



Room for the river projects in the Netherlands



Climate change impacts and mitigation

The Dutch Perspective

Dr. R. (Ralph) Schielen
Rijkswaterstaat/Twente University



1st Rhine - Mekong Symposium
8 - 9 May 2014, Koblenz, Germany

The Netherlands

- 17 million people
- Copenhagen is NOT our capital (Amsterdam is)
- Highest point: 315m+MSL
- Lowest point: -6.7m+MSL



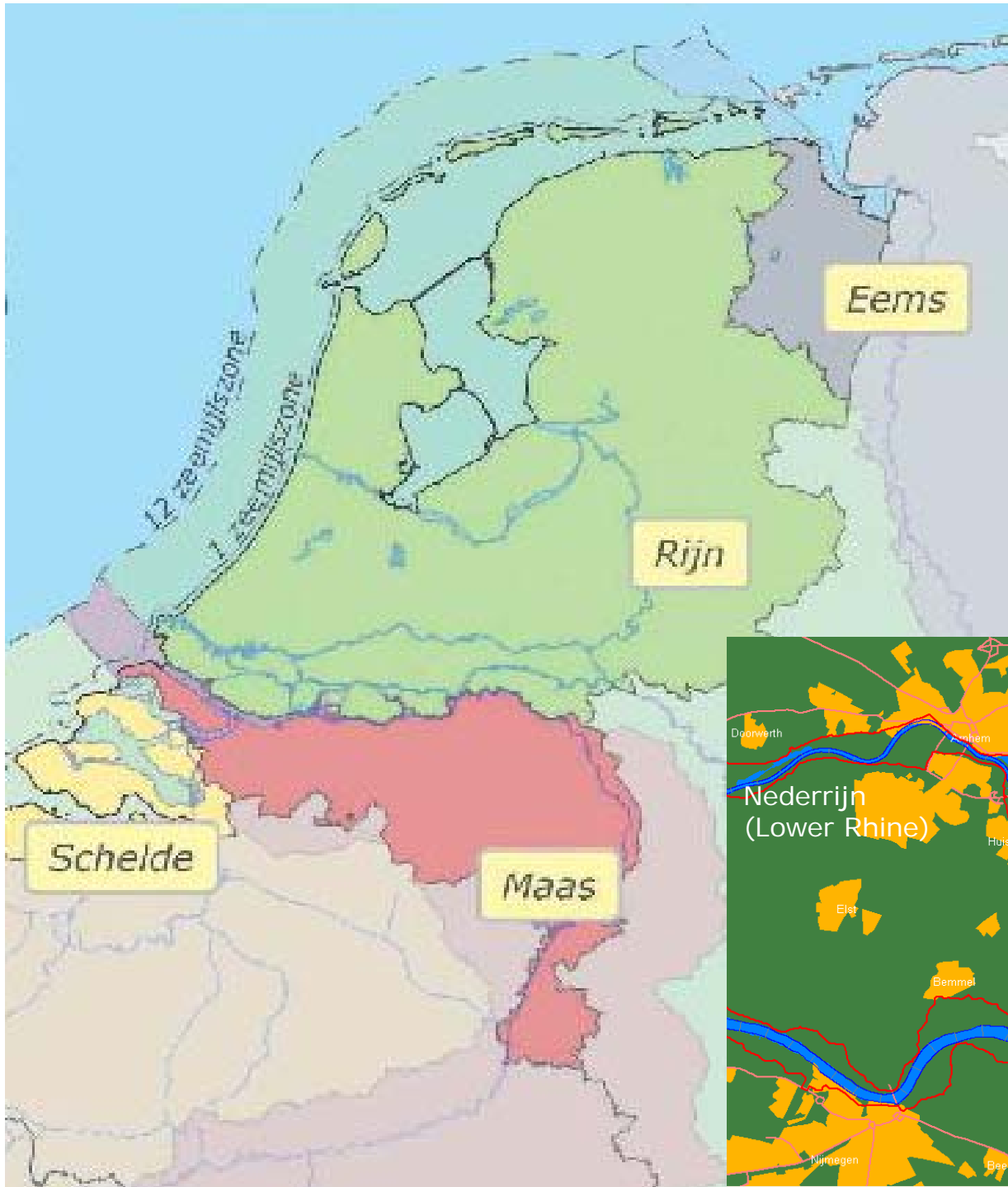


The Netherlands



The Netherlands

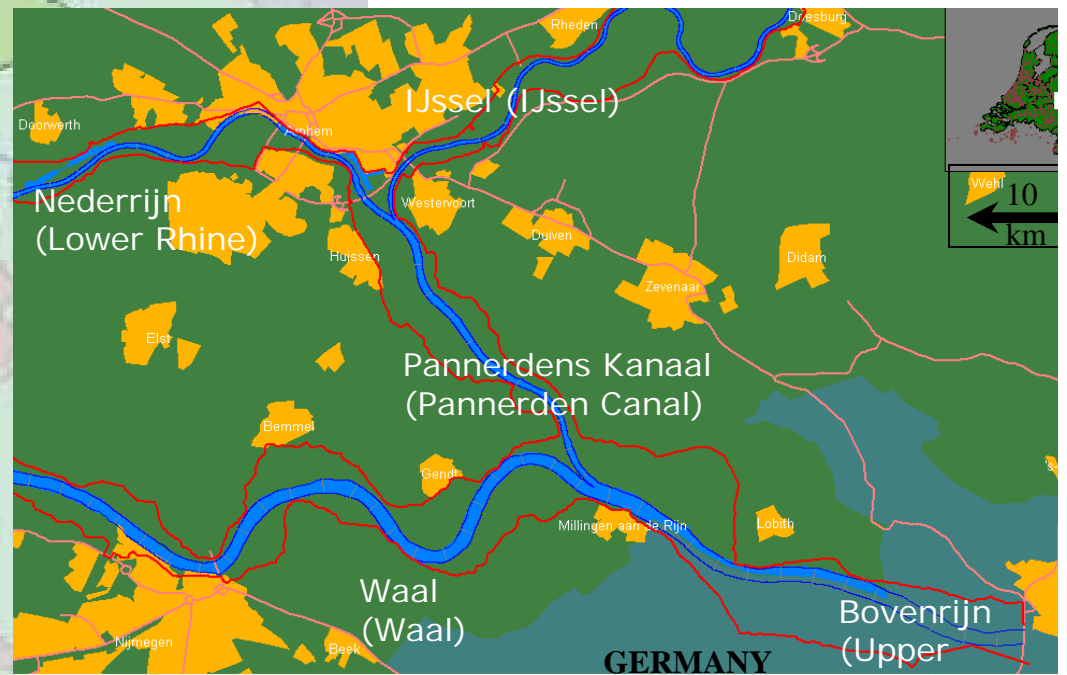




2 major rivers:
Rhine and Meuse

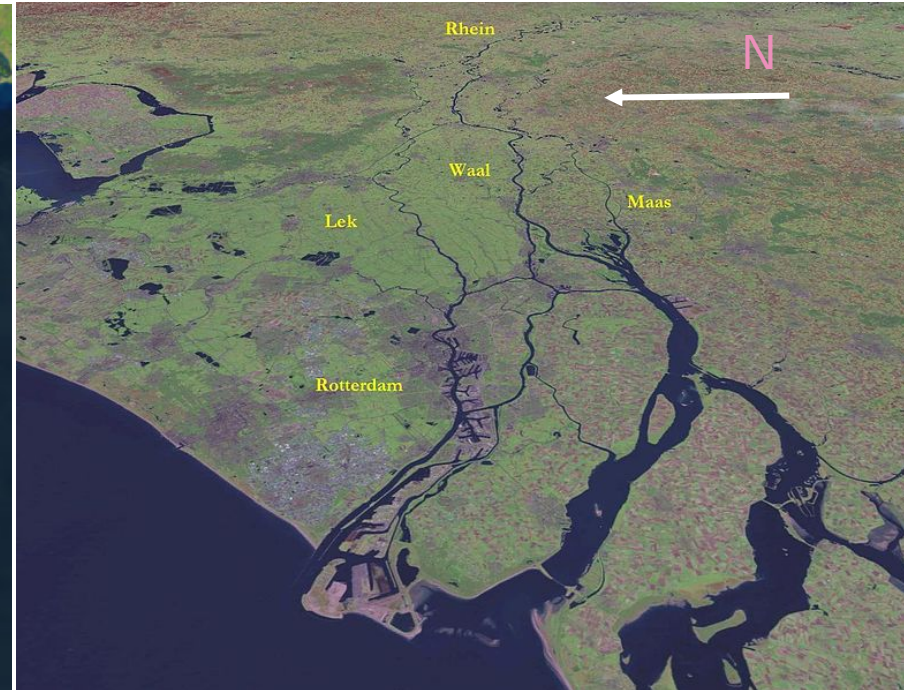
2 minor rivers:
Eems and Schelde

Many small streams,
canals, etc.





