



## Flood management strategies in The Netherlands

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Workshop improving risk reduction &  
contingency management  
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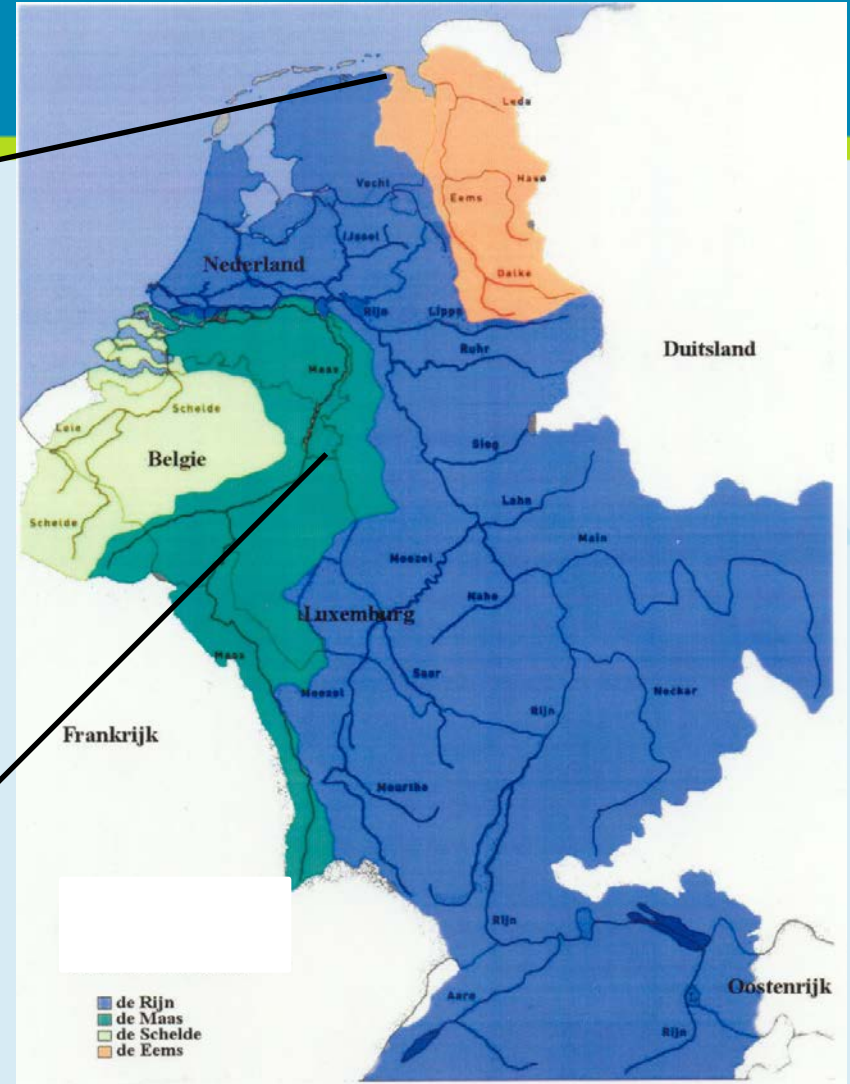




