Rijkswaterstaat
Ministry of Infrastructure and the Environment

Klimawandel in die Niederlände

Sand, silt and sea level rise in the Wadden Sea and Ems-Dollard, a Dutch perspective

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Rijkswaterstaat Noord Nederland

Rijkswaterstaat, who are we?

- Executive agency of the Ministry of Infrastructure and the Environment.
- Develops and manages the national infrastructure networks on the instructions of the Minister and Statsecretar (ger.).
- Ensures:
  - dry feet
  - sufficient clean water
  - smooth and safe traffic flows on the nation's roads and waterways
  - reliable and useful information
- Rijkswaterstaat Noord Nederland manages:
  - The Wadden Sea, Ems-Dollard and North sea coastal zone
  - Sea defences, mainly dunes on islands

Dealing with consequences of climate change (in cooperation with the water boards)

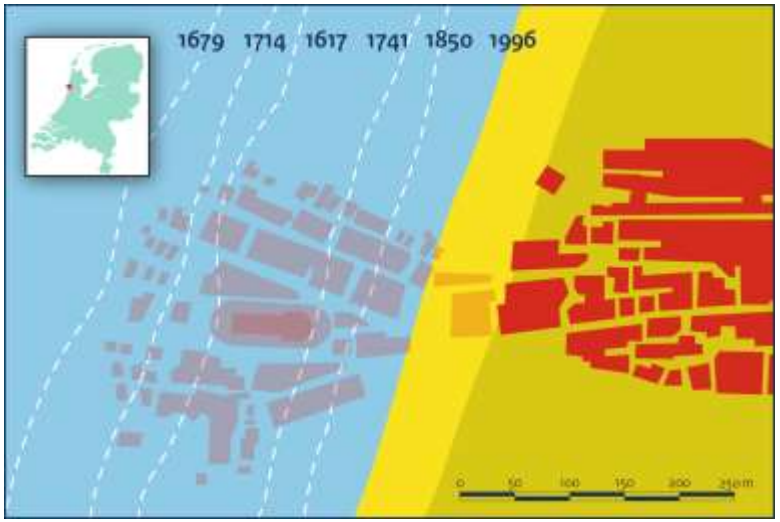
Contents of todays presentation

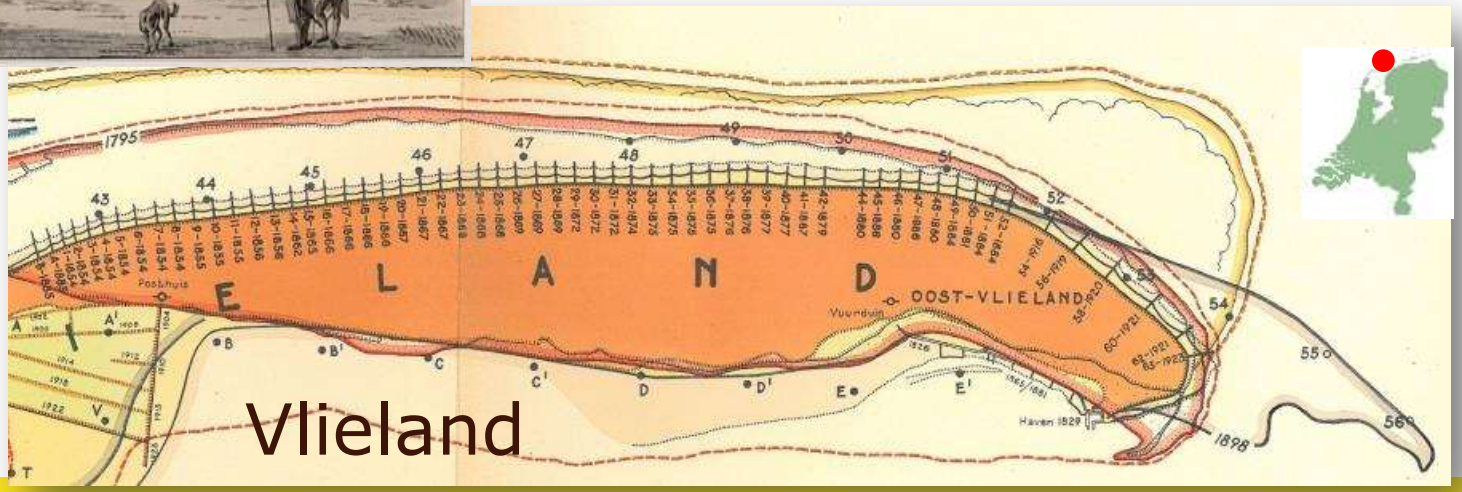
- Dutch coastal , policy and sand
  - Protecting (future) coastline, with sufficient sand
  - How we are dealing with (future) sea level rise and the Wadden Sea