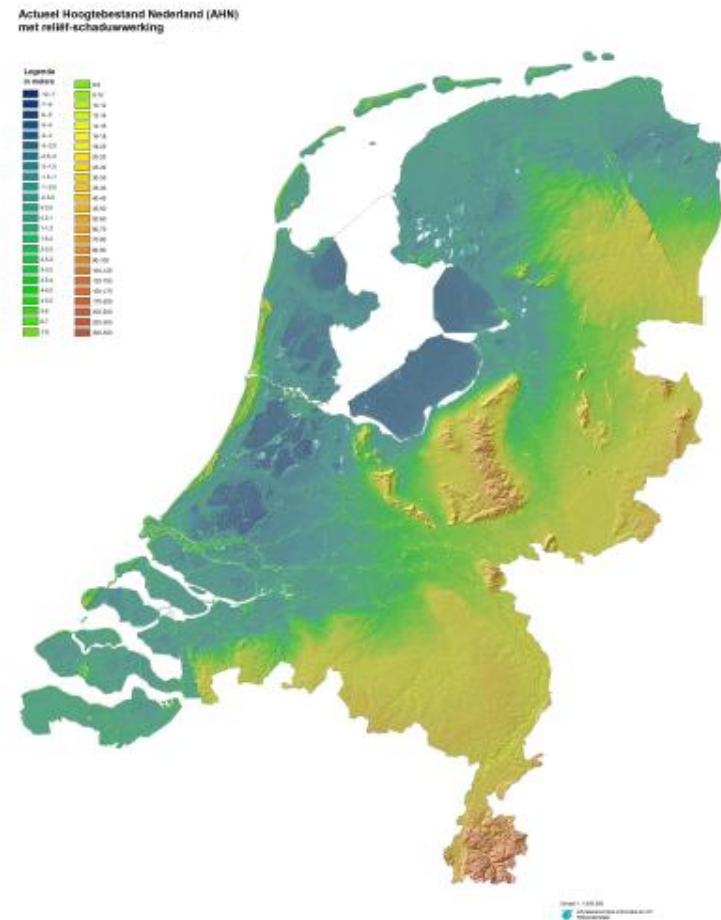
Mekong Delta and Rhine-Meuse Delta





A dangerous, dynamic landscape

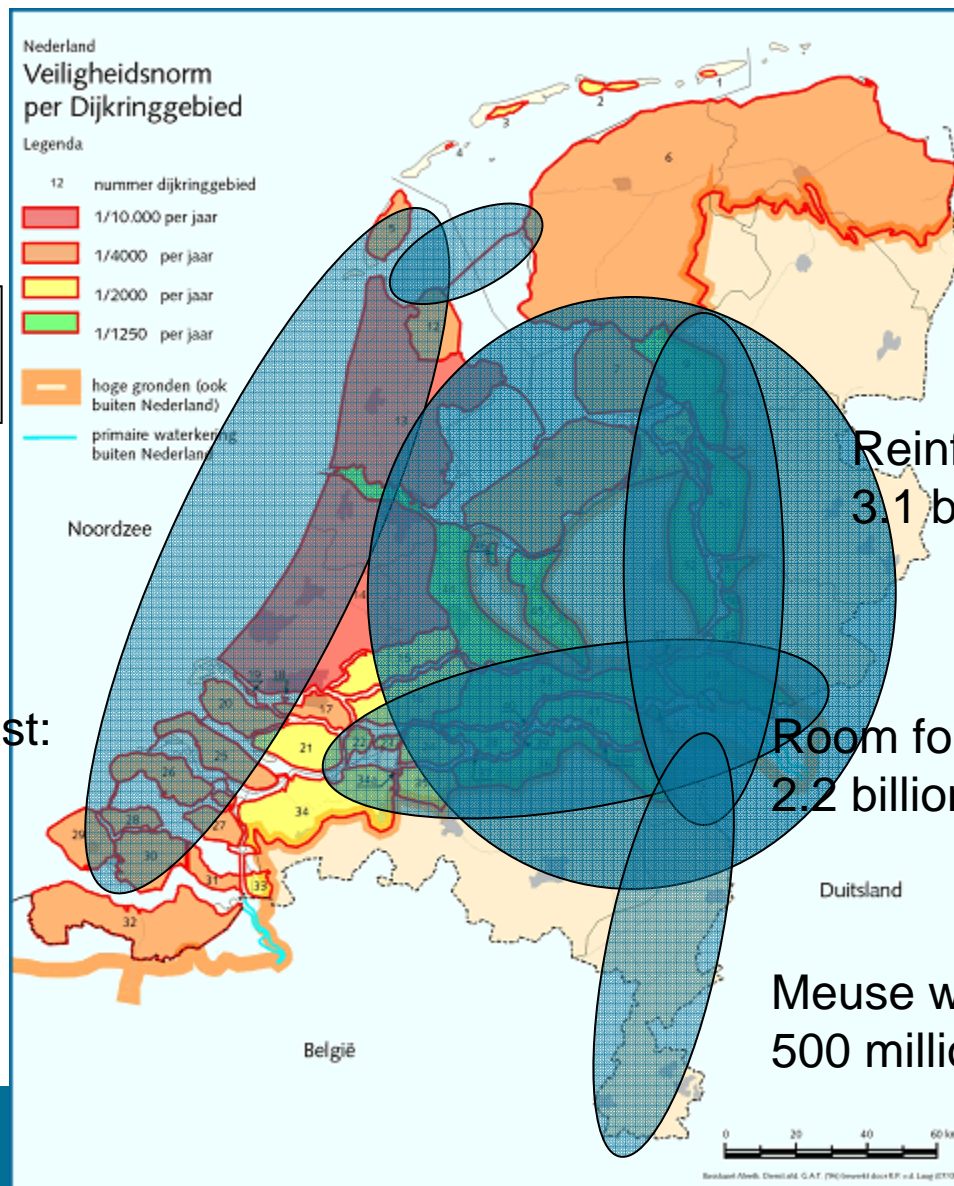
- ~17 million people, 22nd largest economy, 5th most densely populated country
- 60% of people (9 million) live in, 70% of GDP (600 bln) produced in, areas between 1 and 6.5 meters below mean sea level
- ~600 km of rivers, 2500 km of flood defences, hundreds of locks, sluices, etc.
- subsiding, changing climate
- water management is a matter of *national survival*
- water is an *opportunity*





