# "Vraagstuk van de Nederlandse Delta"
## Risk & Resilience Festival

**Waar praten we over:**

- **Delta's hebben toenemend last van klimaatverandering**
- **Resultaten van H2020 MC 'SOS Climate Waterfront'**
- **Matching Delta's voor mutual learning for Resilience**
- **Vier scenarios van Deltares/WUR/TUDelft.**
- **Hoelang gaat het duren, wanneer ingrijpen?**



- **De Nederlandse Delta, wat speelt er? - mini cases**
- **Welke maatregelen kennen we? - groepjes 2 of 3**
- **Wat zien we over het hoofd? - interactief**

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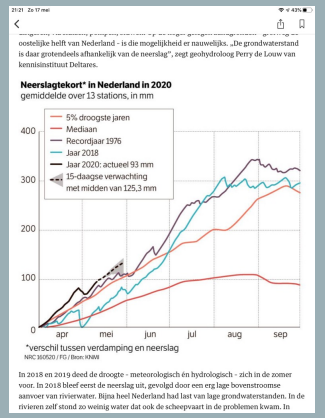
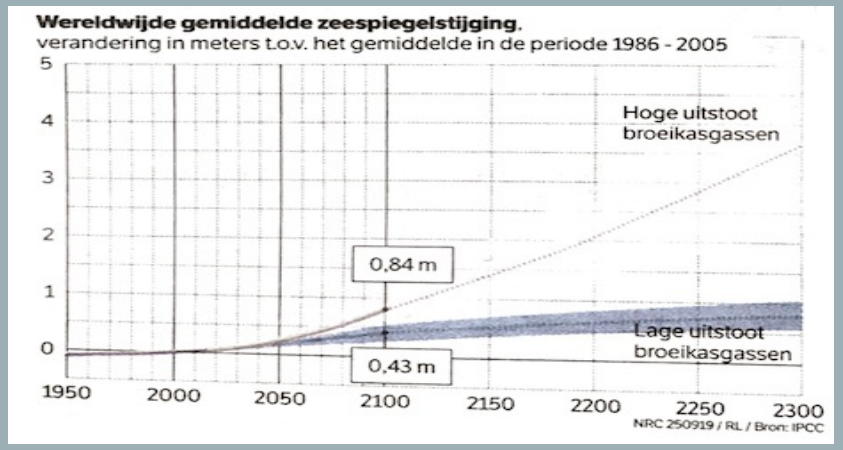
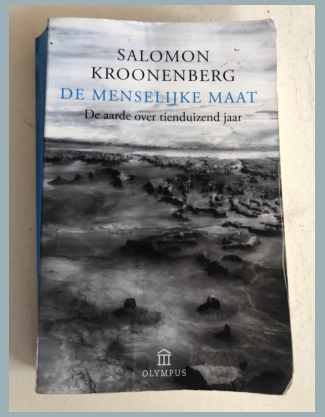
## Delta's hebben toenemend last van klimaatverandering

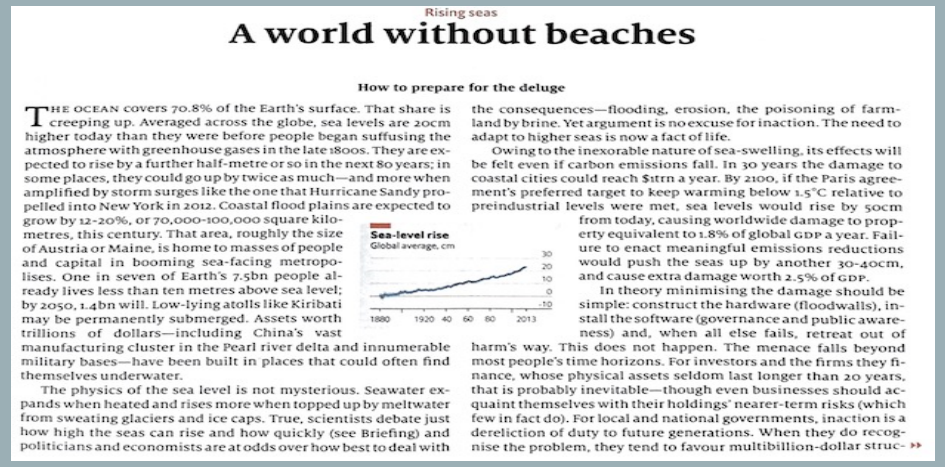










Rising seas

### A world without beaches

**How to prepare for the deluge**

THE OCEAN covers 70.8% of the Earth's surface. That share is creeping up. Averaged across the globe, sea levels are 20cm higher today than they were before people began suffusing the atmosphere with greenhouse gases in the late 1800s. They are expected to rise by a further half-metre or so in the next 80 years; in some places, they could go up by twice as much—and more when amplified by storm surges like the one that Hurricane Sandy propelled into New York in 2012. Coastal flood plains are expected to grow by 12-20%, or 70,000-100,000 square kilometres, this century. That area, roughly the size of Austria or Maine, is home to masses of people and capital in booming sea-facing metropolises. One in seven of Earth's 7.5bn people already lives less than ten metres above sea level; by 2050, 1.4bn will. Low-lying atolls like Kiribati may be permanently submerged. Assets worth trillions of dollars—including China's vast manufacturing cluster in the Pearl river delta and innumerable military bases—have been built in places that could often find themselves underwater.

