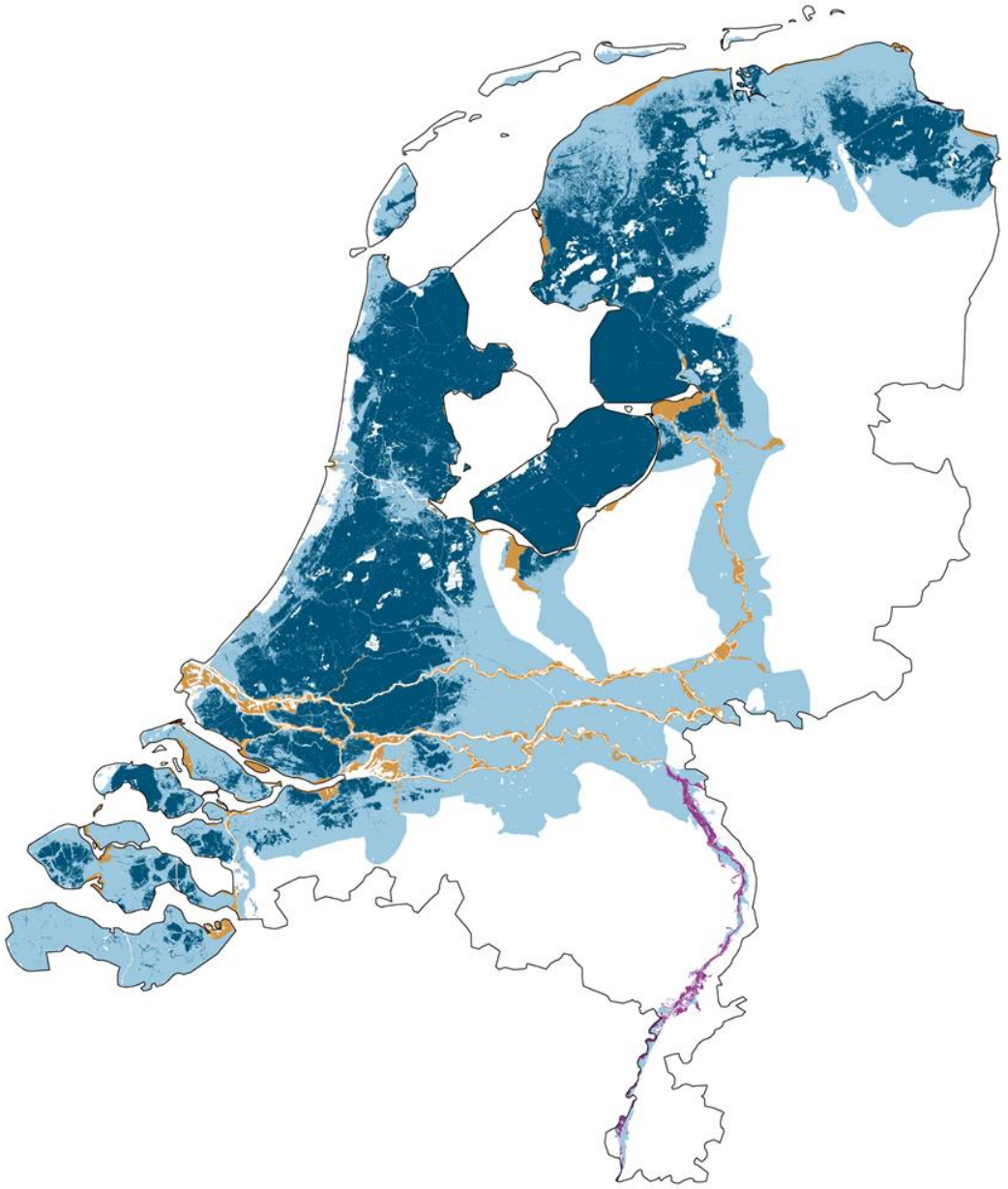


Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

Flood Risk Management in the Netherlands,

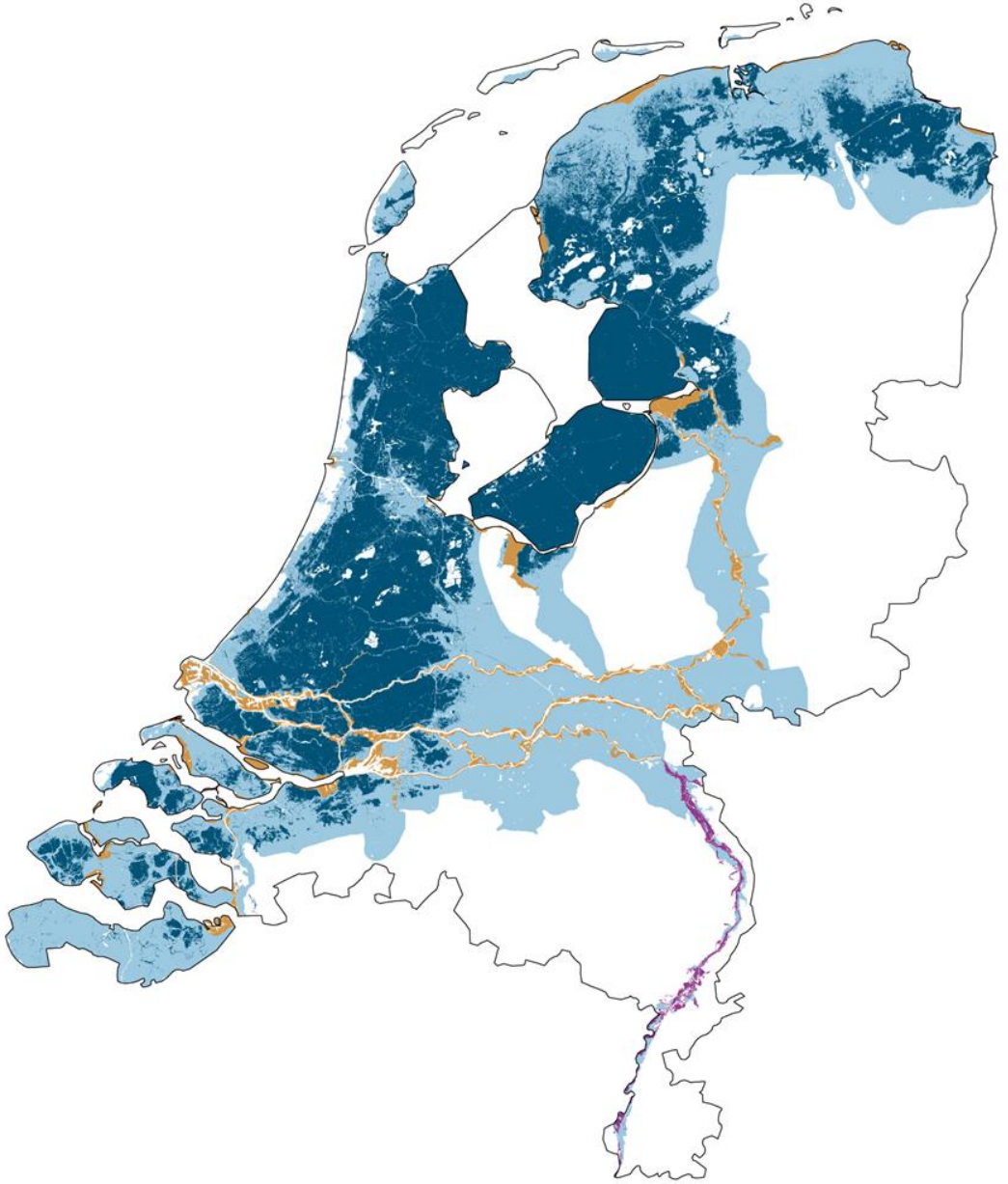
Key principles and funding

Quirijn Lodder, Principal Advisor Flood Risk Management

CEEC october 2025

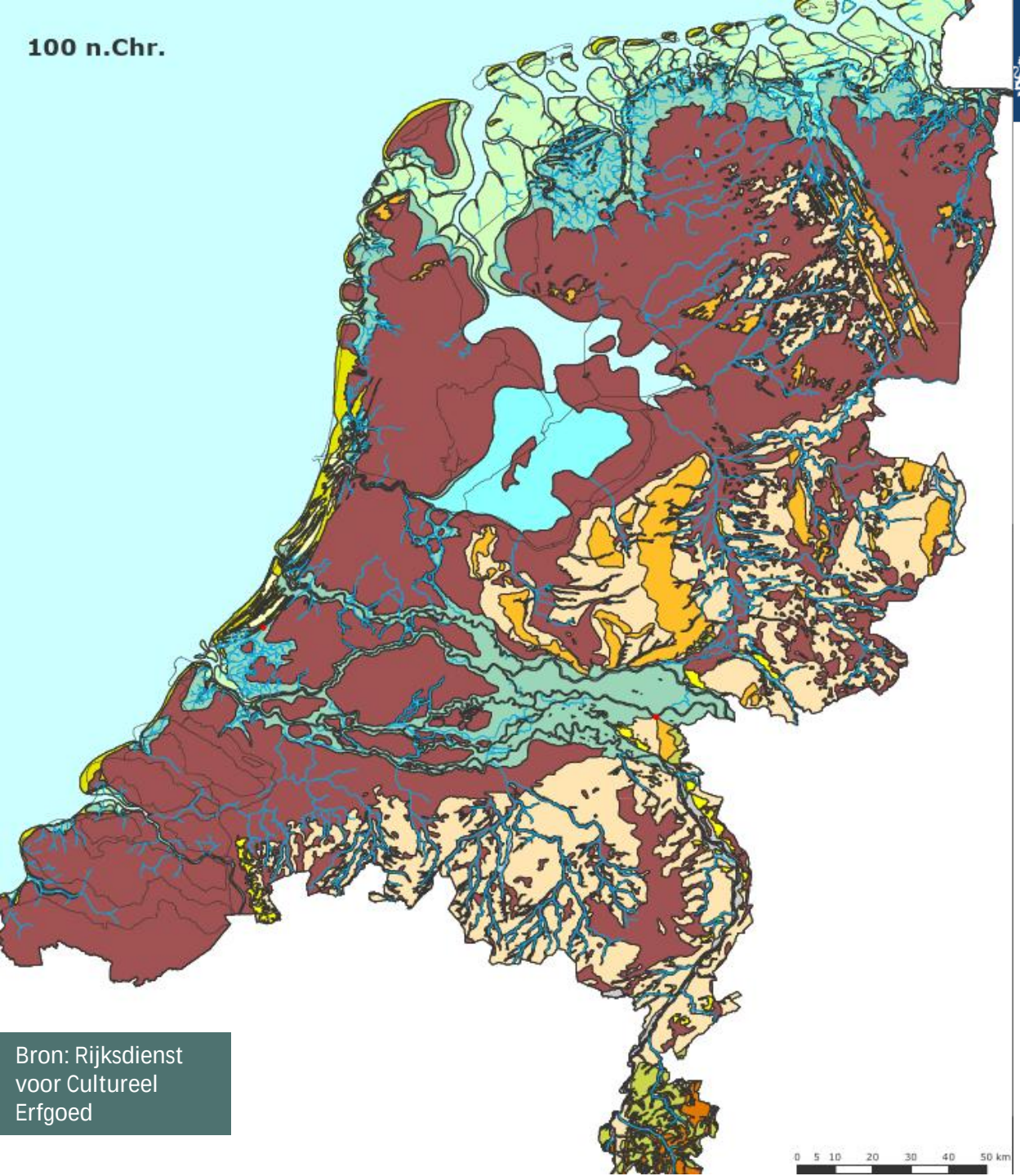
Inhoud

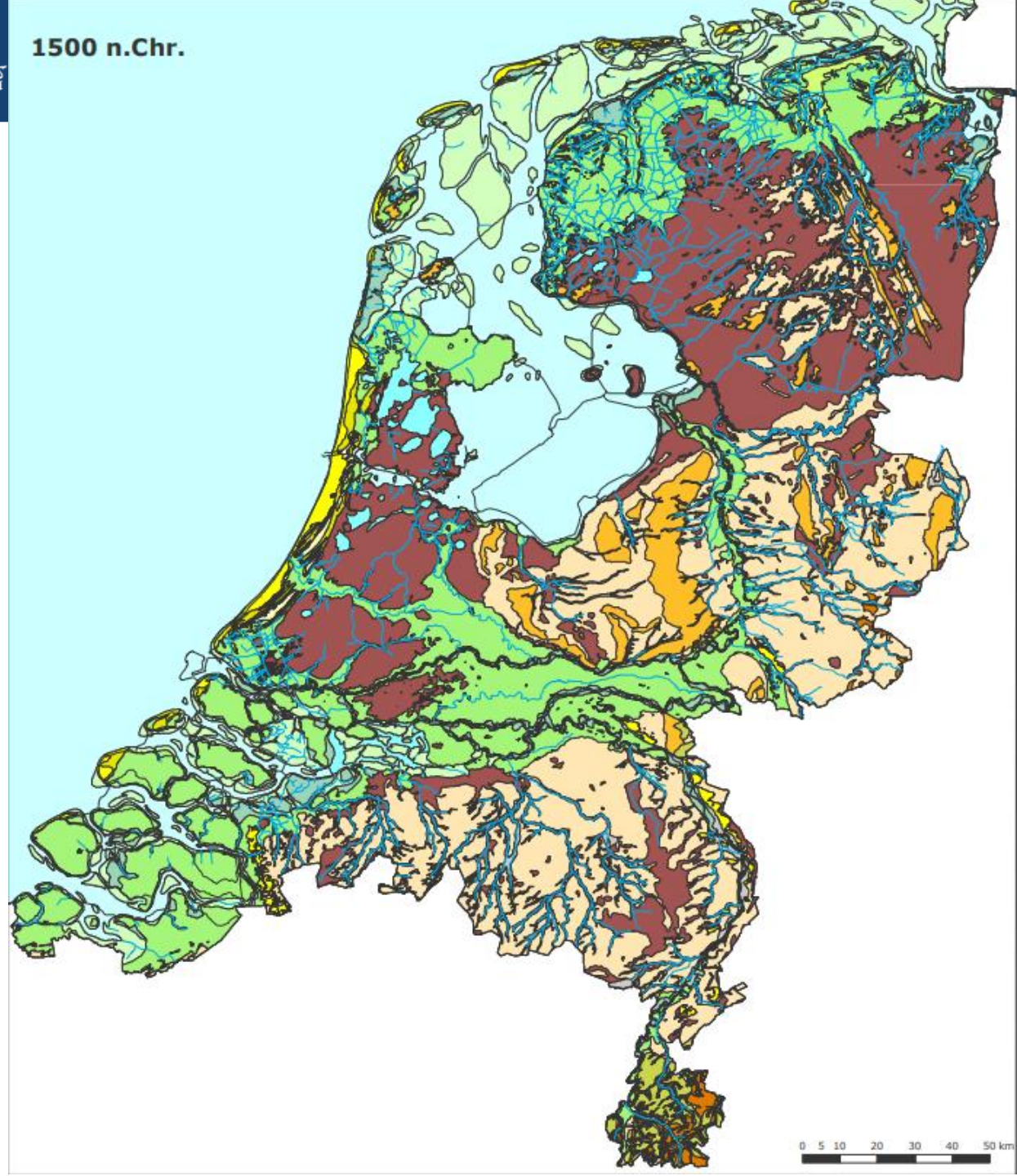
1. Some history (short)
2. Flood Risk Management Philosopy
3. Funding and a bit on costs



Binnen dijkringen
- Beneden NAP: 26%
- Boven NAP: 29%
- Buitendijks gebied: 3%
- Onbedijkte Maas: 1% *)

