Flood Risk in relation to Climate Change and Adaptation in the Netherlands

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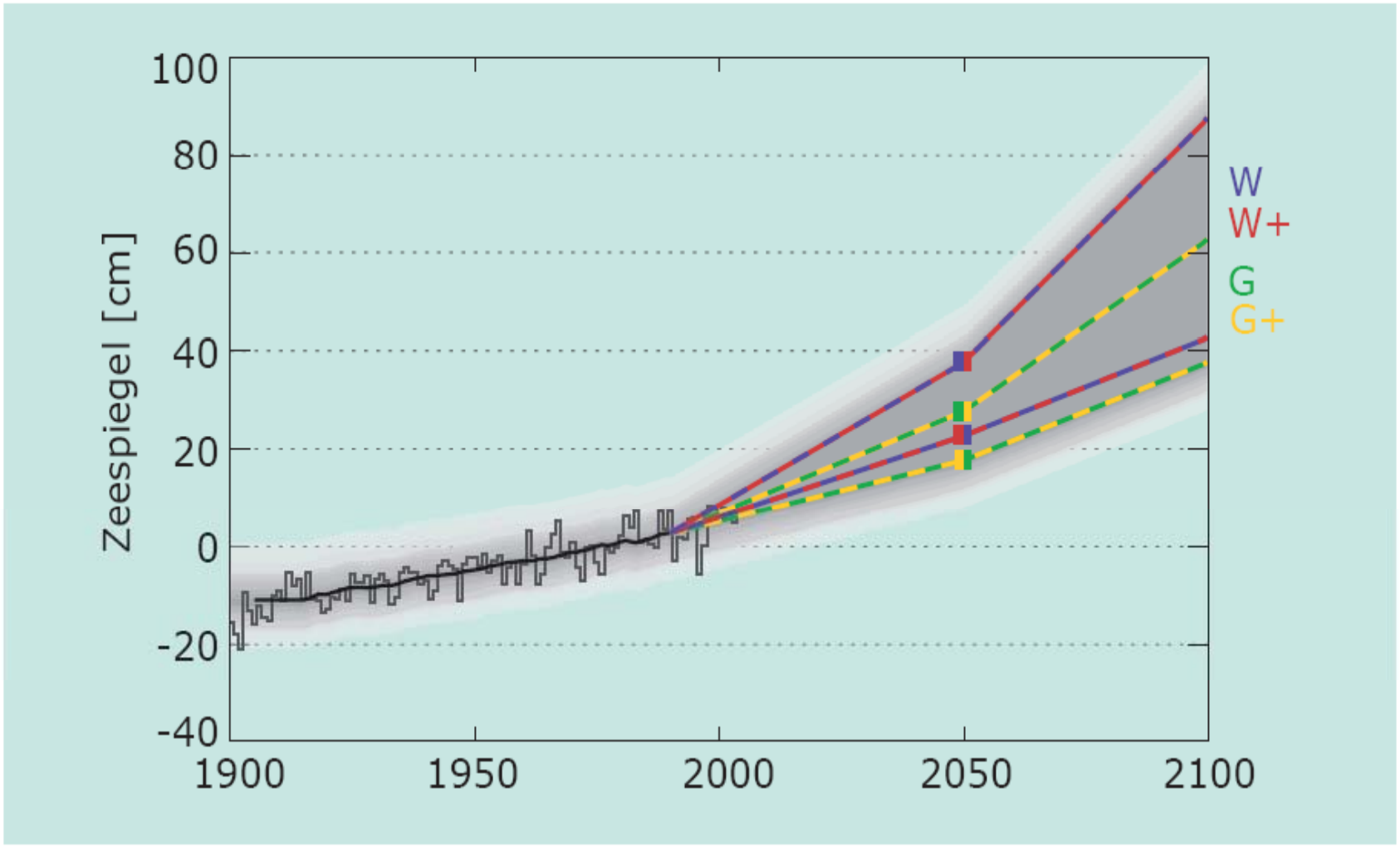
Rijkswaterstaat

Climate change scenarios, 2050

		G	G+	W	W+
Global temperature rise		+1°C	+1°C	+2°C	+2°C
Change in air circulation patterns		no	yes	no	yes
Winter[3]	average temperature	+0.9°C	+1.1°C	+1.8°C	+2.3°C
	coldest winter day per year	+1.0°C	+1.5°C	+2.1°C	+2.9°C
	average precipitation amount	+4%	+7%	+7%	+14%
	number of wet days (≥ 0.1 mm)	0%	+1%	0%	+2%
	10-day precipitation sum exceeded once in 10 years	+4%	+6%	+8%	+12%
	maximum average daily wind speed per year	0%	+2%	-1%	+4%
Summer[3]	average temperature	+0.9°C	+1.4°C	+1.7°C	+2.8°C
	warmest summer day per year	+1.0°C	+1.9°C	+2.1°C	+3.8°C
	average precipitation amount	+3%	-10%	+6%	-19%
	number of wet days (≥ 0.1 mm)	-2%	-10%	-3%	-19%
	daily precipitation sum exceeded once in 10 years	+13%	+5%	+27%	+10%
	potential evaporation	+3%	+8%	+7%	+15%
Sea level	absolute increase	15-25 cm	15-25 cm	20-35 cm	20-35 cm