Investments after 2000

7.2 billion euro's for prevention



Renovation closure dam:
0.8 billion euro

Reinforcing river dikes:
3.1 billion euro's

Room for the River:
2.2 billion euro's

Meuse works:
500 million euro's

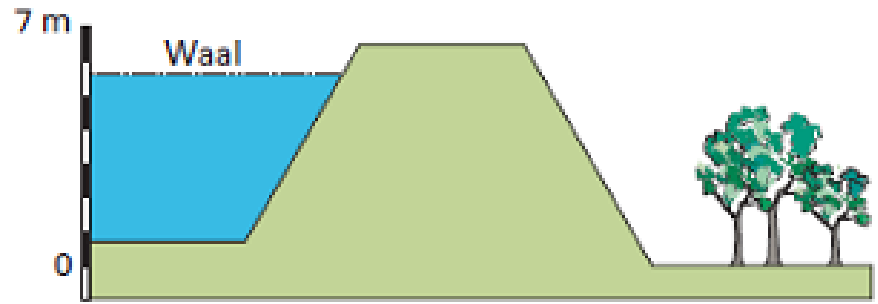
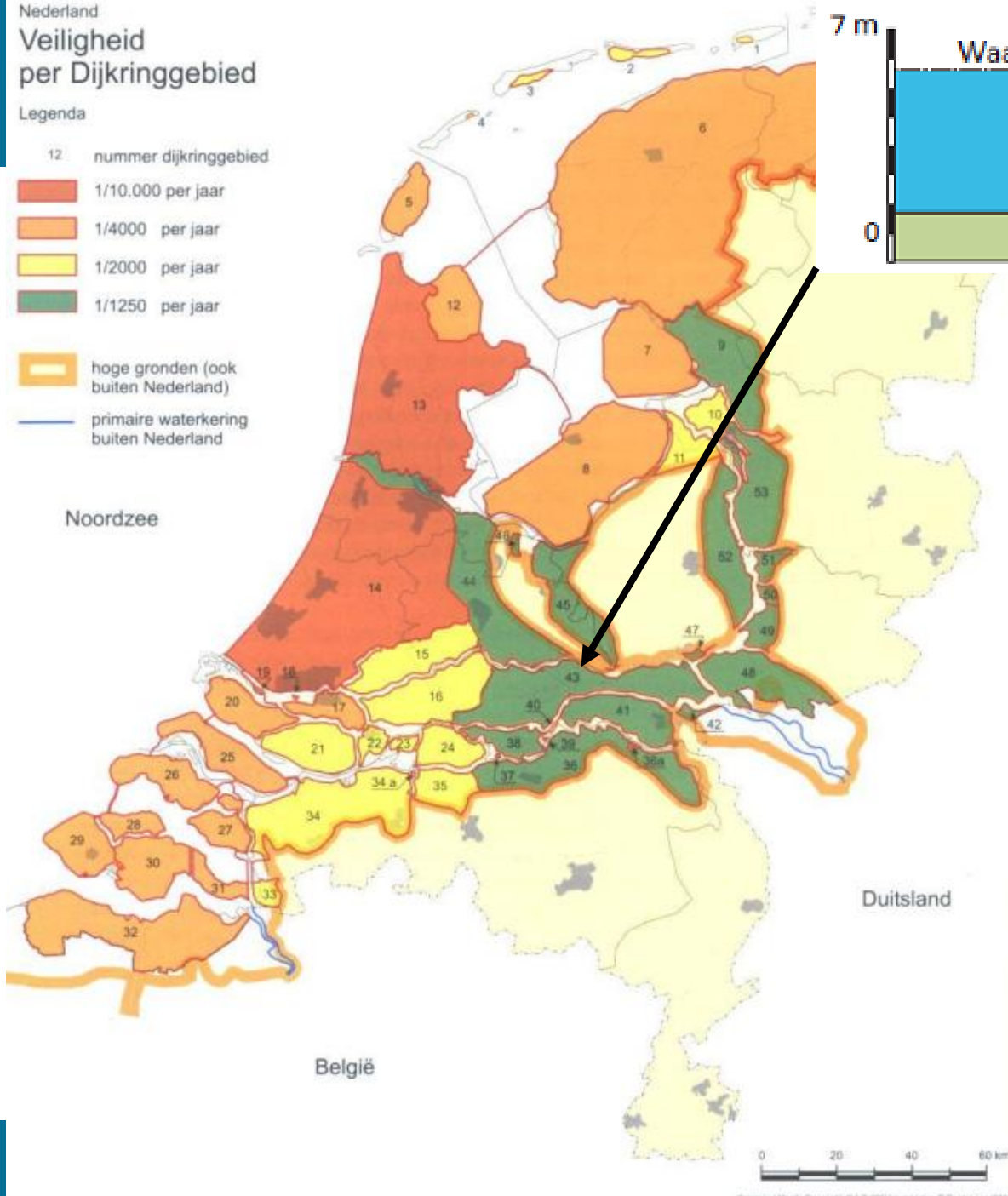
Weak links in the coast:
600 million euro's



Nederland Veiligheid per Dijkkringgebied

Legenda

- 12 nummer dijkkringgebied
- 1/10.000 per jaar
- 1/4000 per jaar
- 1/2000 per jaar
- 1/1250 per jaar
- hoge gronden (ook buiten Nederland)
- primaire waterkering buiten Nederland



Safety standards are accepted.

1:1250 is extremely high!

Only reason: economical and societal

(Standards are under revision!)



Dec 1993



Jan 1995







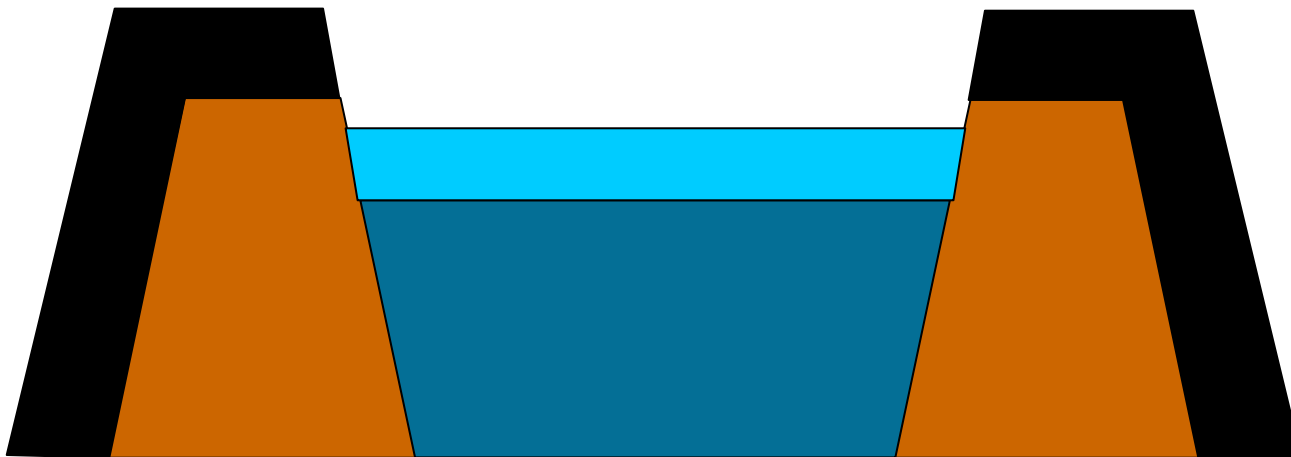
Properties of high discharge

- Two one in 30/60 years event in one year
- Large impact, media attention, etc
- 250.000 people evacuated
- Immediate action-dike reinforcement at weak spots
- Cause of Room for the River!





What to do? Reinforcement of the levees?





