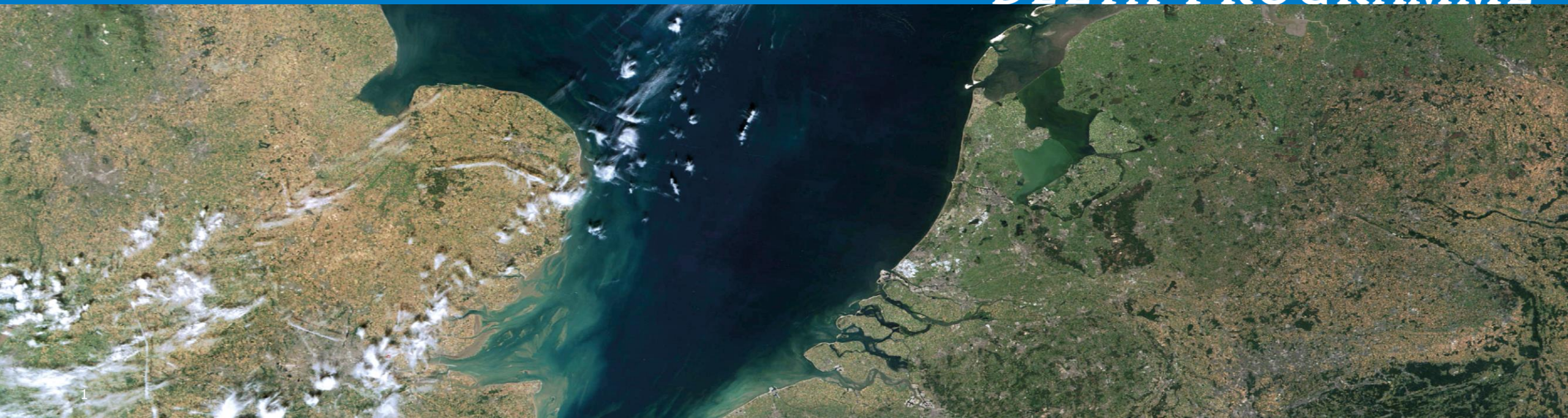




Water management and climate adaptation in the Netherlands – the Delta Programme

Monique Berendsen, staff Delta Commissioner

NATIONAL
DELTA PROGRAMME





The Netherlands a delta country



A history of water management



around 1580



around 1700



2000



20th/21th Century: flooding and protection

- 1916 floods (North) - damming off the Zuiderzee and creation of IJsselmeer (1931)
- 1953 flood disaster (South-West) - civil engineering solutions with dams/barriers: the Delta Works, shortening the coastline
- 1993/1995 high water level (rivers) - new concept: Room for the River
- July 2021 'torrential rainstorm' - flooding in Germany, Belgium, Netherlands > international cooperation needed
- 2018 - 2022 'drought' : growing water shortages





Nederland/Waterland

Sealevel rise
3 mm per year -->
30–110 cm in 2100?

Increased
erosion

More/intense
rainfall

More summer
drought
and heat

Increased
invested
value

Spatial
developments

Increased
river
discharge
+ 10%

Salt
intrusion

Subsidence
10 cm/100yr

Decreased
river
discharge
- 60%



2008: 2nd Delta Commitee

*"Can we still live here in this delta? Yes, we can, **if we adapt**"*

2011 - Delta Act with a Delta Fund (1 Bln/yr) a Delta Commissioner and a (annual) Delta programme:

- Safe against flooding
- Sufficient fresh water
- Resilient against extreme weather

2015 - Delta decisions and regional strategies

2017 - new safety standards

2020 - first 6yr Recalibration



An aerial photograph of a river delta, showing a network of waterways and green land. Five circular callouts are overlaid on the image, arranged in a horizontal line from left to right. The first three callouts are blue, and the last two are orange. The text inside the callouts is white and bold.

