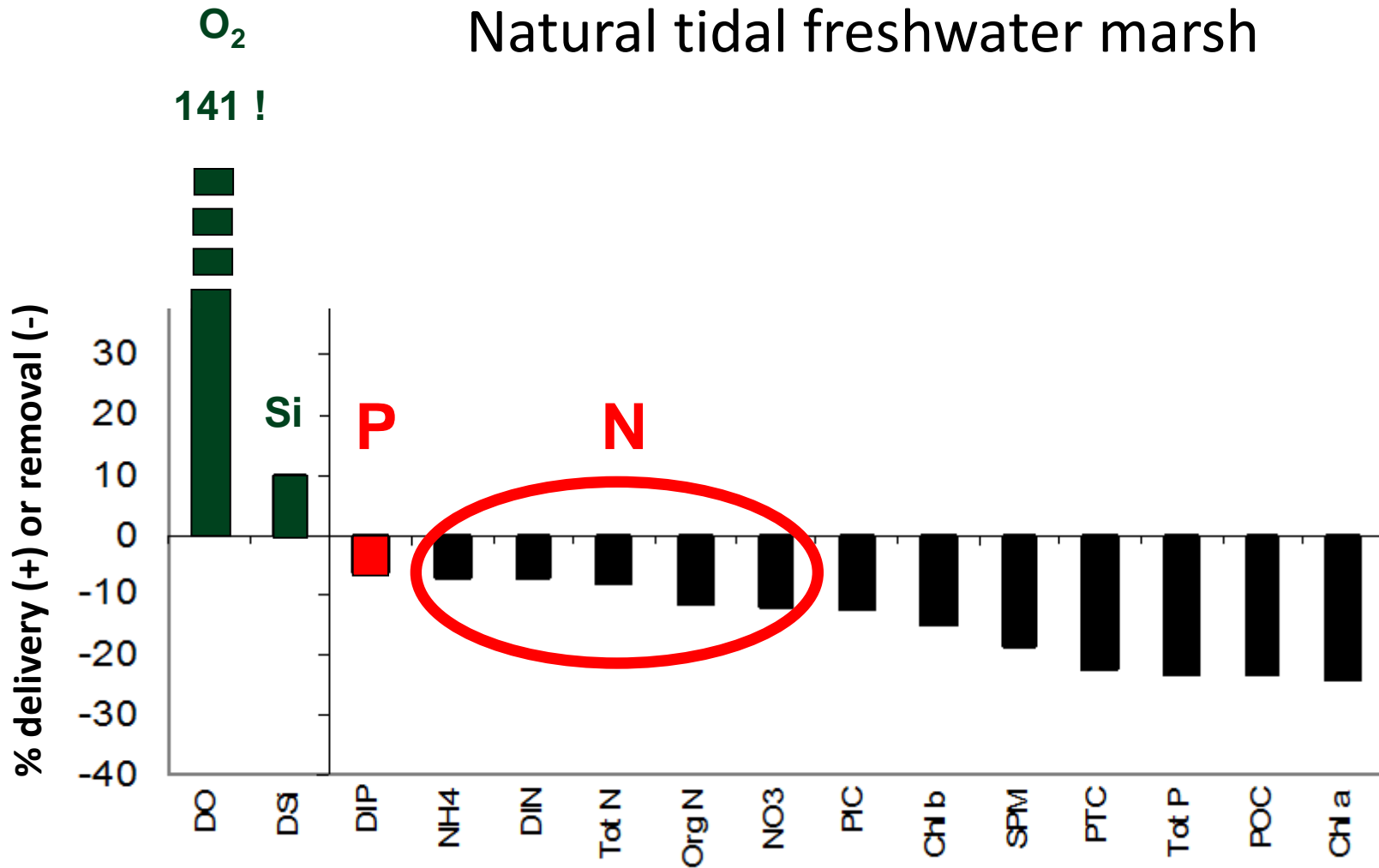
# Goal: Restoring functions

Creating the right tidal conditions  
for tidal marsh development

→ range in inundation frequencies

# Restoring functions: nutrient cycling

Natural tidal freshwater marsh