Or: Spatial measures to reduce flood levels



35-40 different projects
to comply with our standards





Flood control and spatial quality





Time and budget



2007-2015

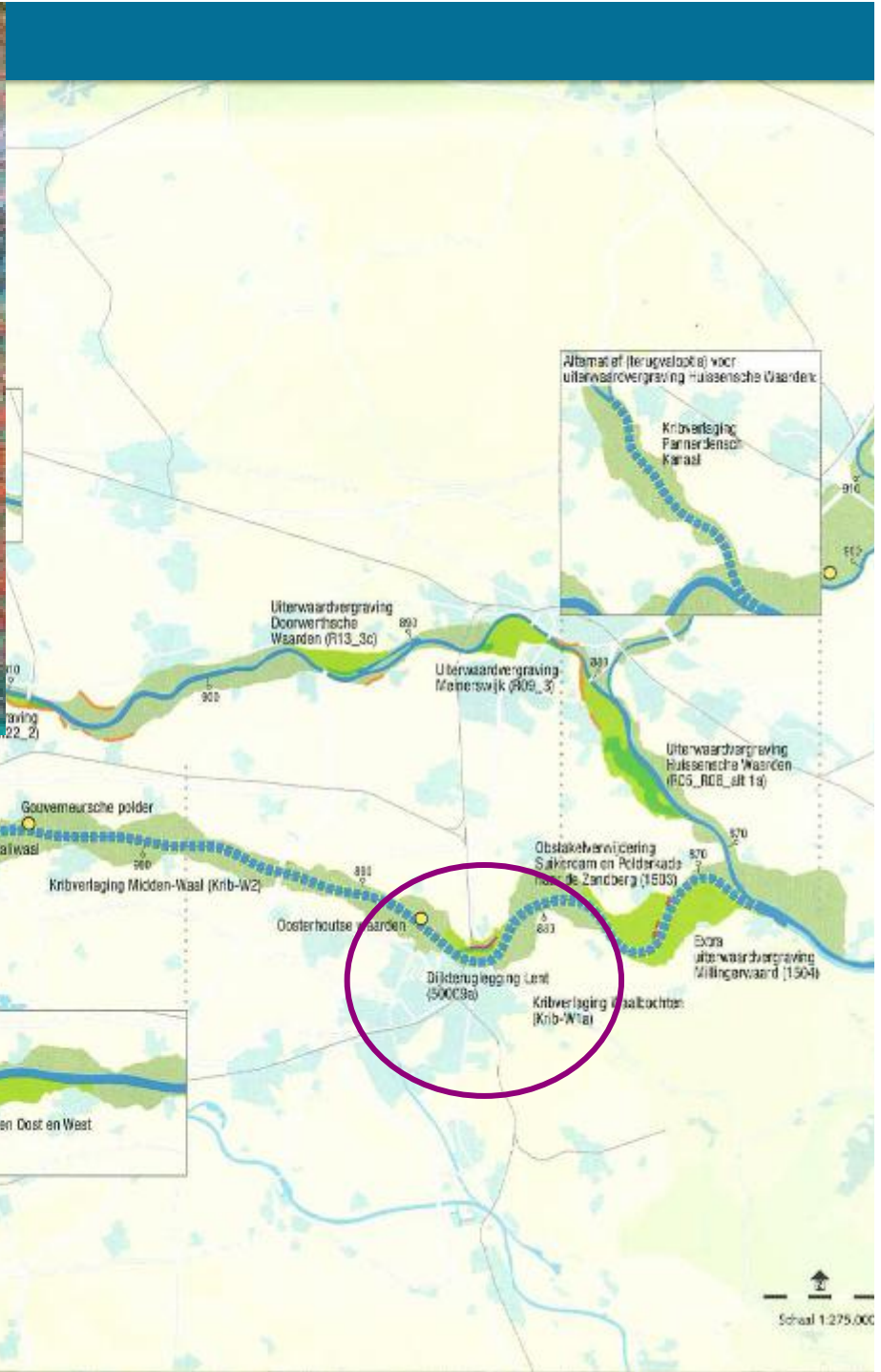


€ 2.2 billion





Copyright © CNEB/NL/RWS/MID

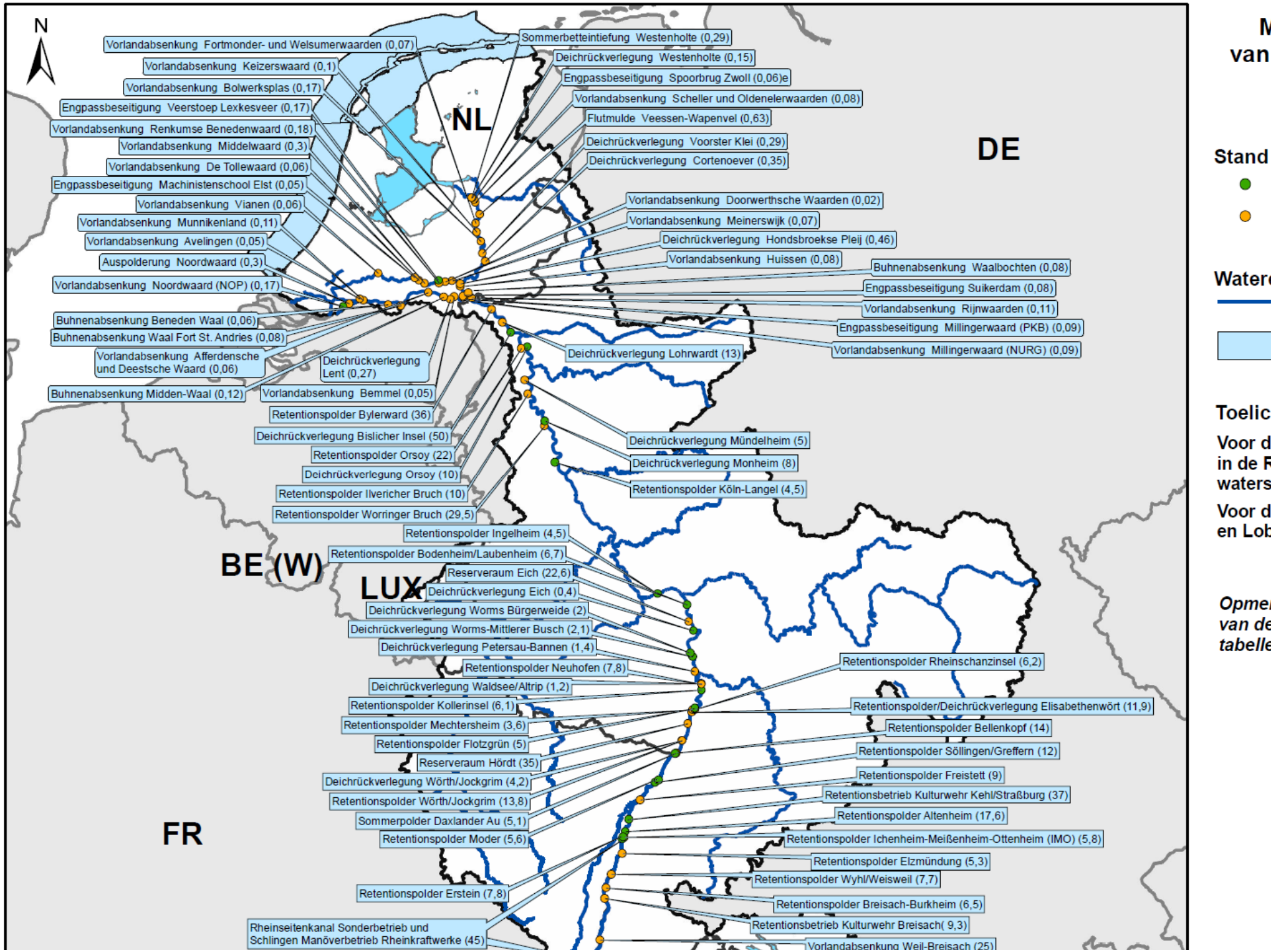


325 million euro's

Schaal 1:275.000







N
van

Stand

Water

Toelief

Voor d
in de F
waters
Voor d
en Lok

Opmer
van de
tabelle



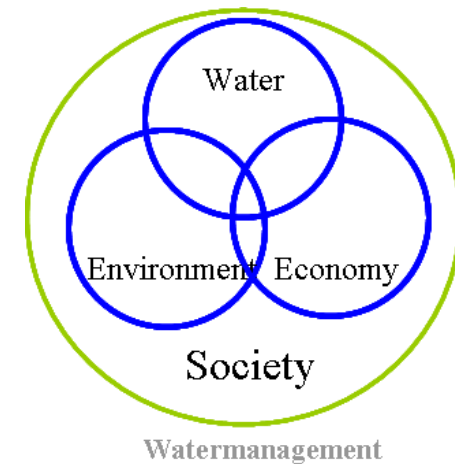
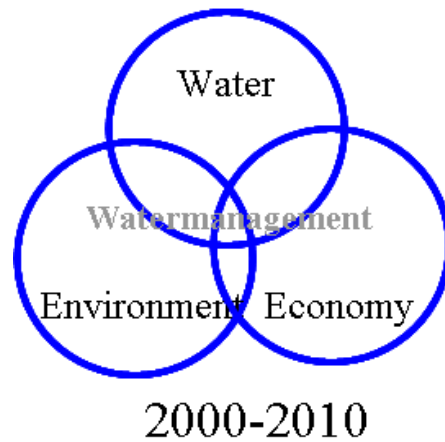
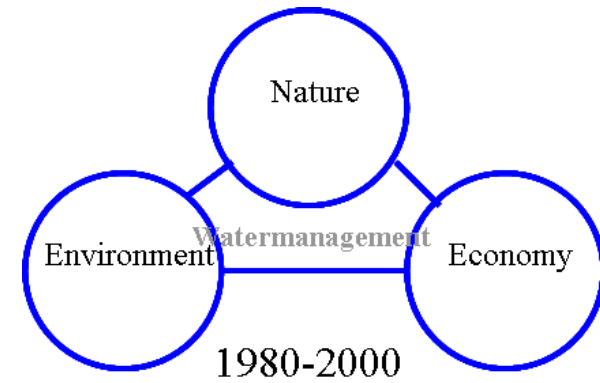
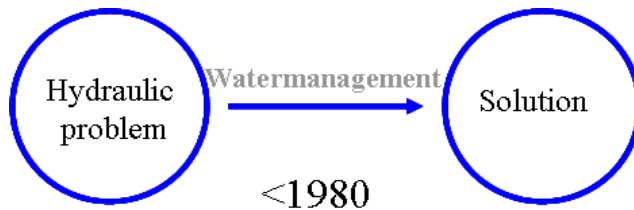
Conclusions Room for the River

- Sense of urgency was present ('93-'95)
- Integrated approach (safety and spatial quality)
- Involvement of complete community
- 'Serious game' to connect local ambition to scientific sound results
- Time span: 1993-2015





Stages of water management



>2010





Deltaprogramme: 2010-2015

- **Anticipate** on climate change, economic scenario's
- **Avoid** a flood rather than react on consequences
- Sea, coast and rivers
- New safety-standards, urban planning
- **Mix** of more spatial measures, and also dike reinforcements
- Timeframe: 2050-2100
- Problem is threefolded:
 - Climate change
 - New safety standards
 - Unexpected piping problems