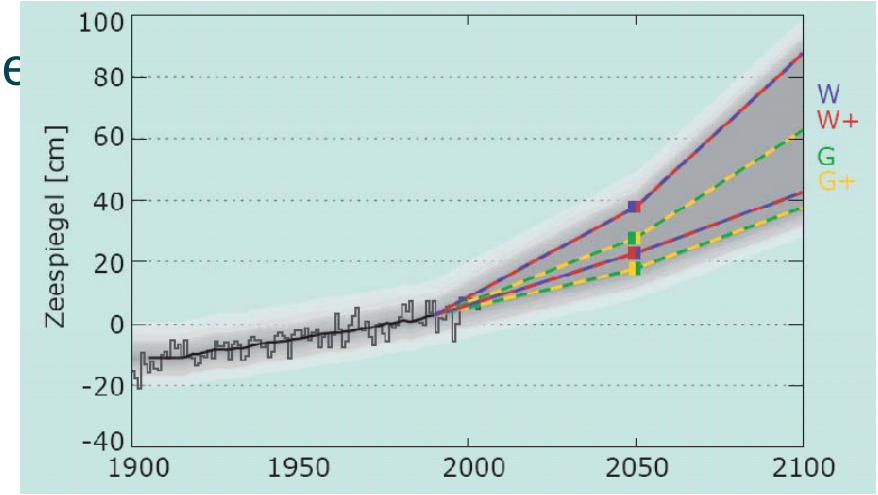
Rijksw

Sea level Rise (2100)



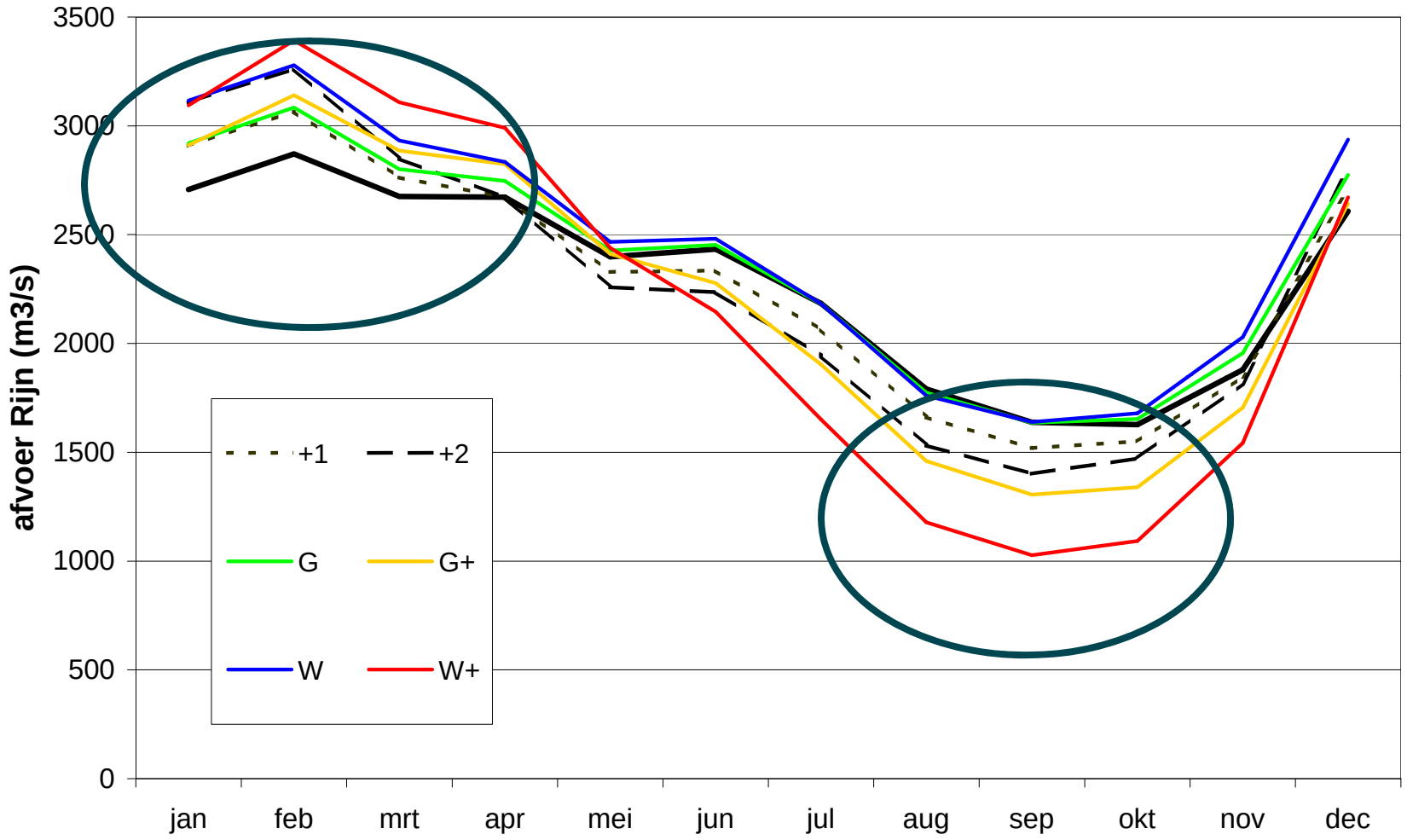
Consequences Sea level rise

- The sea level continues to rise also after 2100!