## Delta of 4 international river basins

Area: 41.500 km<sup>2</sup>

16 million people; 465 inhab./km<sup>2</sup>



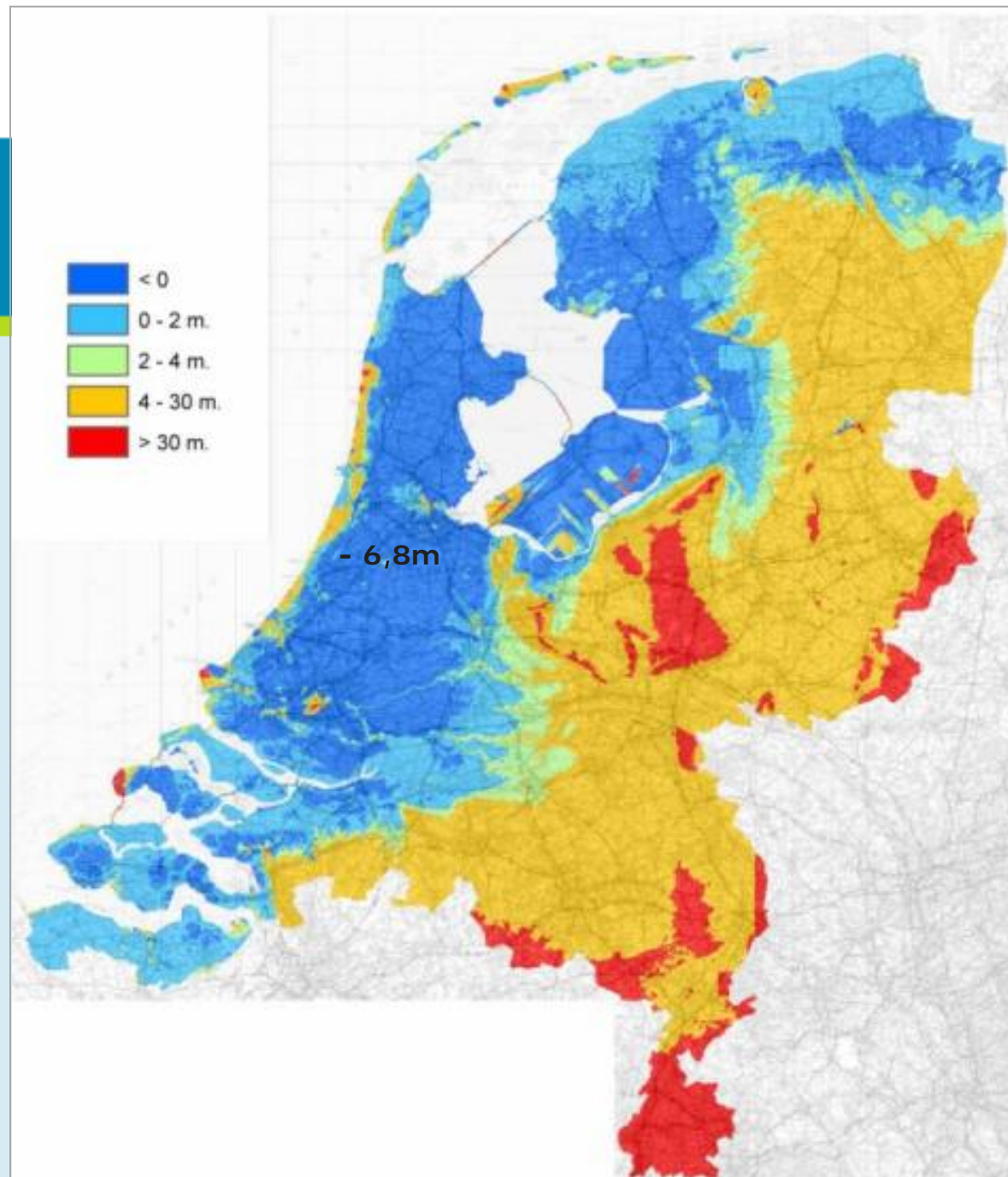


## 50% below mean sea level

water & flood  
management:

**‘to be or not to be’**

- polders
- dikes, dunes
- windmills
- pumping stations
- land reclamation
- canals, watercourses