The physics of the sea level is not mysterious. Seawater expands when heated and rises more when topped up by meltwater from sweating glaciers and ice caps. True, scientists debate just how high the seas can rise and how quickly (see Briefing) and politicians and economists are at odds over how best to deal with the consequences—flooding, erosion, the poisoning of farmland by brine. Yet argument is no excuse for inaction. The need to adapt to higher seas is now a fact of life.

Owing to the inexorable nature of sea-swelling, its effects will be felt even if carbon emissions fall. In 30 years the damage to coastal cities could reach $1trn a year. By 2100, if the Paris agreement's preferred target to keep warming below 1.5°C relative to preindustrial levels were met, sea levels would rise by 50cm from today, causing worldwide damage to property equivalent to 1.8% of global GDP a year. Failure to enact meaningful emissions reductions would push the seas up by another 30-40cm, and cause extra damage worth 2.5% of GDP.

In theory minimising the damage should be simple: construct the hardware (floodwalls), install the software (governance and public awareness) and, when all else fails, retreat out of harm's way. This does not happen. The menace falls beyond most people's time horizons. For investors and the firms they finance, whose physical assets seldom last longer than 20 years, that is probably inevitable—though even businesses should acquaint themselves with their holdings' nearer-term risks (which few in fact do). For local and national governments, inaction is a dereliction of duty to future generations. When they do recognise the problem, they tend to favour multibillion-dollar struc- ▸▸



| Question topics | YES | NO | DONT KNOW |
|---|---|---|---|
| 1. Awareness of the risk that dikes can break | 72,5 | 25,0 | 2,5 |
| 2. Confidence is the construction of dikes | 67,5 | 22,5 | 10,0 |
| 3. Following governmental instructions by flooding | 60,0 | 12,5 | 27,5 |
| 4, Rescuing neighbours instead of running, by flooding | 62,5 | 15 | 22,5 |
| 5. Taken precautionary measures for flood emergencies | 30,0 | 70,0 | 0,0 |

Fred Sanders met resultaten H2020 Marie Curie 'SOS Climate Waterfront' voor Risk & Resilience festival 7 november 2024

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## Resultaten van H2020 MC 'SOS Climate Waterfront': MATCHING CITIES

**Lessons-learned:**

- **Coastal cities can be matched for mutual learning,**
- **Adaptation measures are confronted with all kinds of local blockades.**


