

IPOP project

Robust Flood Protection

Jantsje van Loon-Steensma



WAGENINGEN UNIVERSITY

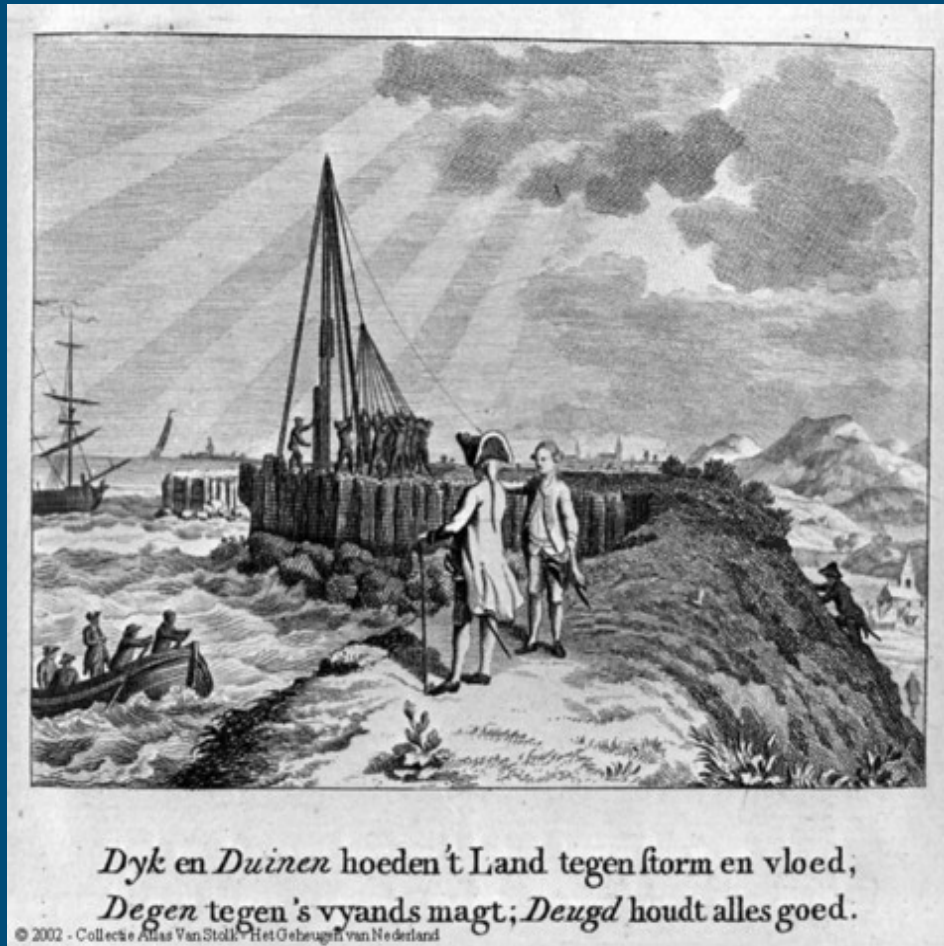
WAGENINGEN UR

Robust Flood Protection

Robust Flood Protection: exploring the chances for 'climate buffers' and 'broad dikes' as safe, climate proof and multifunctional flood protection measures



High priority of Flood Protection in the Netherlands



The Netherlands as save and prosperous, densely populated delta



WAGENINGEN UNIVERSITY

WAGENINGEN UR

Situation Flood Protection in 2001 and 2006

Toetsresultaten waterkeringen	Totaal			
	a+b+c			
	2001		2006	
type:				
voldoet niet	549	15%	680	19%
geen oordeel / onvoldoende gegevens	1.217	34%	1.329	35%
voldoet	1.792	50%	1.590	46%
totaal	3.558		3.599	

Bron: Adviescommissie Financiering Primaire Waterkeringen (Commissie Vellinga), 2006