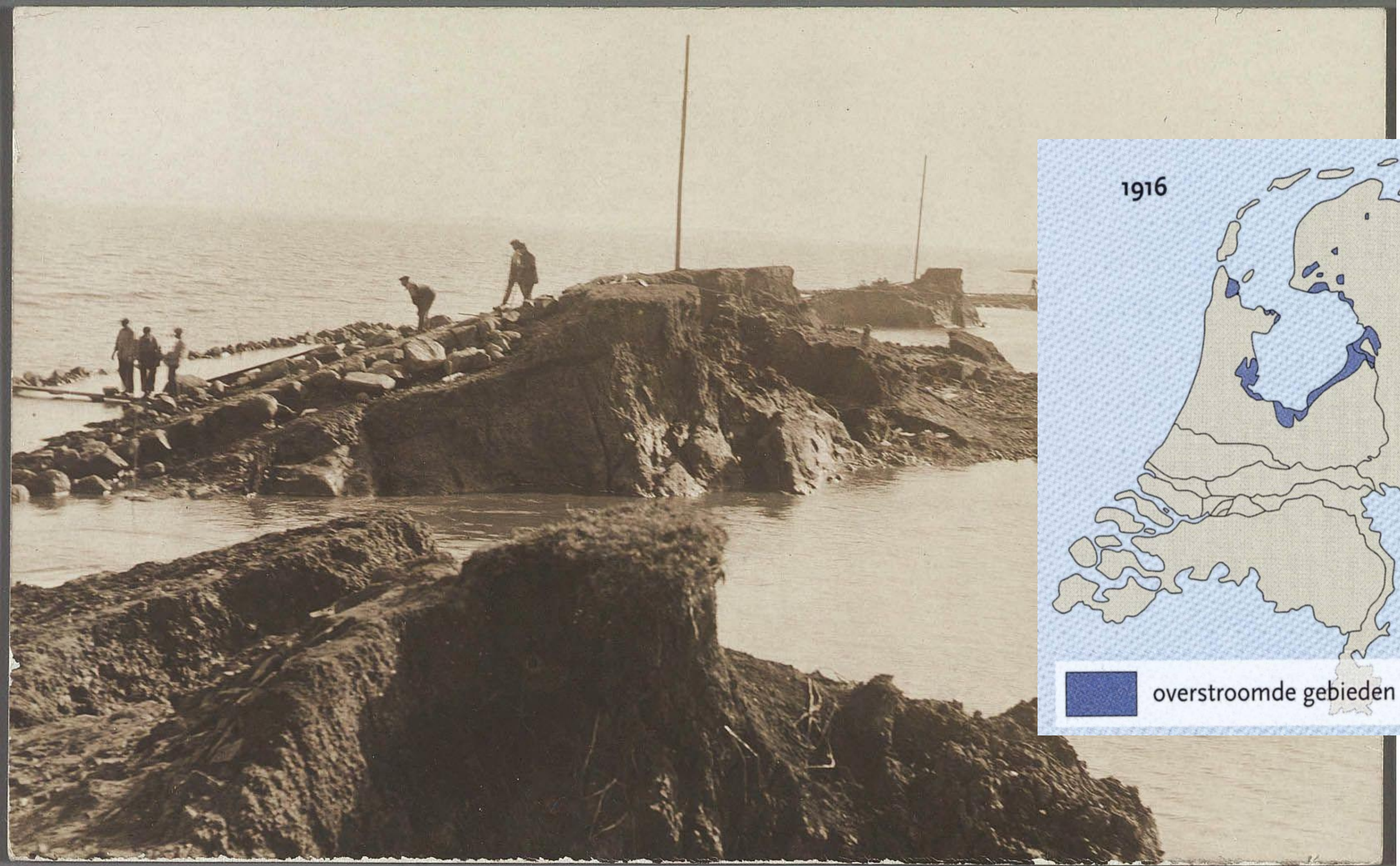

Lauwerszee
Fivel
Middelzee
Boorne
Peizerdiep
Drentse A
Hunze



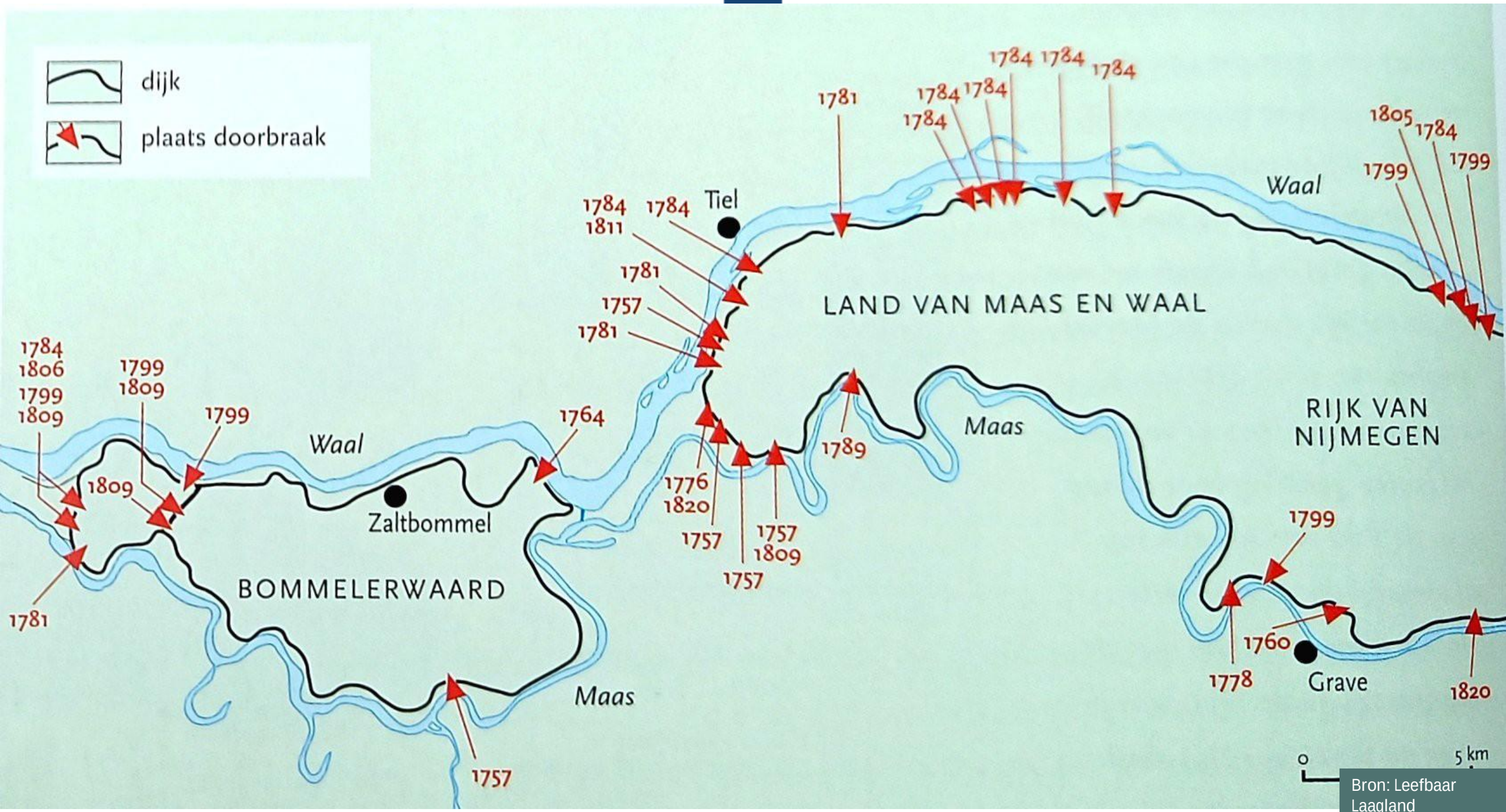


Bron: Rijksdienst voor Cultureel Erfgoed

De Sint-Elisabethsvloed 1421
Meester van de Heilige Elisabeth-Panelen



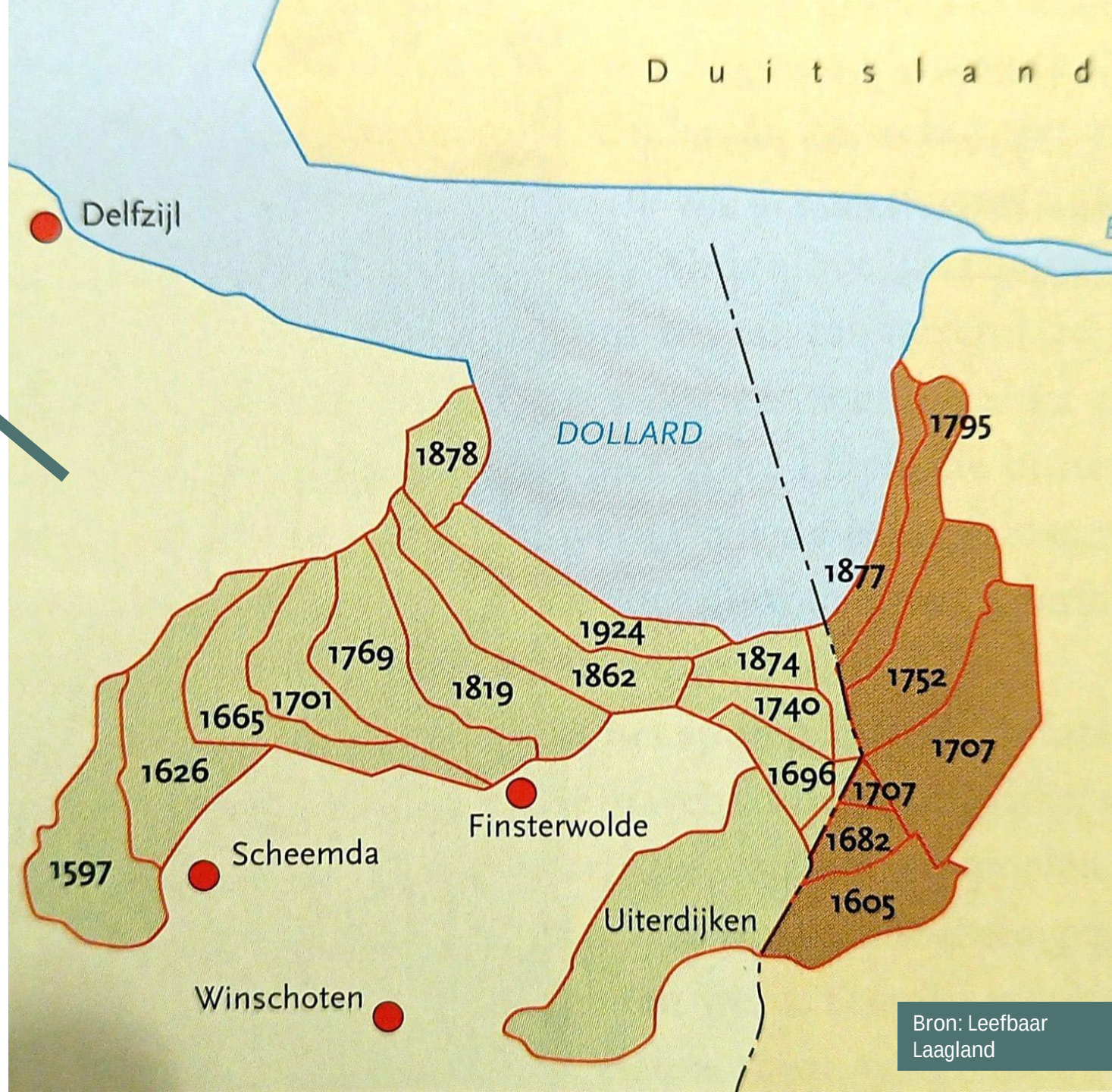
1916
overstroomde gebieden



Bron: Leefbaar Laagland

Dike Breach at Bemmel, 1799,
Christiaan Josi, naar Jacob Cats (1741-1799), 1802

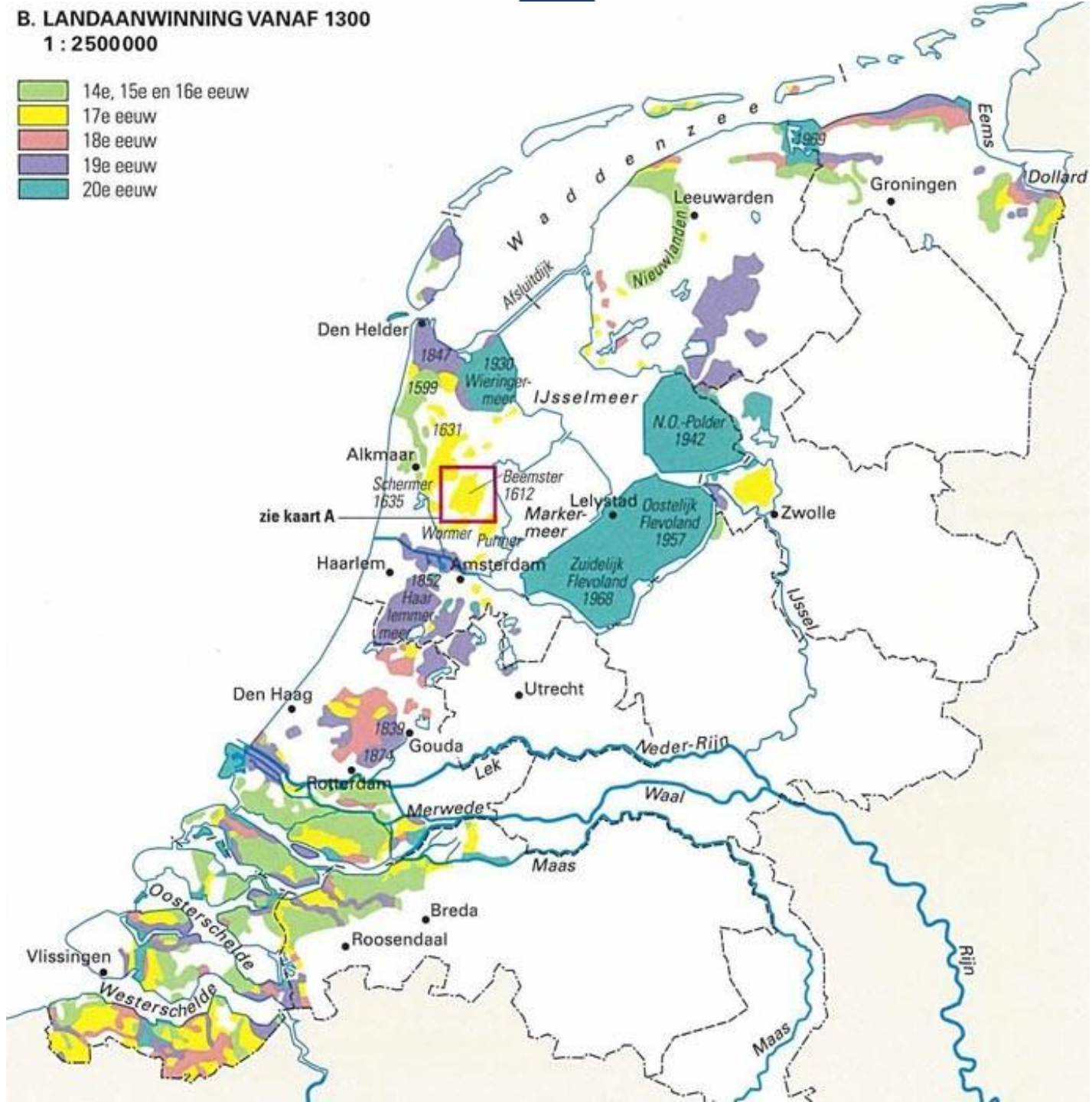
Building dikes to claim land