- Ems-Dollard, silt
  - Historical development
  - Programme Ems-Dollard 2050
    - Recovery of the (ecological) functioning of the estuary
    - Projects and measures


Waddensea
Holland coast
Southwestern Delta

Coastal erosion





Vlieland

Coastal policy in preparation (late ’80’s)

Three options:

- No intervention/Retreat
- Holding the coastline position
- Expand

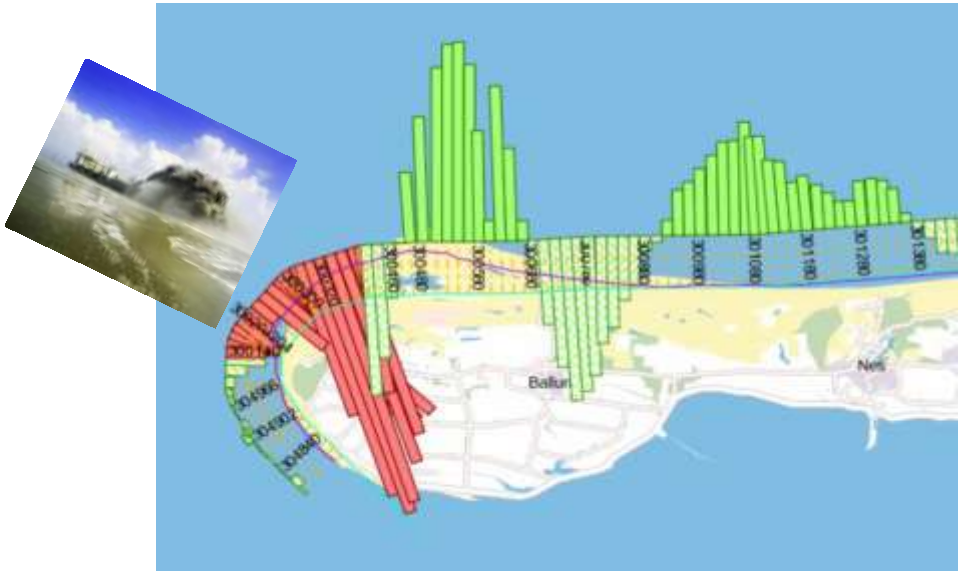
To cater for functions e.g.:

- Safety inside the dikes
- Safety outside the dikes
- Recreation
- Fresh water extraction
- Nature

- Storm of February 1989 was decisive.

(Current) Dutch Coastal policy and management

- From 1990: hold the line (Basis KustLijn)
- Third "Kustnota" (2000): keeping up the amount of sand in the coastal foundation, taking **sea level rise** into account.
- Compensate sand loss: deep water and basins (e.g. Wadden Sea)
- Sand nourishments
  - ~55 mjn euro / year
  - ~12 mjn m3 sand per year
- Strategy: (in Dutch): "Zacht waar het kan, hard waar het moet"