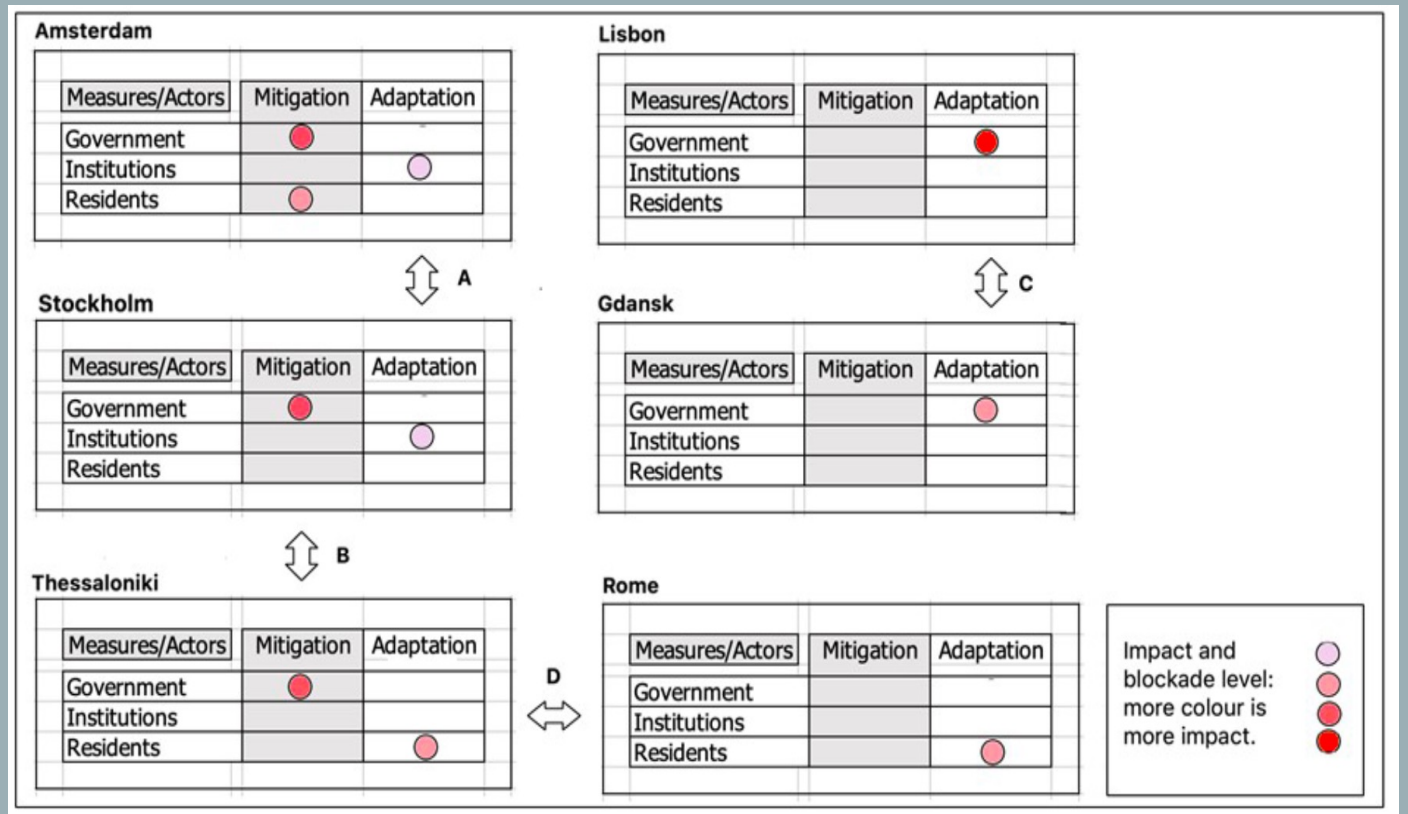


**Figure 8.** The combinations of cities according to their comparable mitigation and adaptation measures.

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**Wat staat ons te wachten? – de 4 klimaat scenarios van het KNMI**


WATERFRONT CLIMATE SOS

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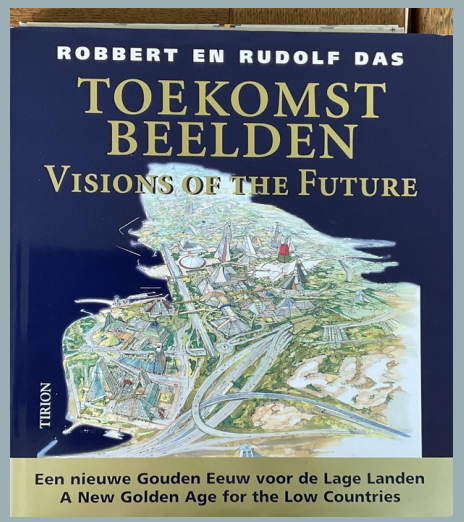
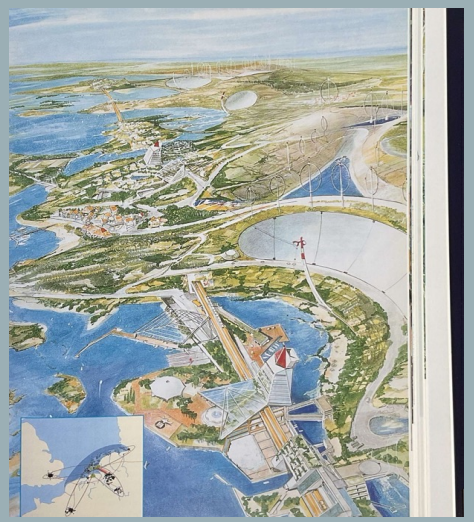
**KLIMAATADAPTATIE – voorbeelden.**