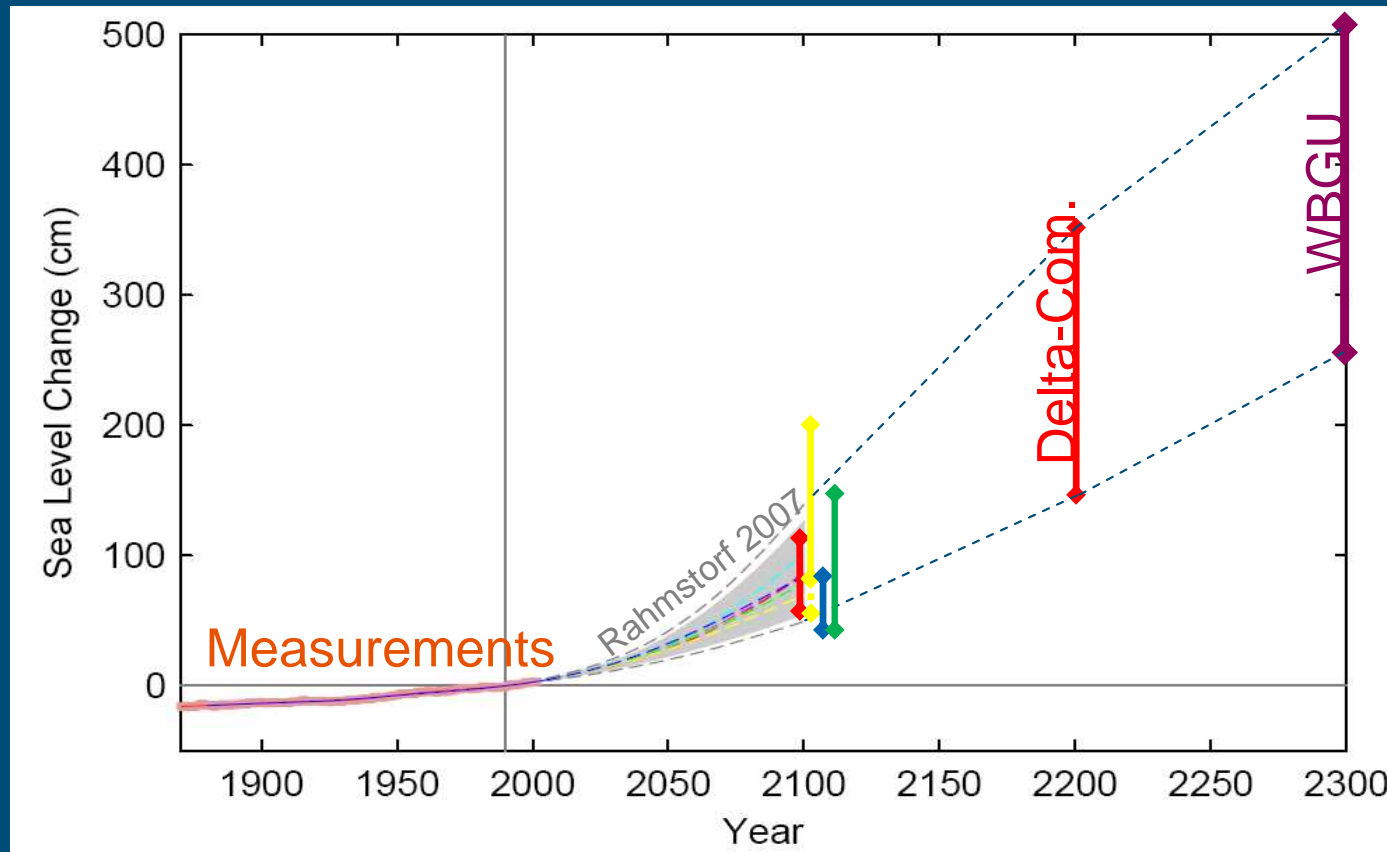


New Challenges for Flood Protection

- Climate Change
 - Sea-level rise
 - Extreme summer rain
 - Extreme river discharges
 - Draughts
 - Strength and direction of Storms?
- Developments in economy
- Developments in demography
- New scientific insights



