Expert Meeting

Urban Real Estate & Infrastructure Climate Risk Management

Thursday 12 March

13.00 – 18.00 walk-in from 12.00

Delft

Berlagezaal

Julianalaan 134, Delft

Do you have a professional responsibility to address climate change?

Visit:
www.menti.com
Use code:
28 72 28

Opening and welcome by the chairman of the day

TU Delft

Co Verdaas

Verbindend
Uitdagingen voor GO

wonen — mobiliteit — energie — klimaat

Effectief
Sturen in GO

proces — waarde — ontwerp — samen-werking

Toekomstgericht
Duurzame GO

inclusief — ver-nieuwend — verankerd

SKG

Het kennisprogramma in 11 thema's

SKG

Round 1

Understanding Real Estate & Infra Climate Risk

Setting the Scene

REAL ESTATE + INFRASTRUCTURE CLIMATE RISK MANAGEMENT

Setting the Stage

Zac Taylor, PhD / 12 March 2020

SKG

Horizon 2020
European Union Funding
for Research & Innovation

KU LEUVEN

Setting the Stage

Before we begin: the question of responsibility.

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Setting the Stage

1. **What's at stake – and why we're here**

2. **Cross-cutting issues**

3. **Intentions for today**

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1. What's at stake – and why we're here

We face a climate conundrum. Real estate is a key driver of how we create wealth and prosperity, yet is exposed to a wide range of climate risks.

There is a 'world of risk' – but it is uneven and ambiguous. Physical and transition risk are bound together in a wide array of combinations and contexts.

Asset (and community) exposures are mediated by several factors. These include

- specific historical development patterns
- uncertain environmental processes
- distinct land and property relationships
- varying forms of tenure, ownership and control over the use and value of assets
- emerging patterns of risk regulation/response within the real estate/finance system

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1. What's at stake – and why we're here

Climate risk represents a threat to business as usual within the real estate sector: Emerging evidence suggests from markets suggest rising costs and declining asset values in 'high value, high risk' markets, shrinking the opportunity for value creation and capture through development.

The business case for investment in 'risky' regions may erode, and global and regional market dynamics may be reshaped as a result.

Zac Taylor, PhD / 12 March 2020

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1. What's at stake – and why we're here

This raises key considerations beyond the real estate sector, about broader patterns of economic and political interdependency. Real estate climate risk management will impact:

- **Individual/small-scale asset owners.** In a world of declining asset values and higher costs, what is the future of the home as an asset-building mechanism, for example?
- **Labor markets.** In places where real estate and construction are among the largest economic sectors, what happens to employment?
- **Public sector accounts.** Given the connections between property markets and public revenue (e.g. real estate taxes), how do we afford to mitigate property risks while still maintaining an adequate level of other services?
- **Non-property financial institutions.** How do declining real estate-related investment opportunities (locally *or* globally) impact the ability of financial institutions to deliver returns for their stakeholders, especially re: pension funds and life insurers?

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1. What's at stake – and why we're here

Climate risk exposes interdependencies, which we are beginning to better understand through promising collaborations

- Focal points of intervention are appearing across scales and industry sub-sectors, driven by specific themes and actors within the value chain, including…
  - asset- and portfolio-level risk analysis, allocation strategy revisions, planning for disclosure, advocacy for regulatory alignment/taxonomization

However, these steps forward largely remain institution-focused. There remains a rift between institutions and the communities they invest in.

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1. What's at stake – and why we're here

While promising, these steps forward are largely institution-focused. There remains a rift between institutions and the communities they invest in.

In light of the interdependencies between institutional financial stability and local political and economic resilience, this merits pause. **How do we create shared value from risk reduction efforts?**

At the same time, public efforts to invest in resilience and secure property markets (among many other policy goals) may not be sufficiently valued by financial institutions. **Bringing this community resilience 'overlay' to institutional practices is a critical issue.**

We need to develop strategies for bridging this institution-community gap.

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1. What's at stake – and why we're here

Three lenses can help us to understand our interdependent but distinct positions. These are points of departure, rather than 'answers'.

1. **Valuation.** How we value climate risk matters.

2. **Responsibility versus control.** Responsibility for managing climate risk in the built environment is distributed spatially and temporally – a result of the complex institutional arrangements and long-term nature of the issues at hand.

3. **Value capture**. Efforts to secure existing value from risk can conflict with those which seek to create new value through risk reduction. A 'resilient dividend' for one actor may be a 'risk rent' for another.

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4. Intentions for today

We envision this meeting as a platform.