- Increase in coastal erosion
- Increase salt intrusion
- Maintain coastal defence
- Discharging river water to the sea becomes increasingly difficult

Rhine discharge at Lobith (2050)



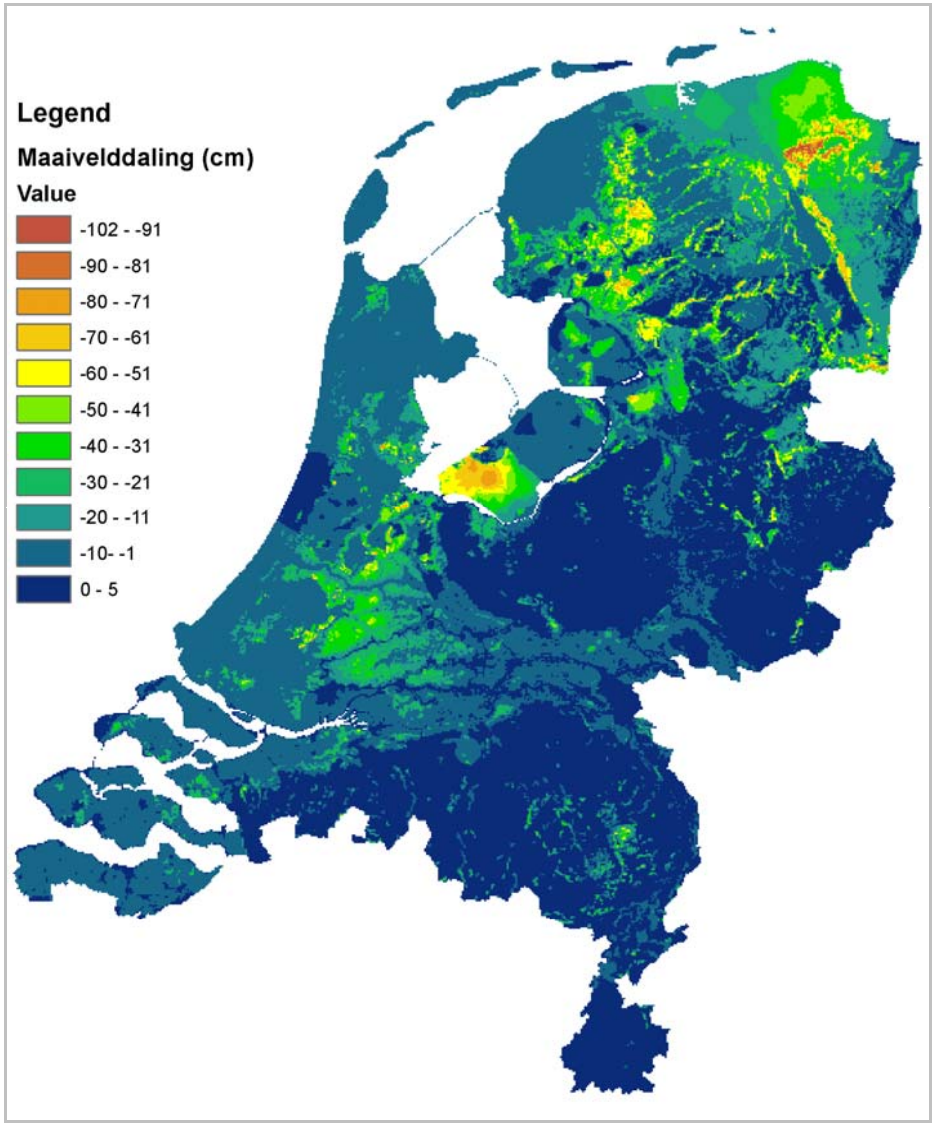
Extreme discharges on the Rhine

- Currently 16.000 m3/s

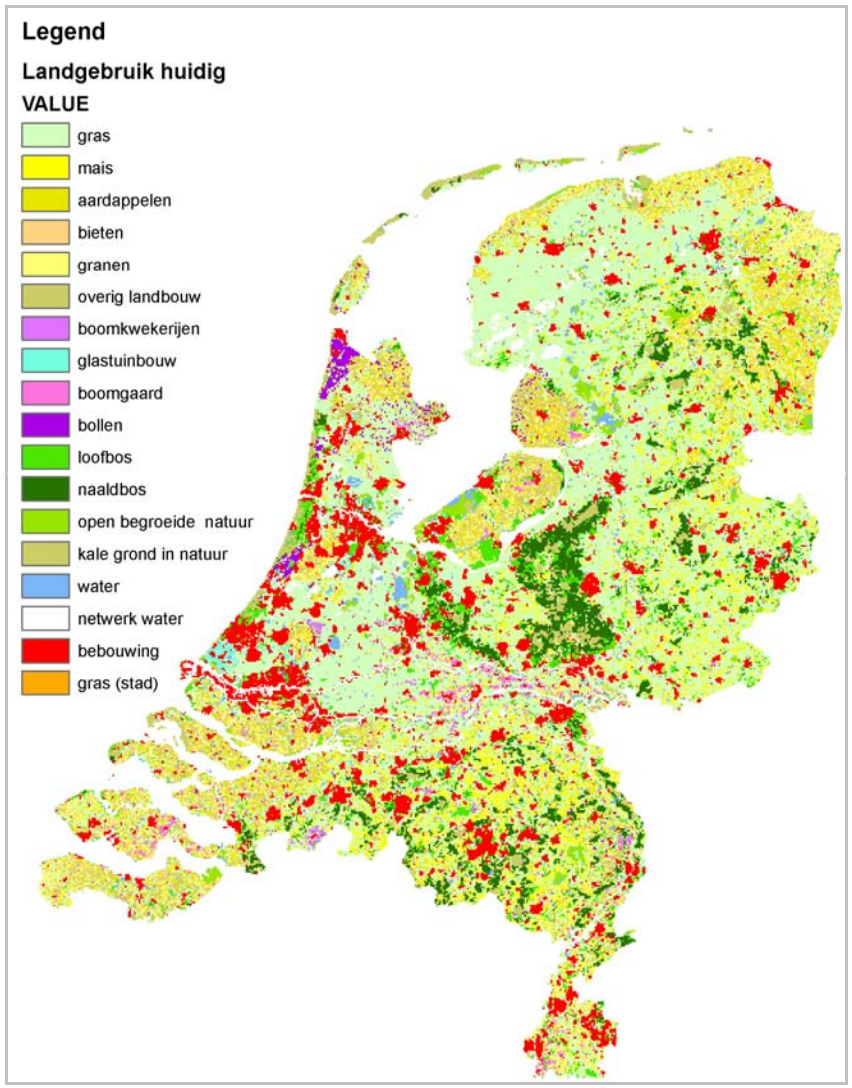
2100

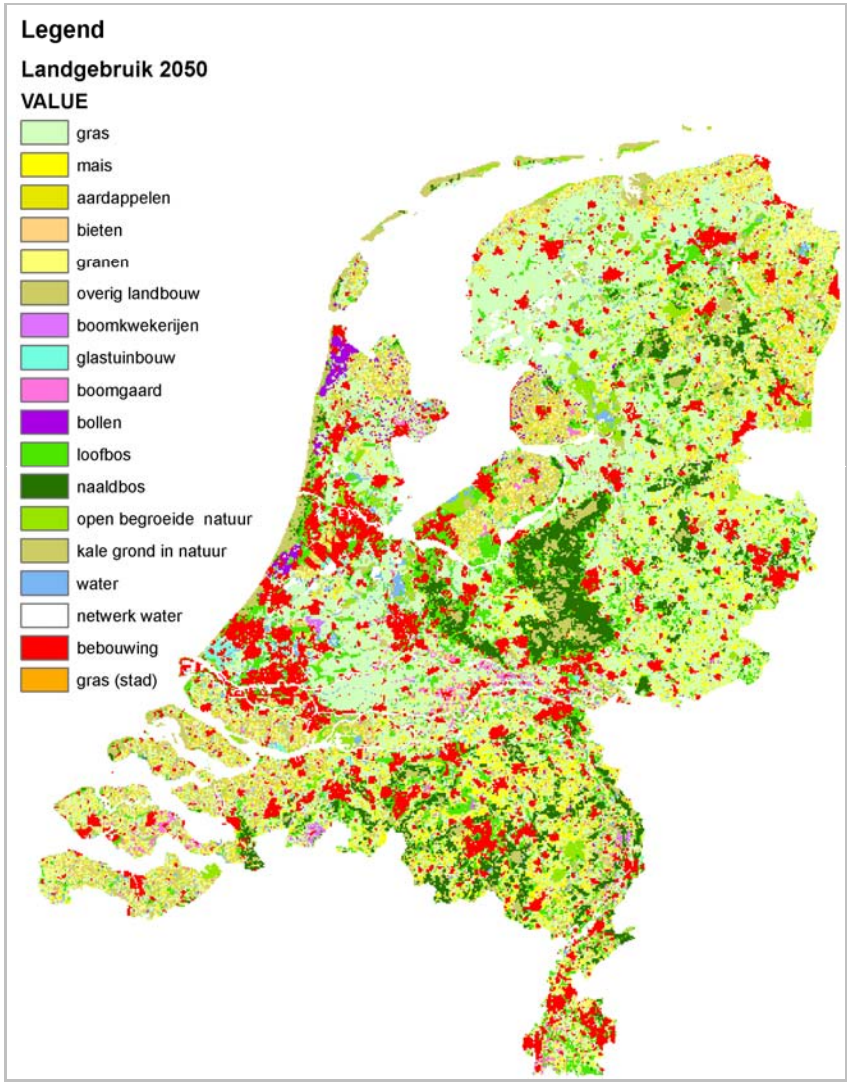
- G - G+ about 18.000 m3/s
- W - W+ 19.000-20.000 m3/s
- Limitation of the discharge capacity, due to flooding in Germany

Subsidence in 2050



Land use in 2050





ncrease in flood risk

from sea
from the large rivers
Increasing upward seepage
Increase in economic value of
low parts) of the Netherlands

The National Adaptation Strategy (ARK)

- Combined forces of 4 Ministries (Departments)
- Association of Provincial Authorities
- Association of Netherlands Municipalities
- Association of Water Boards
- Non governmental organisations
- Private sector- branch org. and “champions”
- Individual Provinces, cities, water boards etc.