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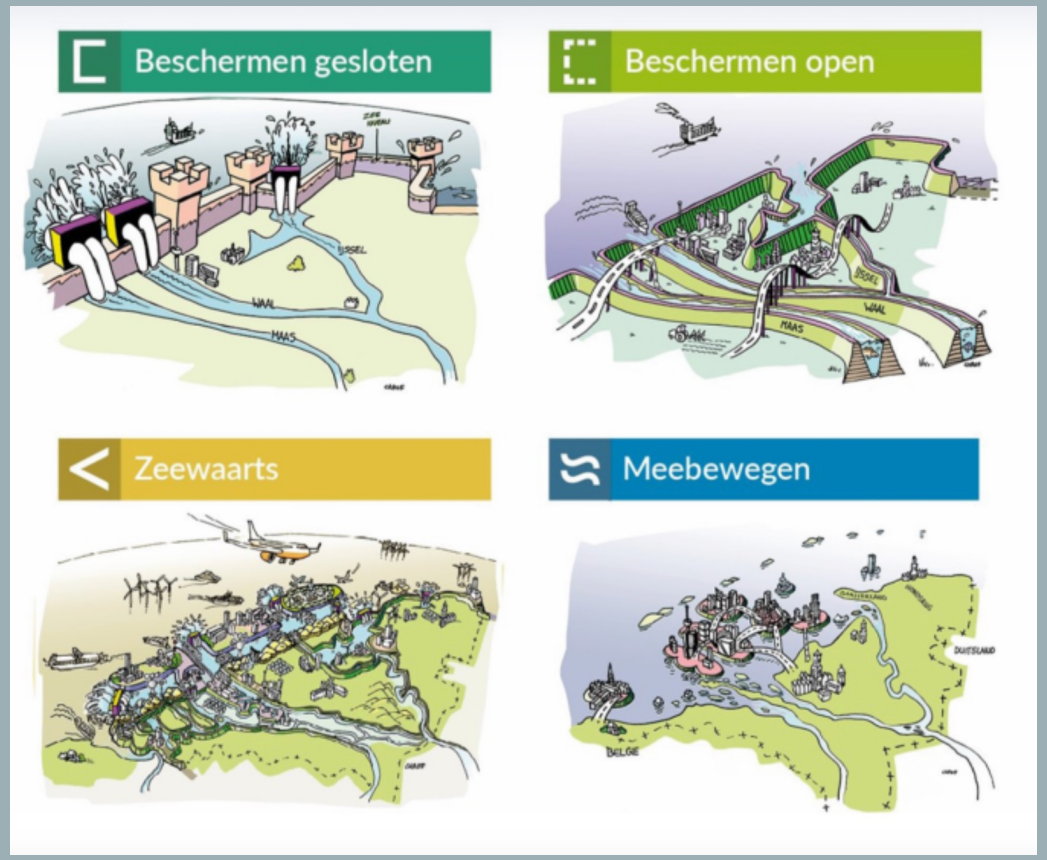
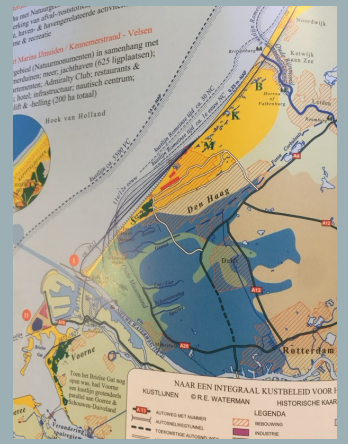
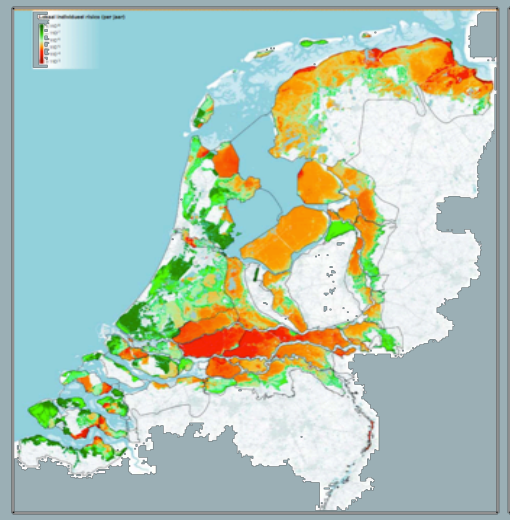
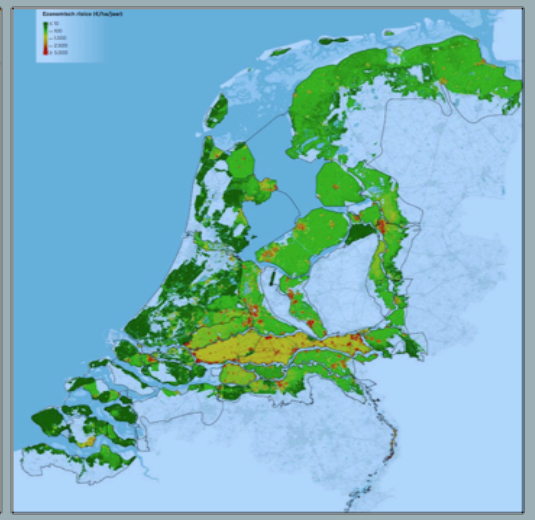
### Vier scenarios van Deltares (WUR/TUDelft)