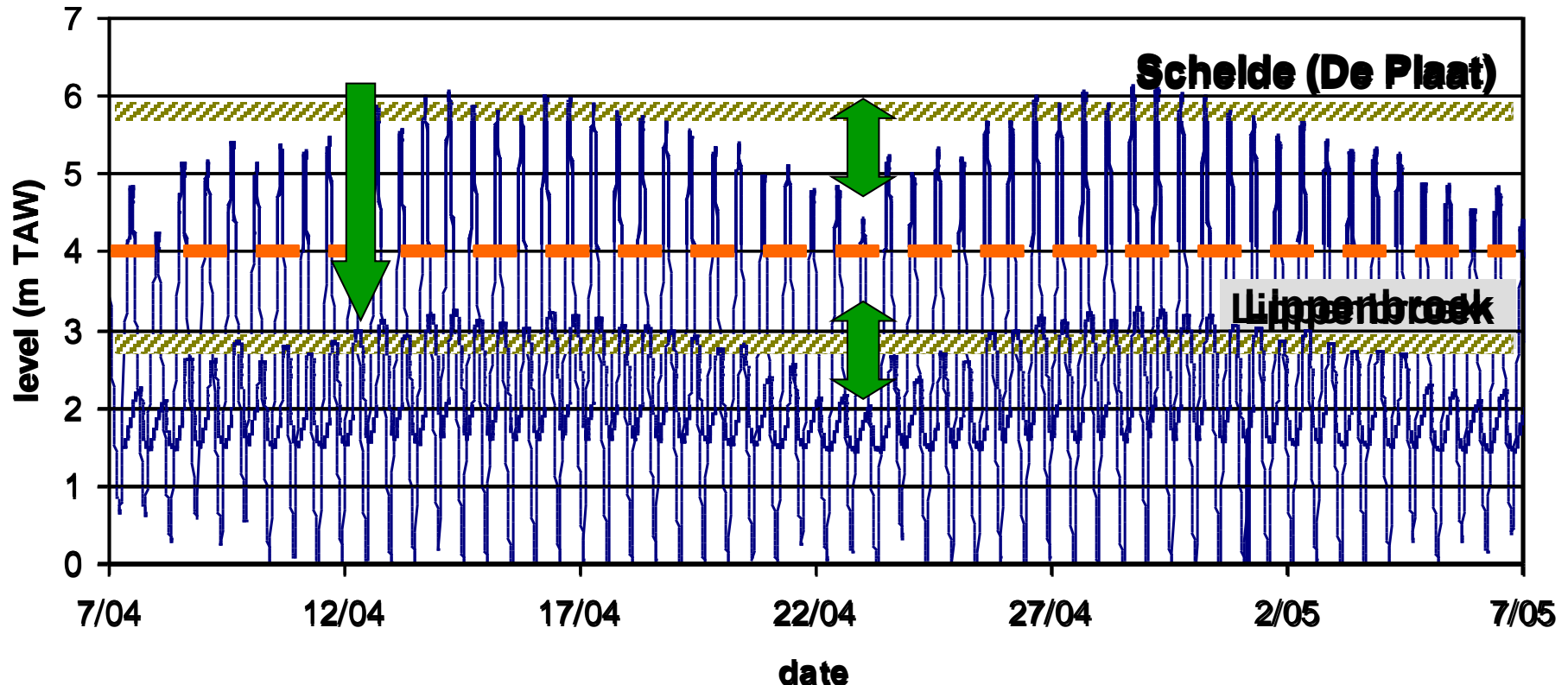


# Research questions for Lippenbroek

- Can we create the right tidal conditions for marsh development?
- Can we expect similar functioning?
  - e.g. Fish habitat: Jan Breine
  - Nutrient cycling
  - Sediments, vegetation, benthos, birds, ...