Goal: Impuls to climate proofing the Netherlands

Focus here on floods/high water

The ARK Programme

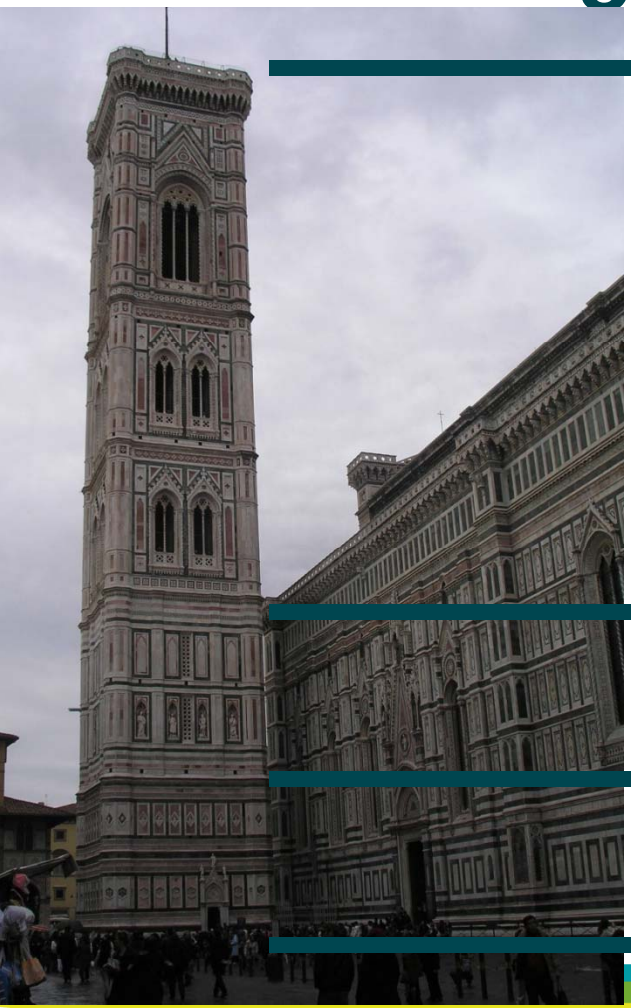
Looking back: the milestones

gered by **Senate**	**March ’05**
t and political backing: conference with Prime Minister	Nov. ’05
RK Programmedoc. approved by **Council of Ministers**	**March ’06**
sultation first draft strategy at three government levels	Oct. ’06
raft strategy (incl. first outline agenda)	**March ’07**
sultation Stakeholders – over 50 regular meetings	Apr.-Jn ’07
inal strategy in Council of Ministers	**Nov. ’07**
tegy in Parliament and Senate	Nov. ’07
ond national congress	Nov. ’07