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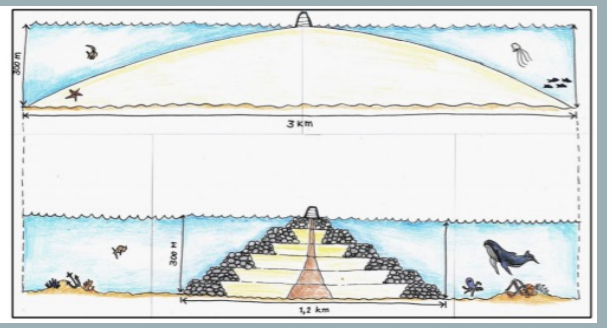
### Hoe kan onze kust meebewegen?

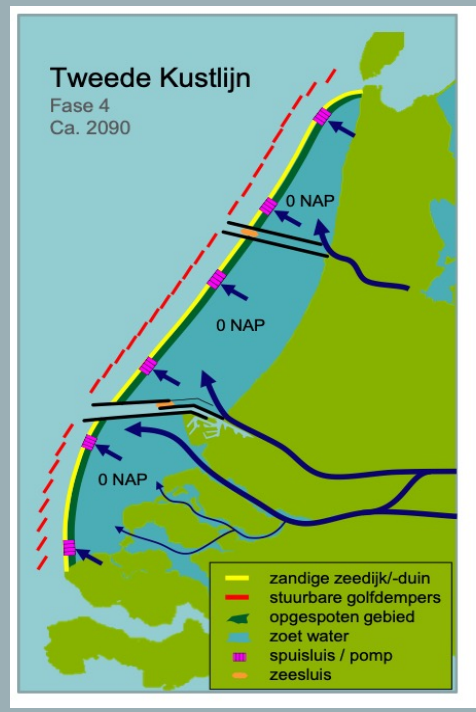




Drie ideeën om de Noordzee te temmen

Het ijs op Groenland smelt nog nooit zo snel als deze zomer. Als het niet lukt om de klimaatverandering te beteugelen, kan het tegen het jaar 2100 al zo'n 2,5 tot 3 graden warmer zijn dan voor de industrialisatie. Met als gevolg dat de zeespiegel meters zal stijgen (gemiddeld 2,3 meter per graad).

Wat betekent deze zeespiegelstijging voor Noordwest-Europa?, dacht fysisch geograaf dr. Sjoerd Groeskamp die bij de Universiteit Utrecht en het NIOZ werkt. Samen met zijn Duitse collega Joakim Kjellson bedacht hij een oplossingsplan: de Northern European Enclosure Dam (NEED) tussen Frankrijk, het Verenigd Koninkrijk en Noorwegen. 'NEED lijkt misschien een overveldigende en onrealistische oplossing', schrijven ze. 'Het is een van de grootste civieltechnische uitdagingen ooit, maar het is ook de meest effectieve bescherming van 25 miljoen Europeanen en hun economisch belangrijke regio.' 'Een schitterend waanidee', vindt prof.dr. Peter Herman het plan. De hoogleraar ecologische waterbouw (faculteit Civiele Techniek en Geowetenschappen) voorziet een ecologische catastrofe omdat de 30 duizend kubieke meter zoet water die per seconde de Noordzee instroomt er binnen een eeuw een zoet Noordmeer van zal maken. Diepere troggen blijven zout, maar zuurstof- en levenloos.

Zeewende kustlijn
Minder ingrijpend is het plan van de ingenieurs Rob van den Haak (inmiddels overleden) en Dick Butijn. Het plan voor De Haakse Zeedijk (DHZ), die Butijn naar zijn compagnon vernoemde, voor ziet feitelijk in een tweede kustlijn. Het is een 1,5 kilometer breed zandlichaam dat 25 kilometer uit

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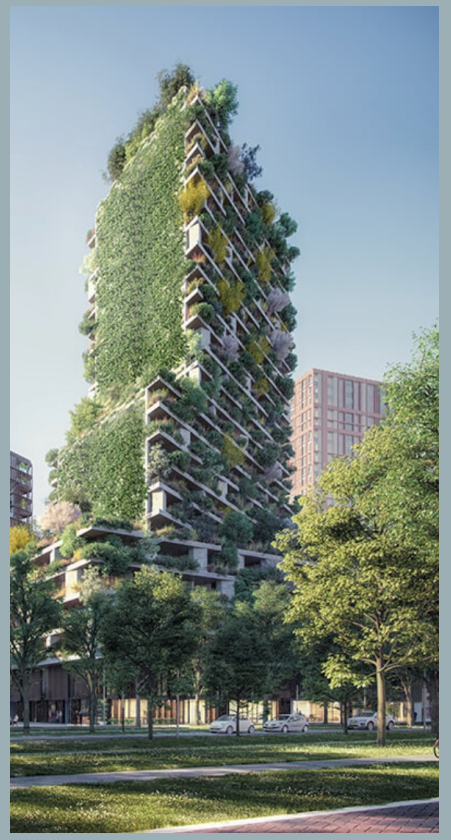
**Vraag: hoe naar 1,5 BOOM per inwoner?**