**SAFE
AGAINST
FLOODING**

**SUFFICIENT
FRESH WATER**

**RESILIENT
AGAINST
EXTREME
WEATHER**

**NOW AND IN
THE FUTURE**

**BASED ON
UP-TO-DATE
KNOWLEDGE**

**NATIONAL
DELTA PROGRAMME**

THE NATIONAL DELTA PROGRAMME INVOLVES US ALL



NATIONAL AND
REGIONAL
GOVERNMENTS



DELTA PROGRAMME
COMMISSIONER
COORDINATION



BUSINESSES
AND NGOS



RESEARCH
INSTITUTES

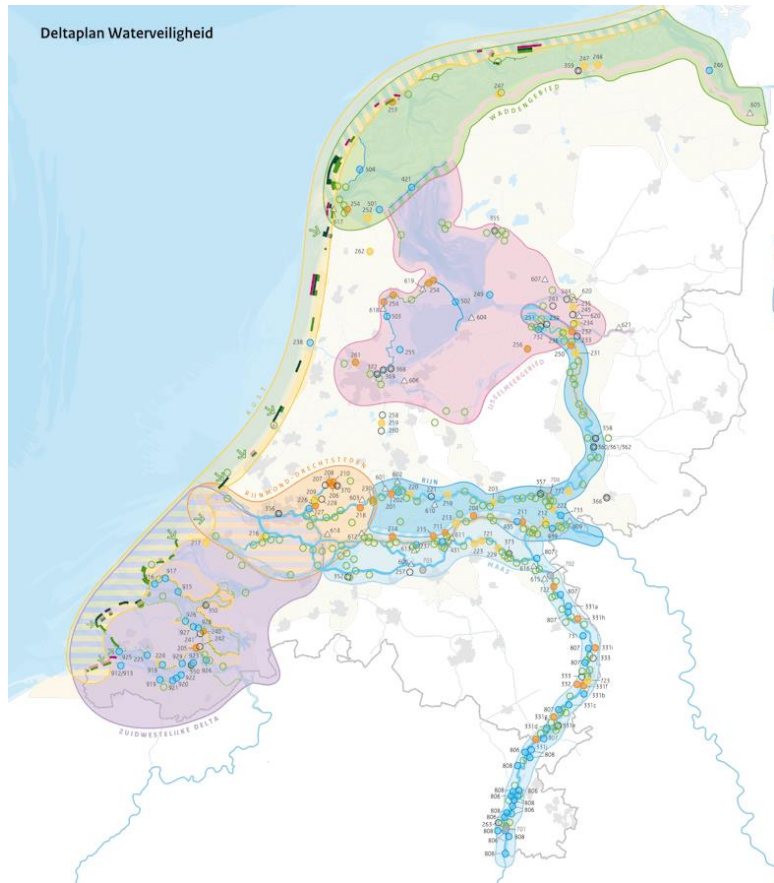


RESIDENTS

NATIONAL
DELTA PROGRAMME



Delta programme regions – three annual Delta Plans



Flood protection



Freshwater availability



Spatial adaptation



Long term horizon → Dealing with uncertainty

Uncertainty in drivers

- (climate change, demography, economy)

Uncertainty in politics

- (discontinuity in support, priority, funding)

Adaptive approach:

- Scenario's
- Adaptive strategies
- Flexible / robust measures
- Monitoring and periodic recalibration

Securing implementation:

- Delta Fund
- Delta Commissioner
- Delta Act
- Annual progress report



Decision making on adaptive strategies and adaptive measures...



Decision making in uncertain future

→ adaptive **strategies**:

- Clear in objectives,
- Adaptable to actual conditions
- Flexible in “way to go”
- Do what is necessary now, keep future options open
- Linking short term agenda’s with long term water challenges

Implementation in uncertain future

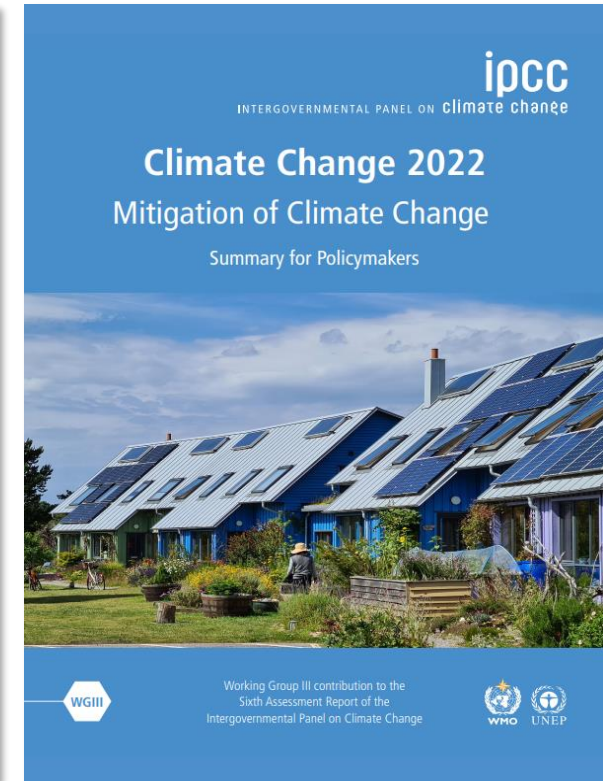
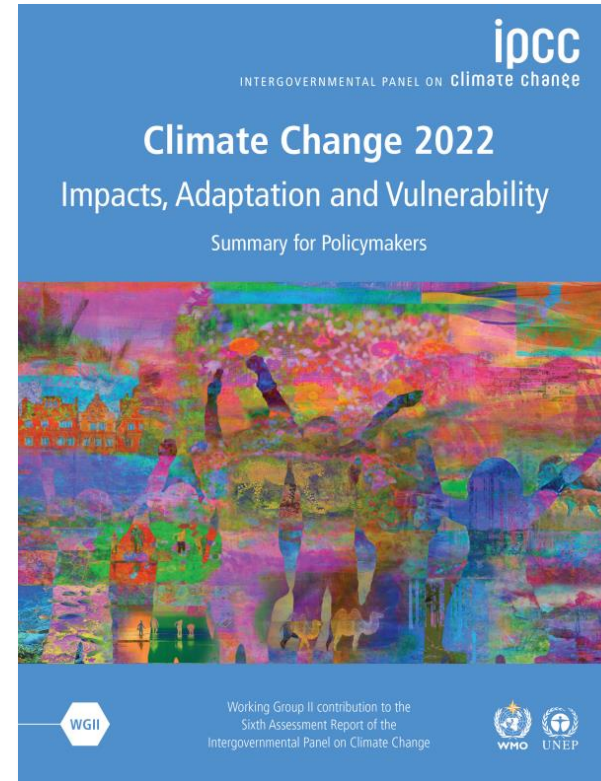
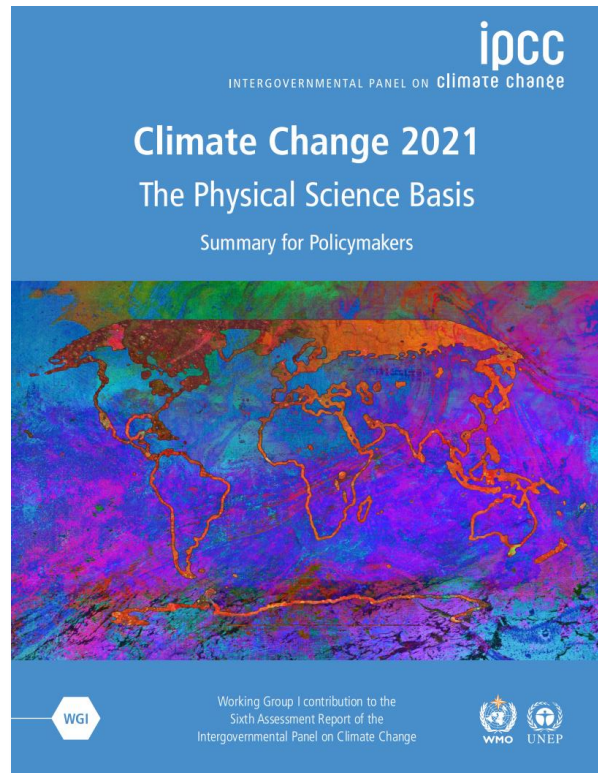
→ Flexible **measures** (“speed up/slow down”)