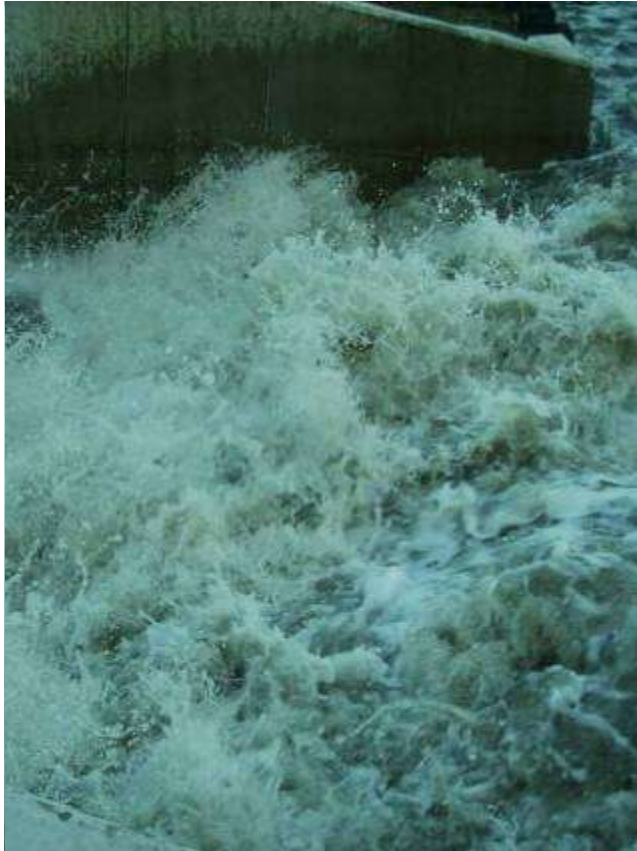


# Results: tidal range

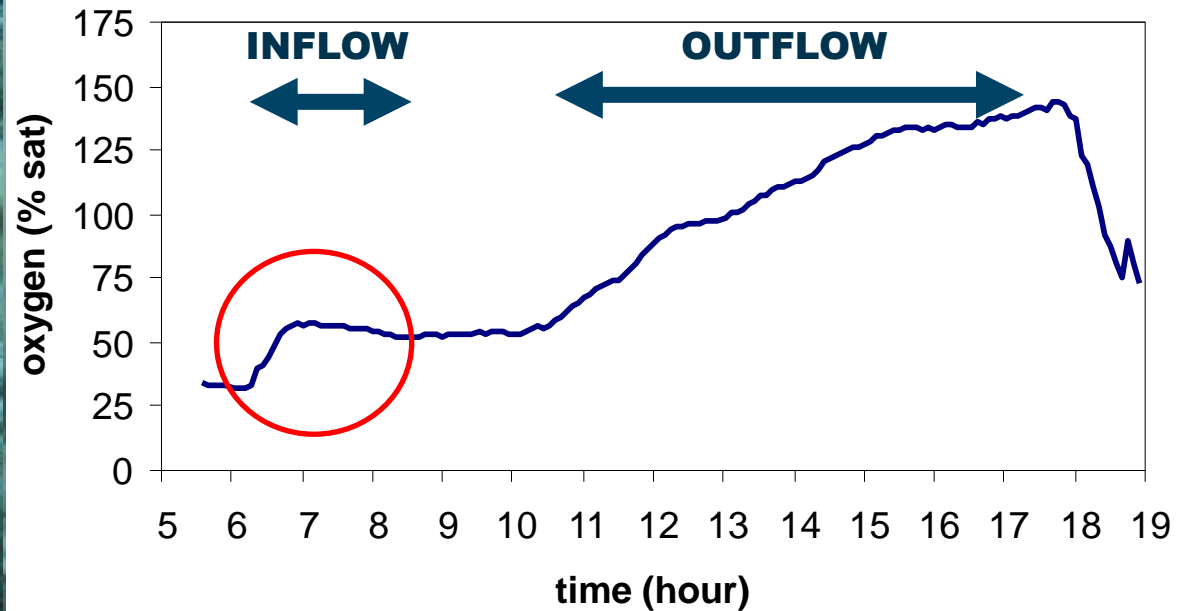


- ❖ reduction of tides with 3 meter
- ❖ No reduction of spring-neap tide variation