**Netherlands = lowlands = wetlands**

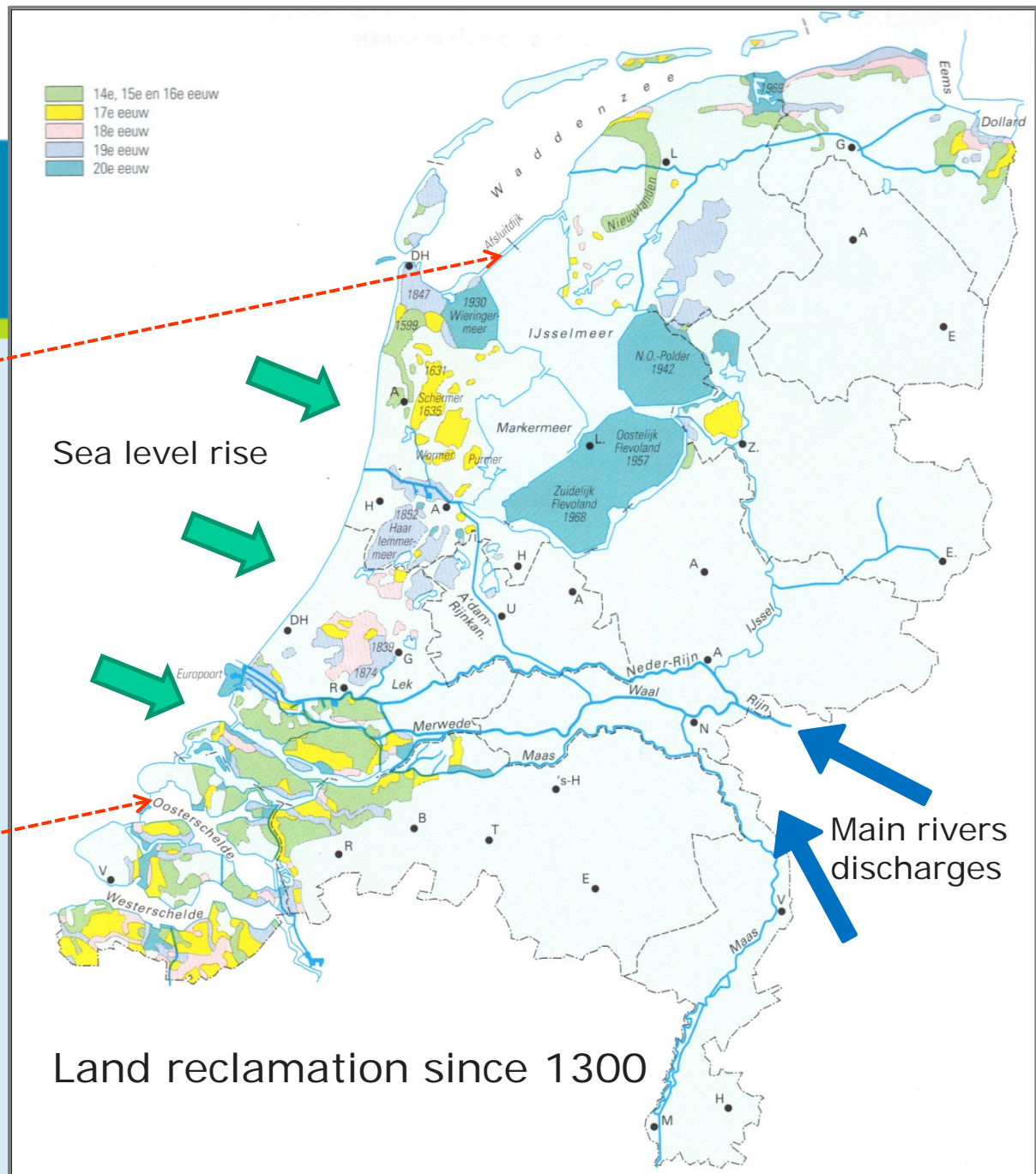




# Flood engineering works



Storm surge barrier





## Rhine near Arnhem



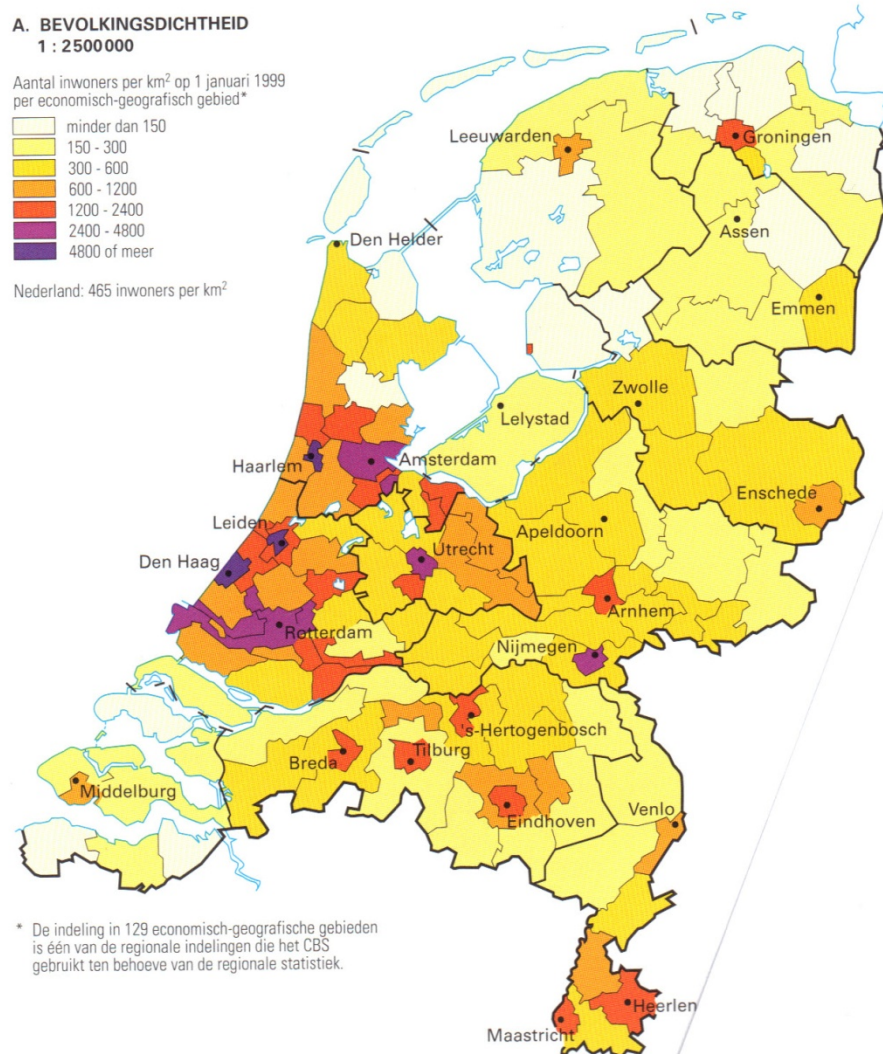


#### A. BEVOLKINGSDICHTHEID 1 : 2500000

Aantal inwoners per km<sup>2</sup> op 1 januari 1999  
per economisch-geografisch gebied\*



Nederland: 465 inwoners per km<sup>2</sup>



\* De indeling in 129 economisch-geografische gebieden is één van de regionale indelingen die het CBS gebruikt ten behoeve van de regionale statistiek.

