



Deltires

Enabling Delta Life



## Innovaties in de delta voor de landbouw watervoorziening

Gualbert Oude Essink  
Bodem en Grondwater Systemen  
Deltires  
[zoetzout.deltires.nl](http://zoetzout.deltires.nl)

- 1. Sense of Urgency
- 2. Voorbeelden
- 3. Kansen



### Sense of Urgency

Deltires

## Grondwater in de toekomst

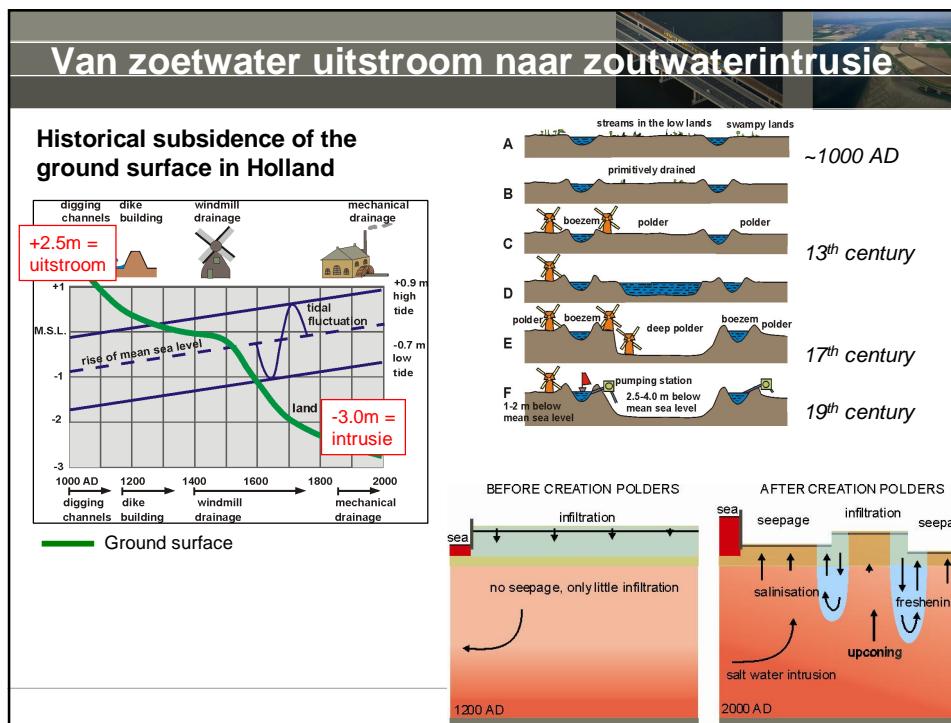


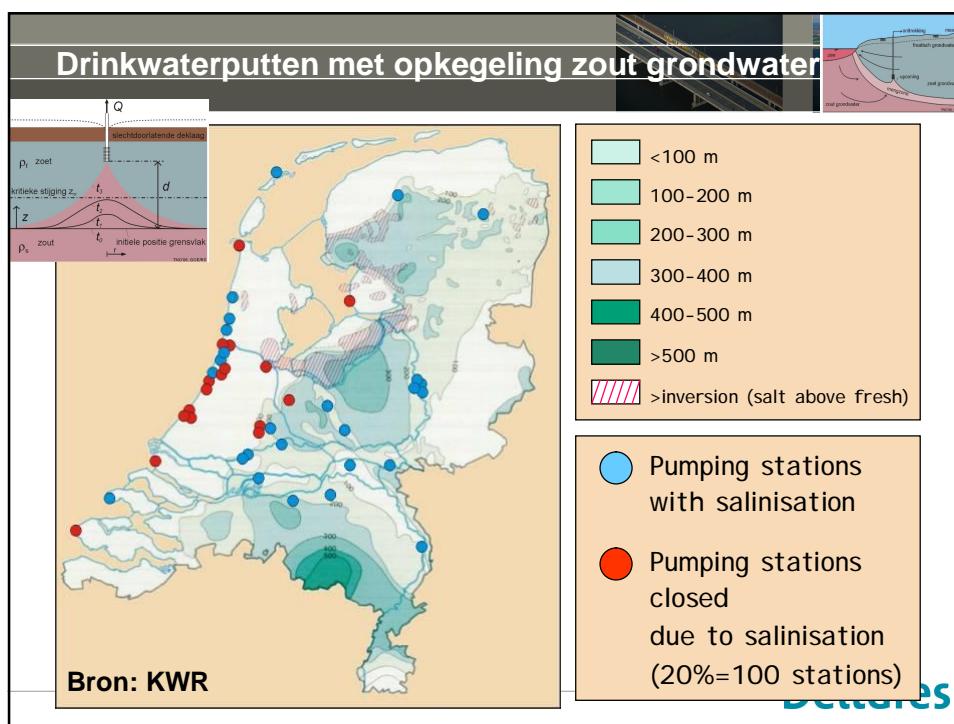
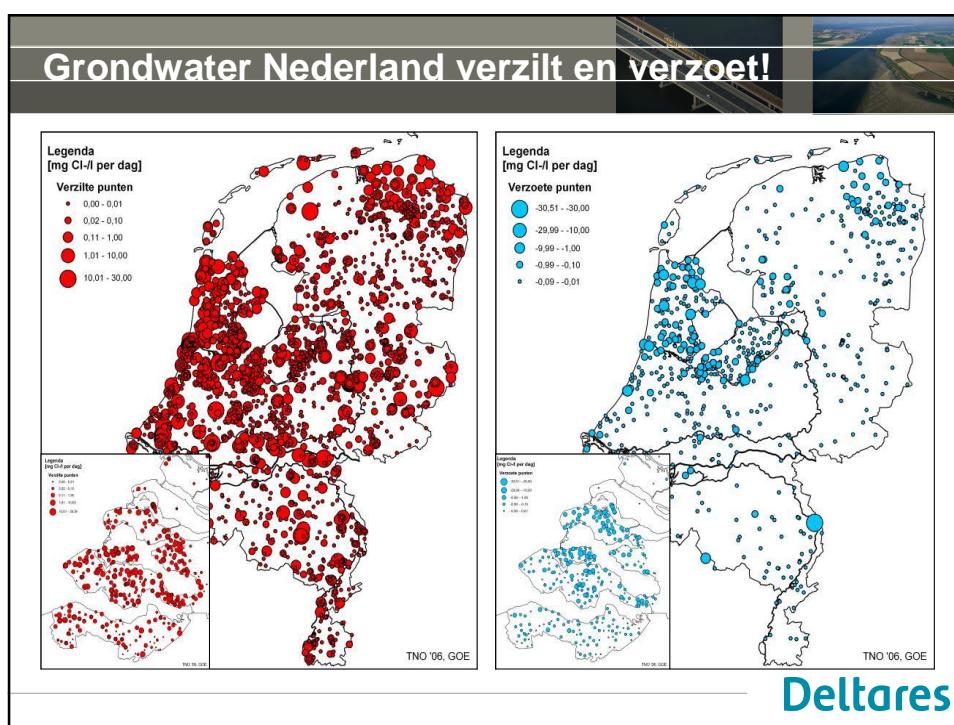
Wat komt er allemaal op ons af?

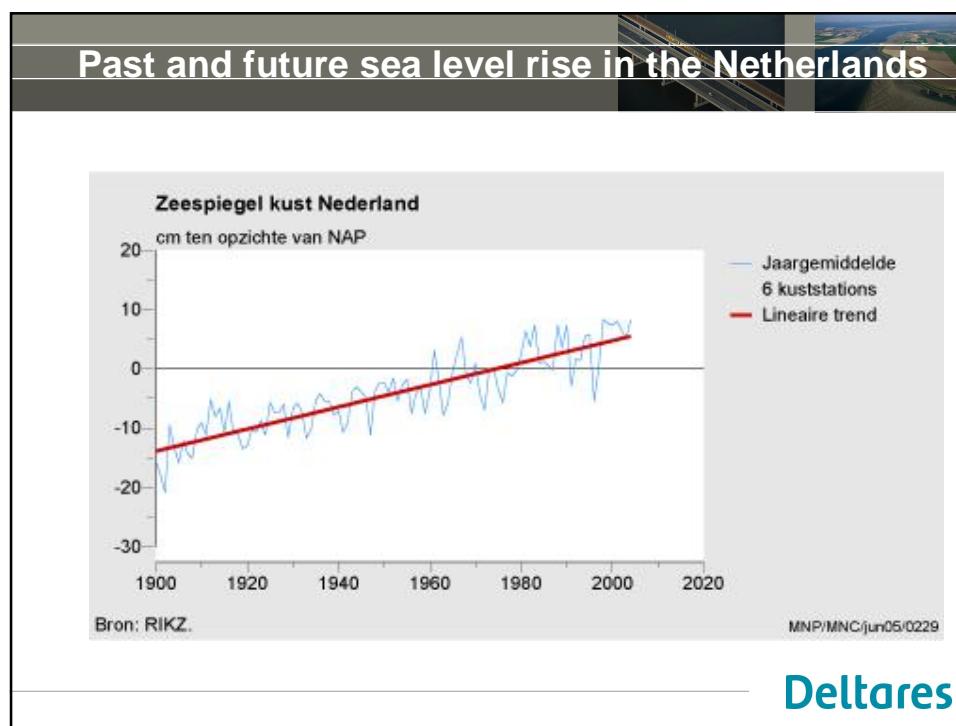
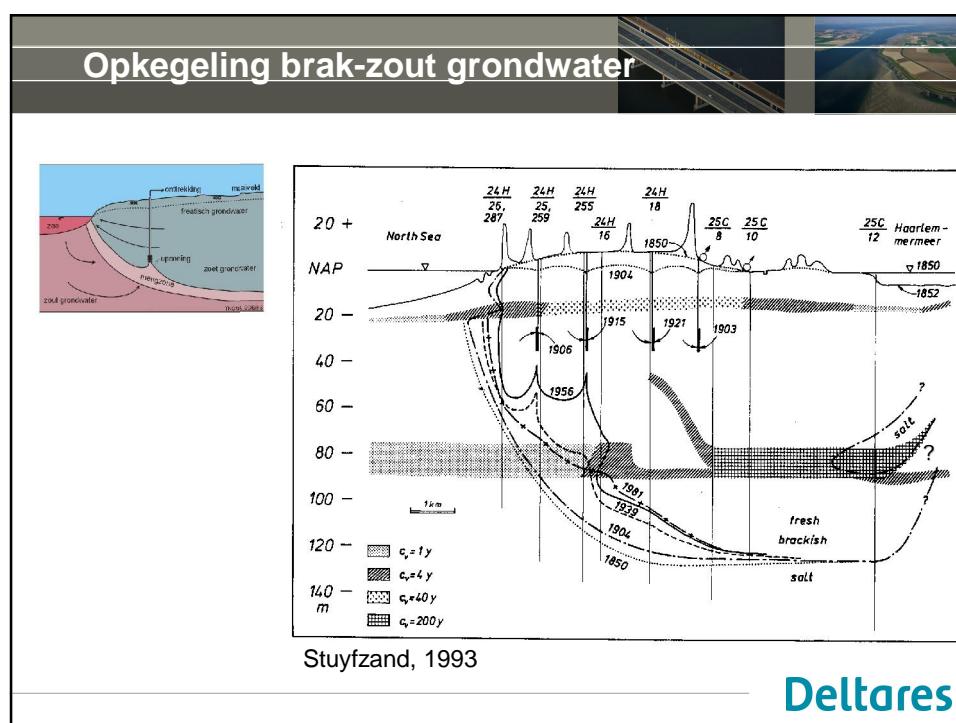
- Grondwaterwinning
- Ontwikkeling energiegebruik/productie en brijnlozing
- Bodemdaling
- Klimaatverandering
- Ontwikkeling ruimtegebruik
- Politiek, Beleid & Waterbeheer