→ Building with Nature or robust design

→ Spatial reservations



Science basis - IPCC and KNMI reports





Early warning: the Delta Programme Signal Group

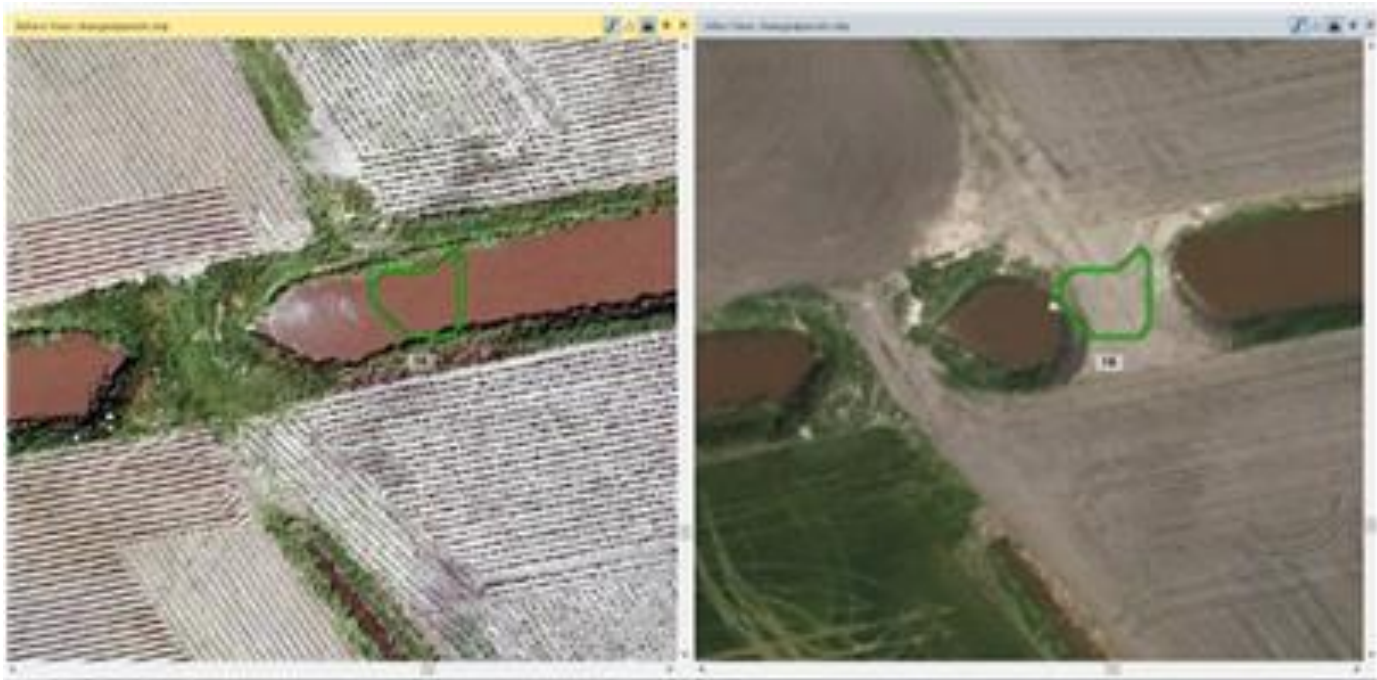
- The Delta Programme Signal Group is composed of substantive experts from several research institutes.
- The Signal Group advises the Delta Programme Commissioner annually on developments that may affect the Delta Programme water taskings or the structure and implementation of the Delta Programme.
- For example in DP2022 the Signal Group advised on an exploration of the vulnerability limits of the current water consumption functions..