- to bring together ideas and insights about efforts underway to manage real estate and infrastructure climate risk in the Dutch context
- to have frank conversations about our practice areas, and in doing so to identify key challenges and opportunities for strategic collaboration
- to identify and refine core themes and questions for joint research bids

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4. Intentions for today

A short exercise: responsibility versus control.

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Responsibility versus Control

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The challenge of Climate Change

VU Amsterdam

Jeroen Aerts

UNDERSTANDING REAL ESTATE & INFRA CLIMATE RISK

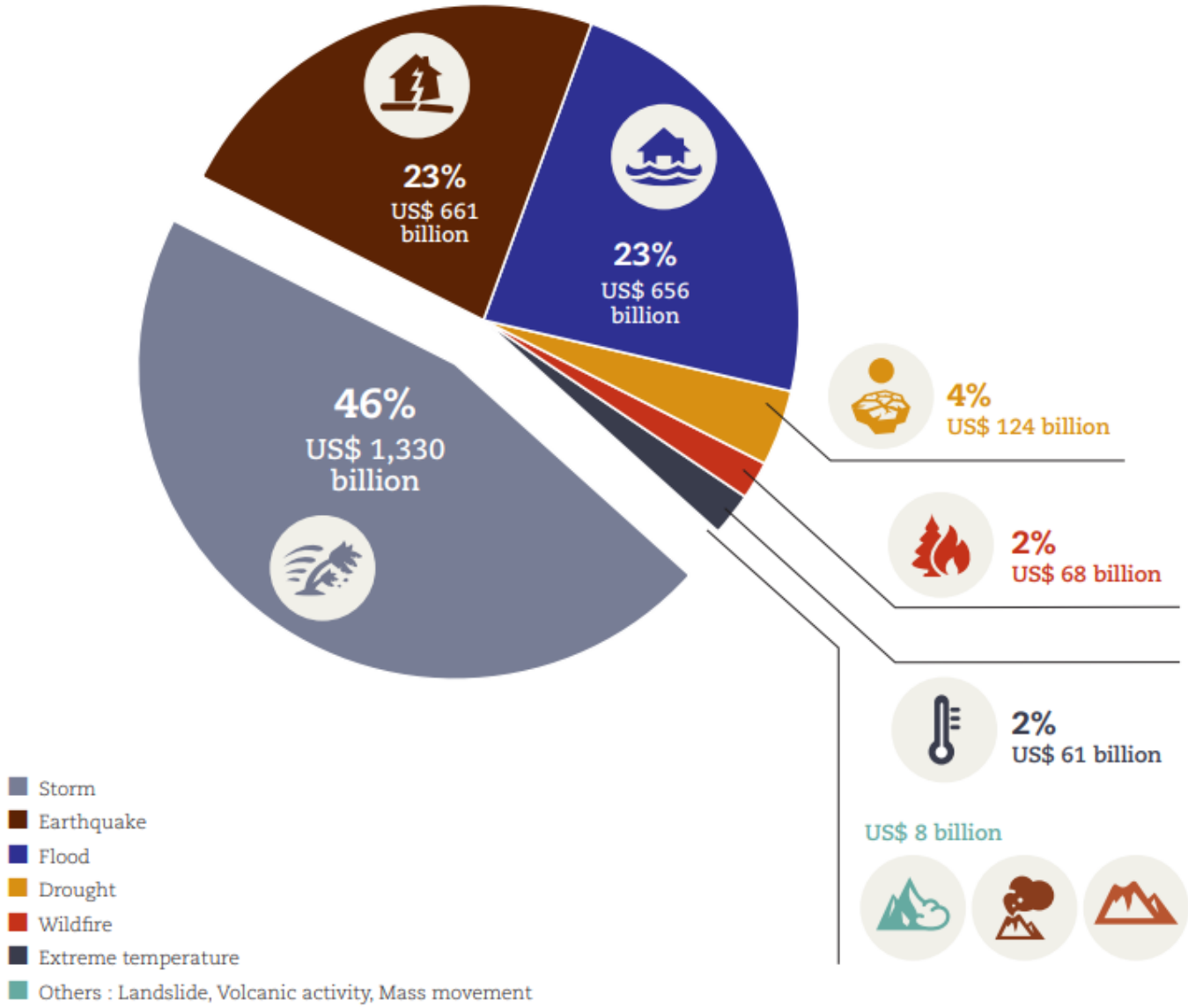
Water-, climate risk and spatial planning