- end of the strategy phase
- start of the agenda phase

The ARK process…

Positioning the <u>strategy</u>



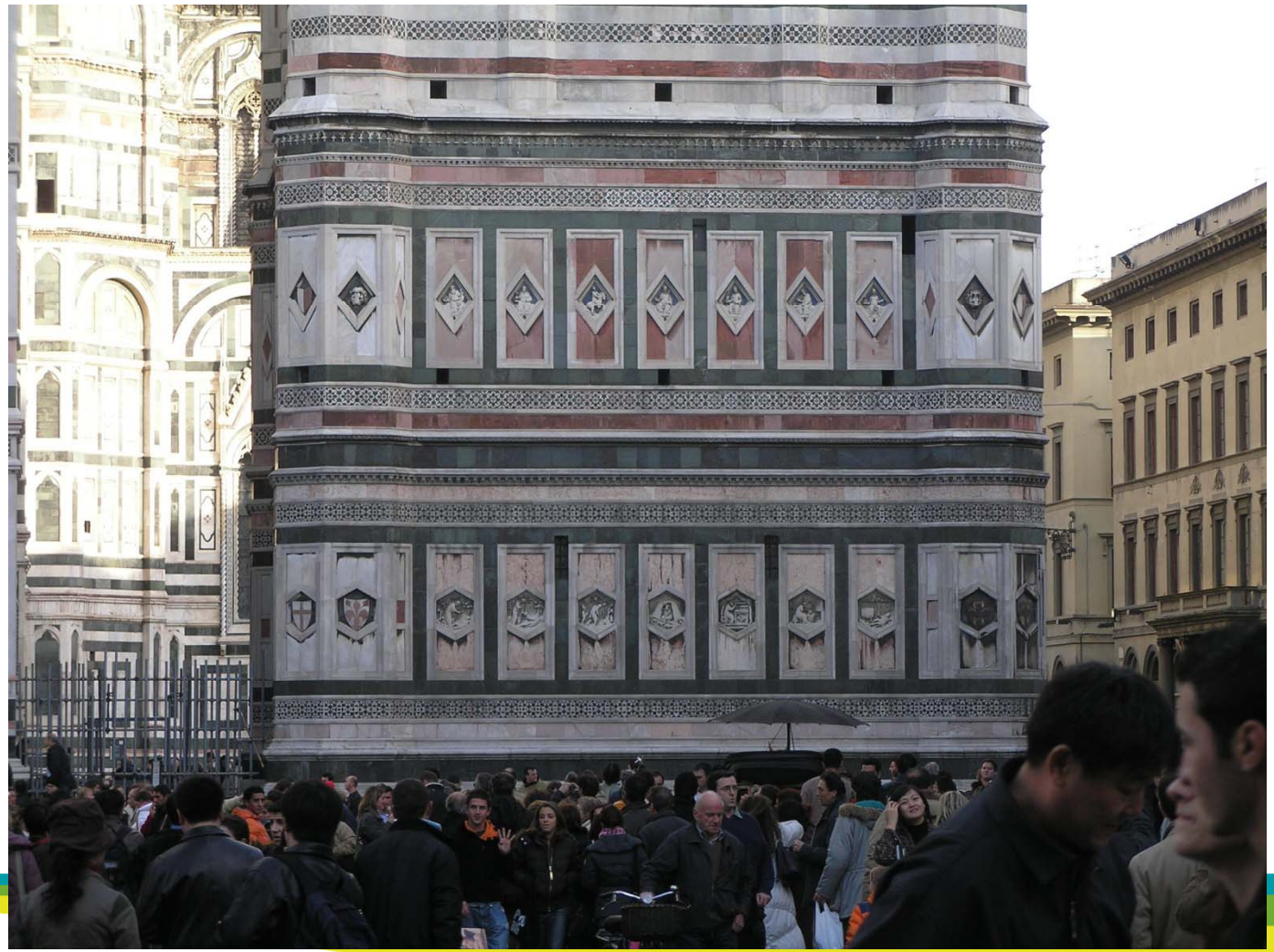
Talenti

Pisano

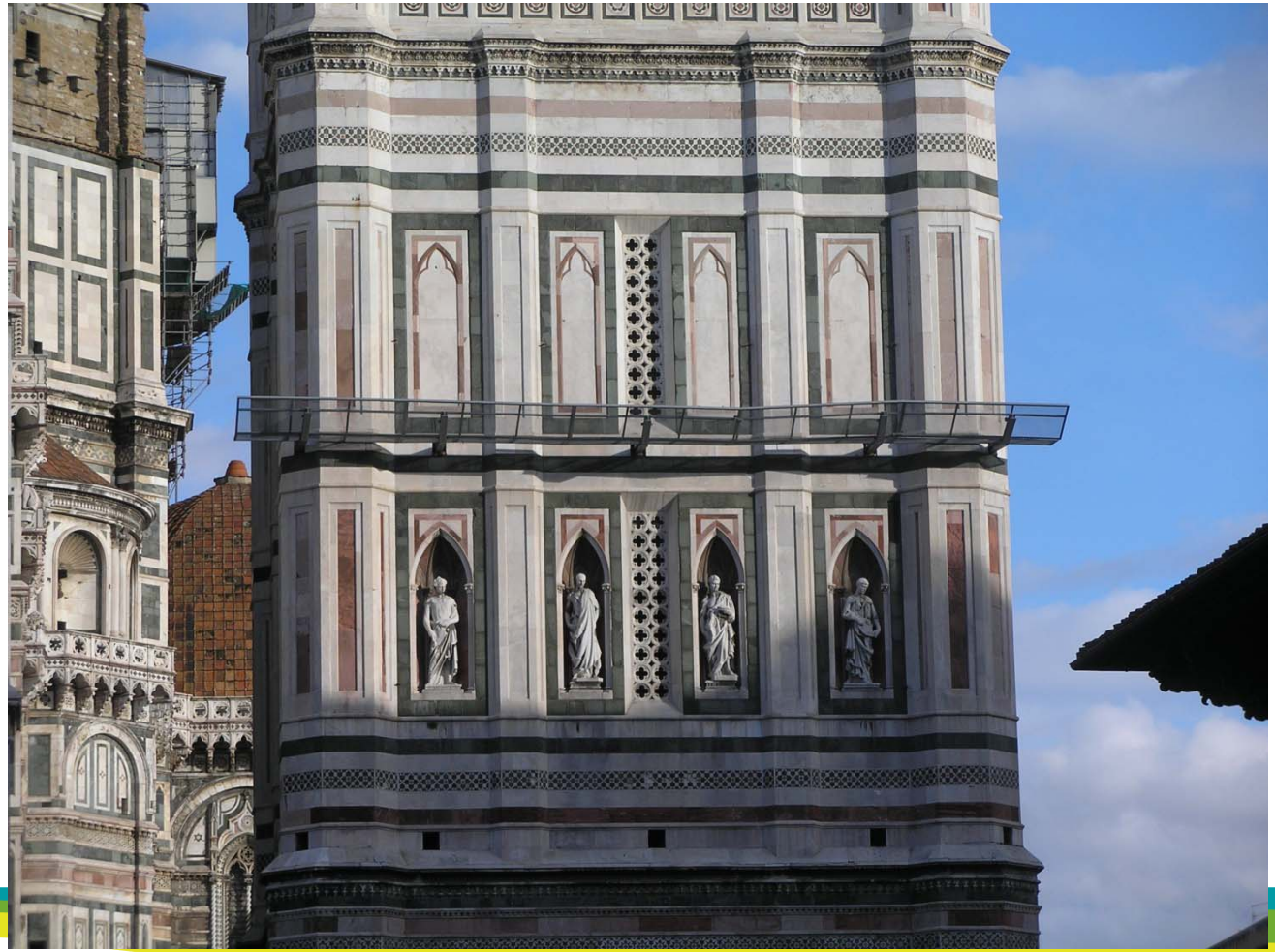