Uncertainties in the expected sea level rise



(Prof. dr. ir. Pier Vellinga, October 2008)

Till 2100:

- 18 – 59 cm + iets (IPCC, 2007)
- 40 – 85 cm (warm scenario KNMI, 2006) (blauw)
- 50 – 140 cm (Rahmstorf, 2007)
- 40 – 140 cm Delta Vision, Blue Ribbon Task Force California (groen)
- 55 – 110 cm (“high end”, Deltacommissie 2008) (rood)
- 80 – 200 cm (fysiek maximaal mogelijk onder extreme aannamen, volgens Pfeffer et al. 2008) (geel)

Till 2200:

- 150 – 350 cm (“high end”, Delta Commissie 2008)

Till 2300:

- 250 – 510 cm (Global Change Adviescommissie van Duitse regering, WBGU, 2006) (paars)

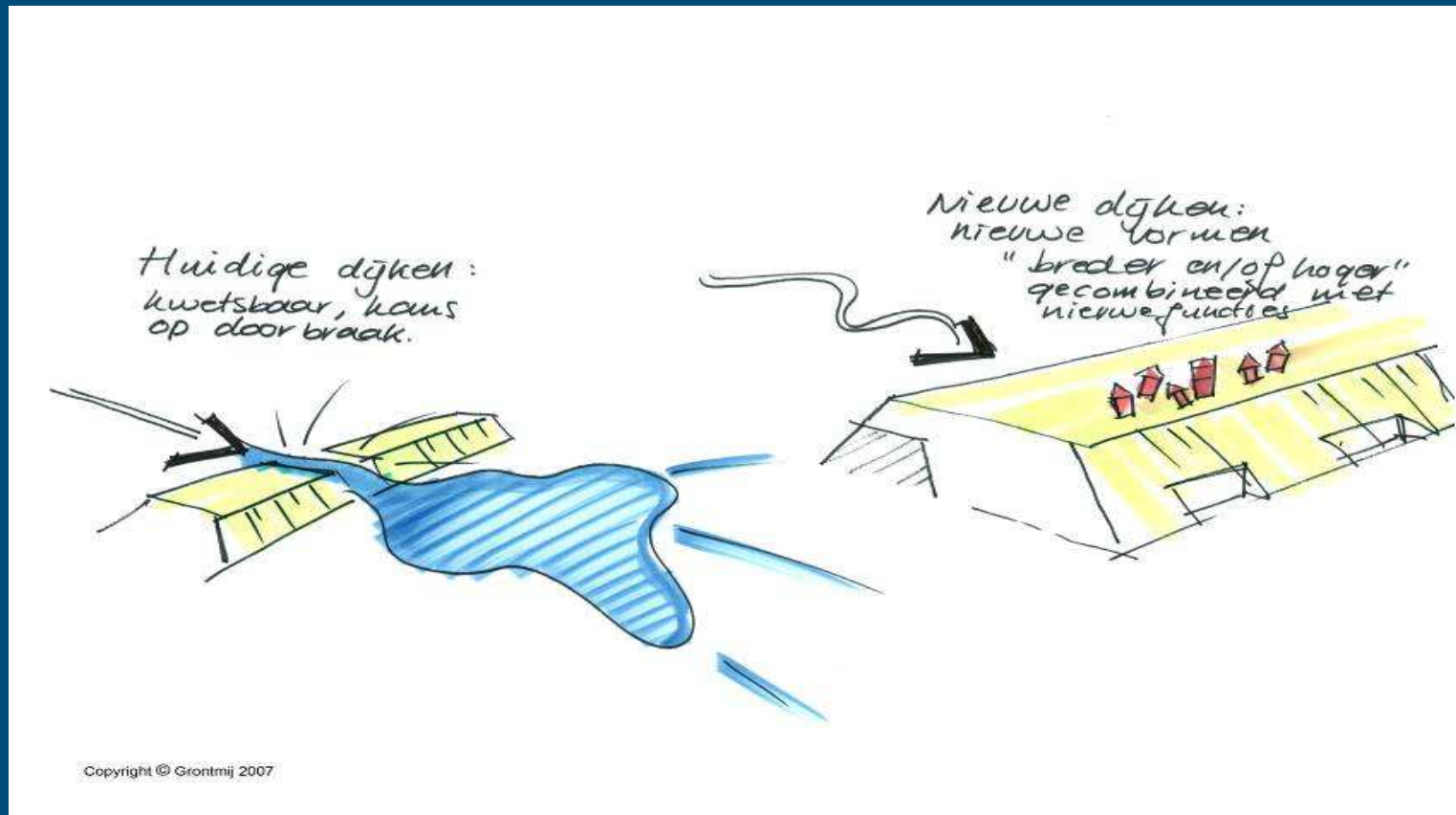


Sufficiently Robust Protection Infrastructure

- Dikes that don't collapse when overflowing with high water
- Can cope with uncertainties in expected sea level rise and river discharges
- Don't fail due to draught stress