Prof. dr. Jeroen Aerts

Delft, March 2020

IVM Institute for Environmental Studies
VU University Amsterdam

Global economic impact from disasters 1998-2017



Hurricane Sandy / New York City


Saturday, October 27, 2012 — Newsstand 50¢

DEAL OF THE DAY » $28 FOR $14 AT JOHNNY D'S SOUTH PHILLY STEAKS: Page 2

THE CITIZENS' VOICE

BREAKING NEWS, BLOGS, VIDEOS AND MORE AT CITIZENSVOICE.COM

FRIDAY NIGHT HIGHLIGHTS

Berwick	34
Coughlin	7
Crestwood	36
Williamsport	17
Lake-Lehman	22
Hanover Area	0
Dallas	60
Tunkhannock	0
Valley West	40
Pittston Area	7
Wyoming Area	55
Northwest Area	37
East Stroudsburg So.	39
Hazleton Area	22

Football coverage begins on page 34

Hurricane Sandy churns over the Atlantic Ocean on Friday.

HEADING TO TRIAL

Families clash as suspects in triple homicide appear in court. Page 3

MONSTER

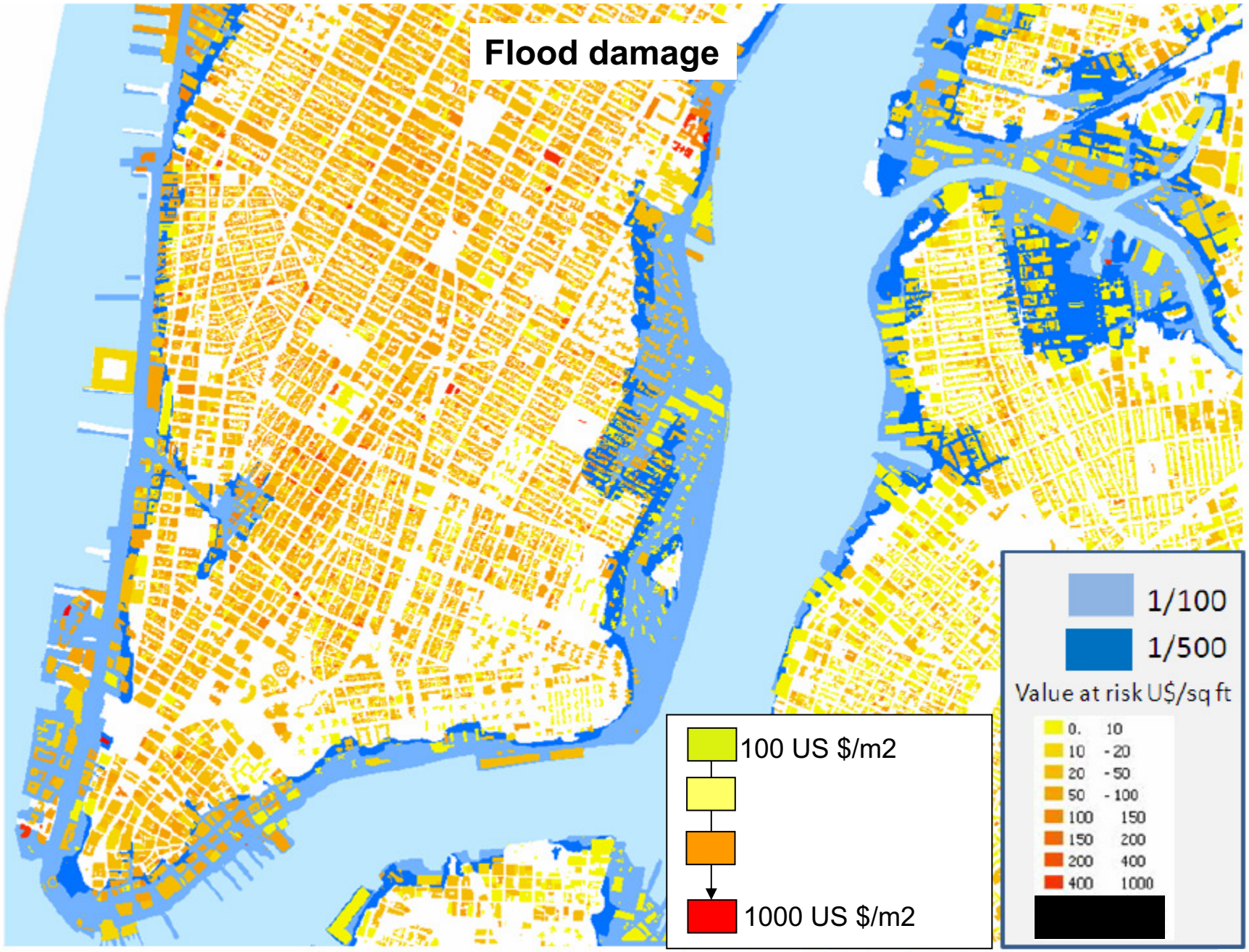
U.S., NEPA prepare for superstorm. Pages 4-5