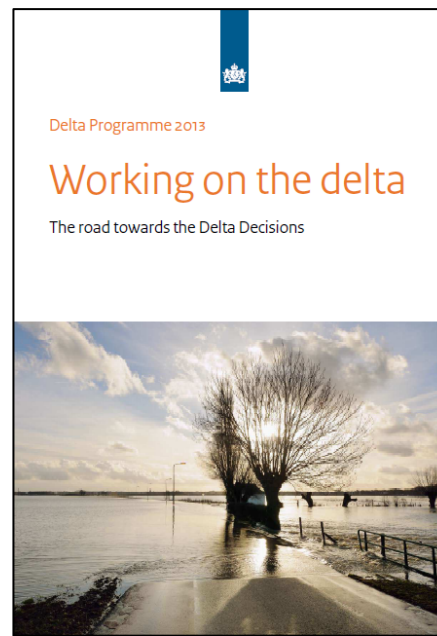
Delta programme: Progress reports



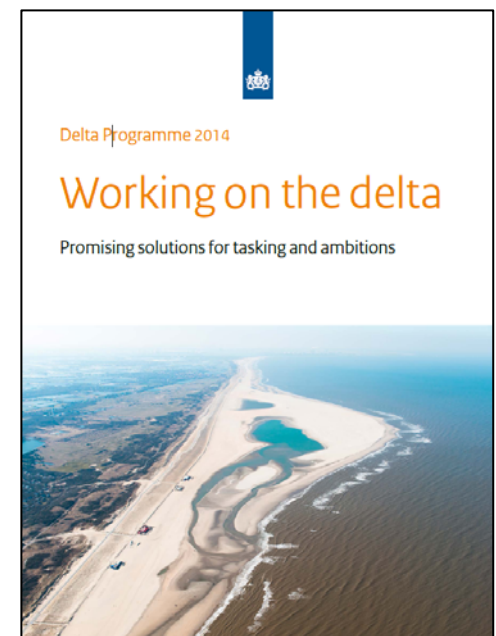
Sept. 2010



Sept. 2011



Sept. 2012



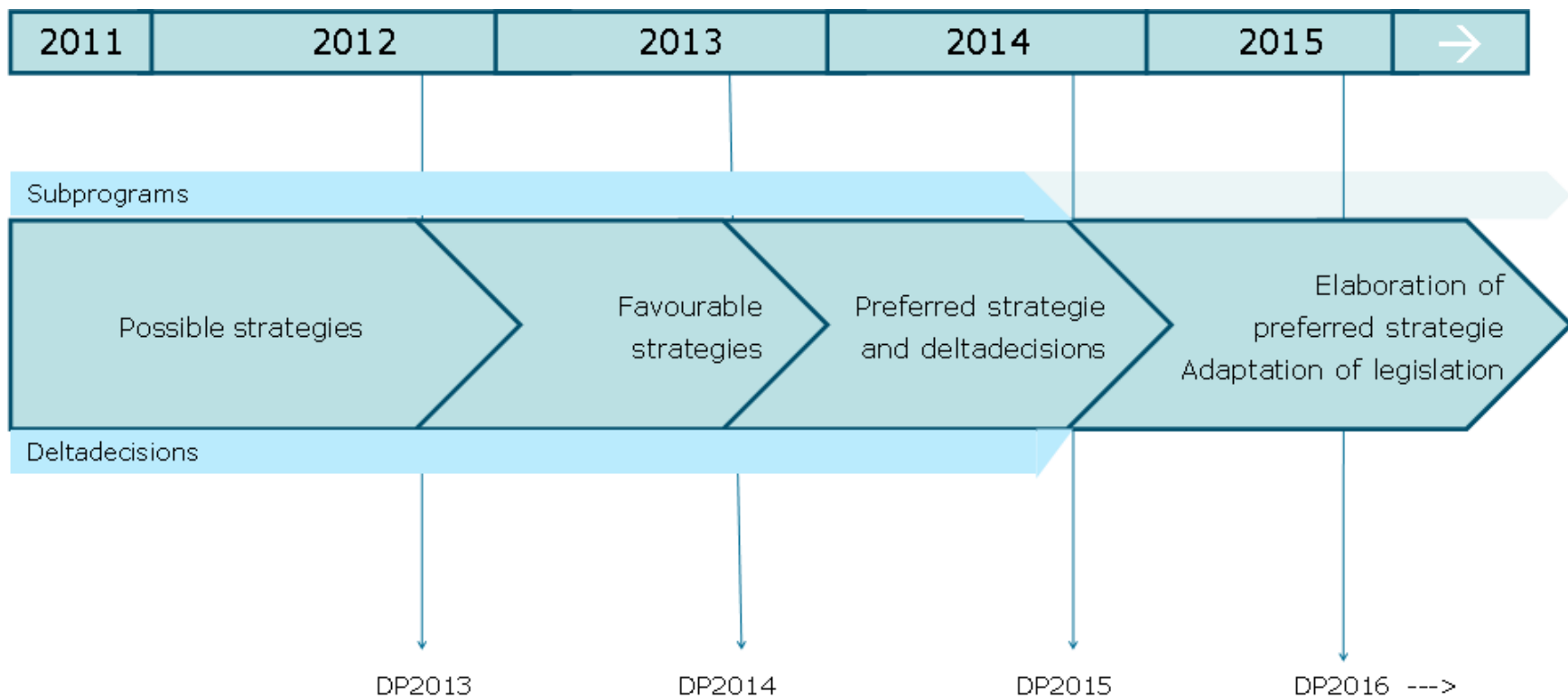
Sept. 2013

Measures -> Possible strategies -> Favourable strategies-> Preferred strategy



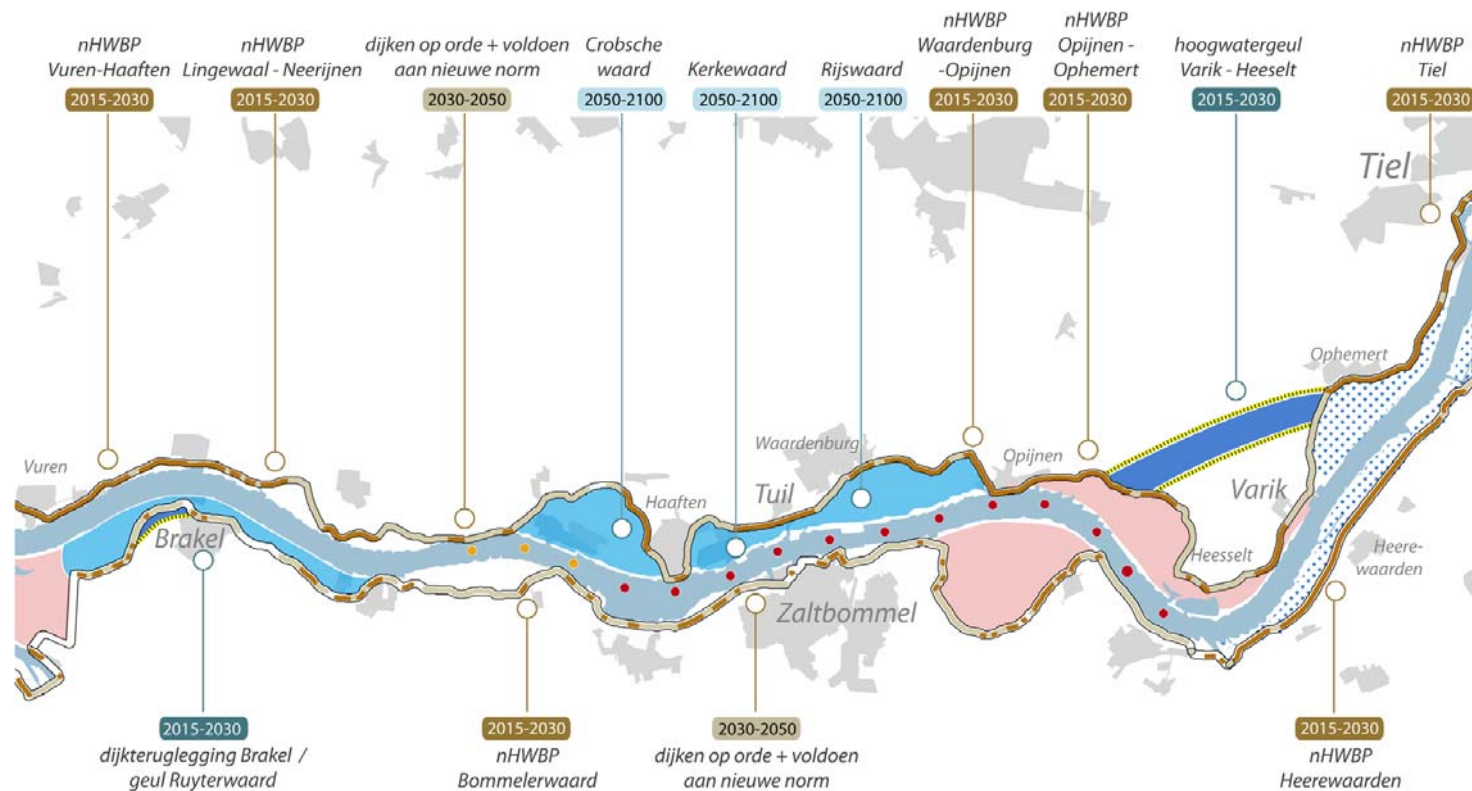


Delta programme Route to preferred strategy





Preferred strategy: balanced mix of spatial measures and dikes





Delta programme: after 2015

- Timeline 2030-2050-2100
- Adaptive delta management
- Let each generation solve its own problems
- Communication is essential
- Money is also essential (deltafund of 600 M € per year)





In summary: shifts in paradigm

- Events: 1926, 1953, 1993/95
- Reaction: Room for the River
- Best protected delta in the world
- Delta programme: Anticipate
- Meanwhile: Testing and maintenance





Management and Research

- Water management as export product
 - St. Louis, Mississippi
 - Los Angeles, LA-river
 - Calgary, Alberta floods
 - Somerset, England
 - ...
- Research: RiverCare



RiverCare

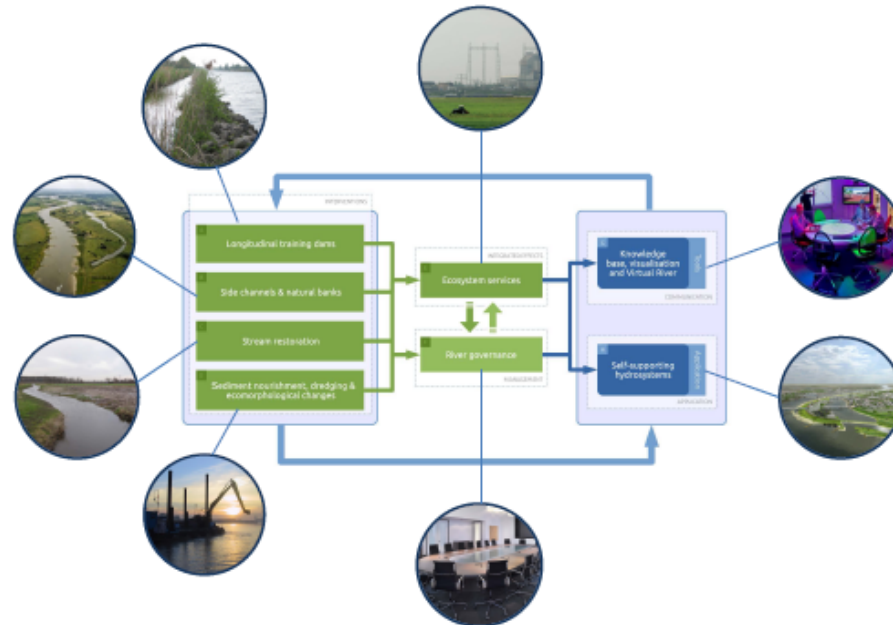
towards self-sustaining multifunctional rivers



RiverCare is a research programme funded within the so called Perspectief Programme of the Dutch Science and Technology Foundation (STW), and consists of 20 research positions at 5 different Dutch universities in cooperation with many public and private partners (see below). RiverCare will run from 2014 to 2019.

Objective

To get a better understanding of the fundamental processes that drive ecomorphological changes in rivers, predict the intermediate and long-term developments and develop best practices to reduce the maintenance costs and increase the benefits of interventions. RiverCare is a combination of fundamental research, river engineering applications and state of the art visualisation tools.



RiverCare is also about cooperation. In a joint effort, universities, knowledge institutes, consultancy firms and the government acted together and defined the challenges that need to be solved for optimal river management.



For more information contact: Suzanne Hulscher (s.j.h.m.hulscher@utwente.nl), Ralph Schielen (ralph.schielen@rws.nl) or Denise Augustijn (d.c.m.augustijn@utwente.nl)





Thank you for your attention