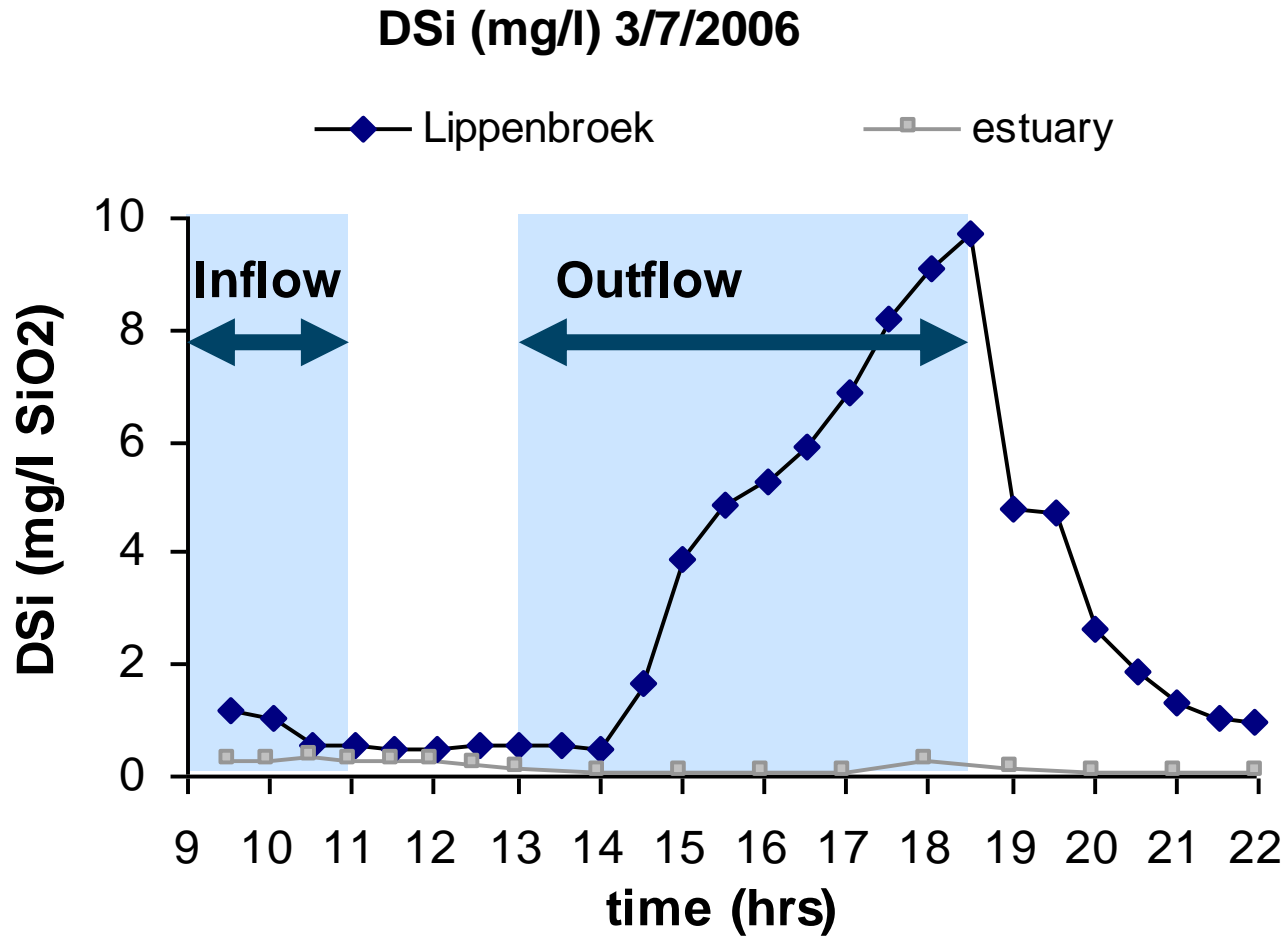
# Results: oxygen delivery !!