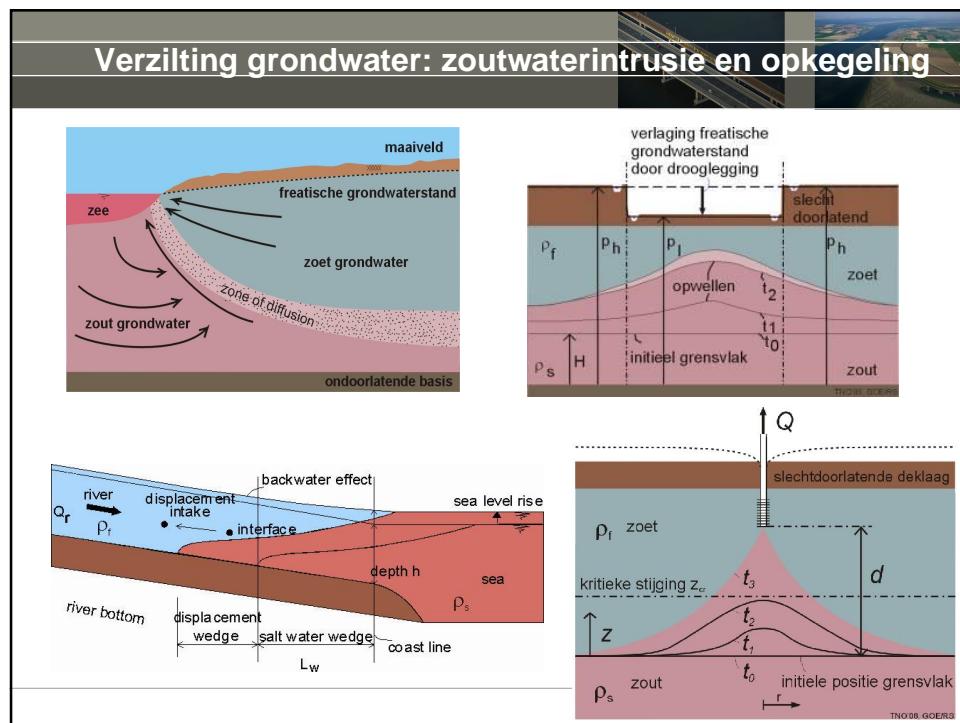
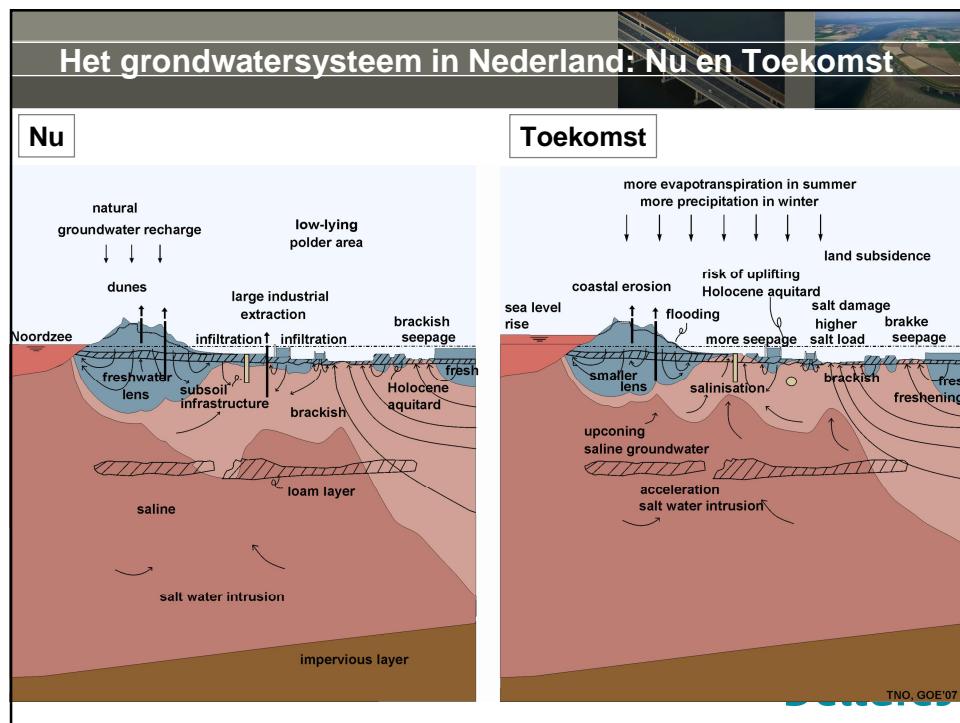
*Directe invloed door de mens op het grondwater is belangrijker dan klimaateffect*

**Deltas**









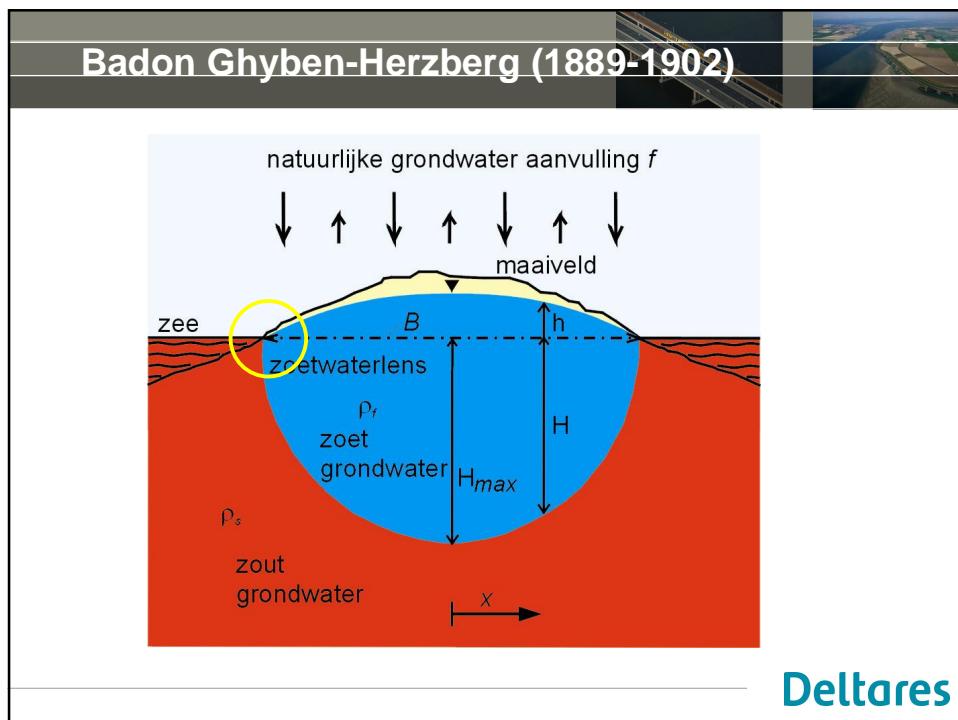
**Grondwater in kustgebieden: urgentiegevoel landbouw  
Interviews Zeeland**