Sufficiently Robust Protection Infrastructure

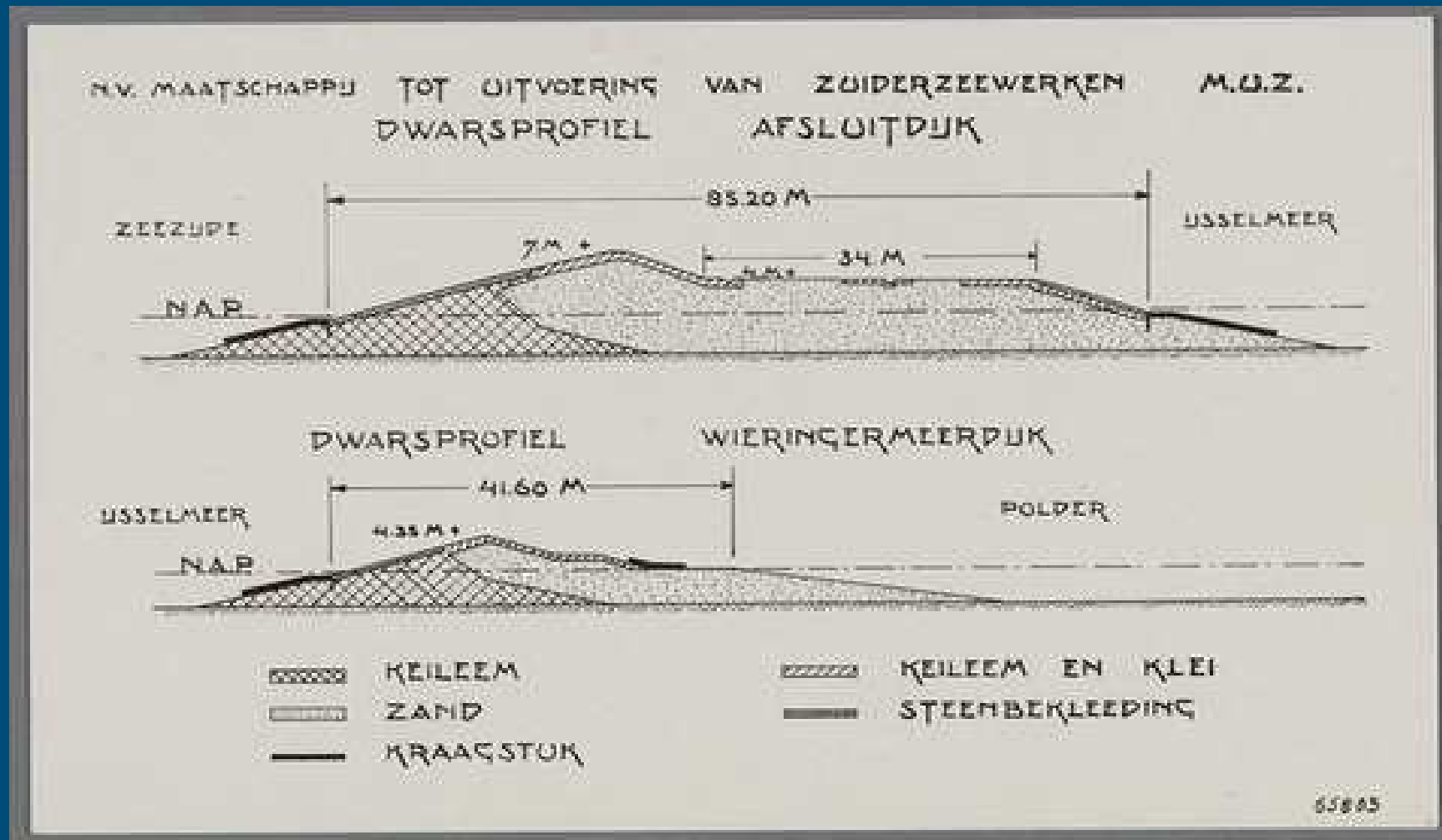


Robust, Climate Proof Dikes

- Robust Dikes are sufficient strong due:
 - to their width
 - to their height
 - to their internal structure
 - a double or triple dike