Giotto

Cathedral of Florence
1296-1887
(bell tower)

Giotto



Pisano



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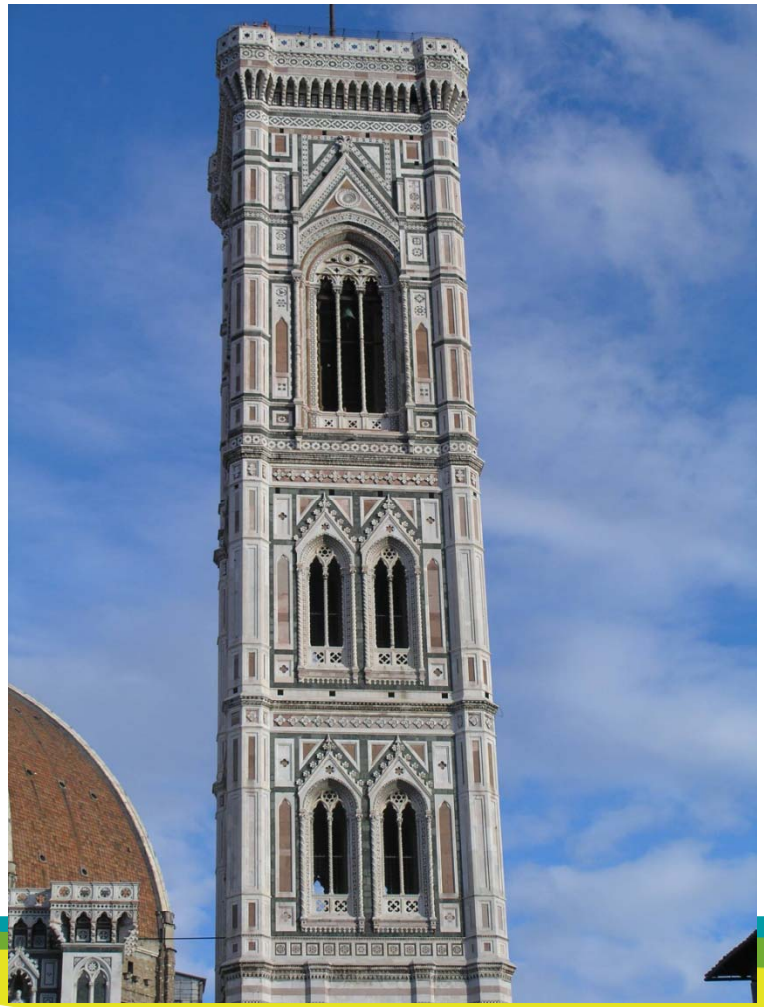