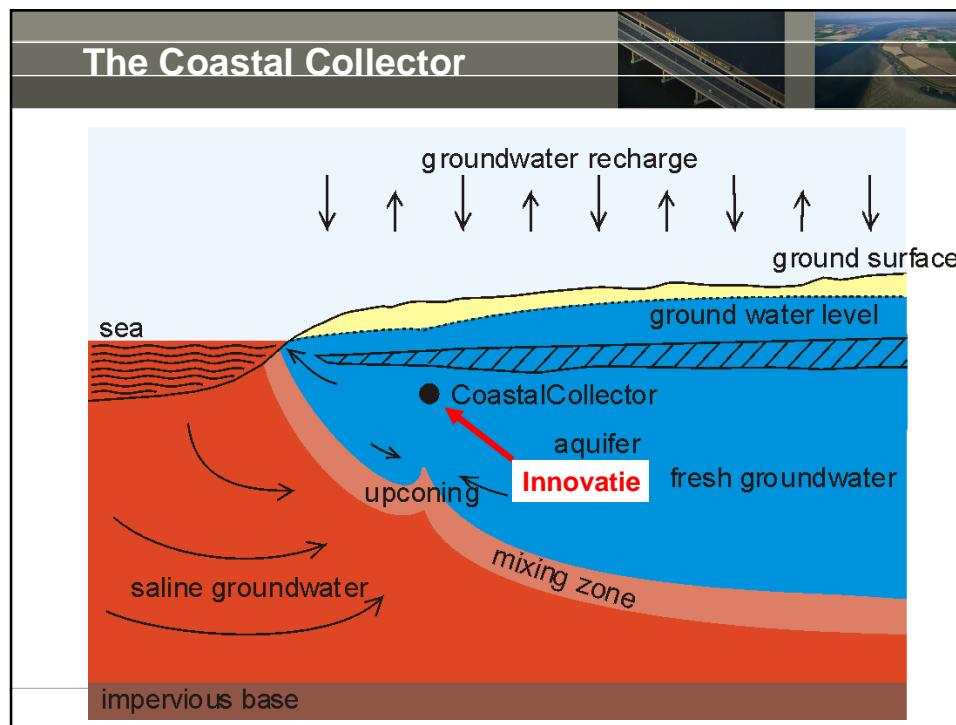
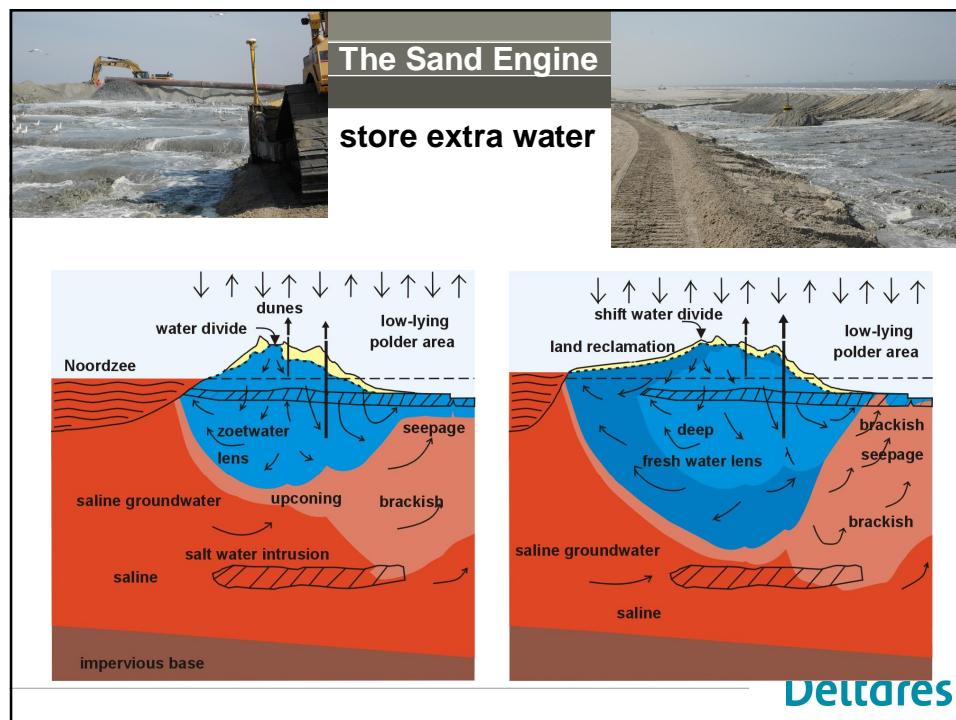
- "Droogte: alle producten van slechtere kwaliteit.  
Wateroverlast: minder product, wel hoge kwaliteit"
- Zeeland, voorjaar 2011:  
>1.000 euro per ha voor  
water per tankwagen!
- "onttrekkingscapaciteit grondwater te klein"
- "Wat ik nu nog wil hebben?  
Veel zoet water!"

**Voorbeeld**

**grondwater in het kustgebied**

**Deltares**

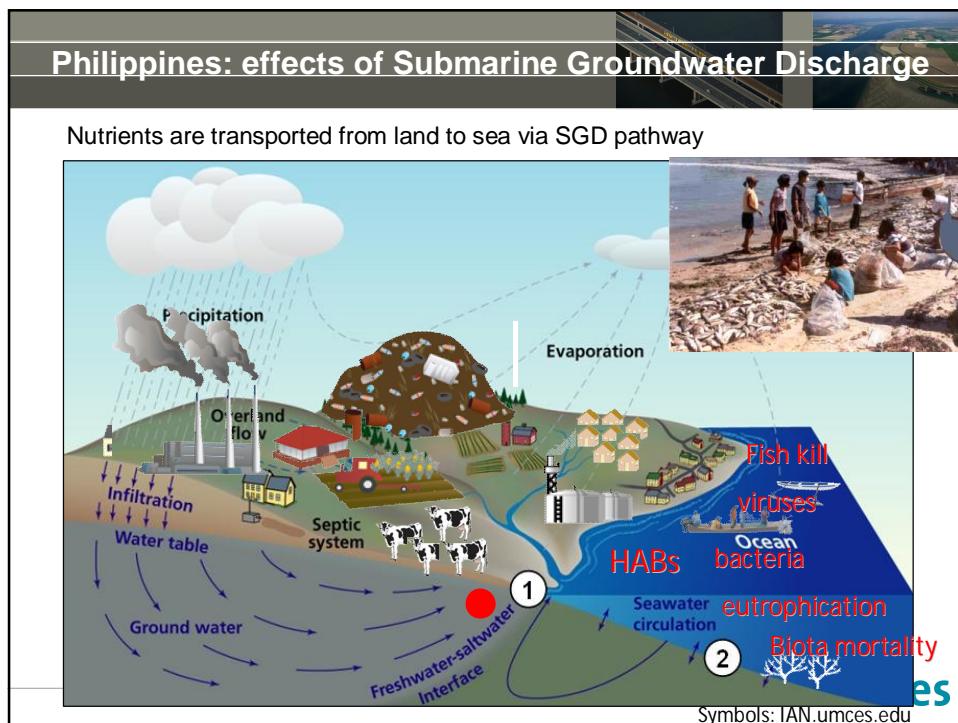




**The Coastal Collector with horizontal drilled drains**

Source: HDDW

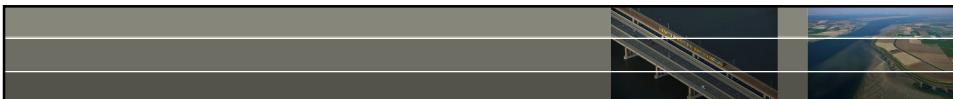
**Deltares**





## Zuidwestelijke Delta

Deltares



Water in sloten in grote delen van Zeeland zijn  
brak tot zout

Toch is landbouw mogelijk!

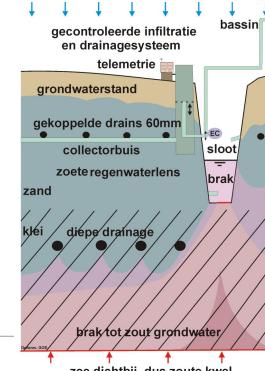
Hoe kan dat?

Deltares

## Stappen

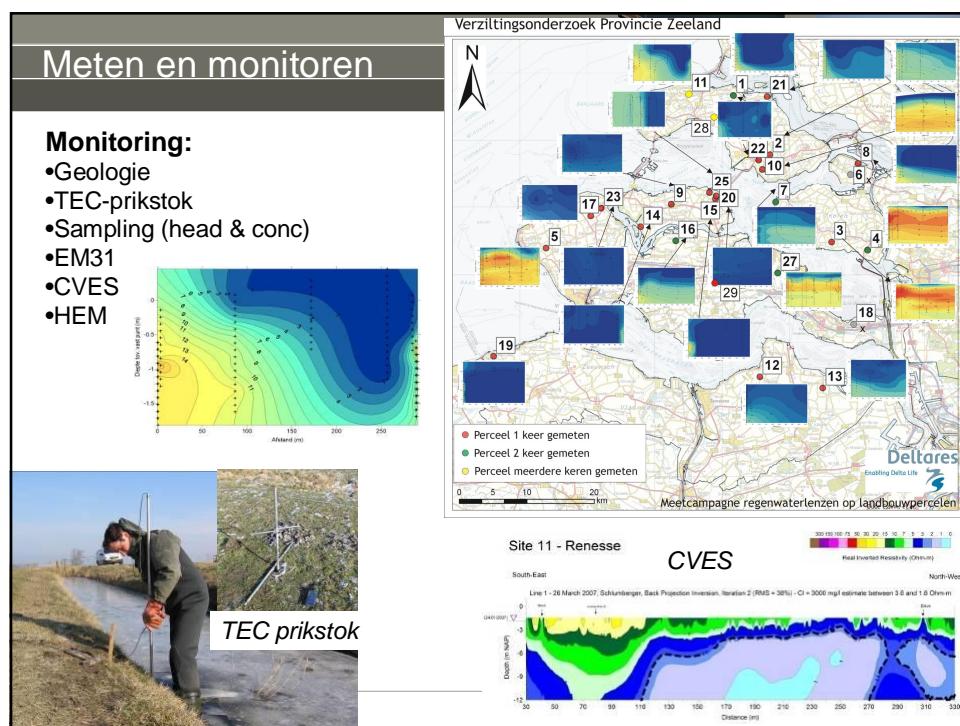
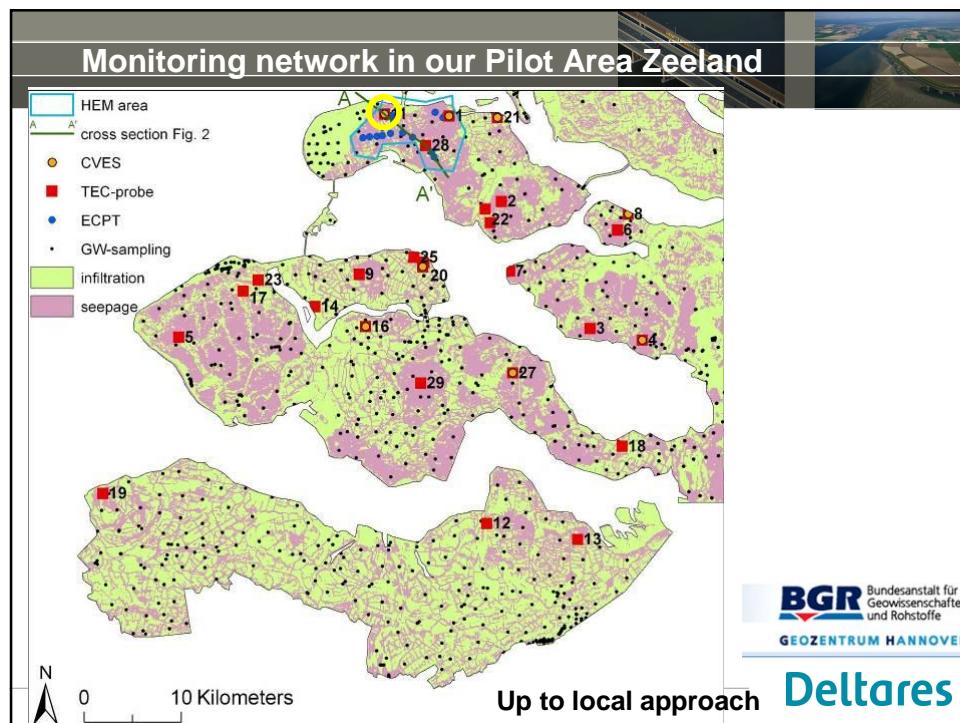