- But how wide, how high and by what kind of structure on each specific area?
- And how to plan these new dikes in our densely build up and populated country?

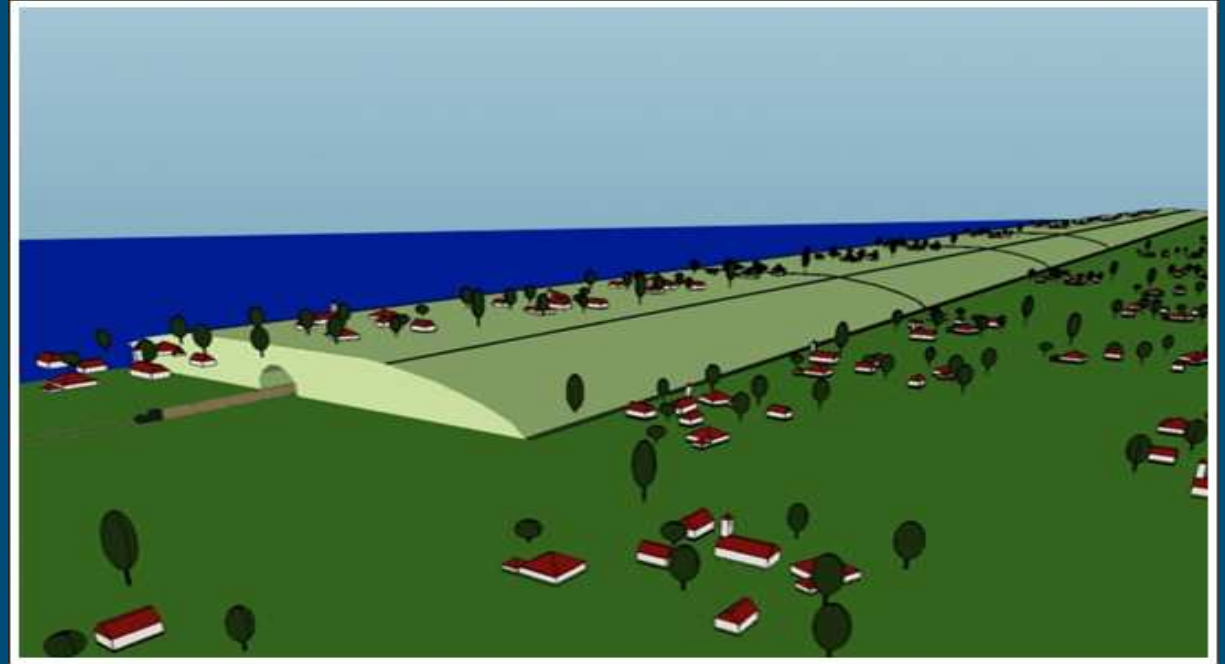


Which Design and how to construct?