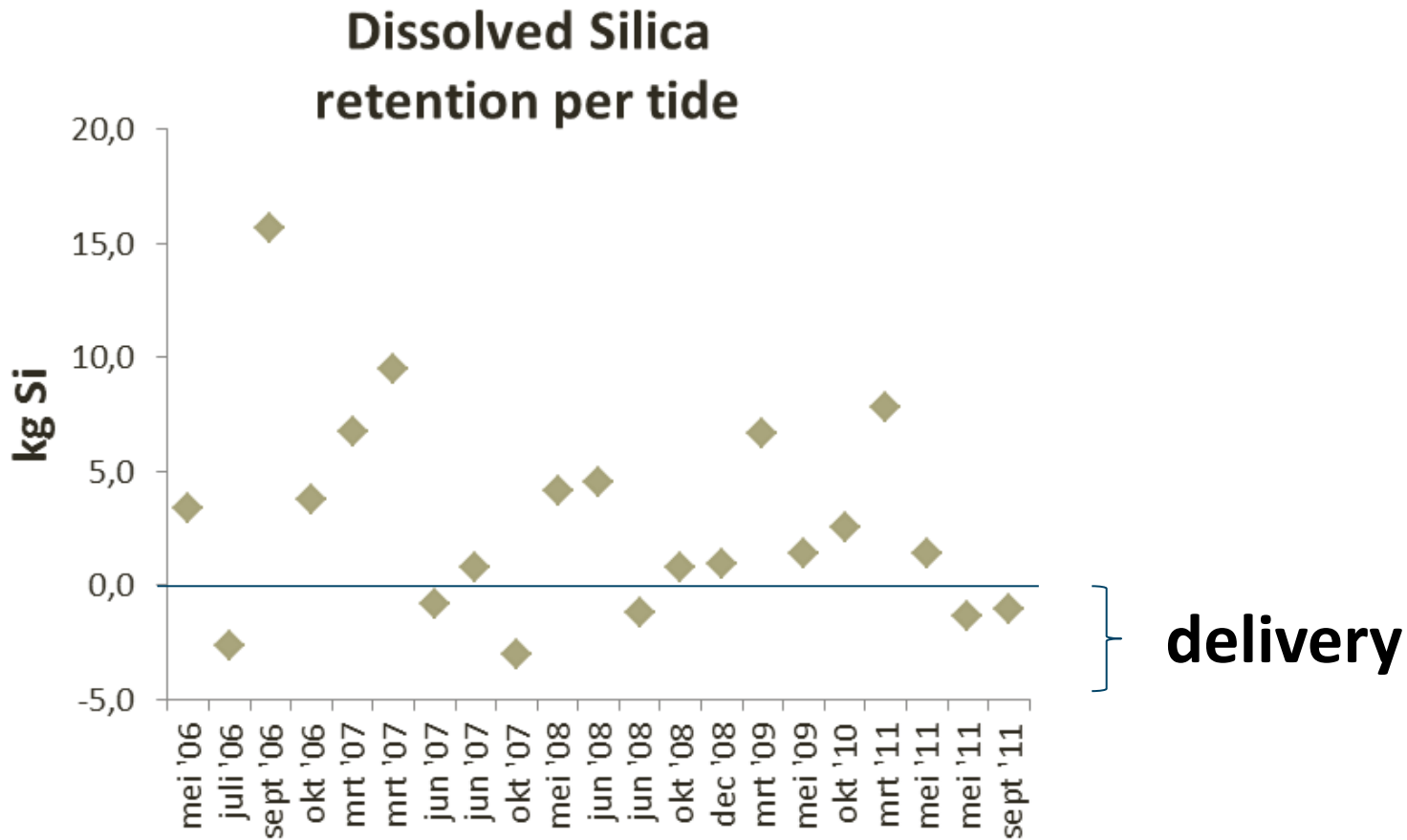
Lippenbroek 16-05-06



# Results: Silica delivery ?

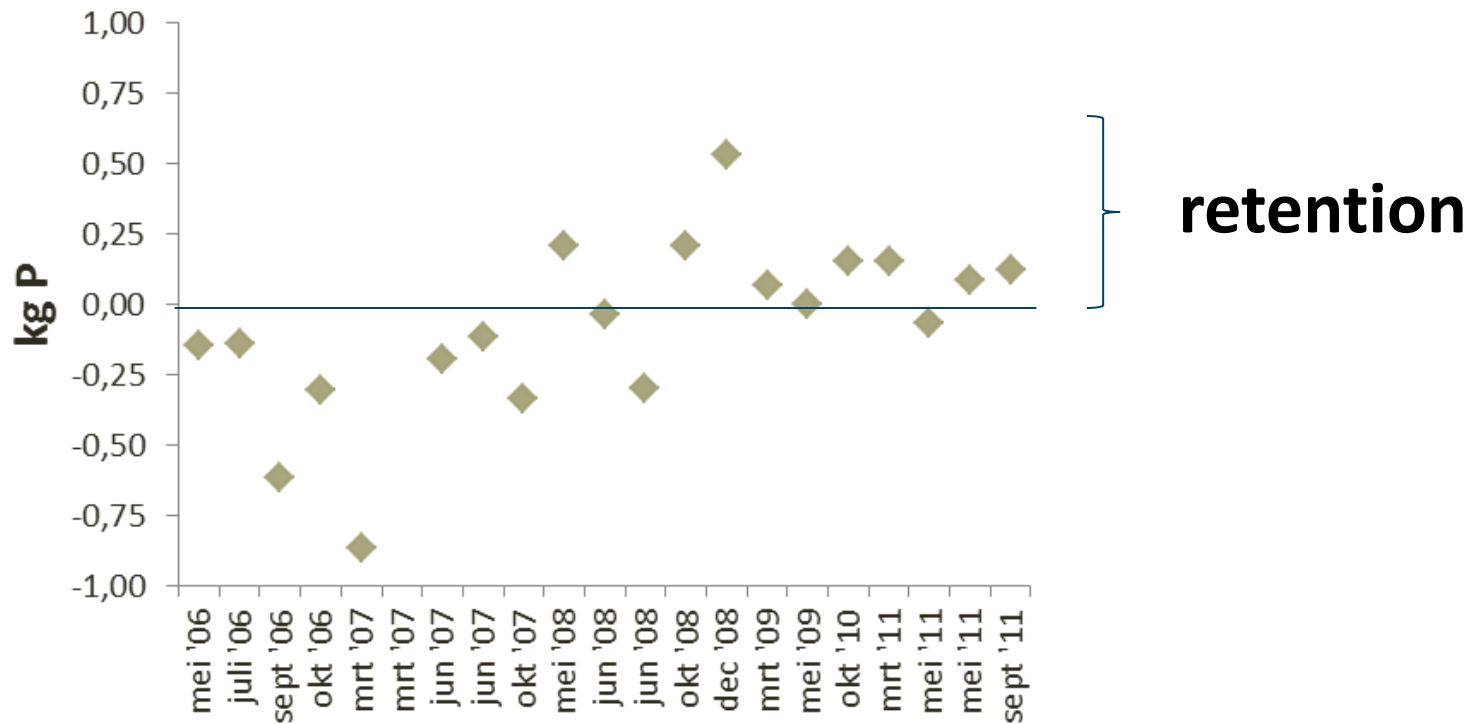