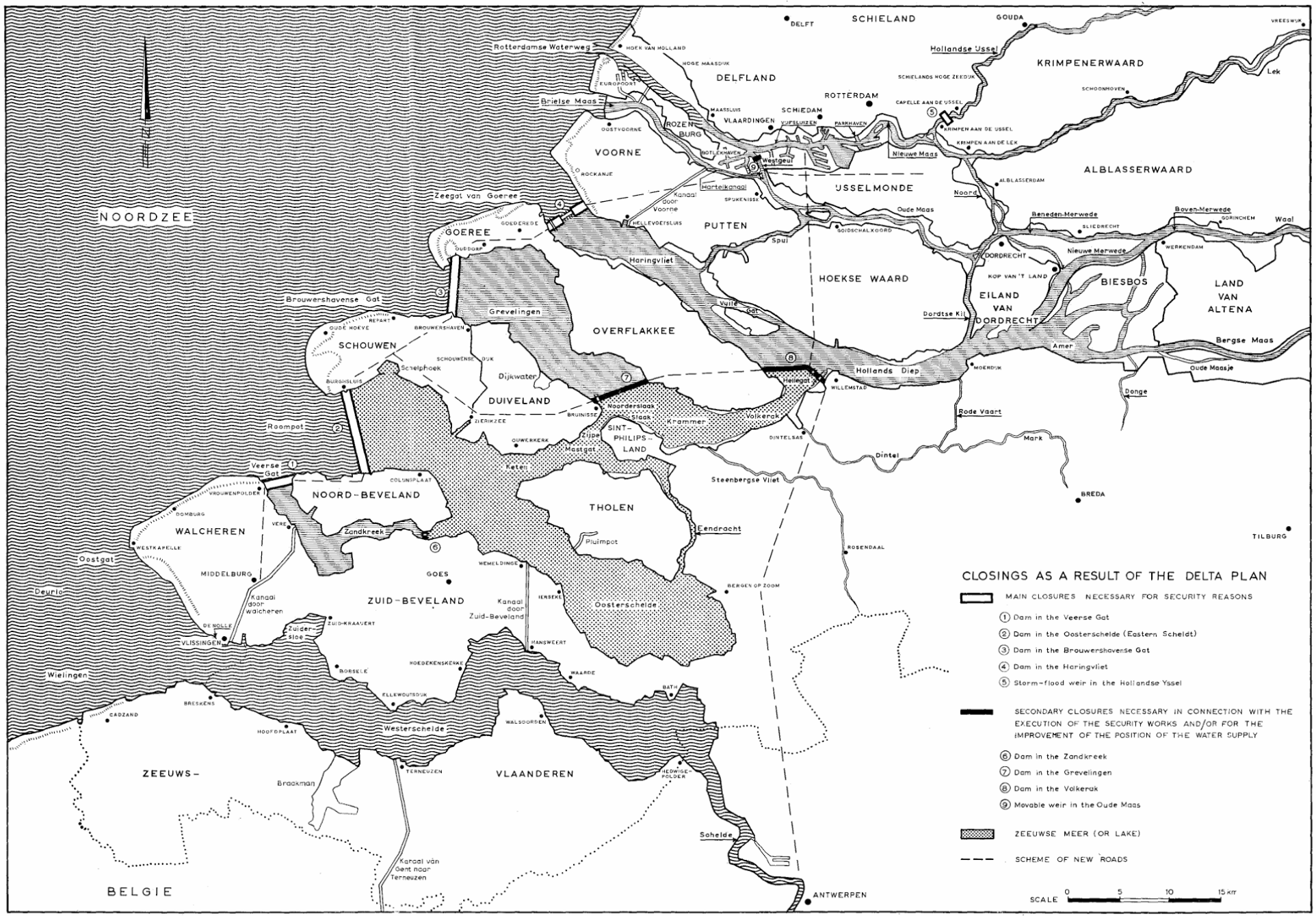
Bron: Leefbaar Laagland


N O O R D Z E E
HAARLEM
AMSTERDAM
HET IJ
VOORM.e SPIERING MEER
Afdeeling
Ryhoizen
HAARLEMMER MEER POLDER
Rijk
Afdeeling
Beinsdorp
Afdeeling
Burgerveen
Afdeeling
HAARLEMMER MEER POLDER
Burgerveen
Zandvoort
Noordwijk aan Zee
Katwijk aan Zee
Oude Wetering
Nieuwveen
Zevenhoven
Uithoorn
Mijdrecht
Wilnis
Vinkeveen
Waverveen

B. LANDAANWINNING VANAF 1300
1 : 2500000



1953 Watersnood



Delta area with closings

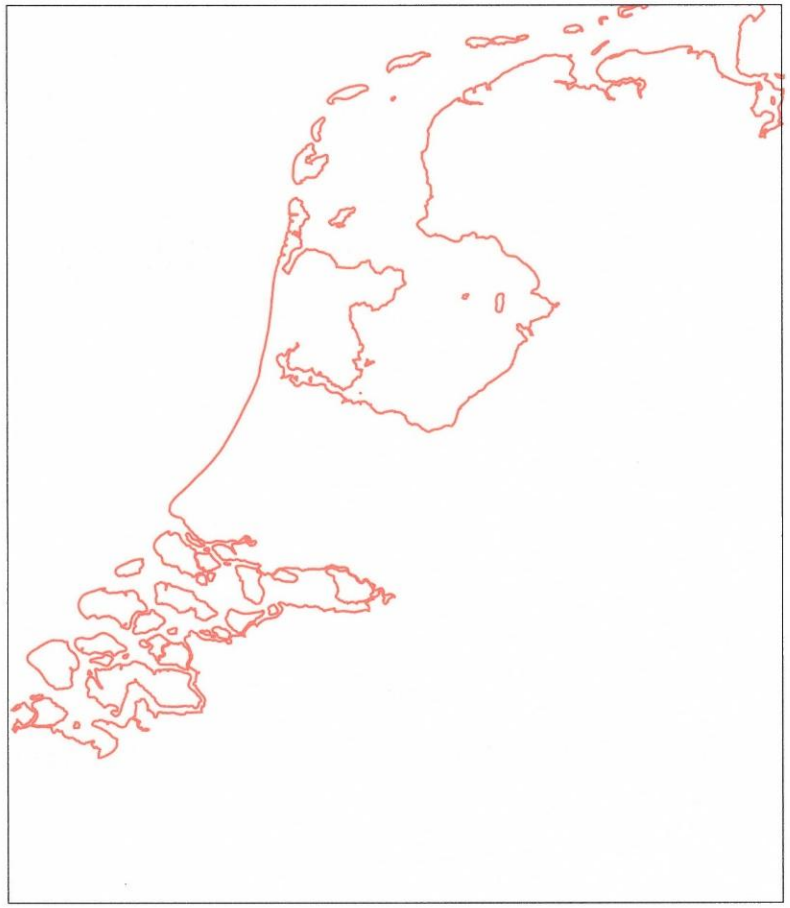
Enclosure 5.0.1.