Combining a broad range of functions

- Safety
- Nature
- Agriculture
- Reservoir
- Transport
- Recreation
- Cultural History
- Urban Planning
- Energy-infrastructure



(by Prof. dr. ir. Pier Vellinga, Oct. 2008)



Combining functions isn't new!



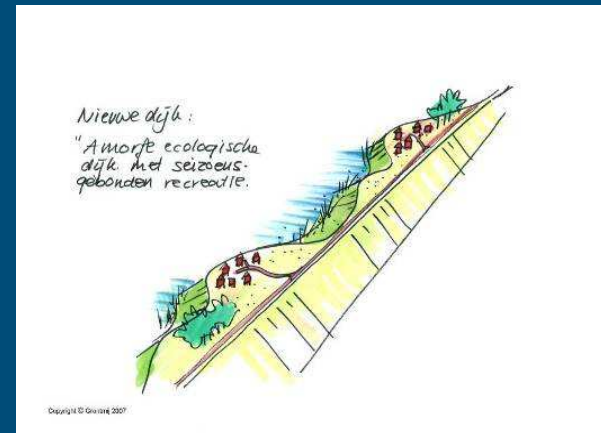
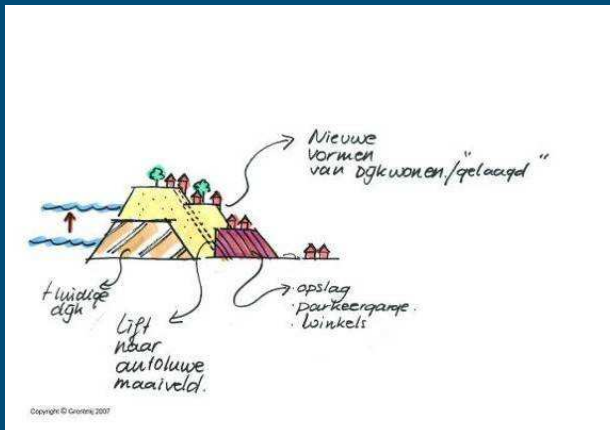
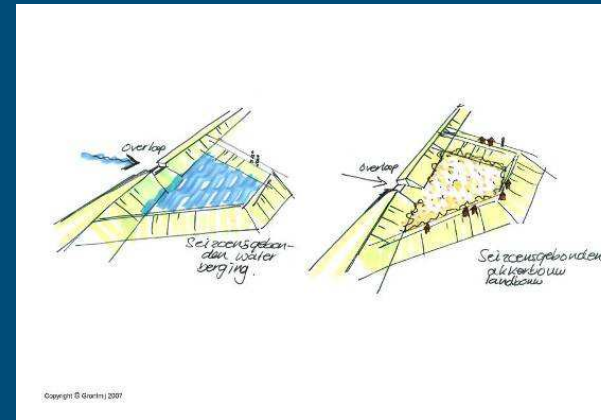
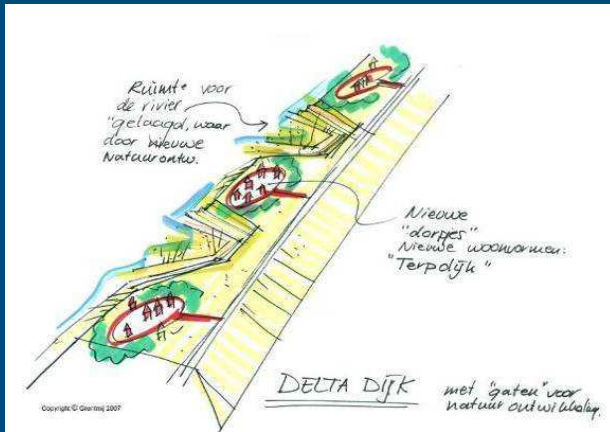
© Aart Klein / rfa, coll. Nederlands fotomuseum