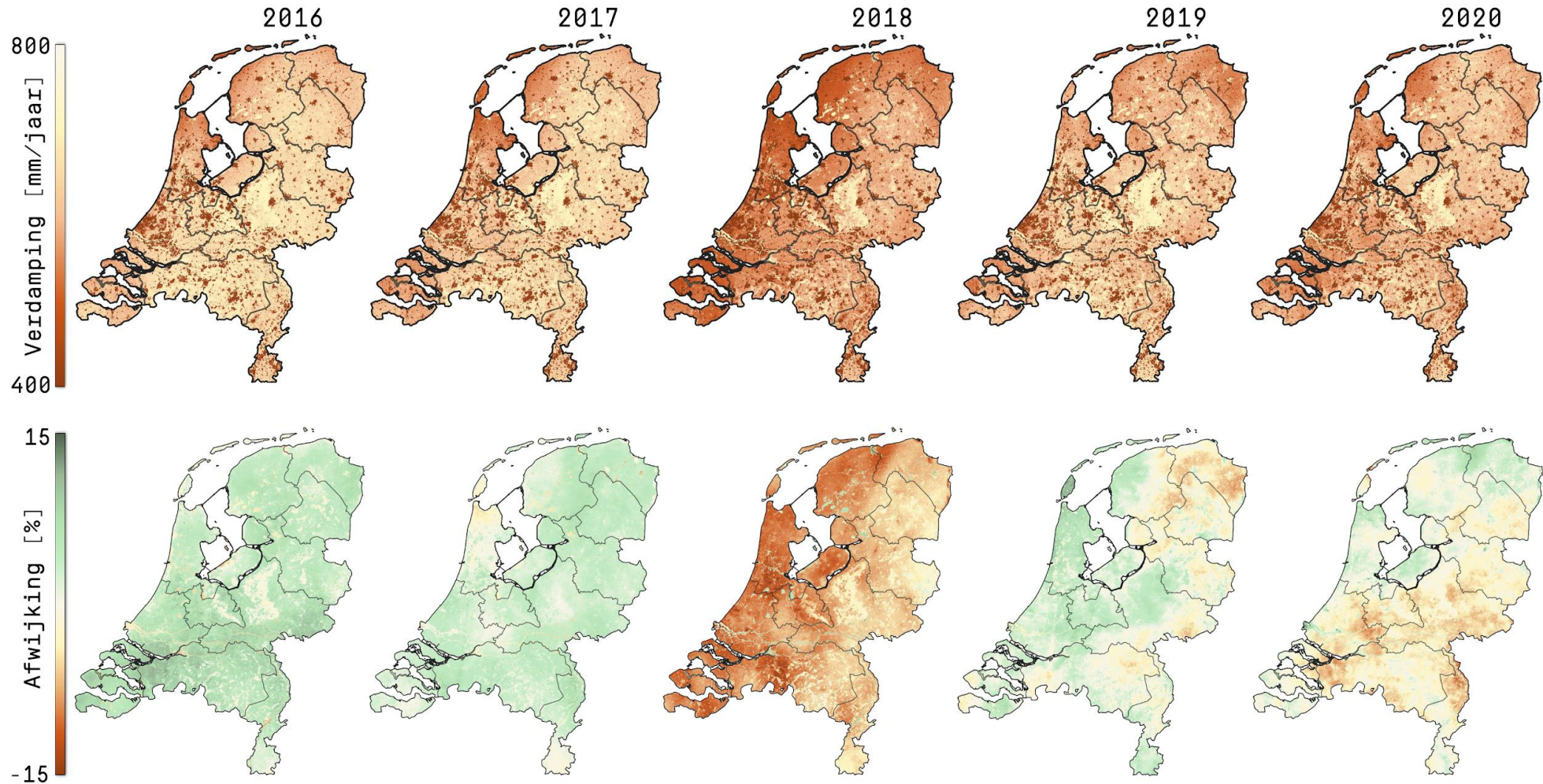
Fresh Water supply:

- Real time remote sensing information watersystem and irrigation



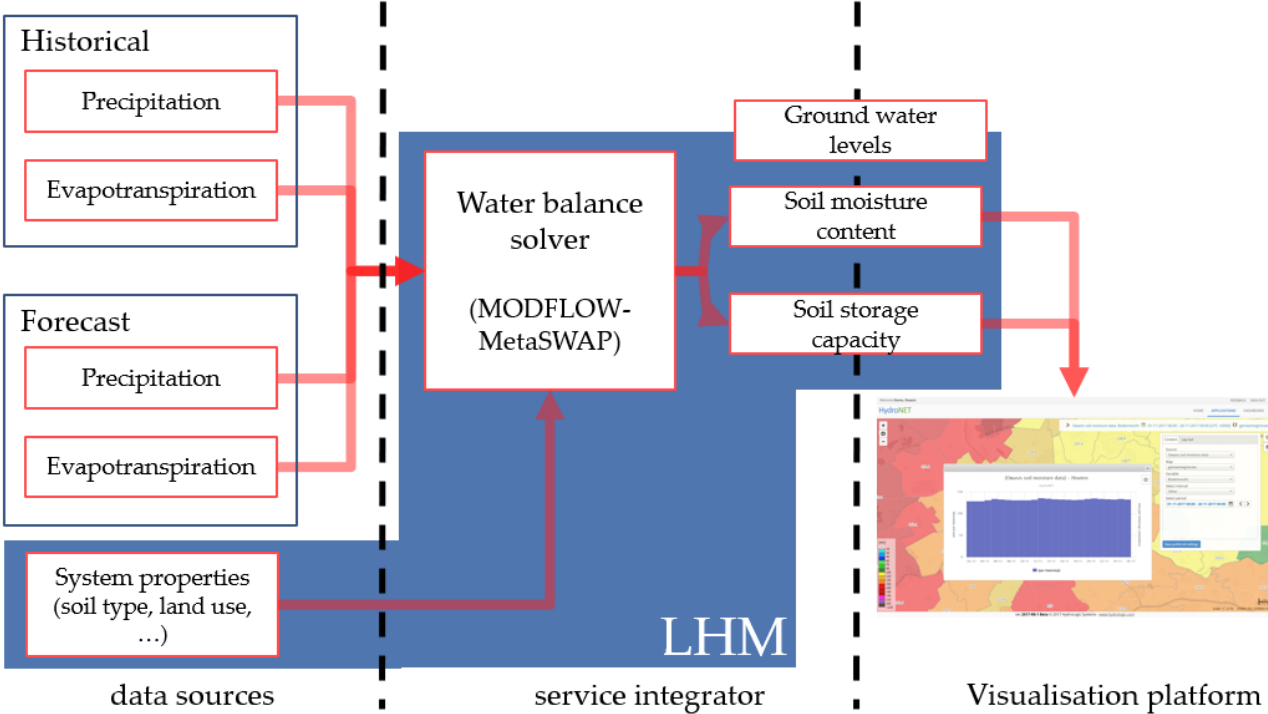
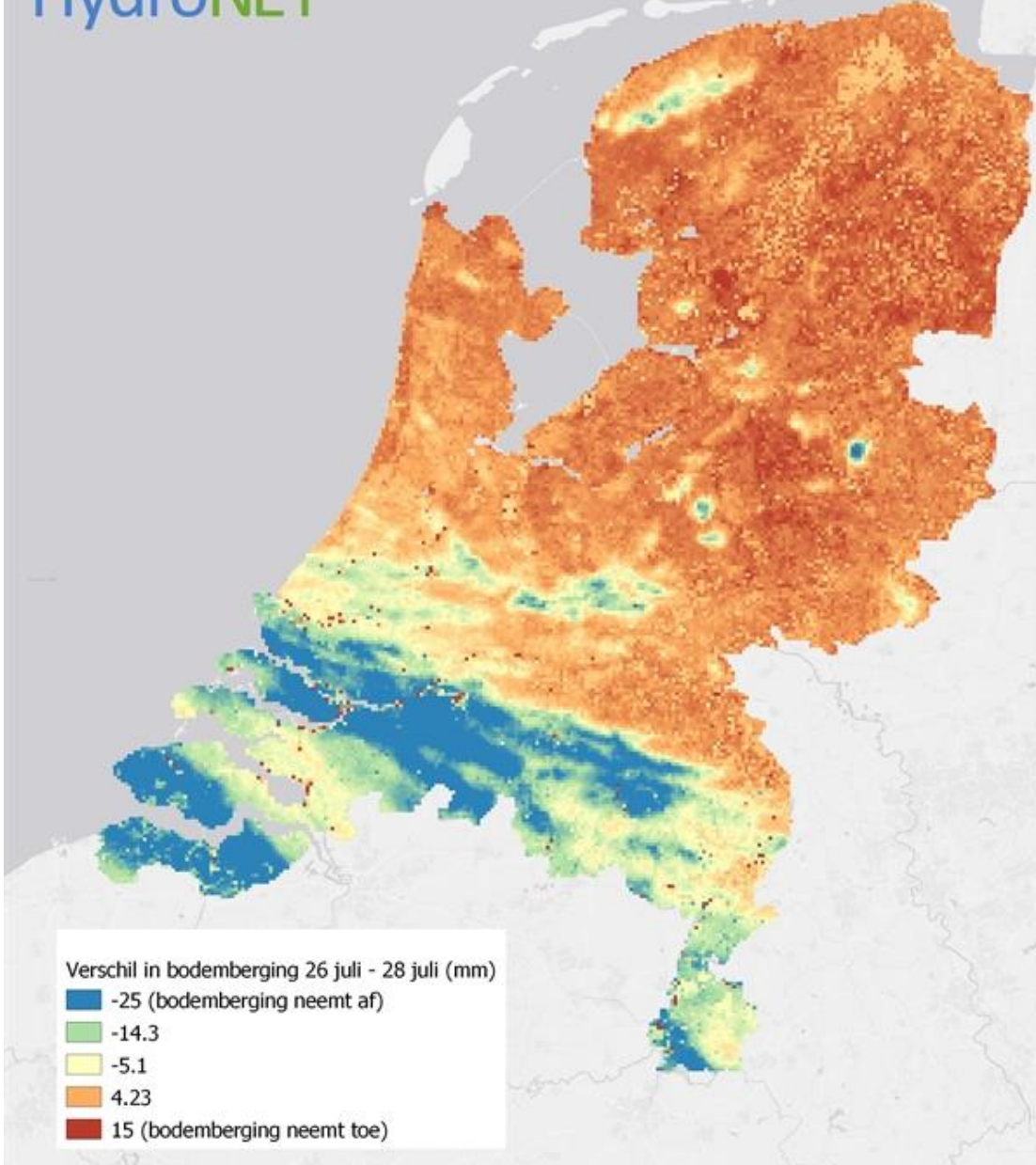
Evaporation during draught