1939 Stormvloedcommissie

1953 Watersnood

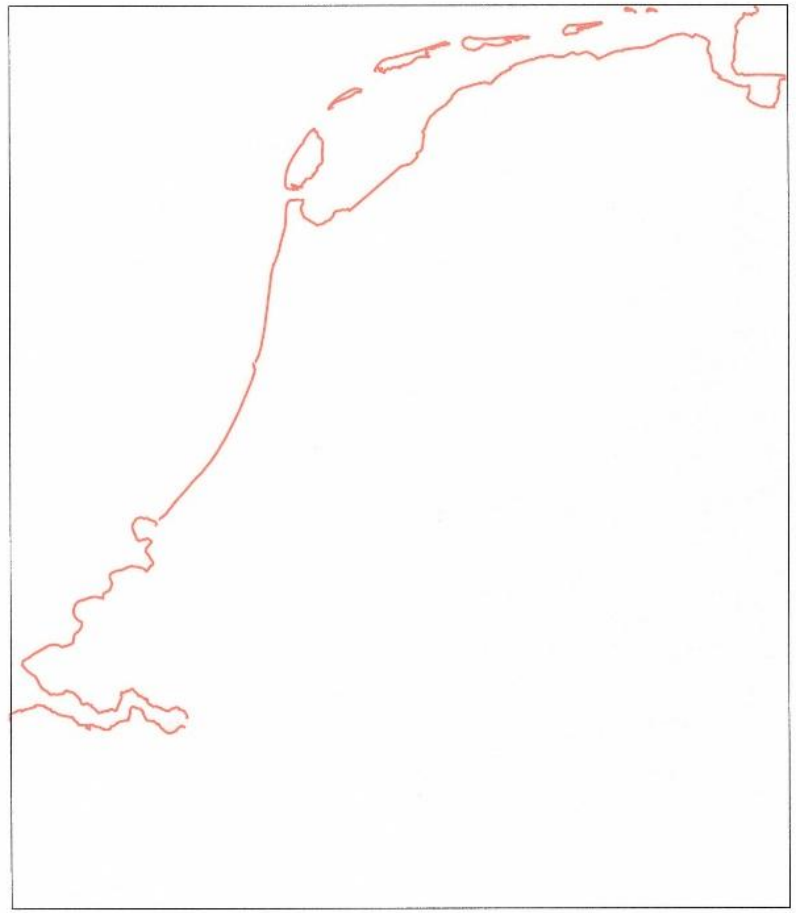
1997 Voltooiing Deltawerken

Reducing the length of the coastline



1500
2.600 km kustlijn

1850
2.100 km kustlijn



2000
880 km kustlijn

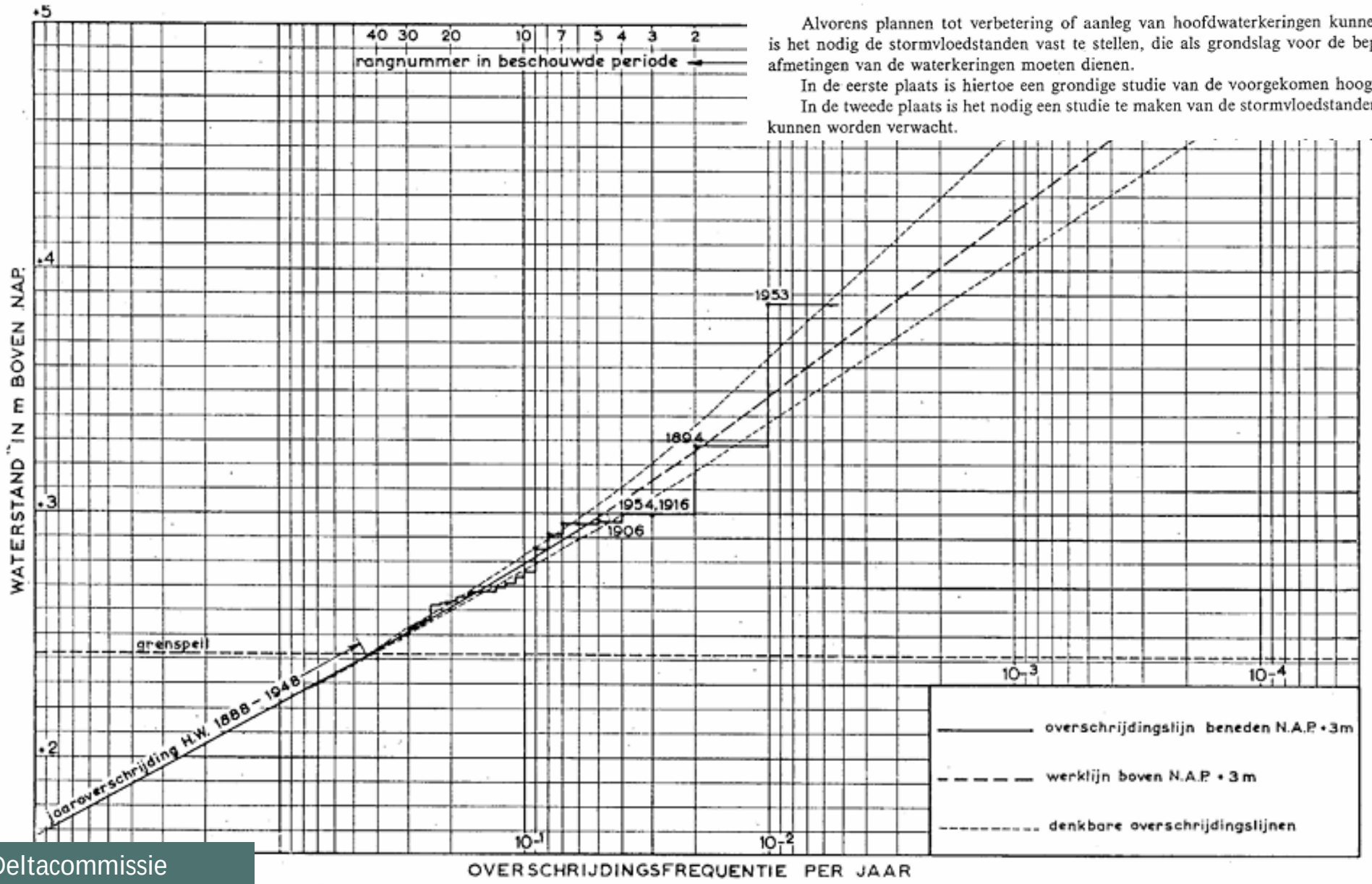
Bron: Dijken van Nederland

3.0 BASISPEILEN EN ONTWERPPEILEN LANGS DE KUST EN DE ZEEGATEN IN HET ZUIDWESTEN DES LANDS EN IN HET WADDENGEBIED

Alvorens plannen tot verbetering of aanleg van hoofdwaterkeringen kunnen worden opgesteld, is het nodig de stormvloedstanden vast te stellen, die als grondslag voor de bepaling van de hoofdafmetingen van de waterkeringen moeten dienen.

In de eerste plaats is hiertoe een grondige studie van de voorgekomen hoogwaterstanden vereist.

In de tweede plaats is het nodig een studie te maken van de stormvloedstanden, die in de toekomst kunnen worden verwacht.



Figuur 3.0.1. Overschrijdingslijnen van de stormvloedstanden te Hoek van Holland 1859 t/m 1958

1e rapport Rapport Deltacommissie 1961

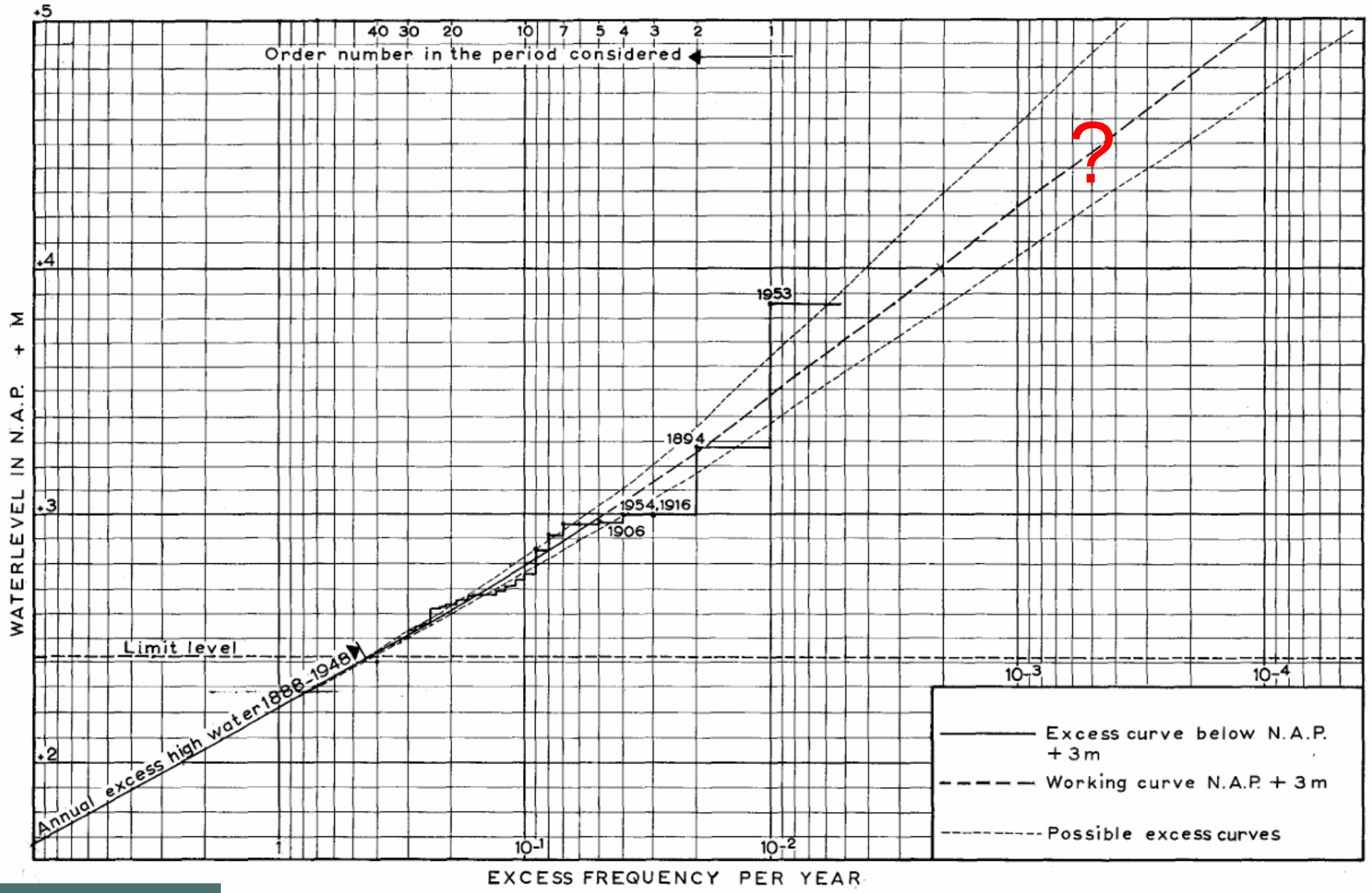
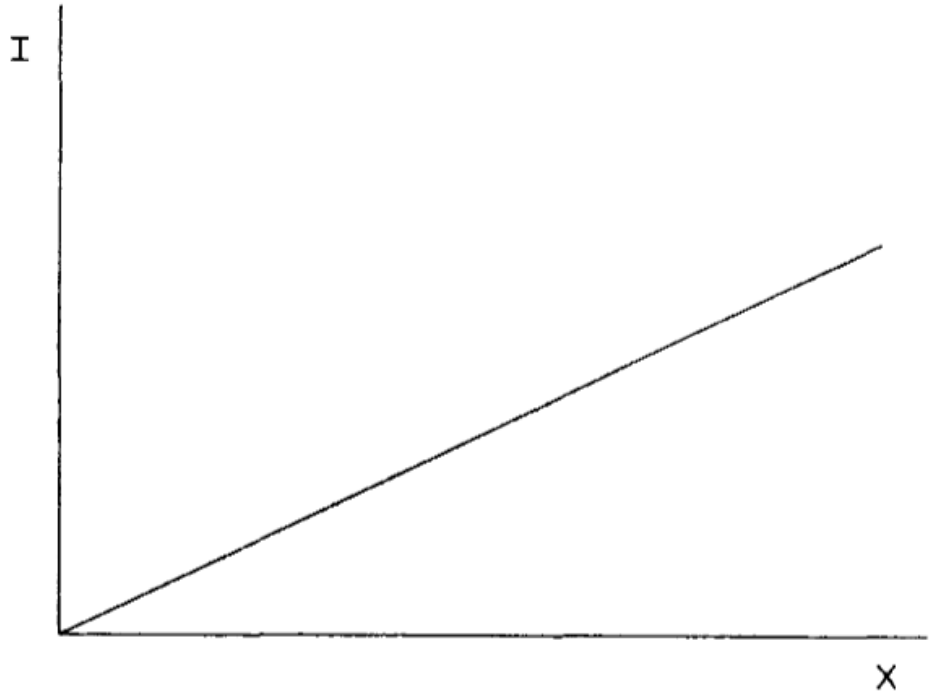