# Results: Silica delivery ?



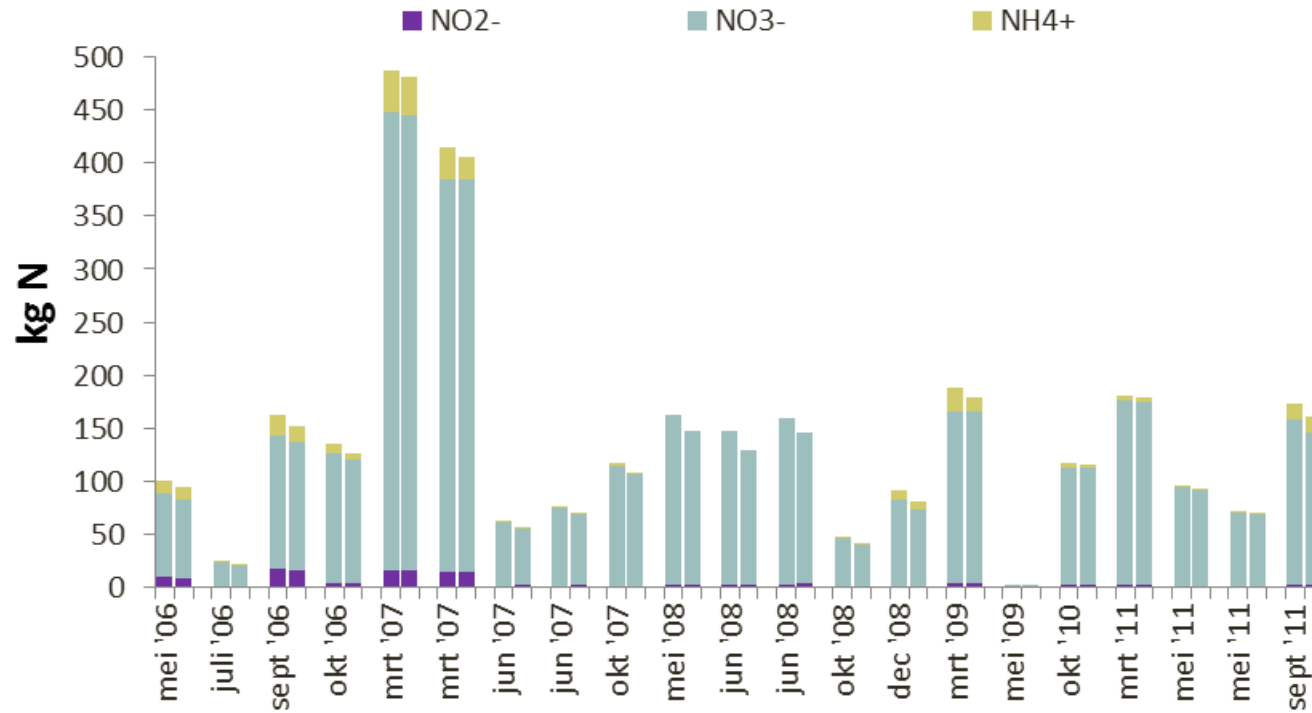
# Results: P retention !