Beelden op basis van geverifieerde SATDATA 3.0

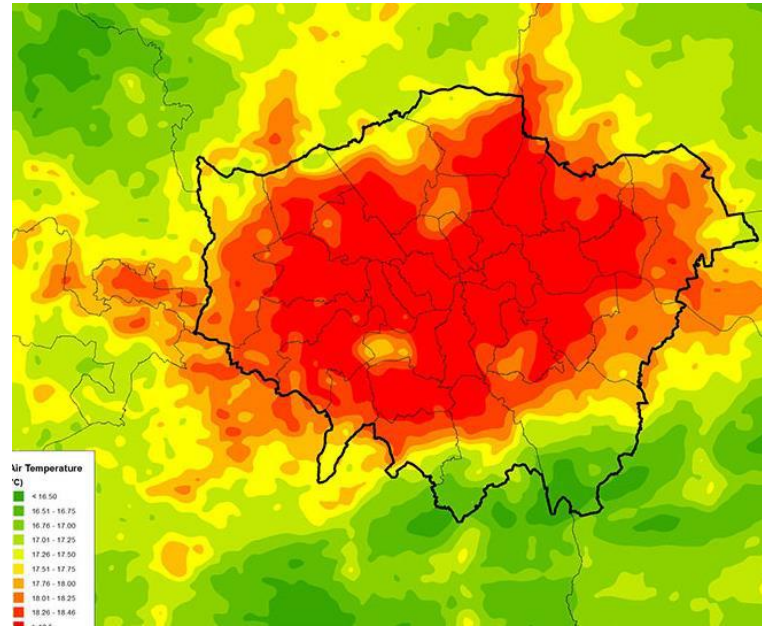
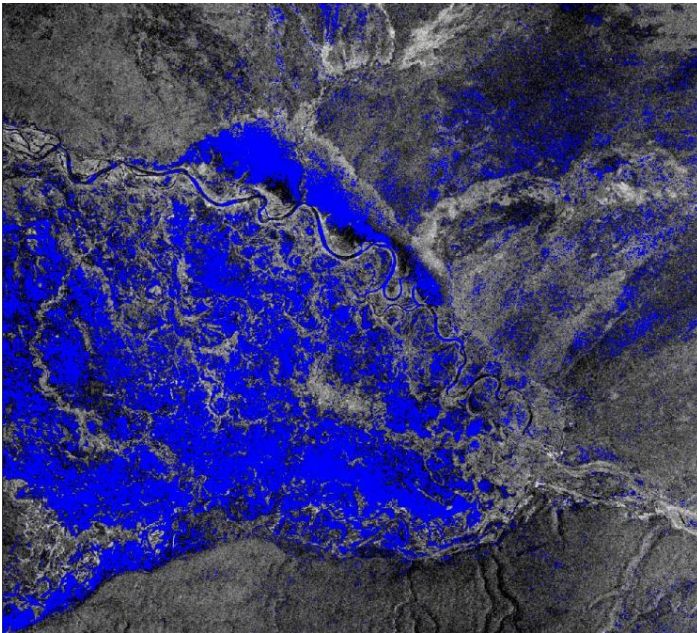


Translated to soil moisture OWASIS (Slim Watermanagement)

HydroNET



Monitoring Inundation, heat-islands & moisture “peatdikes”