Population density

#### D. TOEKOMSTBEELD 'STEDENLAND' 1 : 2500000

Mate van verstedelijking

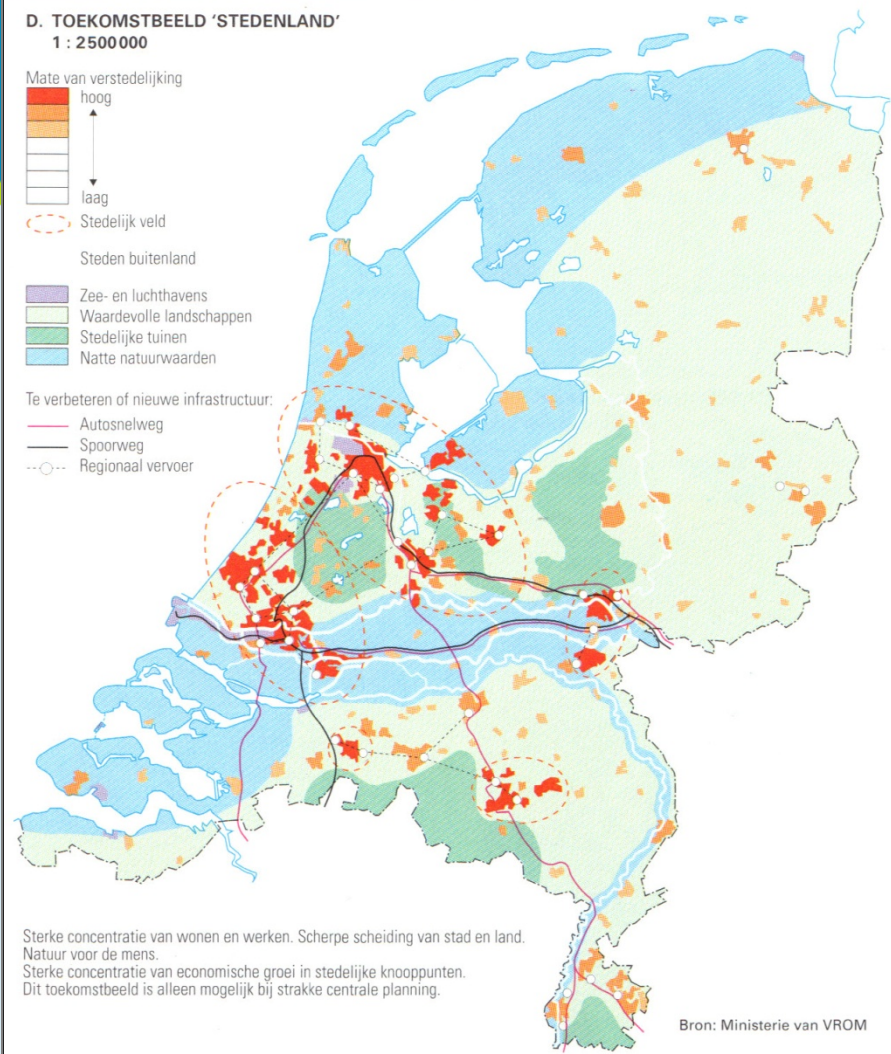


Stedelijk veld

Steden buitenland



Te verbeteren of nieuwe infrastructuur:






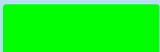
Sterke concentratie van wonen en werken. Scherpe scheiding van stad en land.  
Natuur voor de mens.  
Sterke concentratie van economische groei in stedelijke knooppunten.  
Dit toekomstbeeld is alleen mogelijk bij strakke centrale planning.