## PO4-P Retention per tide



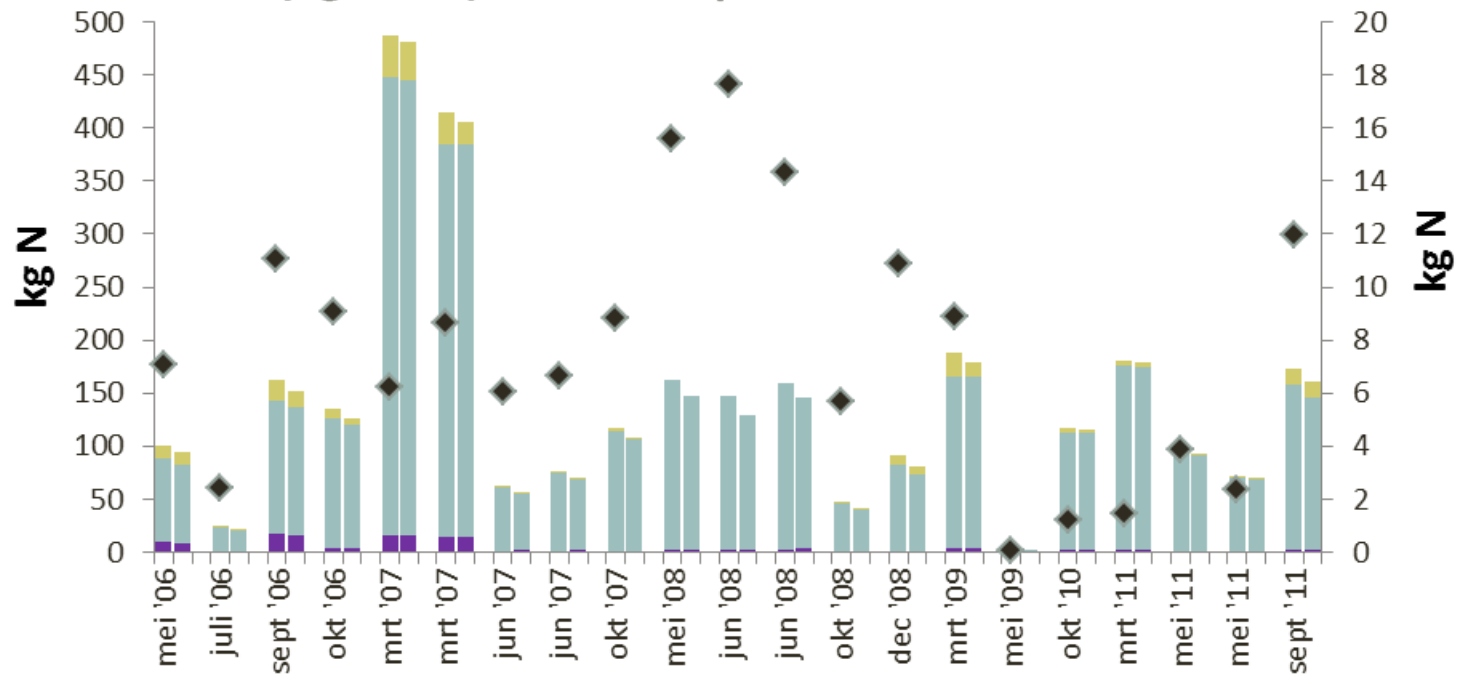
# Results: N retention

## TDIN (NO<sub>2</sub> + NO<sub>3</sub> + NH<sub>4</sub>) inflow and outflow



# Results: N retention

TDIN (NO<sub>2</sub> + NO<sub>3</sub> + NH<sub>4</sub>) inflow and outflow  
N (kg TDIN) retention per tide



➔ Always N retention

**Questions?**