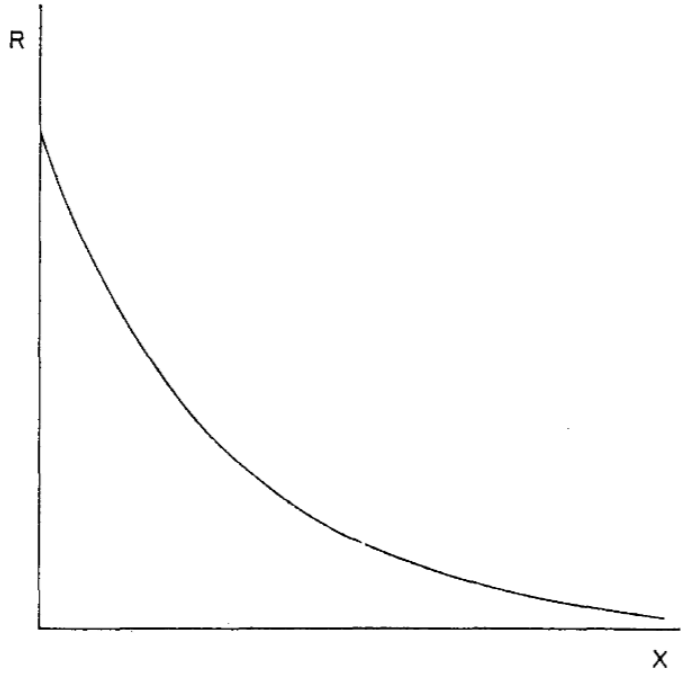
Figure 3.0.1. Excess curves of the storm-flood levels at the Hook of Holland 1859–1958 inclusive

1e rapport Rapport Deltacommissie 1961

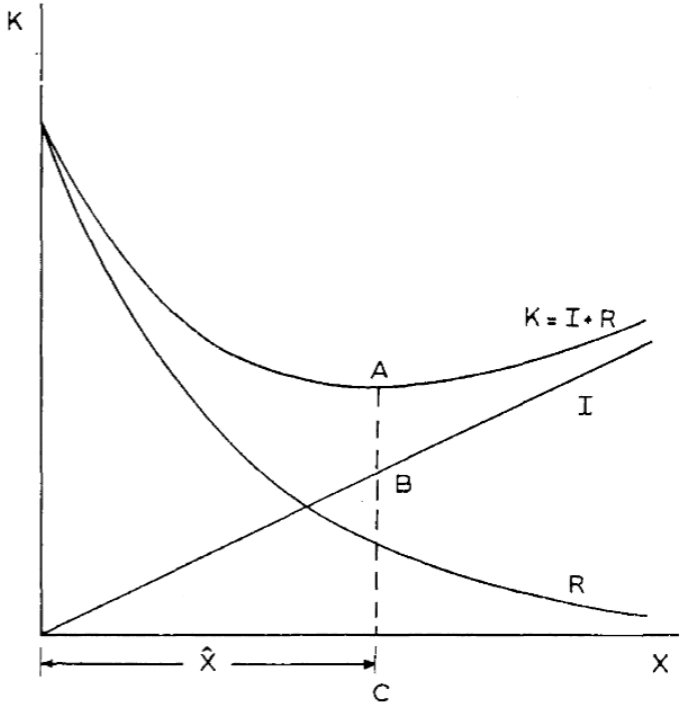
Economic optimisation



Figuur 3.1.1. Kosten I bij dijkverhoging met X meter



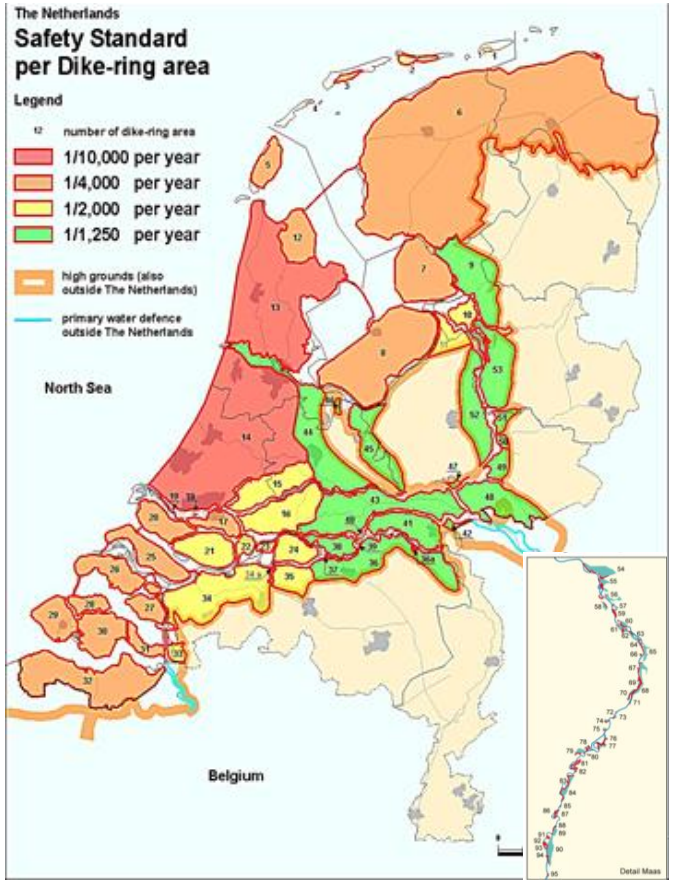
Figuur 3.1.2. Rampschadeverwachting R bij dijkverhoging met X meter



Figuur 3.1.3. Totale kosten K bij dijkverhoging met X meter

Advise first Deltacommittee, 1961. Part 3. v. Dantzig

Safety standards Flood defences Act 1996



Standards based on:

- Risk assessment
- Design water levels
- Dike rings

Probability	per year	in a lifetime
	1 : 10.000	0,75%
	1 : 4.000	2,00%
	1 : 2.000	3,75%
	1 : 1.250	6,00%

Not: Flood risk behind levees

New Flood Risk Standards

Statutory-> Besluit Kwaliteit Leefomgeving

https://wetten.overheid.nl/BWBR0041313/2024-07-01/0#BijlageII

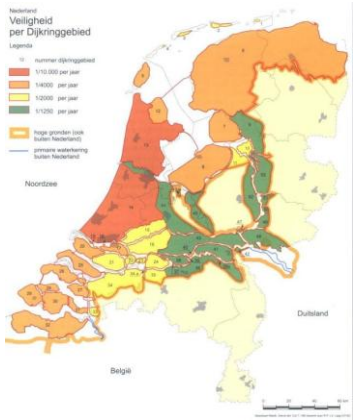


Figure 4.3
Maximum permissible flood probabilities: the lower limits stipulated in the Water Act.

Annual probability
1:100
1:300
1:1.000
1:3.000
1:10.000
1:30.000
1:100.000

Probability in event of demand
1:10

Flood Risk Standards

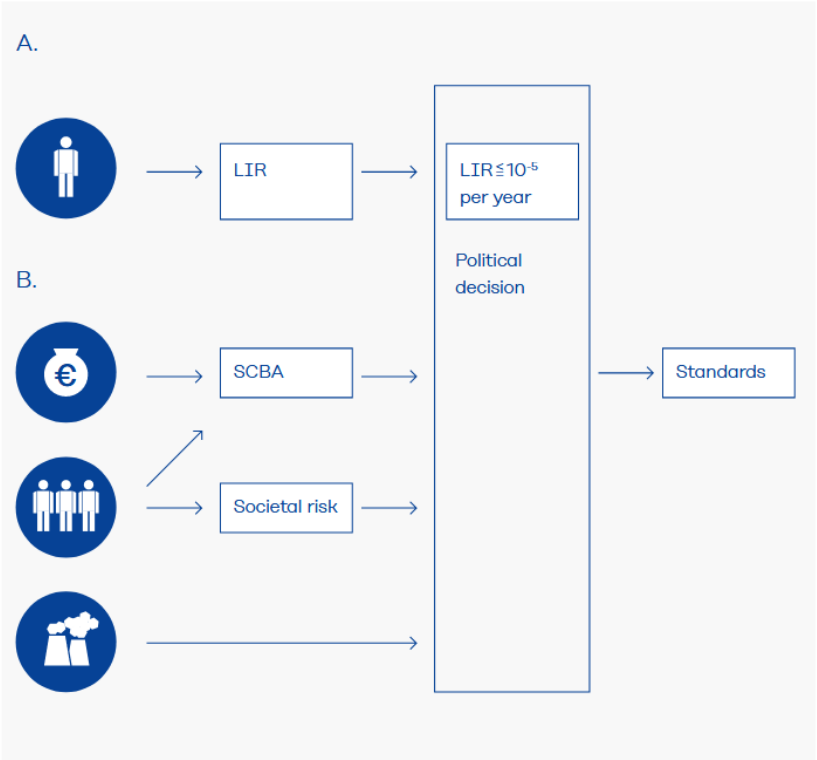
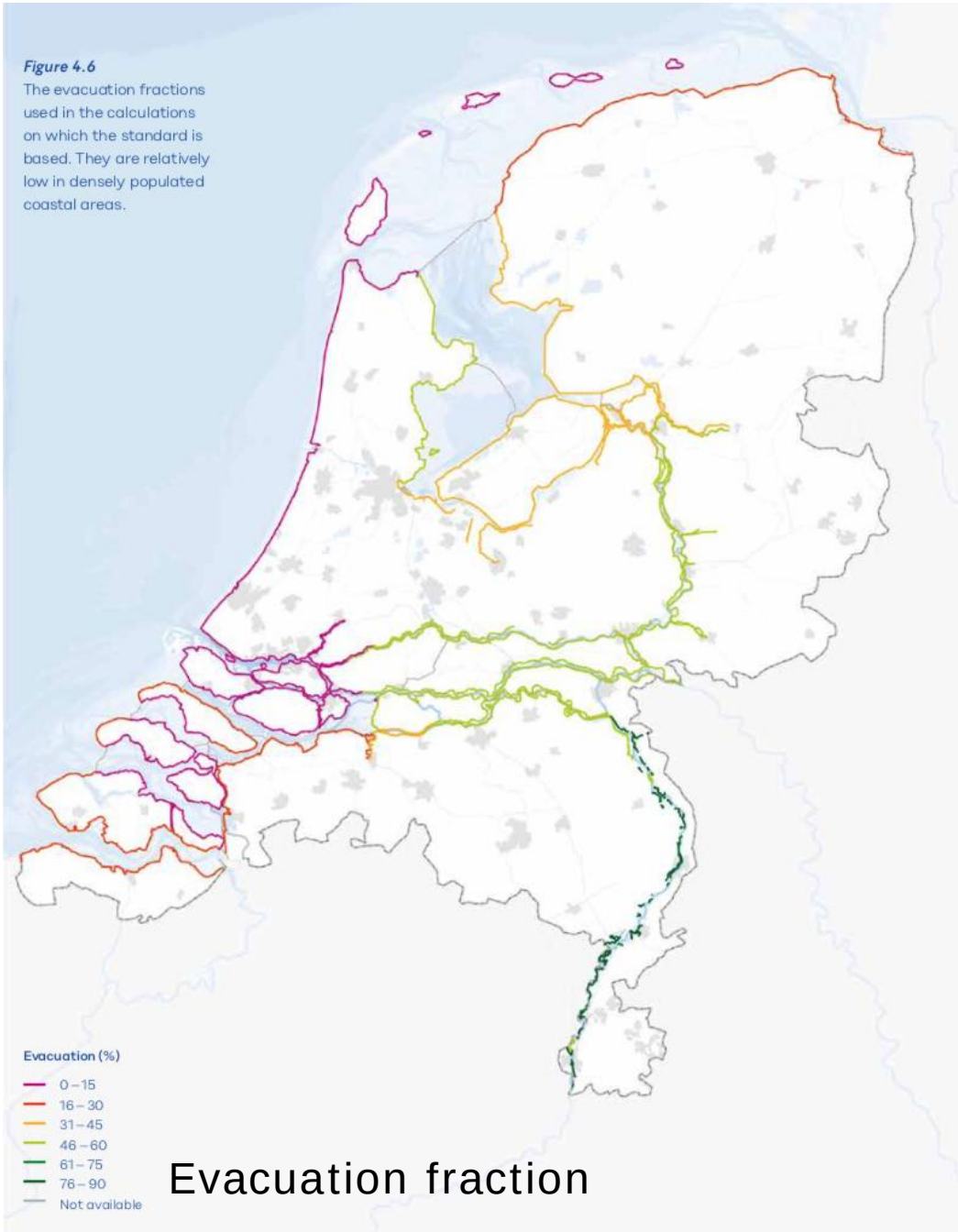


Figure 4.2 The principles underpinning the flood probability standards for primary flood defences.