Bron: Ministerie van VROM

Urban economic activity

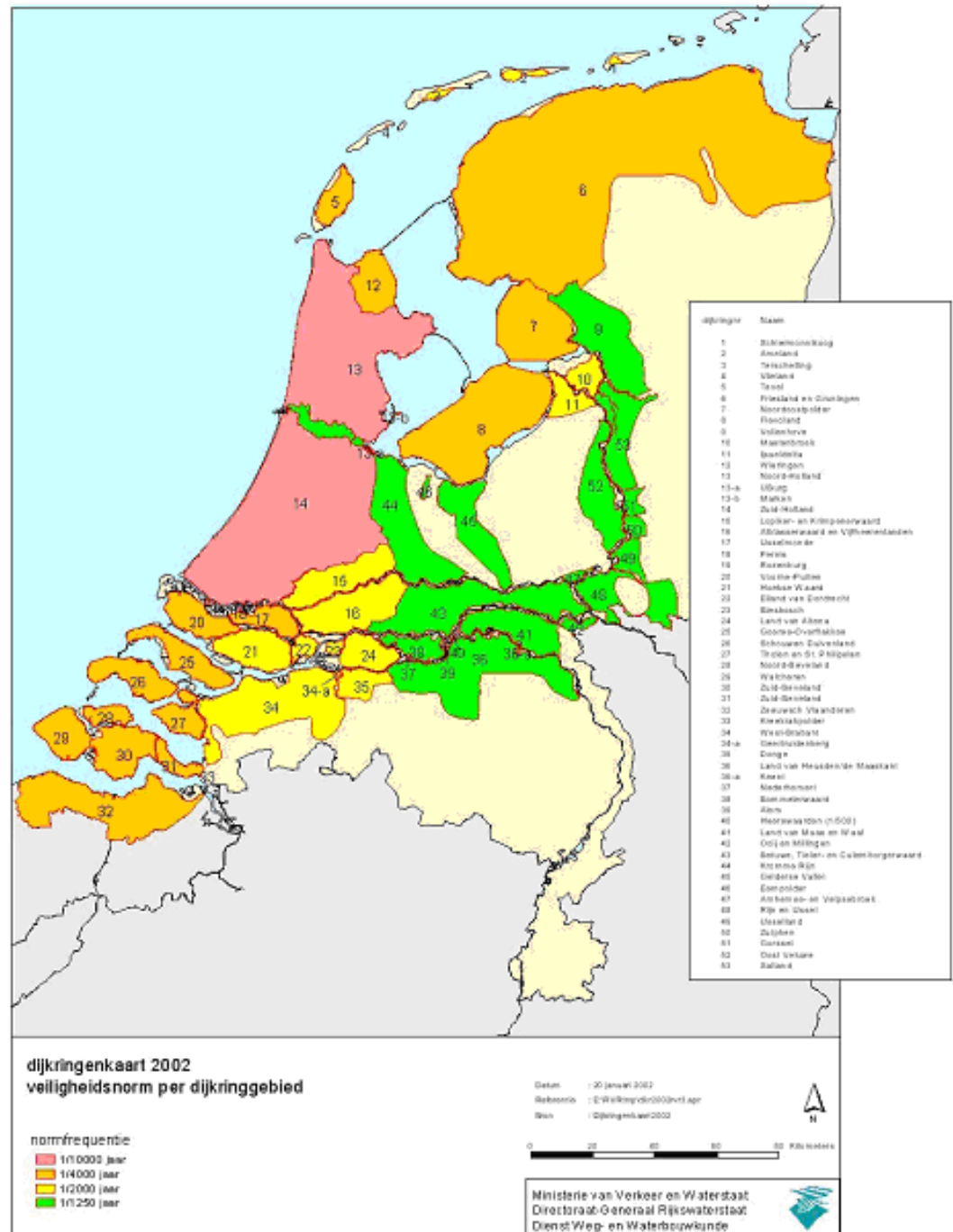


## Safety standards

	1/ 10.000 year
	1/ 4.000 year
	1/ 2.000 year
	1/ 1.250 year

Standards depend on:

- actual flooding risks
- risk development
- population density
- invested capital
- evacuation options



## Flood protection

About 60 dike circles

100% flooding safety is impossible

Invested volume behind dikes: € 2.000 billion





## Ramspol inflatable dam



## Multi layer flood management policy

- Prevention of flooding by strong dikes, dunes & storm surge barriers
- Solid sustainable spatial planning taking account of flooding risks
- Adequate disaster management (preparation, evacuation strategies, damage reduction)
- Increasing public awareness; *‘living with water’*
- Regularly dike evaluation, dike reinforcement & adjustment of standards
- Anticipating on climate change & land subsidence
- Annually € 1 billion from 2020
- Law enforcement, inspection & maintenance
- National & regional disaster management exercises





Thank you for your attention