**Bomen in Nederlandse steden**

| | Bomen gemeente | Bomen privaat | Totaal | Inwoners | b/inw |
|---|---|---|---|---|---|
| Amsterdam | 300000 | 700000 | 1000000 | 920000 | 1,08696 |
| Rotterdam | 165000 | 450000 | 615000 | 600000 | 1,025 |
| Den Haag | 120000 | 420000 | *540000* | 560000 | 0,96429 |
| Utrecht | 375000 | 277500 | *652500* | 370000 | 1,76351 |
| Arnhem | 50000 | 120000 | *170000* | 160000 | 1,0625 |



**Drie case-studies in groepjes van  twee of drie,**

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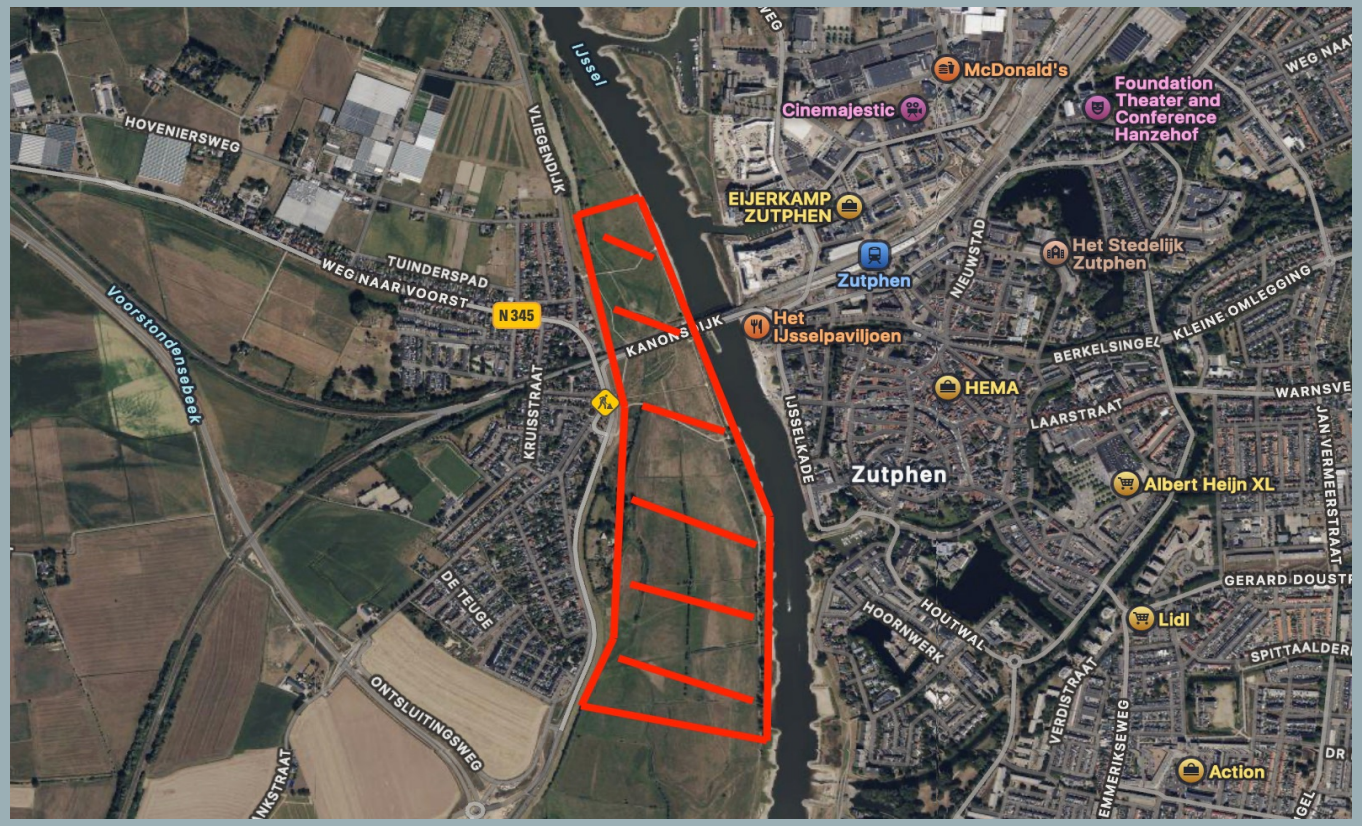
## Hoe WONINGBOUW in de UITERWAARDE in Zutphen.