Subsidence

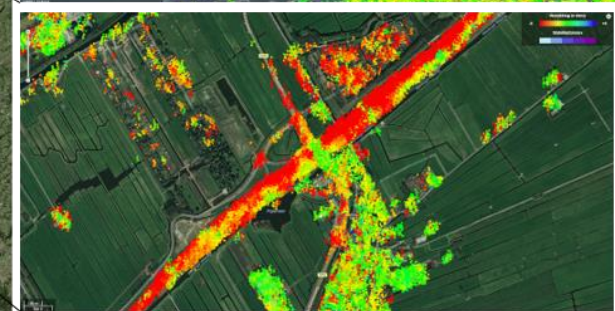
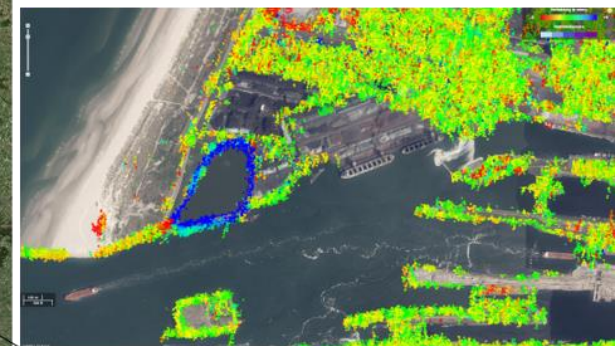
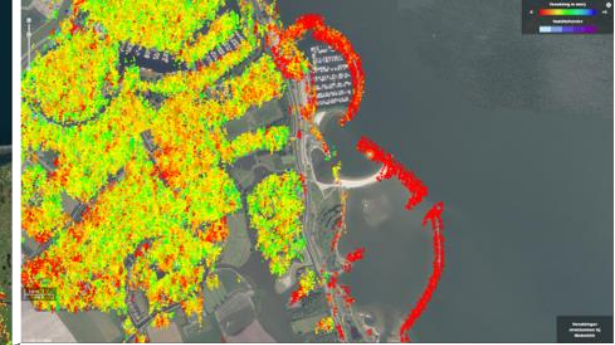
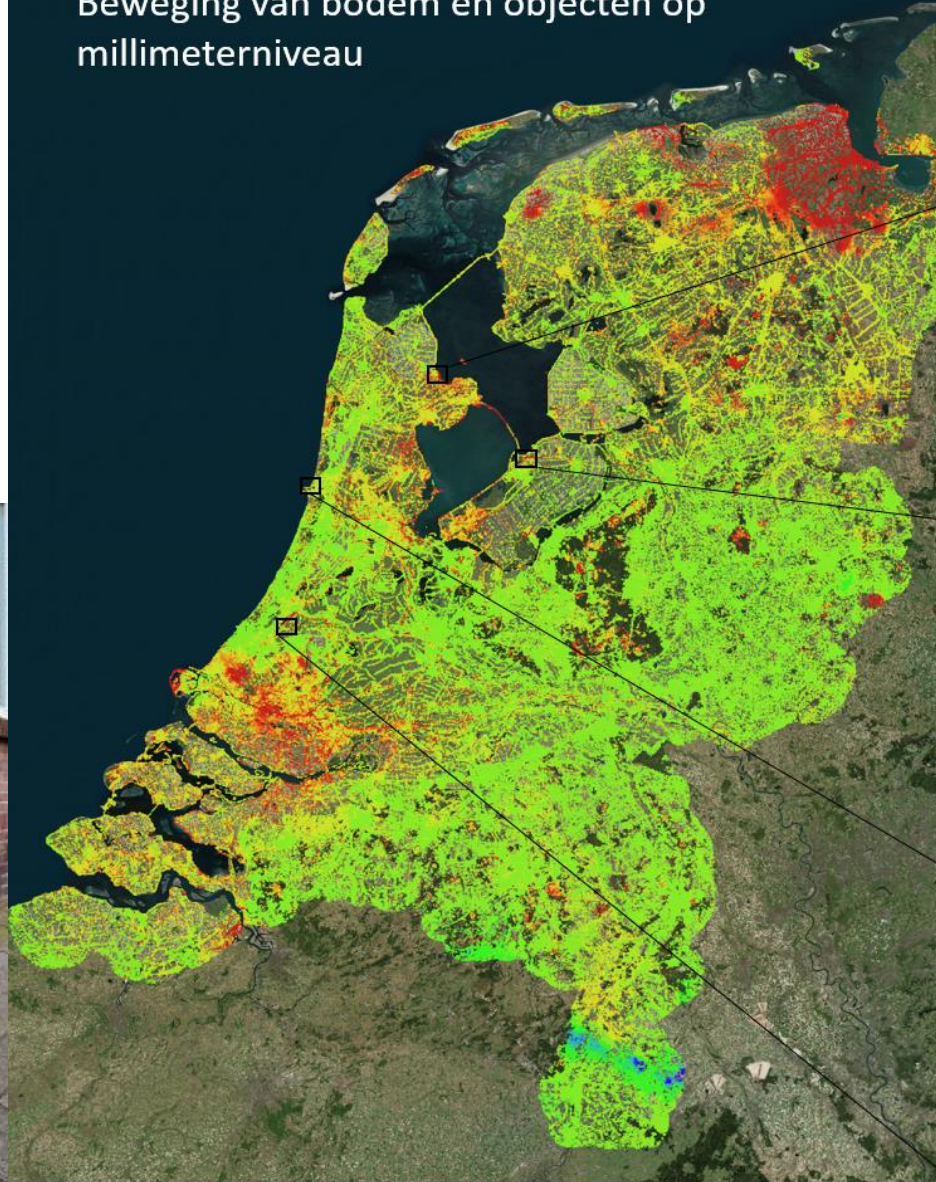
InSAR

Bodemdalingskaart.nl



Bodemdalingskaart 2.0

Beweging van bodem en objecten op millimeterniveau





Knowledge Programme Sea Level Rise

- Extra acceleration SLR is uncertain, after 2050 at earliest ;new insights?
- Present strategies good basis to keep Dutch Delta safe until 2050
- Extreme SLR > 2050 makes fundamental choices inevitable

- In the meantime: research!
- Reducing uncertainty in processes and effects
- Exploring necessary measures and future options

- **Preparing for accelerating sea level rise**

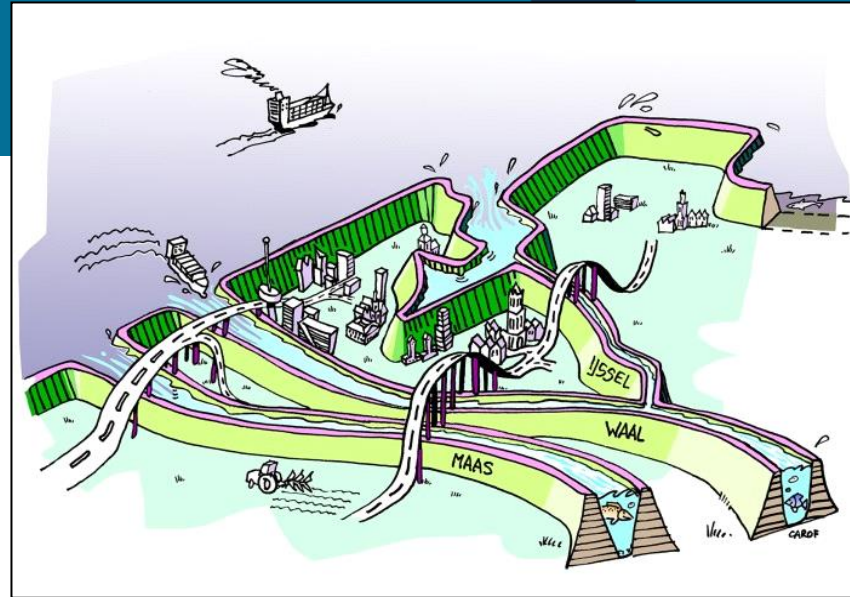
- A new 5 yr. comprehensive research program –