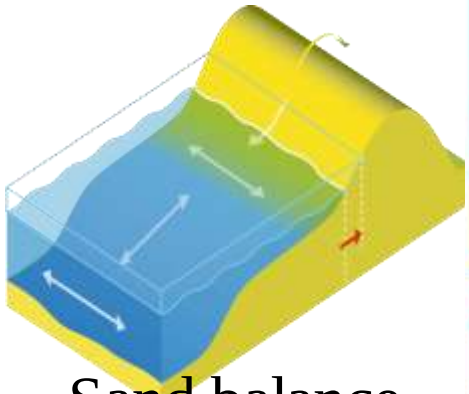


Nourishment volume follows the sediment balance

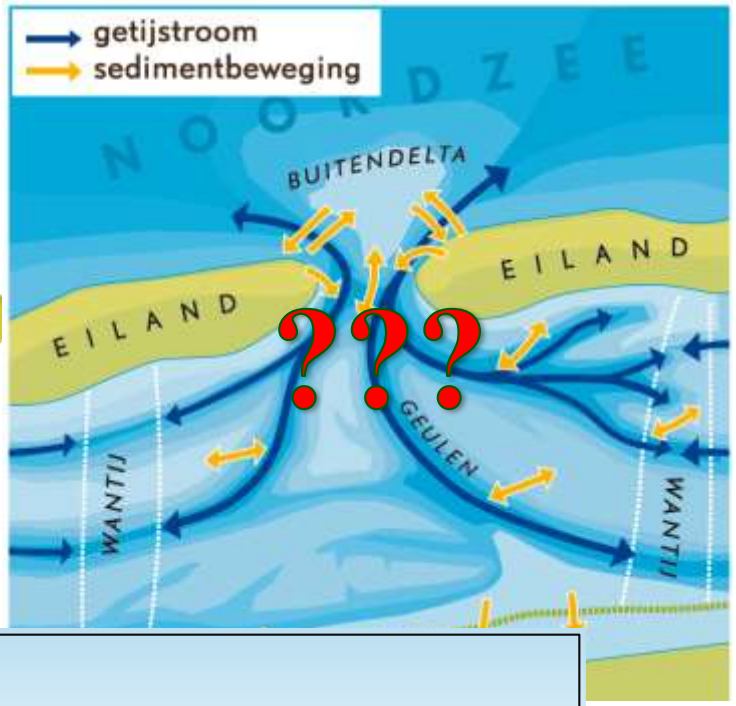
Coastal foundation (-20 m NAP – binnenduinrand)

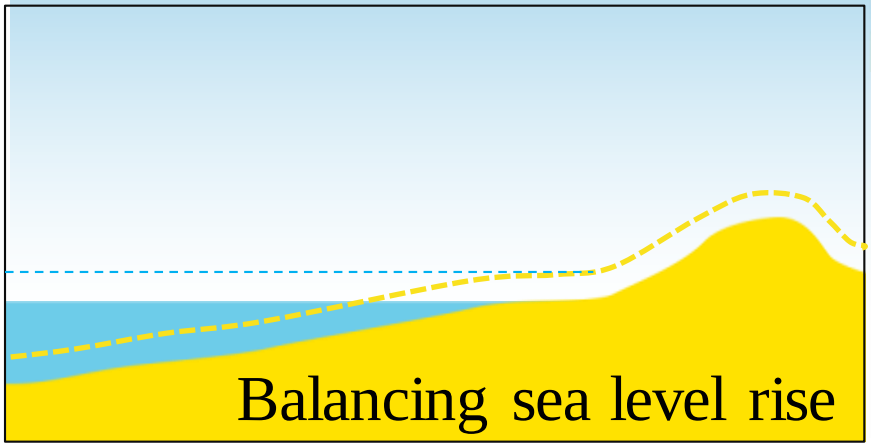
Tidal basins (Waddenzee & Westerschelde)