**Drie case-studies in groepjes van twee of drie**

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**Hoe de WADDENZEE bij zeespiegelstijging behouden?**


**Drie case-studies in groepjes van twee of drie**

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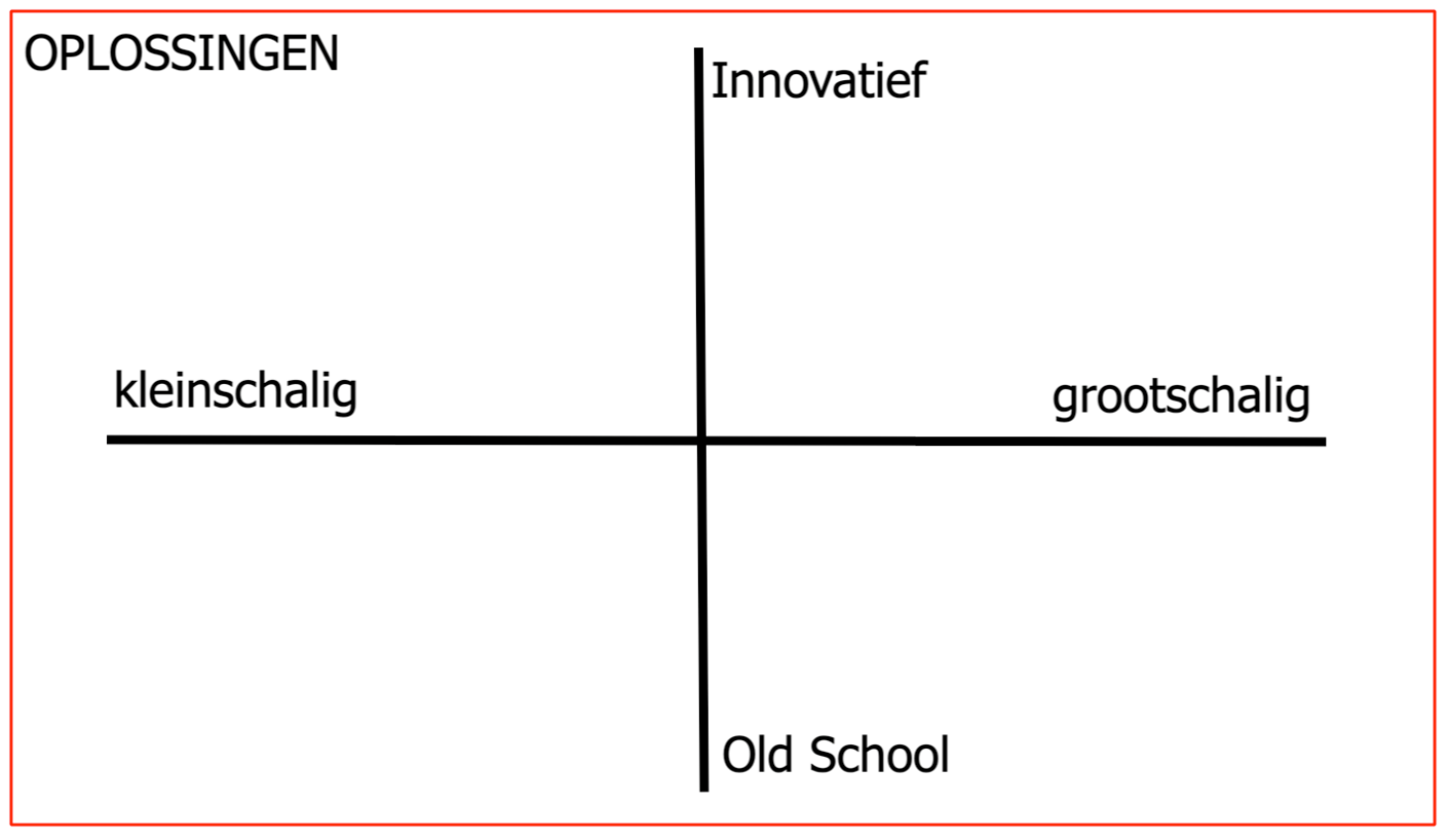
**Drie case-studies in groepjes van  twee of drie – in assenstelsel**