- Local Individual Risk

LIR = P flood * mortality * (1- evacuation fraction)



Evacuation fraction

Economic optimisation

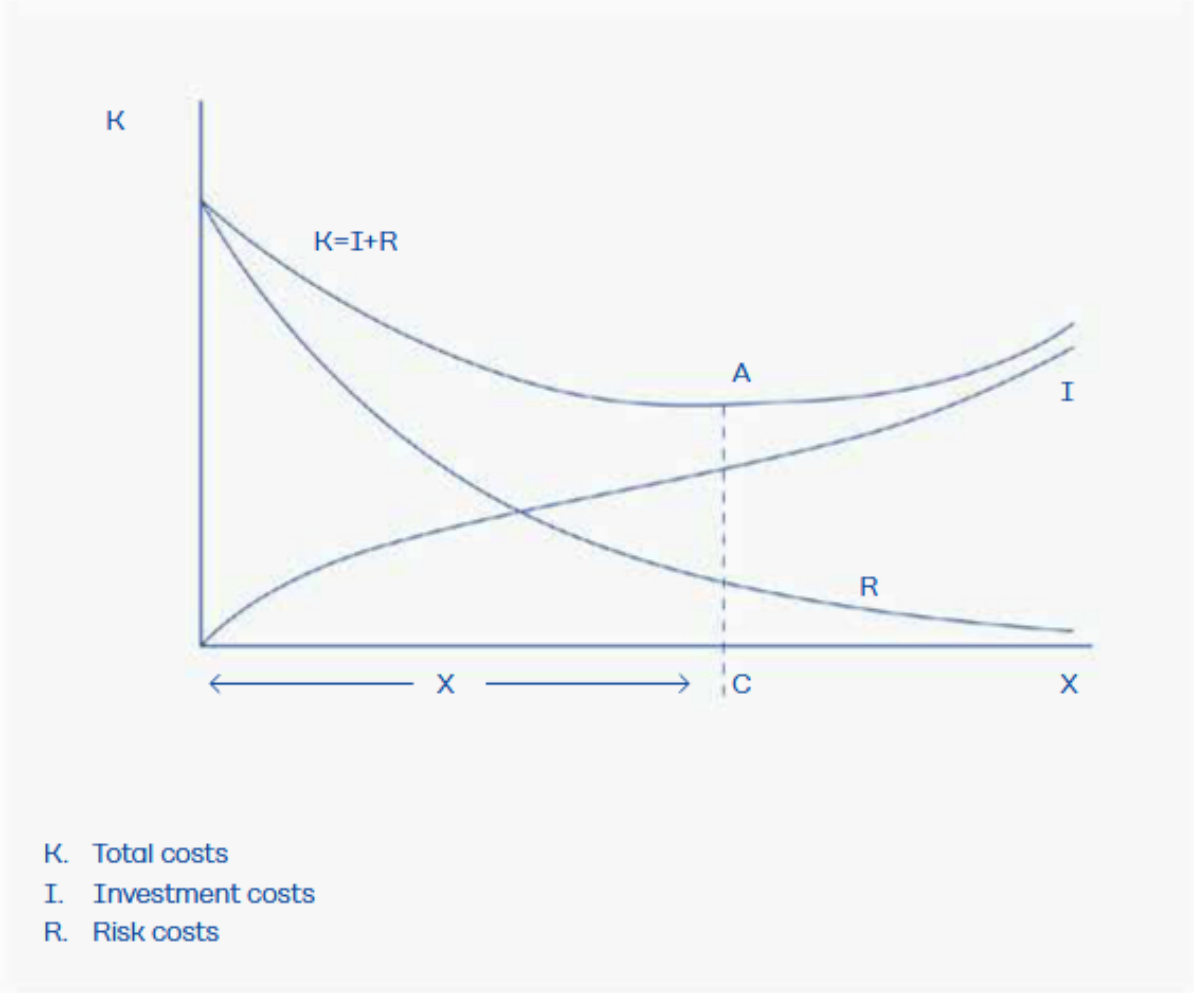


Figure 4.8 The basic principle of economic optimisation. The total costs (K) are equal to the investment costs (I) associated with improving reliability (here: heightening levees) plus the present value of the risk (R). The optimum lies at the point where the total costs (I+R) are lowest.

NL, Economic optimisation: investment balance risk reduction. 1 to 1 ratio.

Based on extreme waterlevel statistics

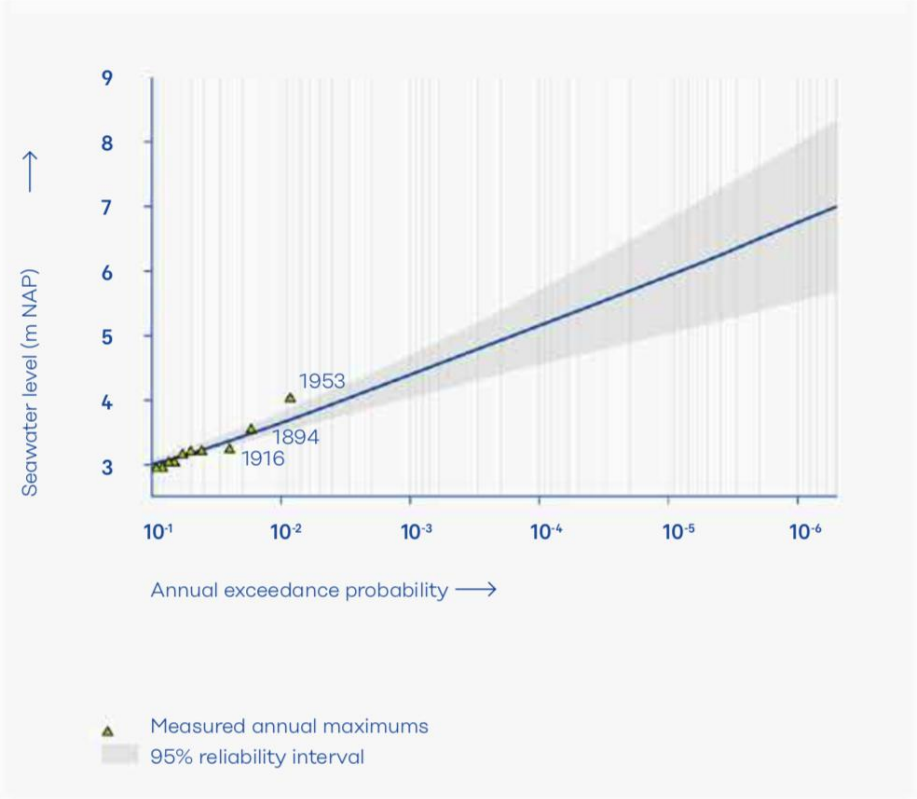


Figure 3.1 The annual probability that a certain water level will be exceeded.

Data NL, Rijkswaterstaat

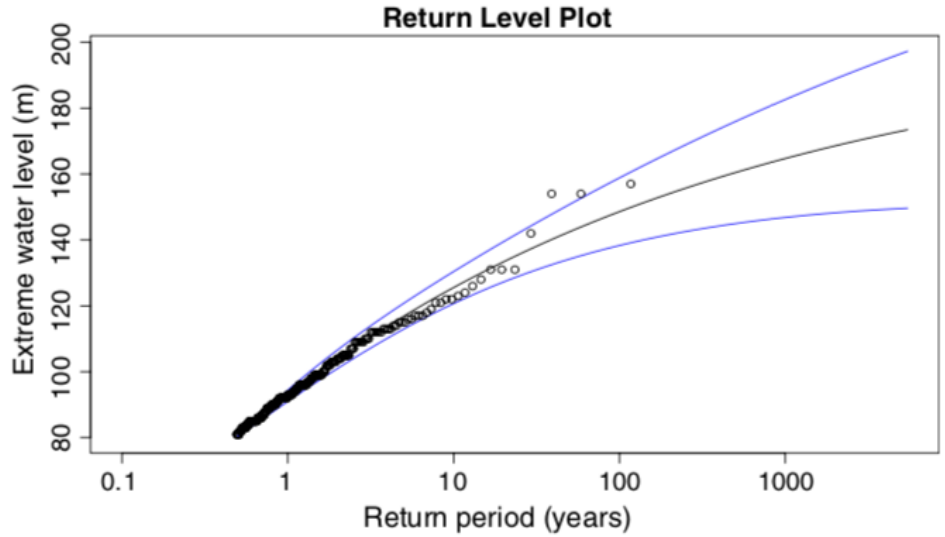


Fig. 2 Storm surge return water level (cm) corresponding to various return-periods, up to 1,000 years. Note: the 117 years of data are reproduced with *circles*. The presented data was de-trended for extreme analysis

CHP, Kystdirektoratet

Local Individual Risk

Bescherming

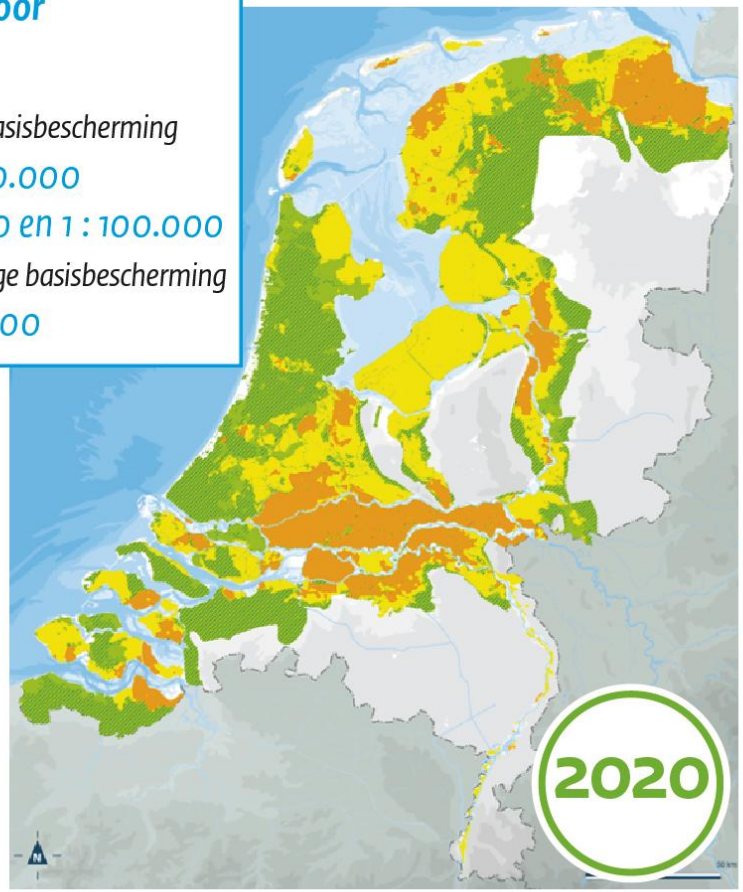
Kans op overlijden door een overstroming

Voldoet aan toekomstige basisbescherming

- *kleiner dan 1 : 1.000.000*
- *tussen 1 : 1.000.000 en 1 : 100.000*

Voldoet niet aan toekomstige basisbescherming

- *groter dan 1 : 100.000*



Economic Risk

Economische waarde

Schaderisico (euro/ha/jaar)

- *minder dan 100*
- *tussen 100 en 1000*
- *tussen 1000 en 10.000*
- *meer dan 10.000*