The National Adaptation Strategy

Analysis and leading principles - 1

tion:

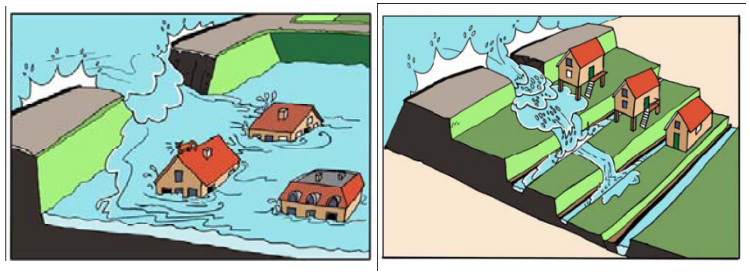
obable trends	Rise of sea level and temperat.
treme events	Storms, high river discharges Combinations of events
ndamental uncertainty	Validity of statistics

:

bustness	Wide dikes
exibility	Easy to reboot electr.generators
aptability	Rapid proced., reserved space

The National Adaptation Strategy

Analysis and leading principles - 2



r management

bsolute safety does not exist

revention + reduce effects

djust risk & cost-benefit analysis for long term investments

ural systems

se natural functions of soil, water and air,

estore natural systems en buffering functions

reate win-win situations for large scale spatial structures

nature, water safety, tourism, landscape, economic activities)

The National Adaptation Strategy

General actions

Start a public campaign for raising awareness
Promote leading principles & stimulate research programs

Adjust procedures for decision making large scale developm.
Assess projects in progress
Review existing instruments (financial, legal)

Develop new instruments (revolving funds, stim. progr.)
Small scale interventions (“climate buffers”) and “icons”

Monitor & evaluate the “transitions”

The National Adaptation Strategy

Choices made in the process...

pen debate

t: ‘for and by governments’ or a technocratic problem

ngoing, planned, future investments, plans, policies

t: *just new* investments and programmes

novation parallel to practice

t: sequential; first research, than policyframes, laws, implementation

laptation mainly by ‘combining work with work’

t (yet): megaprojects *just* for adaptation

ainstream in 10 years

t: blueprint or series of projects for the coming 50 years

The National Adaptation Strategy

ainlines and theme-specific actions

NMI-scenario's: no major shift in investmentplans in West Nl.

/e will take up the challenge **NOW** on **ALL** major effects:

fety: spatial reservat. (long term) and speed up investments (short term)

mage: more storagecapac.; experim. design, urban floodmngt; compart.

onomy: reliable networks transport, electr.,water; key econ. areas access

ality of life/public health: green/blue veins in towns, subsid. restructr.

ture: National Ecological Network: connect, transparent coat, EU-rules

Examples (innovative) solutions?
Super dike in Japan

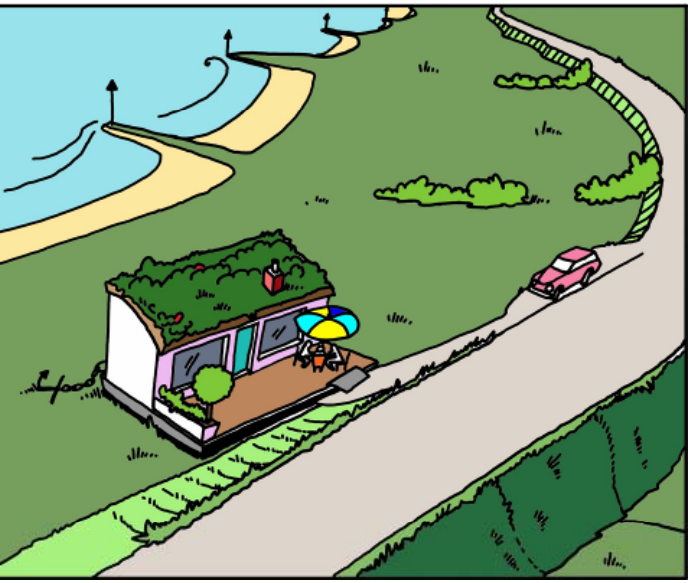
Examples (innovative) solutions?
Climate robust spatial planning laws England