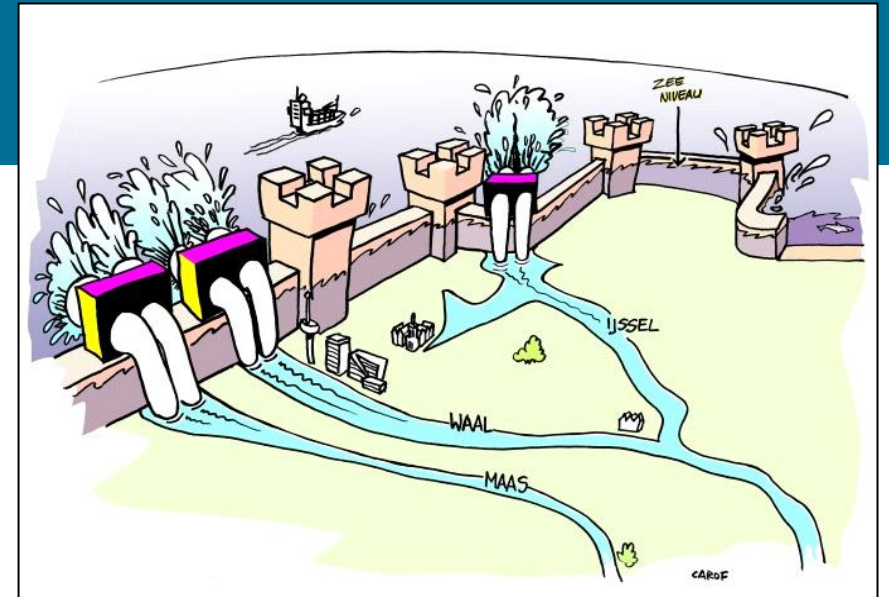
Beyond 2100...

Story line for
a long term
perspective

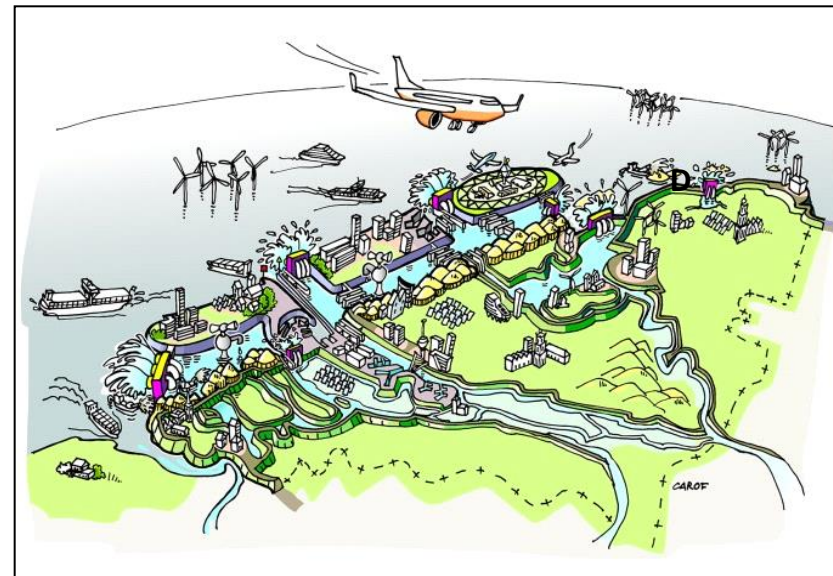
>2m SLR



Protect – open



Protect - closed



Seaward offensive



Tactical retreat



Lessons from the Delta approach



- Long-term thinking - time scale 2020-2050-2100, using scenario's, models and research
- Adapt now for the next generations!
- Integrated approach
- National & regional orientation combined
- Values: Solidarity, flexibility, sustainability
- Create a Delta community (communication, annual conference, social media)
- Joint fact finding
- **Science based- sufficient objective knowledge**



**Thanks for
your attention**

@deltaprogramma

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<https://english.deltaprogramma.nl/delta-programme>



Delta Plan on Spatial Adaptation – 7 steps

- 1 Stress tests in 45 regions / 345 municipalities (flood risk, heat, drought)
- 2 Risk dialogues with stakeholders on ambitions and way forward
- 3 Develop programme of measures
- 4 Link with other major transitions (e.g. green energy, housing, agriculture, biodiversity)
- 5 Stimulate / facilitate realization (2021-2026 stimulus programme)
- 6 Regulate and secure planning & building standards
- 7 Preparation for emergencies