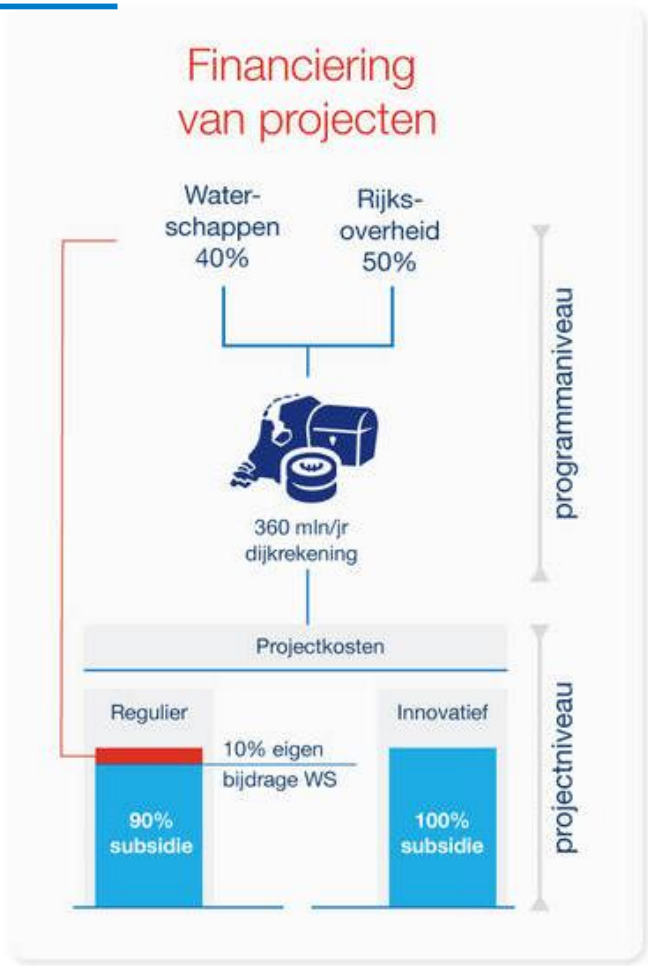
Funding Dike updrages (reinforcement) Regional Water Authorities

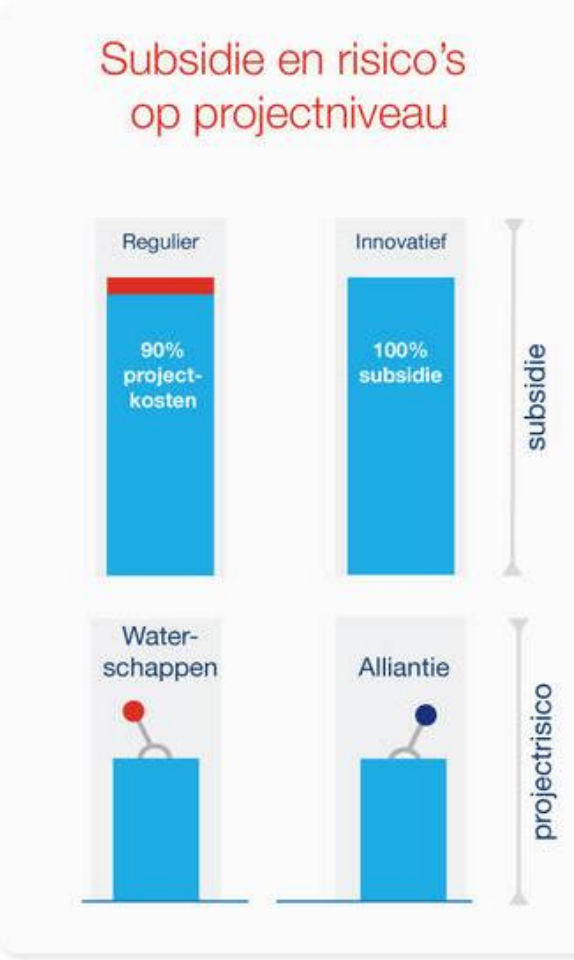
Annually

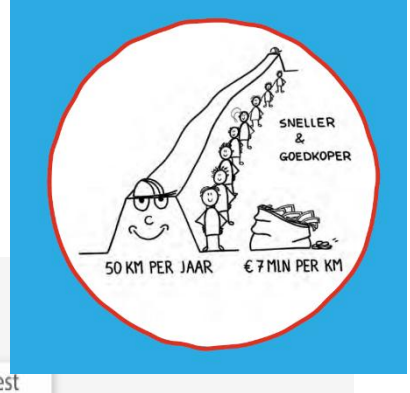
- Around 500 mln € National Government and Regional Water authorities.

- 50% Rijkswaterstaat

- 40% All Water authorities together
- 10% recieving Water authority







van HWBP

onde projecten

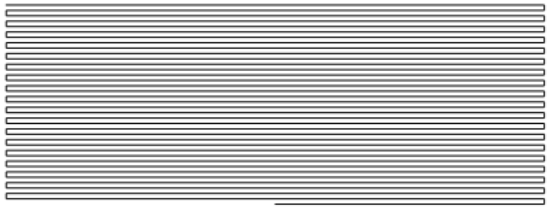
cten op het programma

https://www.hwbp.nl/projecten/documenten/rapporten/2021/11/11/projectenkaart-hwbp-2022

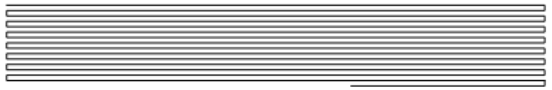
Stand van zaken Prinsjesdag 2021

DIJKEN, DAMMEN EN DUINEN (KM)

Nederland
3.750 km



Aangemeld (Veiligheidsportaal)
1.862 km

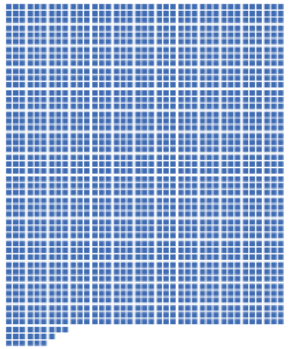


Programma 2020-2025
681 km

Gerealiseerd
436 km

KUNSTWERKEN (AANTAL)

1.777 stuks



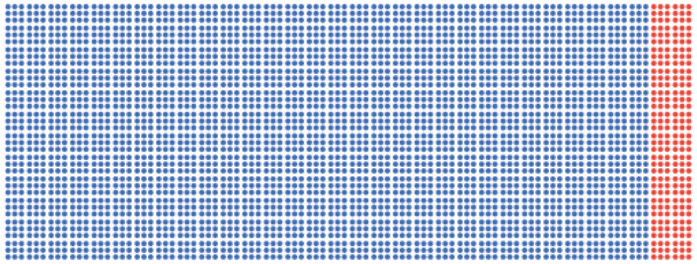
397 stuks

307 stuks

44 stuks

BUDGETTEN (X 1.000)

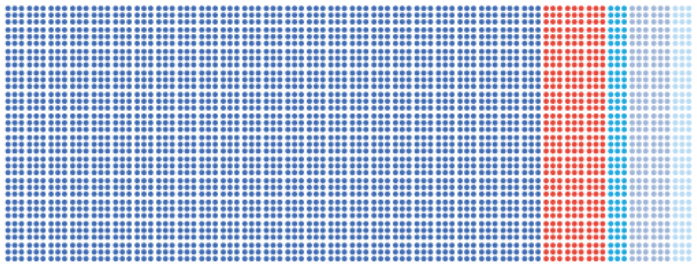
Totaal beschikbare budget: 11.034.300 euro



Subsidiebijdrage €10.334.500 **Eigen bijdrage waterschap** €699.800 (alleen voor HWBP-projecten)

UITVOERINGSPAKKET

Totaal beschikbare budget: 11.034.300 euro



Waterschapsprojecten € 9.169.600 **Rijksprojecten** € 819.400 **Innovatieprojecten** € 315.700
Reservering voor nieuwe projecten € 456.300 **Overige bijkomende kosten** € 273.200

Gerealiseerd €3.433.000 **Nog te besteden** €7.601.300

Deze cijfers gaan over het HWBP-programma 2022-2027 en het HWBP-2.

https://hoogwaterbescherming.foleon.com/jaarbericht/jaarbericht-2021/jaarbericht-2021/overlay/hwbp-in-vogelvlucht/

Stand van zaken Prinsjesdag 2021

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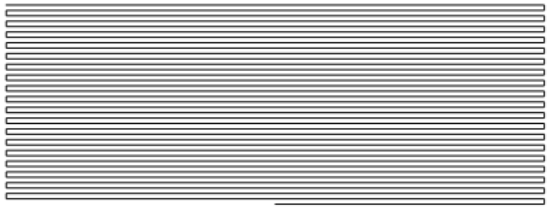

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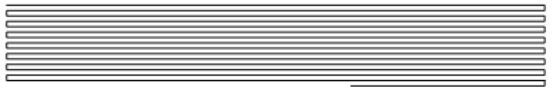

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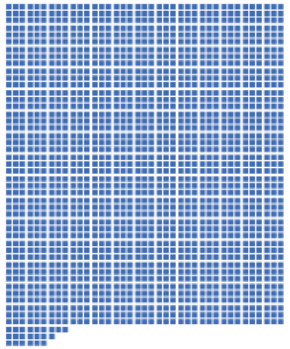
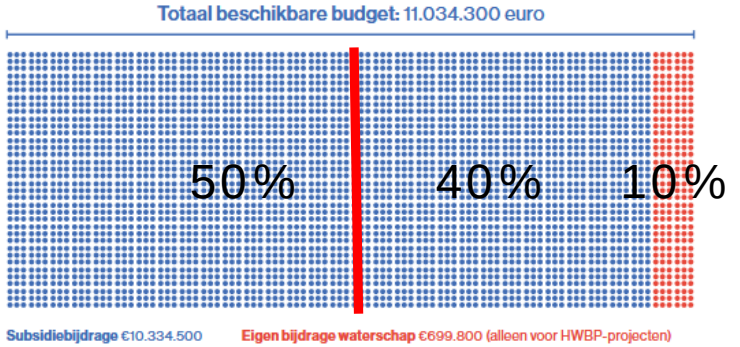


397 stuks

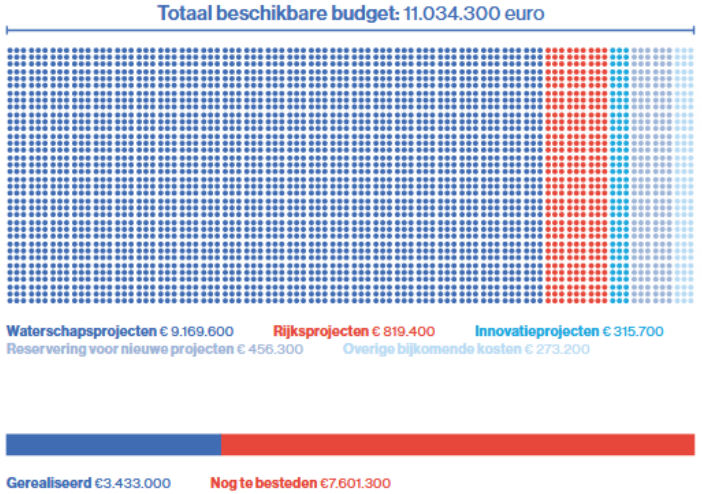
307 stuks

44 stuks

BUDGETTEN (X 1.000)



UITVOERINGSPAKKET



Deze cijfers gaan over het HWBP-programma 2022-2027 en het HWBP-2.

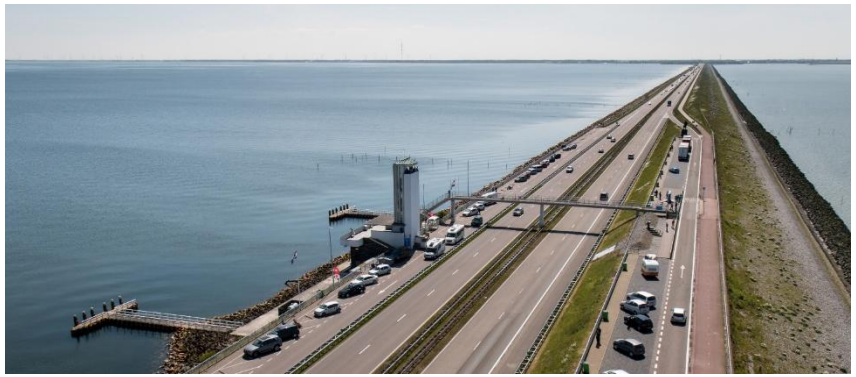
https://hoogwaterbescherming.foleon.com/jaarbericht/jaarbericht-2021/jaarbericht-2021/overlay/hwbp-in-vogelvlucht/

Rijkskeringen = Flood Defence owned by National Government (Statens Dige)

- 100% funding from national taxes

- Daily Operations and Maintance Rijkswaterstaat around 250 M euro per year
- Not including replacements