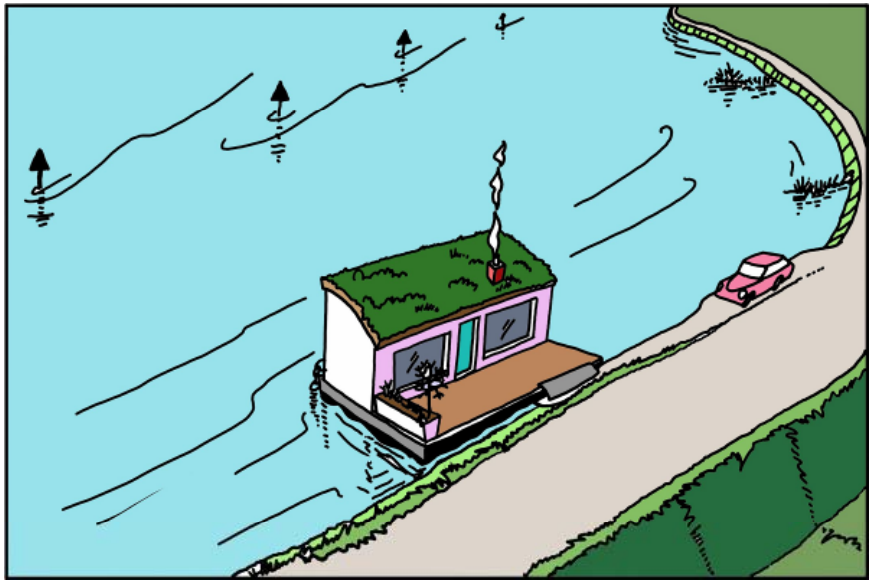
Levensduur bouwwerk (jaar)	Zeespiegel stijging
10	0.10
25	0.20
50	0.40
100	0.85
200	1.70

Examples (innovative) solutions?

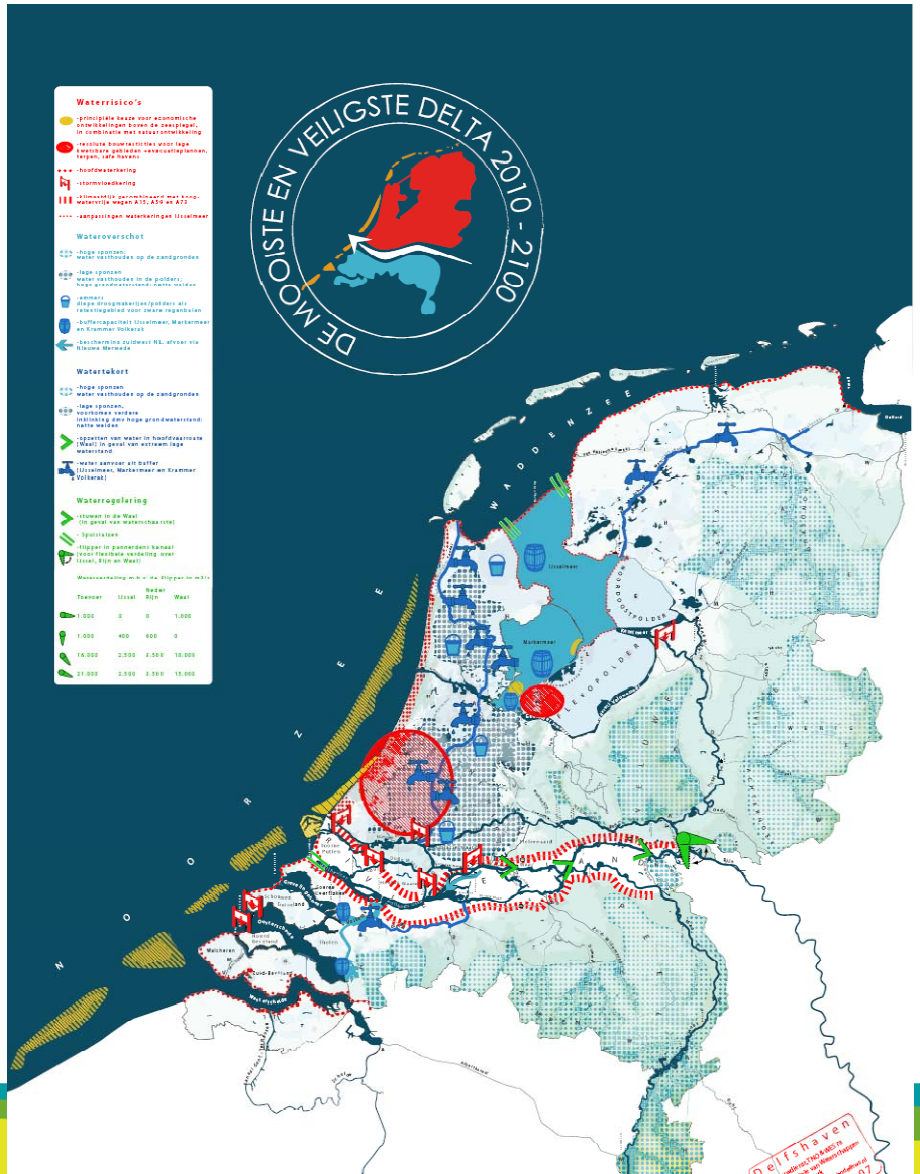
***Freeways:* high (compartments) or deep (landscape)**

Examples (innovative) solutions?
Amphibian living





Examples (innovative) solutions?



Last comments..

- We must start with anticipating on the coming changes instead of reacting after disasters!
- Examples from other countries of anticipating to climate change?
- Interested in the reports? Leave your email address with me!

Thank you for your attention!

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