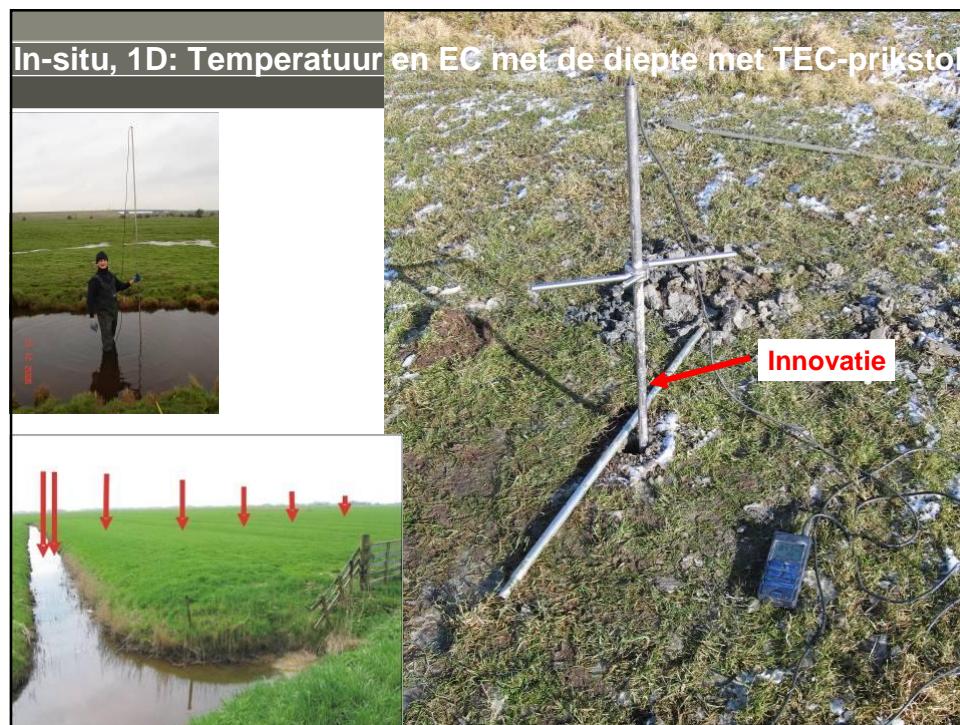
1. Monitoren
2. Modelleren
3. Effectstudies Grondwatersysteem
4. Oplossingen en responses
  - Delta-technologie
  - Agro-technologie
  - Water-technologie



## Meten







Voorbeeld

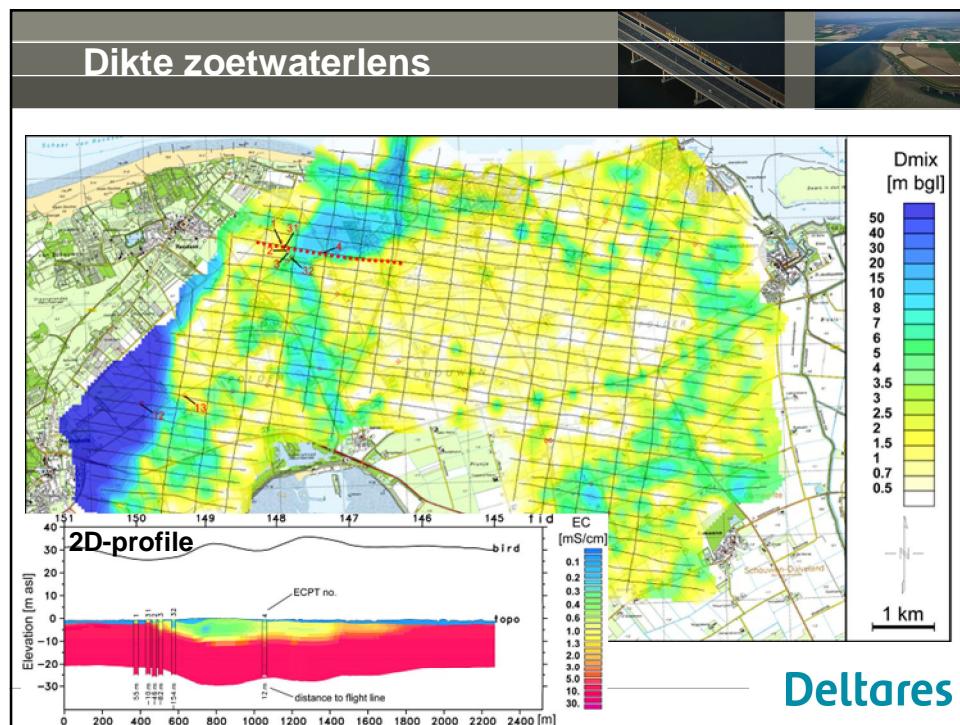
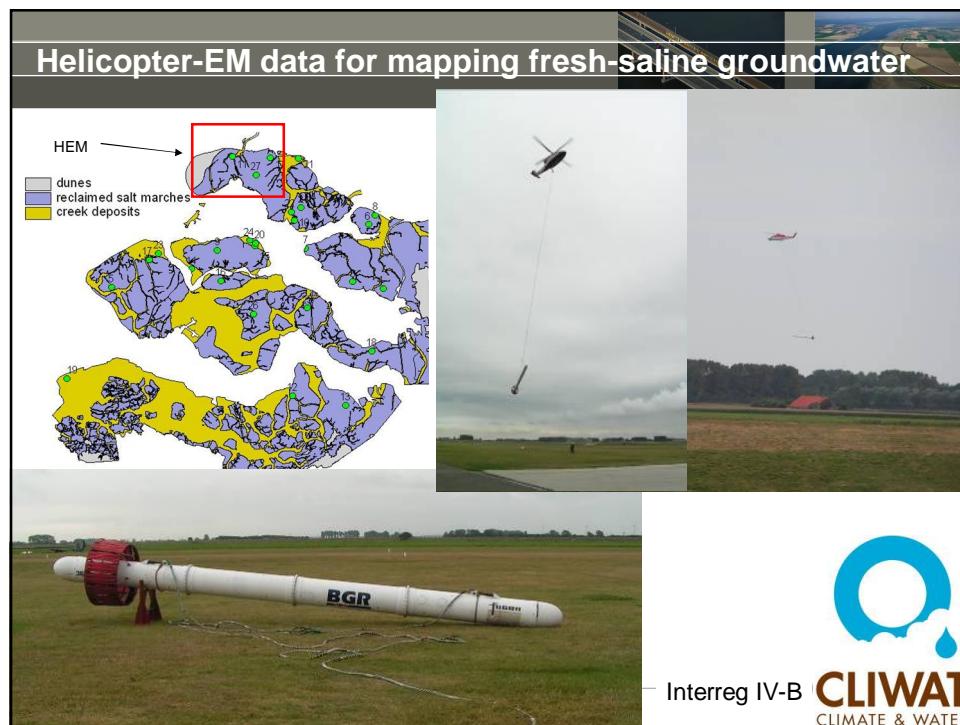
Probleem:

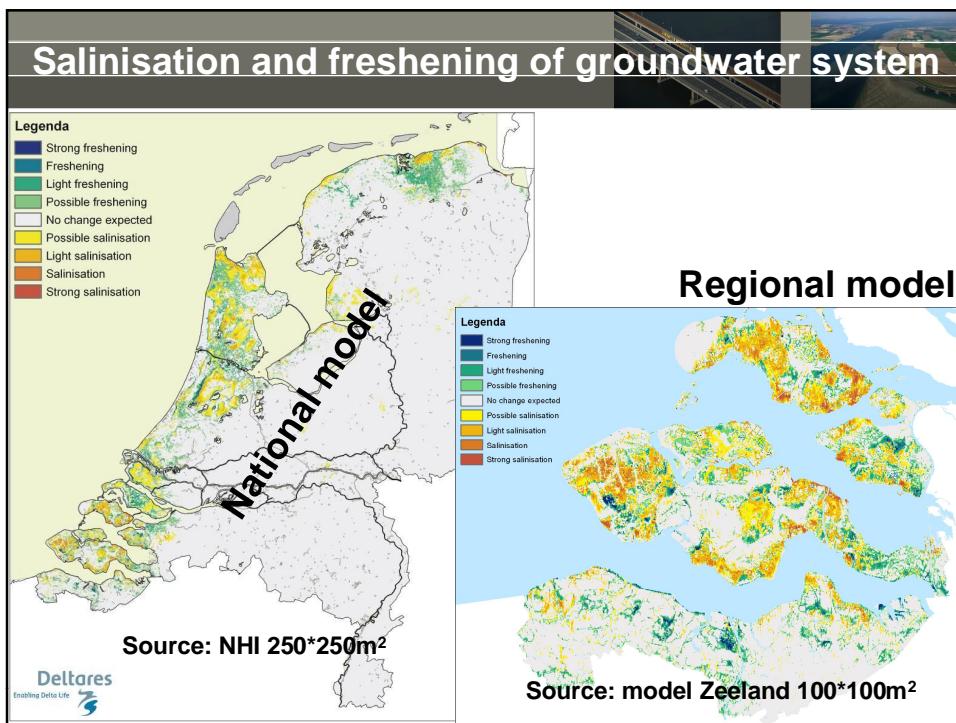
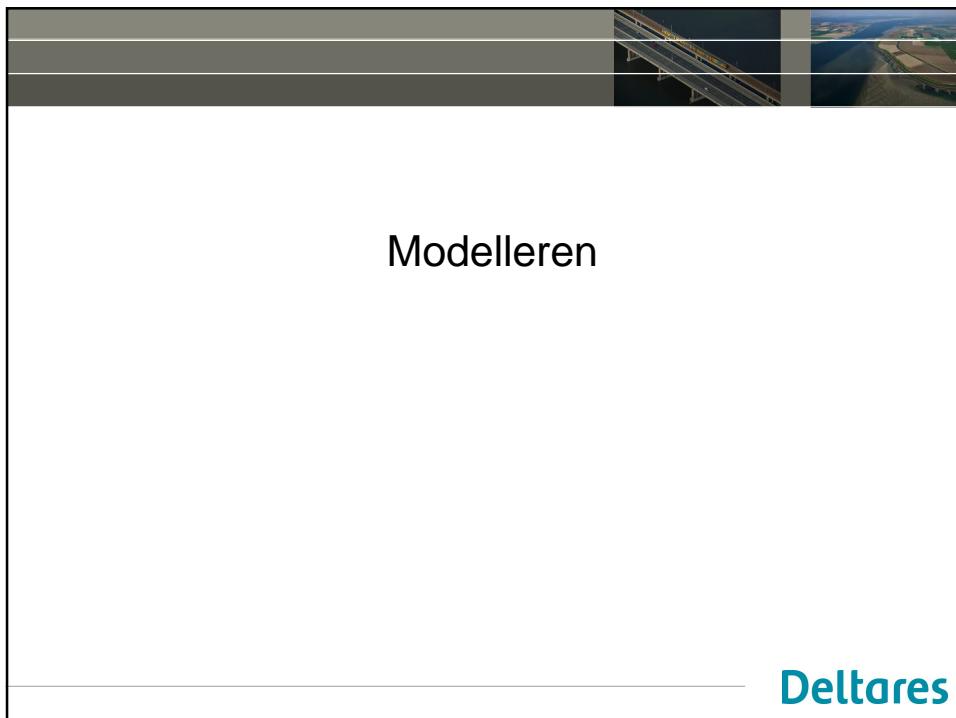
we weten te weinig over zoet-brak-zout verdeling in de ondergrond om grondwaterbeheer goed uit te voeren

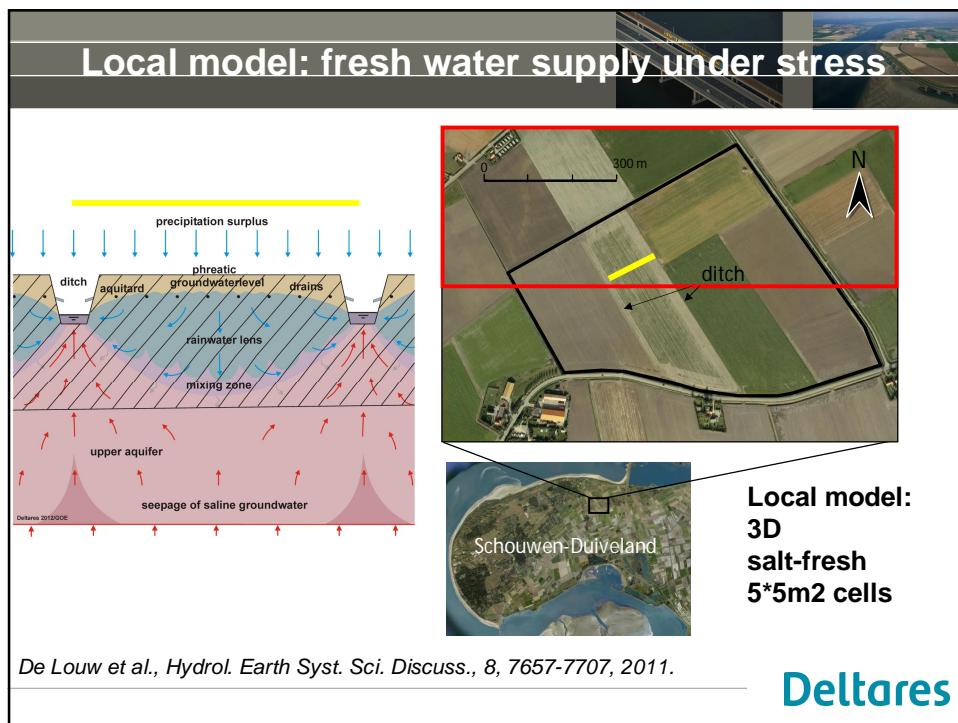
Innovatie:

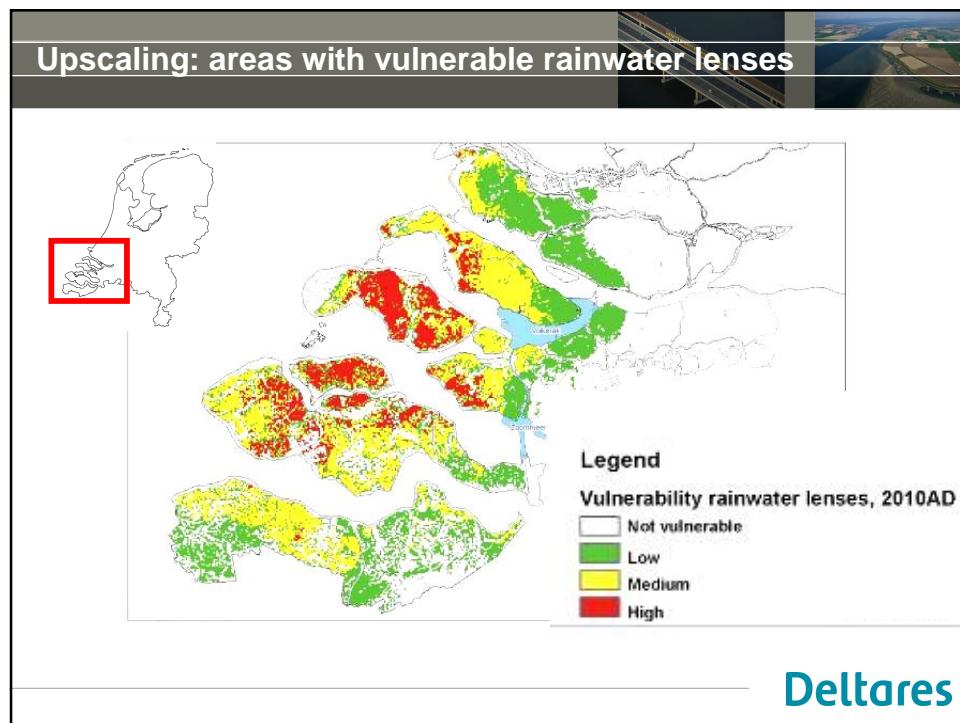
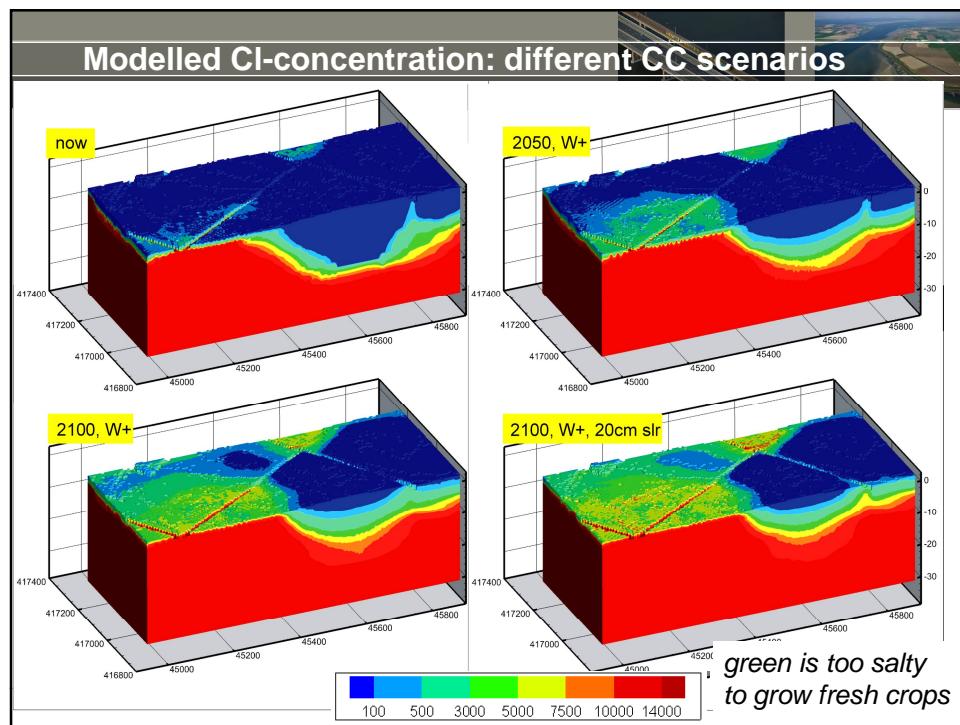
Airborne Geofysica

Deltares







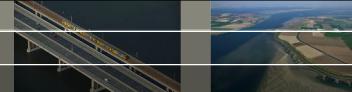




## Oplossingen/responses

Deltares

### Doel



Onderzoeken in hoeverre lokale maatregelen de zoetwaterbeschikbaarheid voor landbouw in de ZWD kunnen vergroten