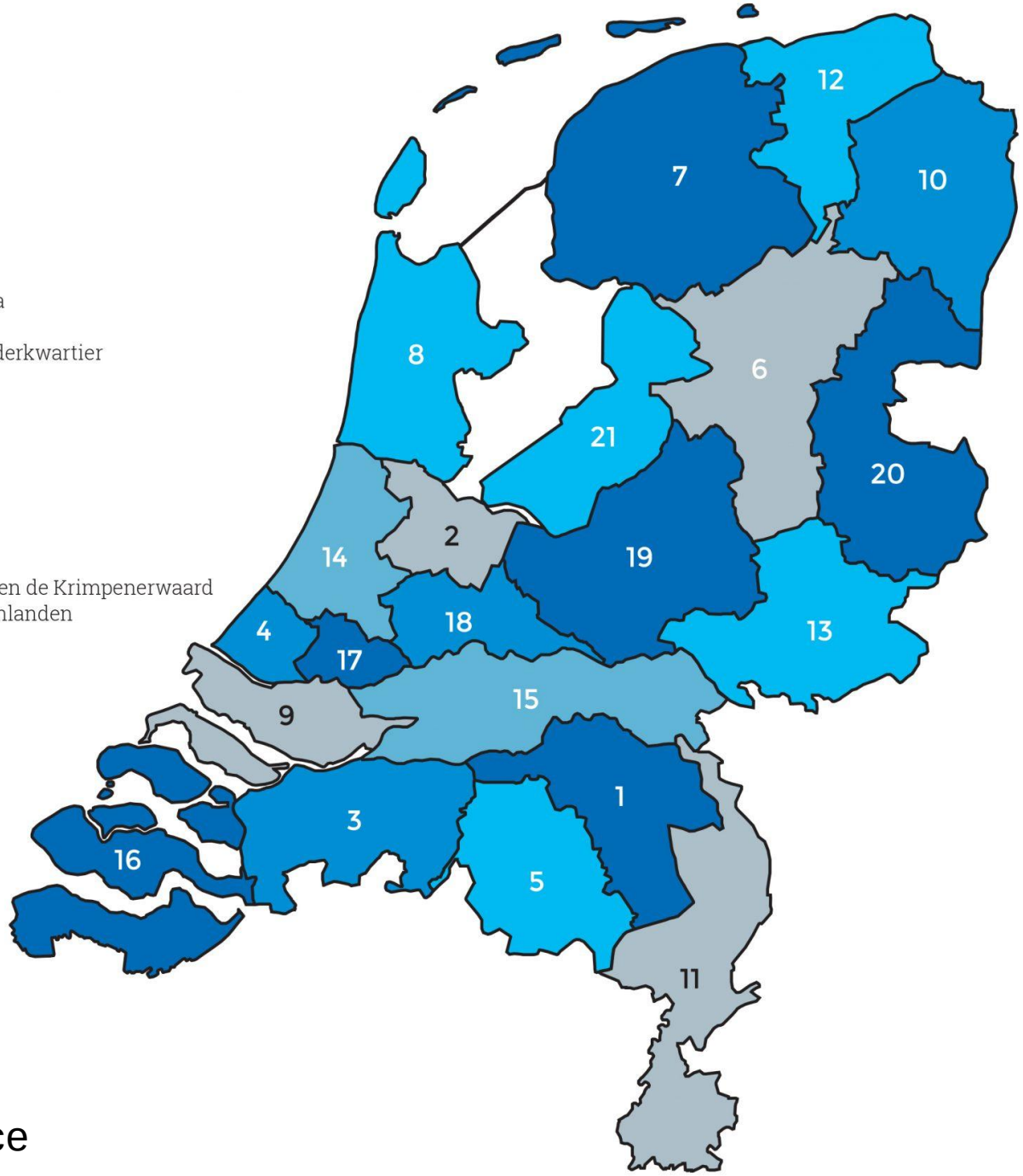
Coast, Rivers, Lakes, Storm Surge Barriers, Flood Risk Management, Water scarcity, Water Quality.



UNIE VAN WATERSCHAPPEN

LEGENDA

1. Waterschap Aa en Maas
2. Waterschap Amstel, Gooi en Vecht
3. Waterschap Brabantse Delta
4. Hoogheemraadschap van Delfland
5. Waterschap De Dommel
6. Waterschap Drents Overijsselse Delta
7. Wetterskip Fryslân
8. Hoogheemraadschap Hollands Noorderkwartier
9. Waterschap Hollandse Delta
10. Waterschap Hunze en Aa's
11. Waterschap Limburg
12. Waterschap Noorderzijlvest
13. Waterschap Rijn en IJssel
14. Hoogheemraadschap van Rijnland
15. Waterschap Rivierenland
16. Waterschap Scheldestromen
17. Hoogheemraadschap van Schieland en de Krimpenerwaard
18. Hoogheemraadschap De Stichtse Rijnlanden
19. Waterschap Vallei en Veluwe
20. Waterschap Vechtstromen
21. Waterschap Zuiderzeeland



Own taxes for daily maintance of flood defence and other watermanagement

Taxes:
- 20-60% inhabitants, depending on population density.
- rest based on economic value poperty

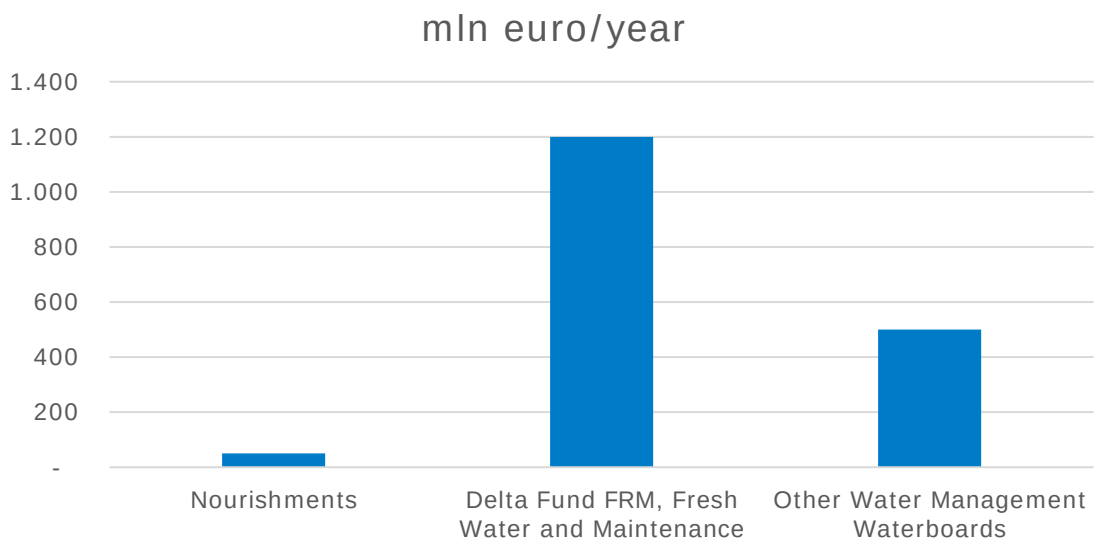
Summary

- Daily maintenance = Regional government
- Large scale upgrade = 50% national 50% regional
- Large infrastructure of national importance = 100% national

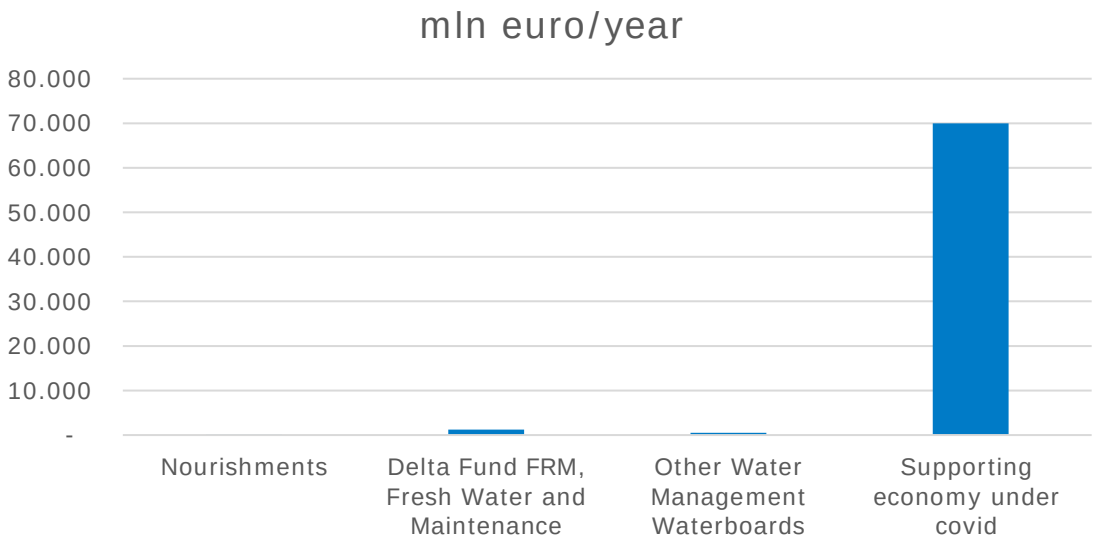
All based on taxes, no direct private investment (there is for extra’s, like additional amenities)

Bottom line: Everyone pays of flood risk reduction. Roughly 0.2 percent of GDP. That is al lot of money but is not expensive.

Slide on costs, now that I have the audience.



Slide on costs, now that I have the audience.



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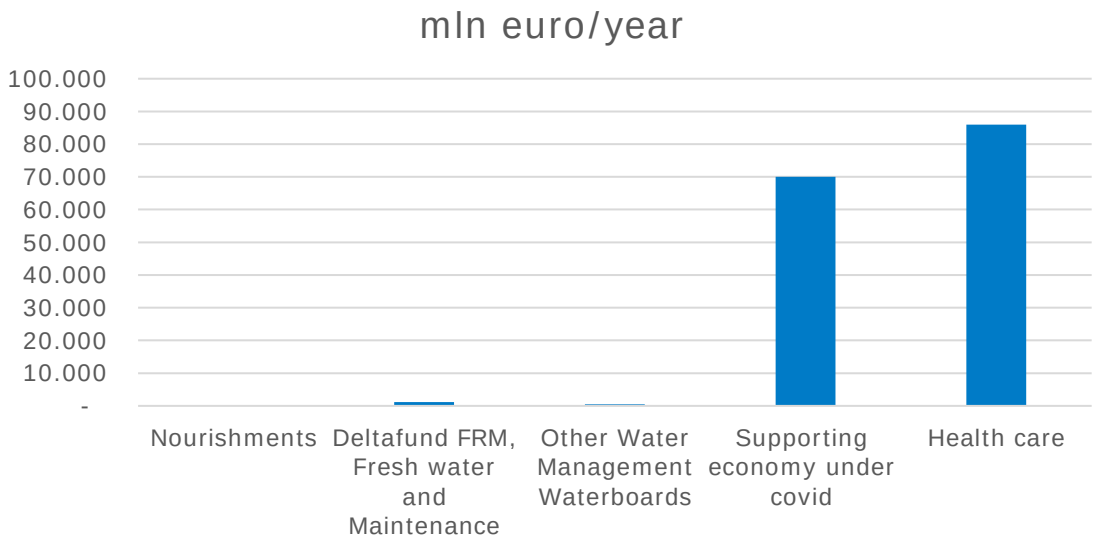

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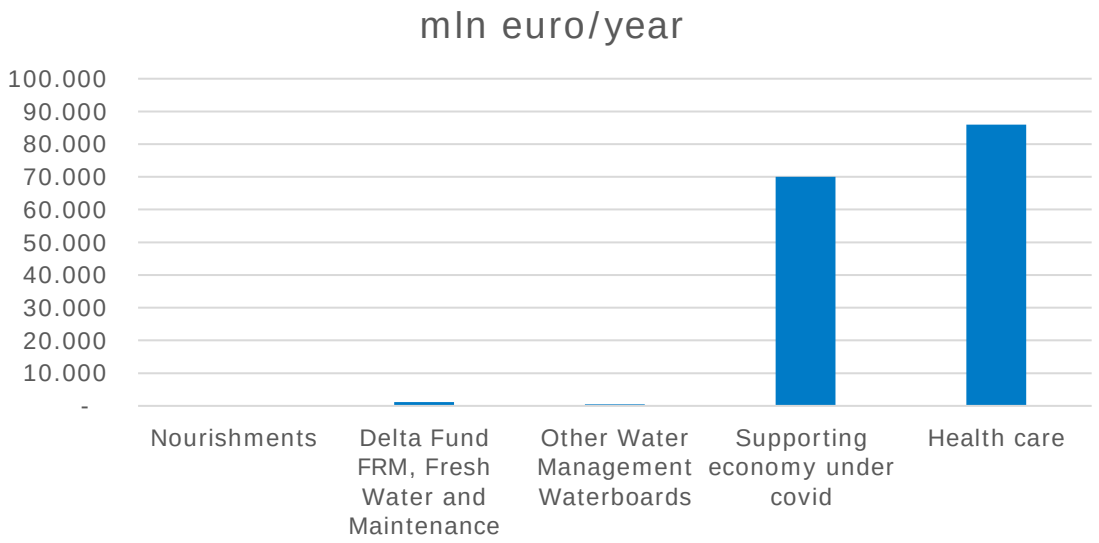

Flood Risk Management in NL can't be a financial challenge. It is certainly a societal challenge! From financial point of view there is no reason to give up the lower parts of the Netherlands.

Learning German is a really good idea. But not because we have to move there..

Contact information

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