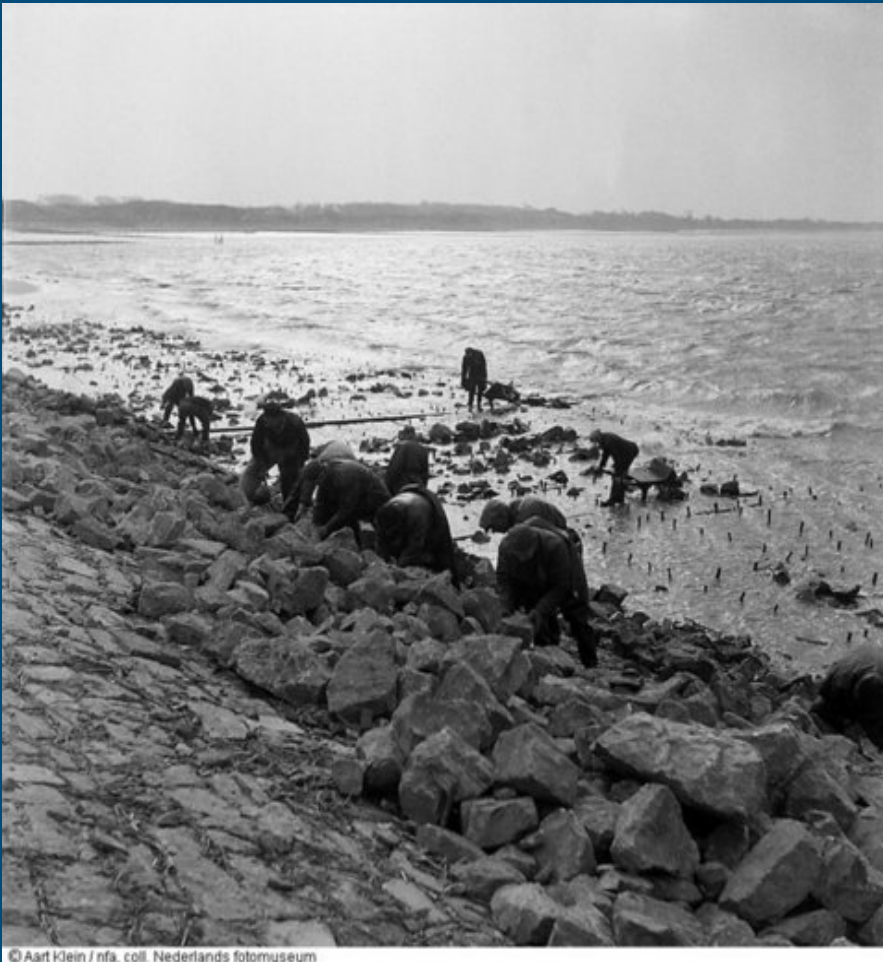
Afsluitdijk naar Friesland gezien vanaf geulenkleiën met A.T.O. autobus



Forms of Robust, Climate Proof and Multifunctional Dikes



Climate Buffers: can nature areas and natural processes be utilized for flood protection?



Climate Buffers: can nature areas and natural processes be utilized for flood protection?

- How to stimulate the natural processes whereby sedimentation of mud or sand in such a way that it enhances the dimension or stability of dams and dikes?
- How are these natural processes influenced by climate change?
- What are bottlenecks for the realisation of climate buffers
- How do climate buffers react on extreme events?



Project Aim

- Overview – what options / under what conditions

- Process – quantity & quality



Approach of the research

1. Literature
2. Experts

- Overview by considering all functions
- Special attention for natural processes / elevated floodplains



Foreseen Results

A set of options for flood protection that are robust, multifunctional and climate proof

- In the first year an overview and analyze of various options followed by a detailed research proposal
- 2010-2013 scientific and professional publications and presentations, communicating the overview of robust flood protection measures as well the procedure to combine different types of information around the implementation process



Foreseen Cooperation

- Prof. dr. ir. Pier Vellinga (supervisor)
- Centre for Water & Climate Environmental Sciences Group, Alterra Centre Landscape, Plant Sciences Group and IMARES
- Deltares, TU Delft, VU Amsterdam, Grontmij



Suggestions?

© Wageningen UR



WAGENINGEN UNIVERSITY
WAGENINGEN UR