Focus op grondwater

Gebieden zonder of met beperkte externe zoetwateraanvoer

3 pilotstudies

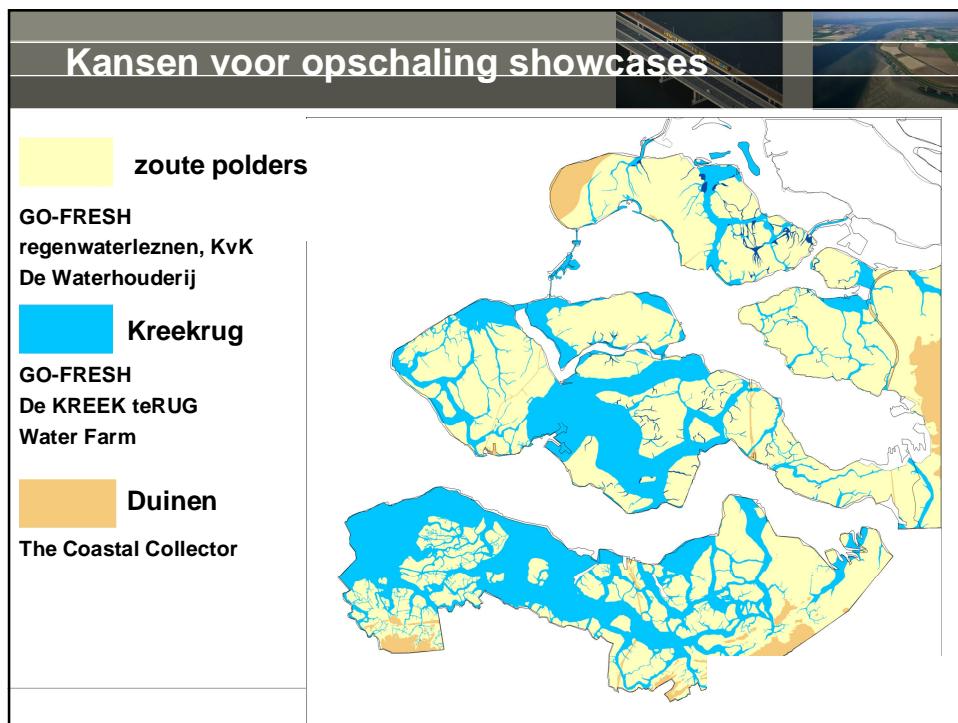
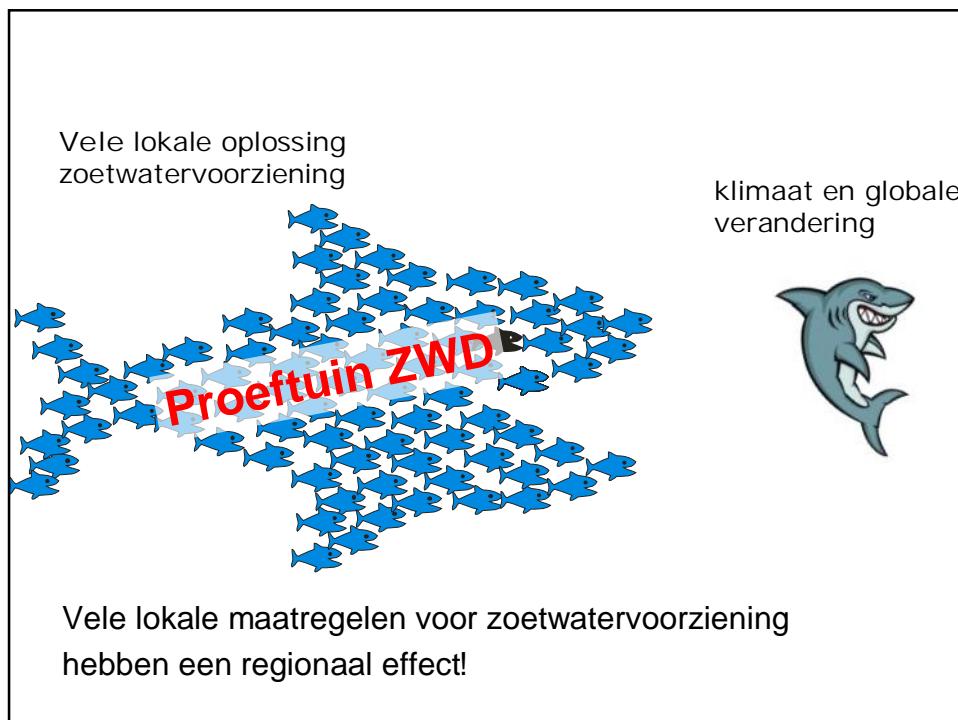
Deltares

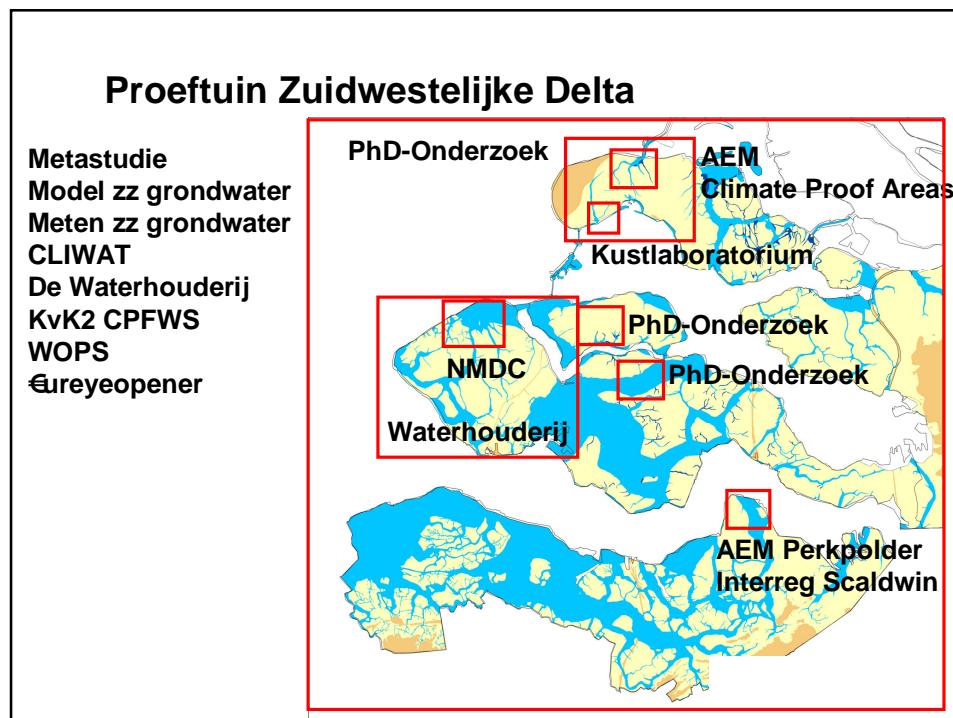
lokale oplossing  
zoetwatervoorziening

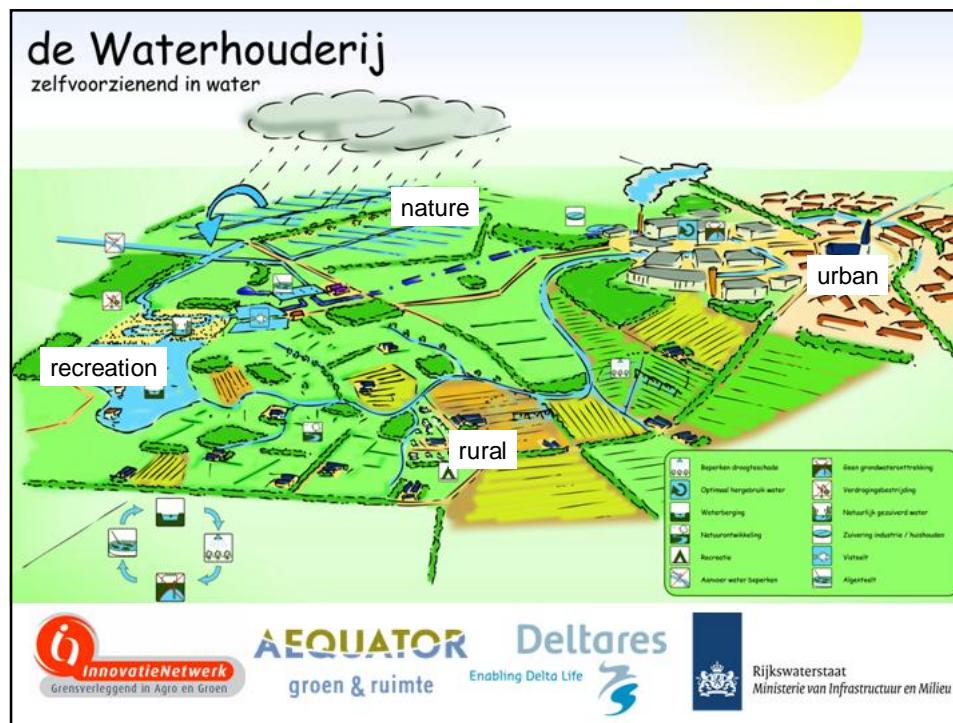
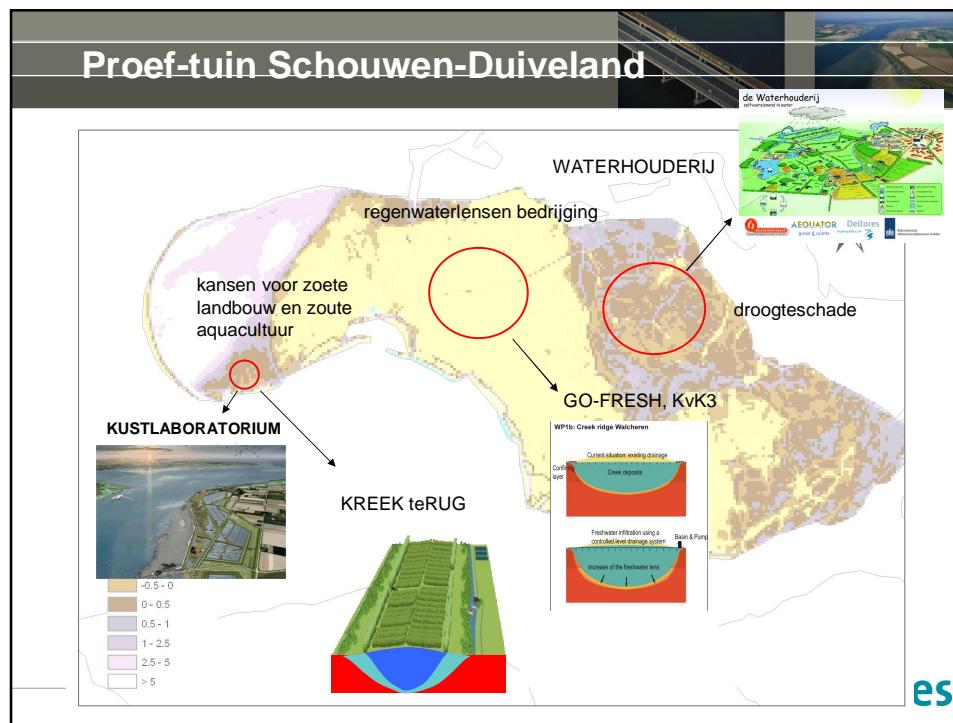
klimaat en globale verandering



Hoe gaan we dit probleem  
aanpakken?