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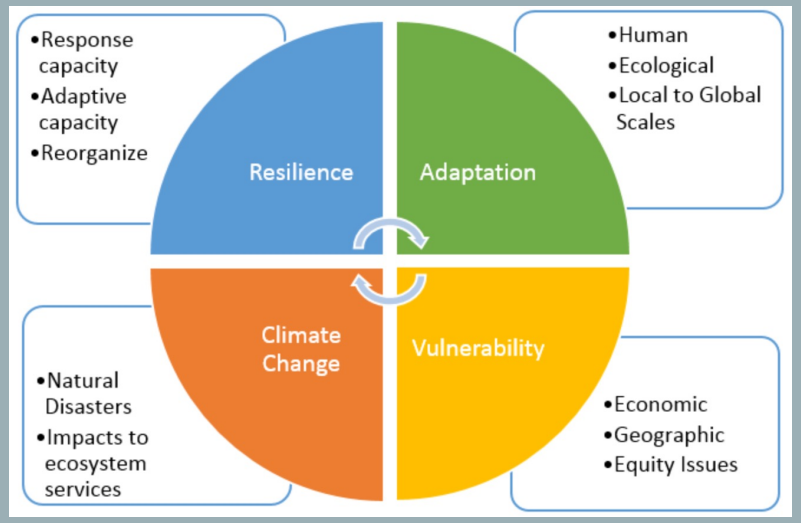
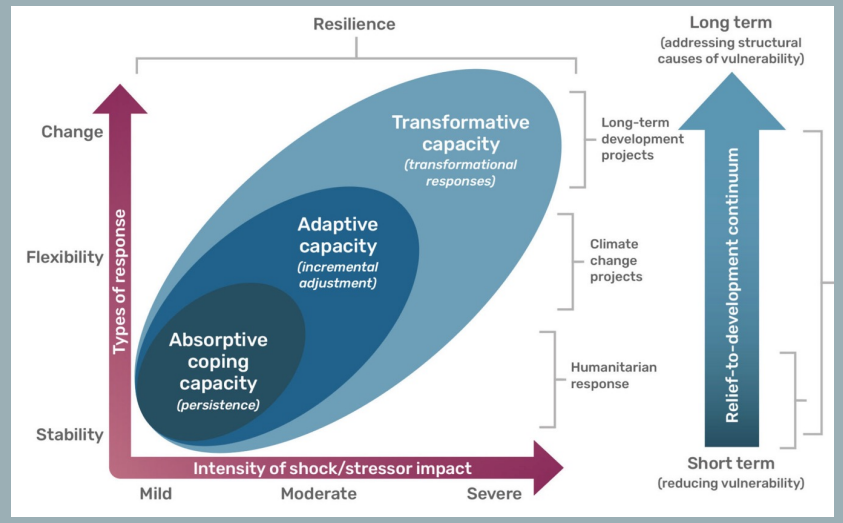
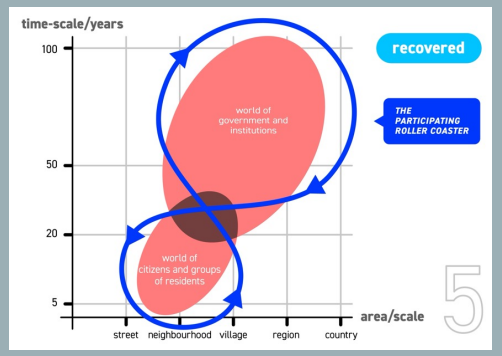
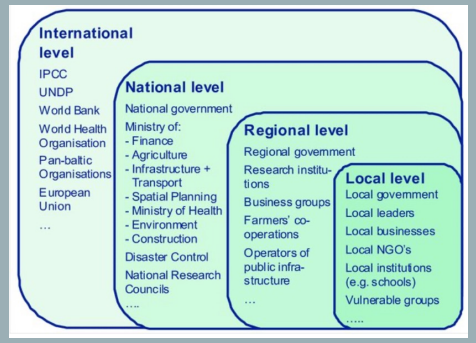
## WIE DOET WAT EN WANNEER?



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**Schijfsels:**

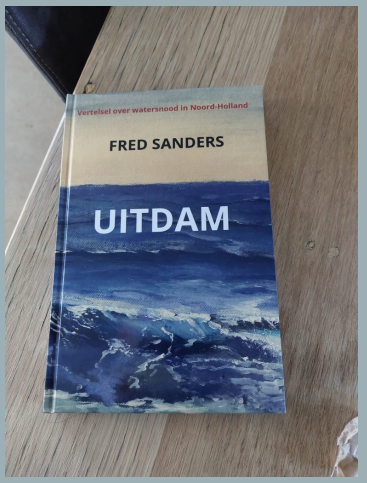
**- De tweede zeekering is multifunctioneel**

**- Behoud de Waddenzee op eigen kracht**

**- Woningen langs onze rivieren**

**Dr. Fred Sanders MSc MBA Senior-Fellow**

**Met dank aan Ana, Carel, Judith, Karin, Leo, Peter, Dick, Dick, Henne, Harold en veel meer.**



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