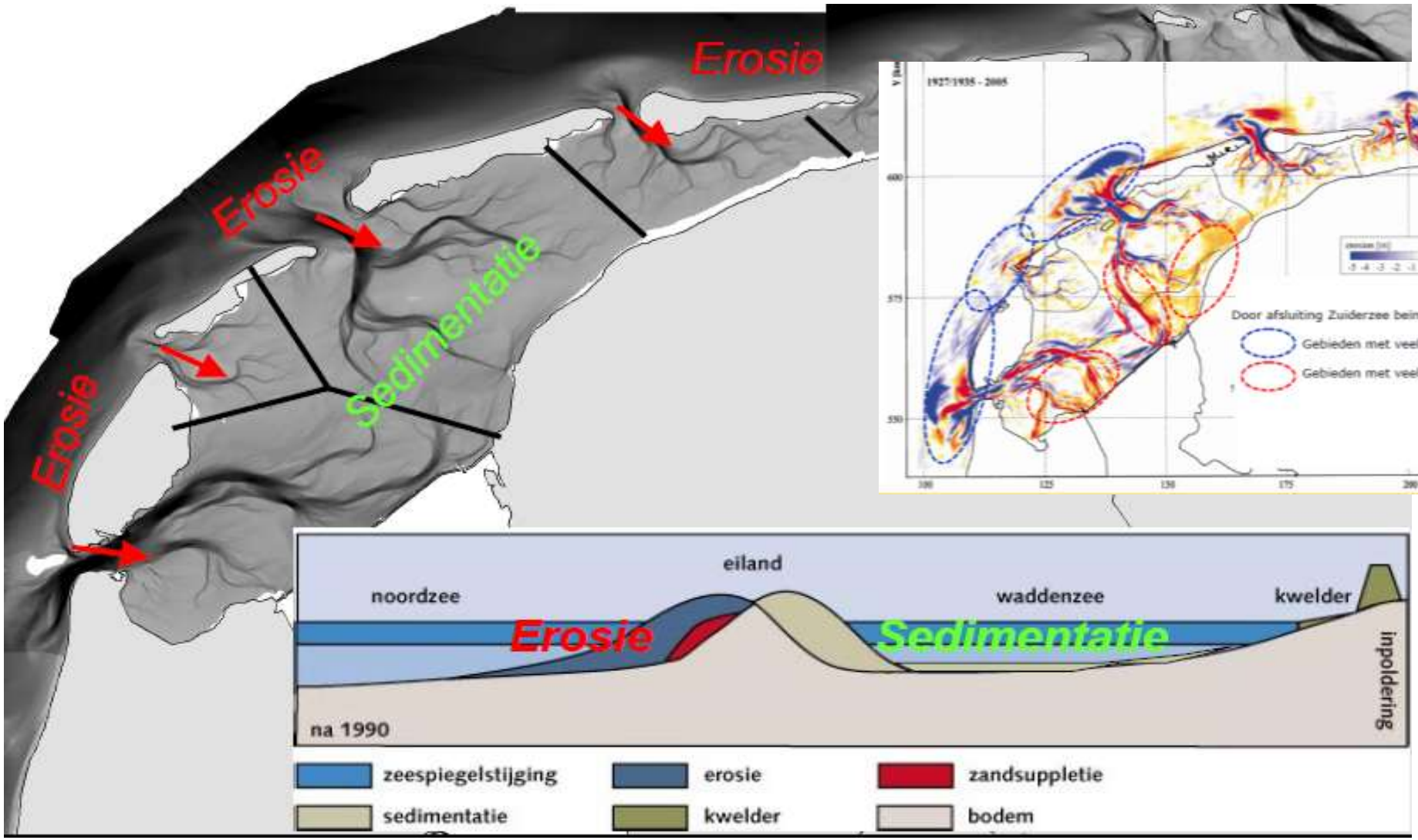
Mainland



Sand balance

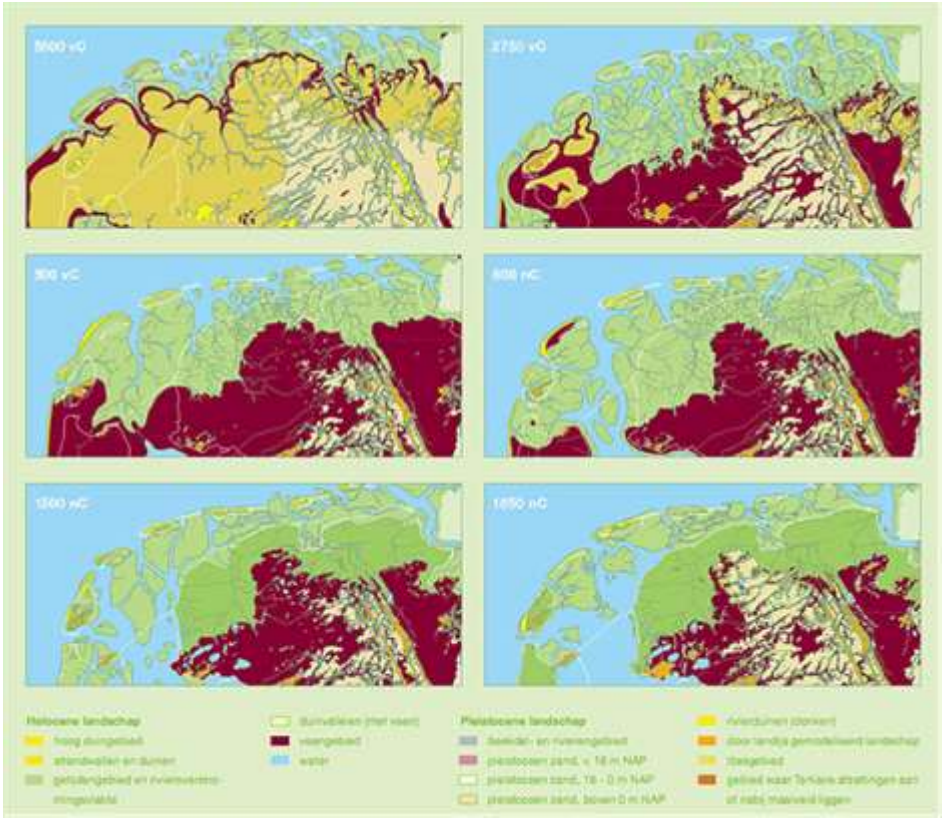





Erosie
Erosie
Sedimentatie
Erosie
1927/1935 - 2005
Door afsluiting Zuiderzee beïnvloede
Gebieden met veel erosie
Gebieden met veel sedim
eiland
noordzee
waddenzee
kwelder
Erosie
Sedimentatie
inpoldering
na 1990
zeespiegelstijging
erosie
zandsuppletie
sedimentatie
kwelder
bodem

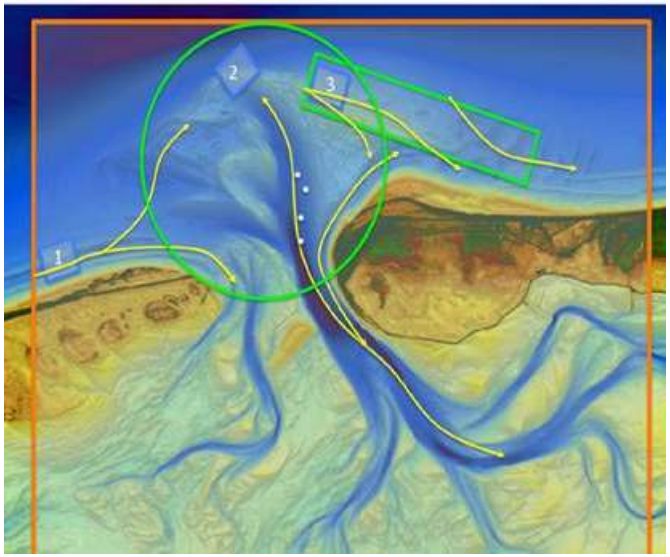
Implications (present) coastal policy for Wadden Sea and Eems-Dollard

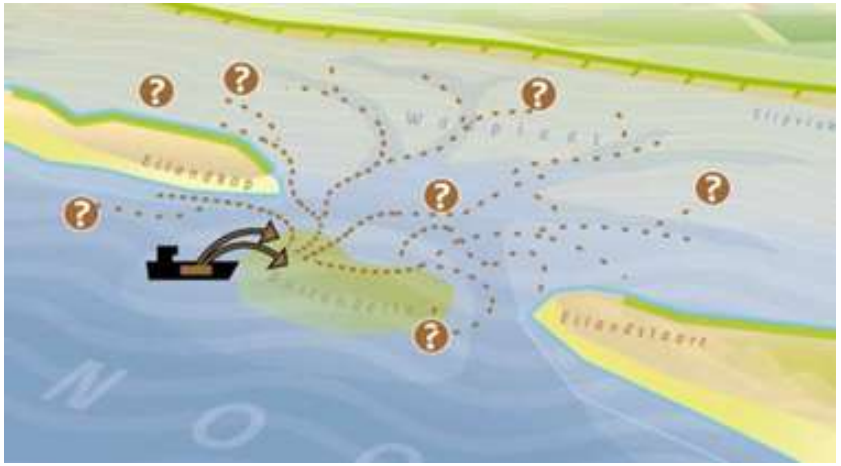
- Keep sediment balance in order
- Sand nourishments prevent erosion islands and facilitate sand for the Wadden Sea (long term)
- Prevent loss of sand: no sand subtraction/mining (or fully compensate)
- Nourish sand on the coast, but no interventions in the Wadden sea (natural growth)



Ongoing research and policy development

- More knowledge is needed to make good long term decisions
  -> e.g. understanding **<u>response to climate change</u>**
- Kustgenese 2: Long term development of the coast, incl. behaviour ebb-tidal delta (model, measurements)
- Sandmotor and SEAWAD (large scale nourishments)
- Investigating feasibility pilot nourishment on ebb-tidal delta
- Ongoing: a.o. sand balances, effects ecology, monitoring coastline





Question, info

- Thank you for your attention
- Questions: Robert.zijlstra@RWS.nl