**De KREEK teRUG: measure for local freshwater supply**

Goal The Creek Back:

- climate proof fresh water supply
- vital agricultural sector
- robust nature
- innovation & growth aquaculture

Initial situation

The Creek Back

Creek 1500 m

De Deltalores

**Kansrijke oplossingen lokale zoetwatervoorziening**

Zuidwestelijke Delta

1. vergroten zoetwatervoorraad in kreekruggen
2. robuuste regenwaterlenzen in zoute kwelgebieden.

'Local solutions with regional impacts'

GO-FRESH

Geohydrological Opportunities for FRESH Water Supply

KWR

Deltalores

Hogeschool HZ Zeeland

Acacia Water

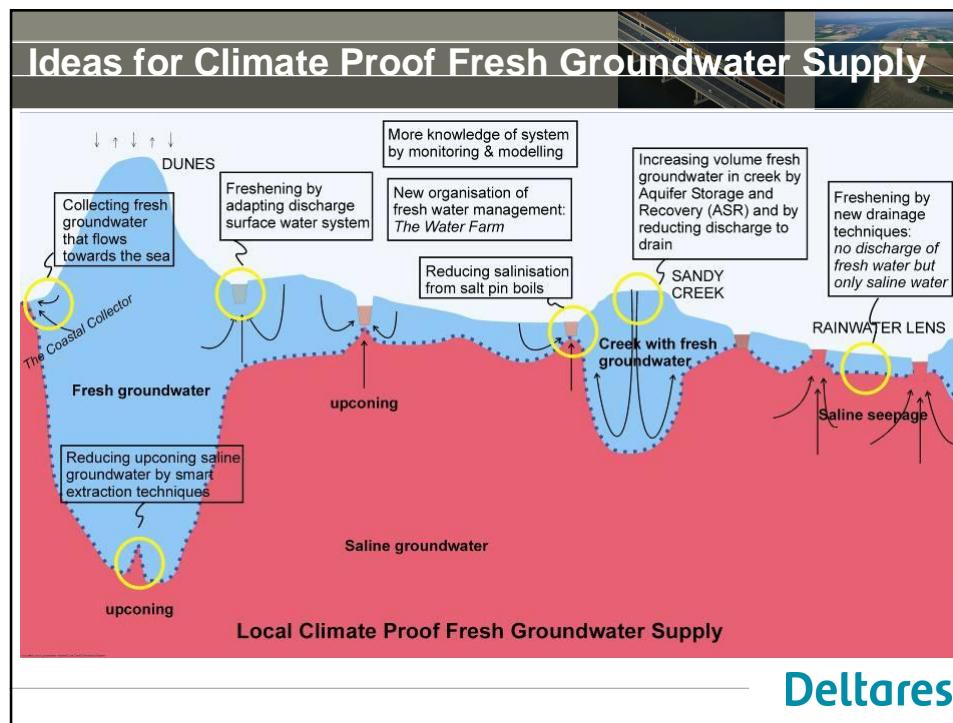
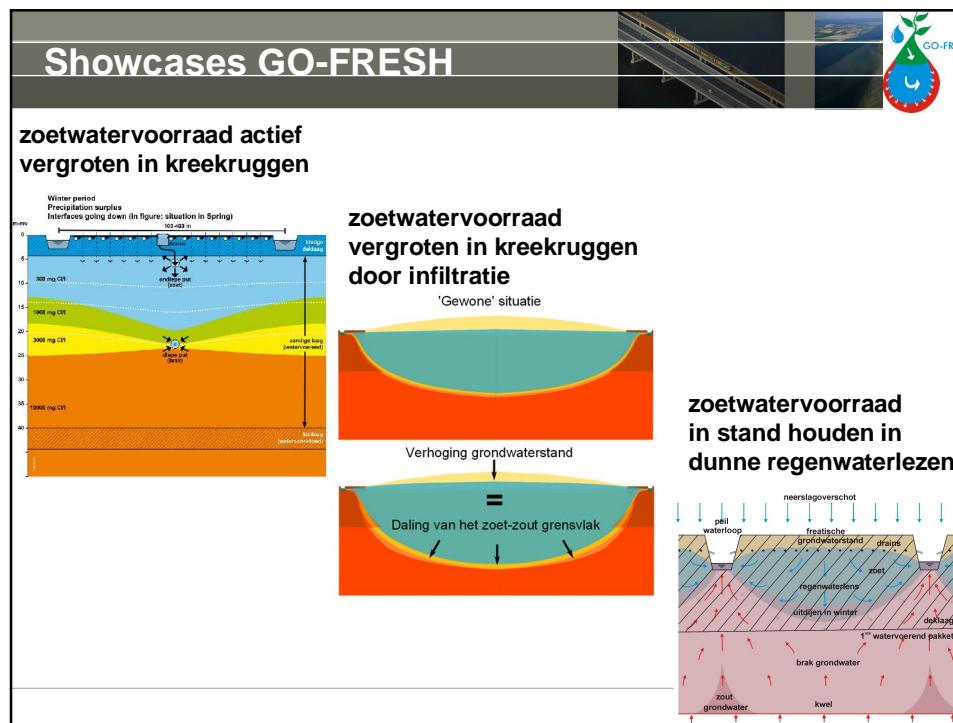
WAGENINGEN UR

Deltalores

Legend

Depth brackish-saline interface	0 - 2
	2 - 5
	5 - 10
	10 - 25
	25 - 50
	50 - 100
	100 - 200
	200 - 300
	> 300

$1000 \text{ mg Cl-l}$  ( $\text{m} \text{-ground surface}$ )





## Kansen internationaal?

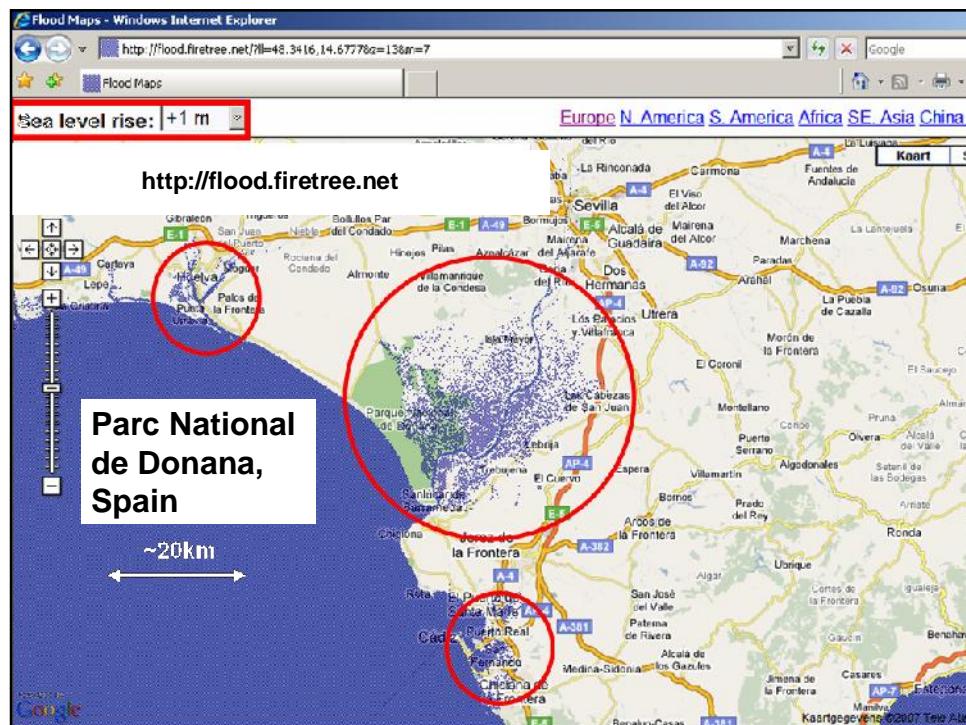
Deltares

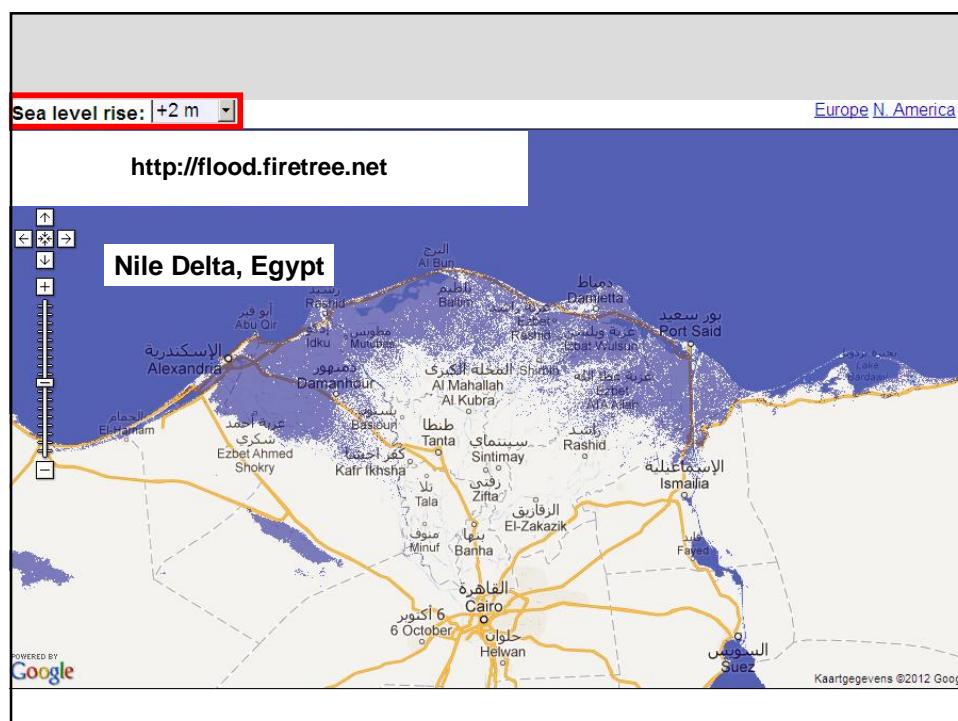
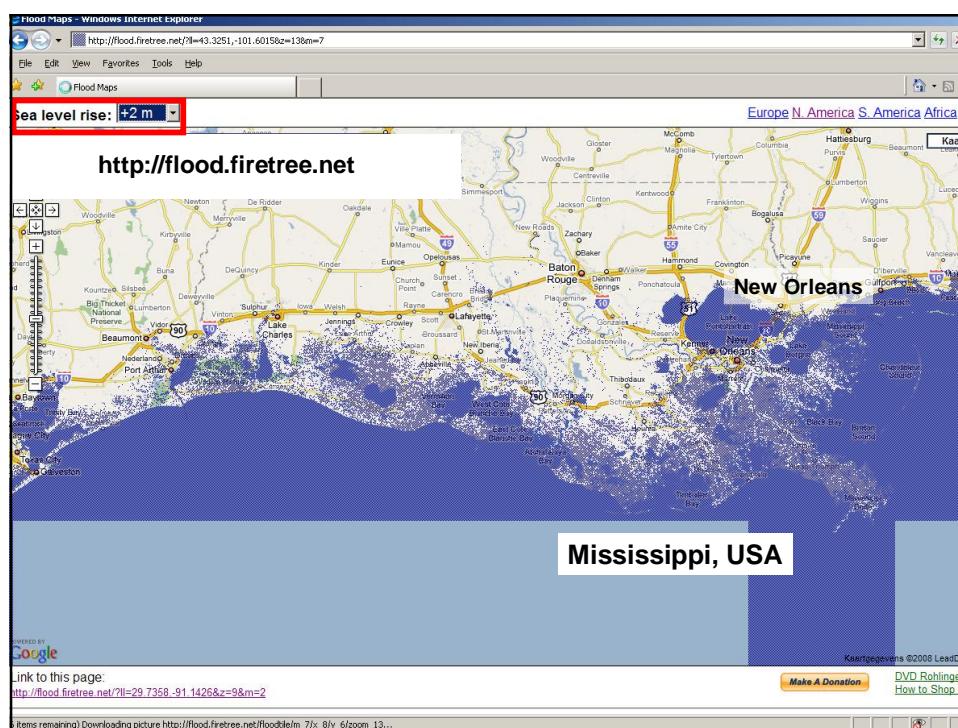


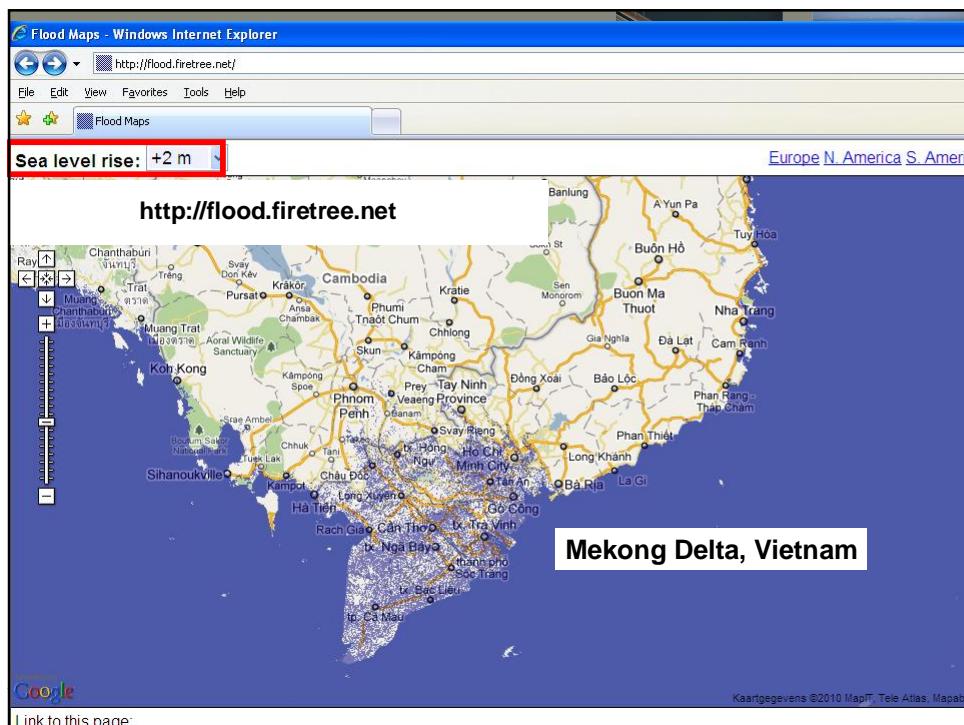
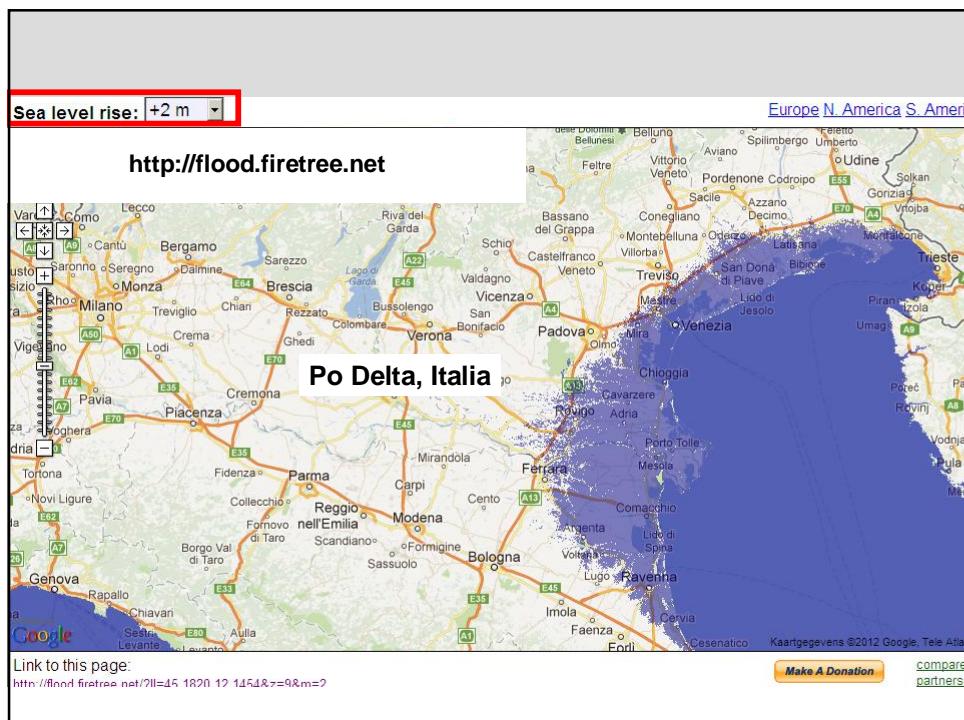
Om een idee te krijgen wat de mogelijke effecten zijn van klimaatveranderingen en globale veranderingen, en wat je eraan kan doen...

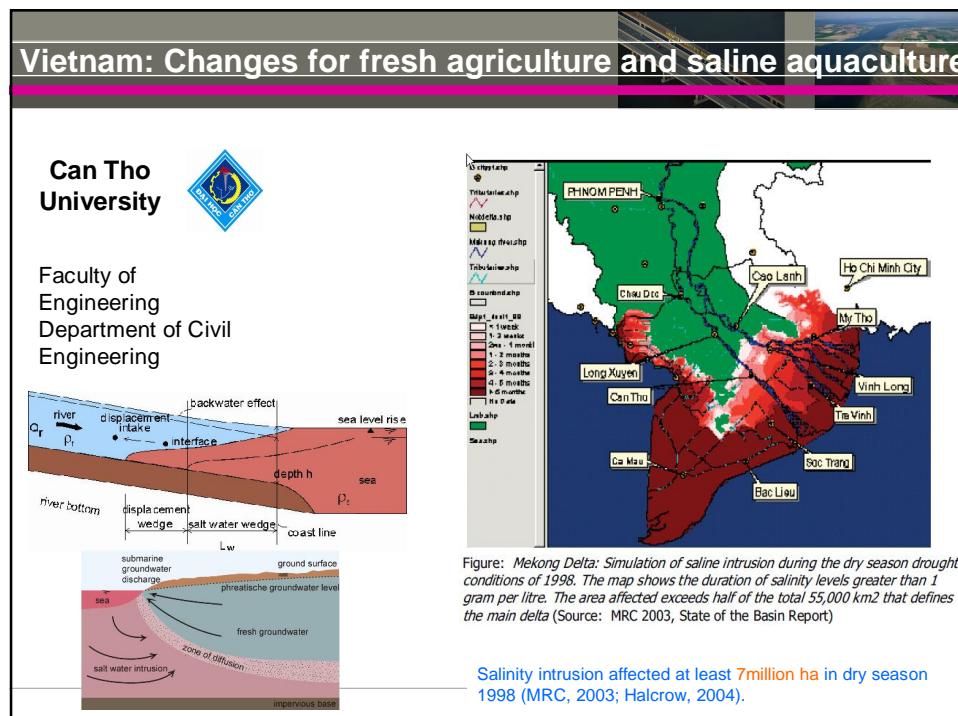
*Kijk naar de waterhuishouding in de Nederlandse Delta*

Deltares











**Take-home messages**

- Major fresh-salt issues are facing us, worldwide
- It is just started!
- We can make a difference
- Work together in getting better solutions:
  - uni's-kennisinstituten-bedrijfsleven-eindgebruikers
- Let us organize, e.g. in programs:
  - Topsector Water: Leven met Zout
  - Horizon 2020
  - Interreg IV-B
  - Worldwide setting: Worldbank, ADB, FAO...

Deltares