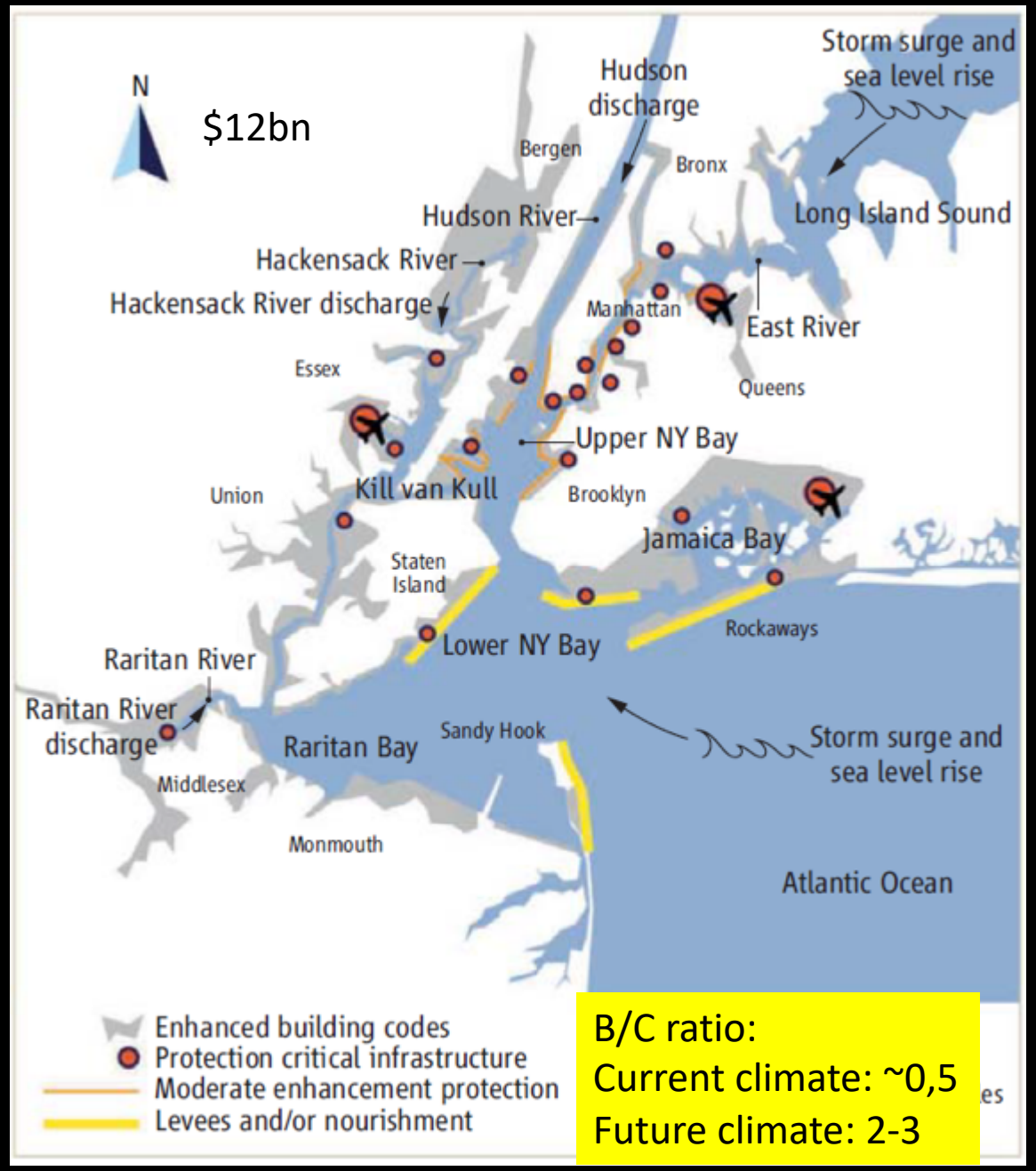
WINNER OF THE 2012 KEYSTONE PRESS SWEEPSTAKES AWARD

READ MORE ABOUT THE HONOR AT CITIZENSVOICE.COM/AWARDS

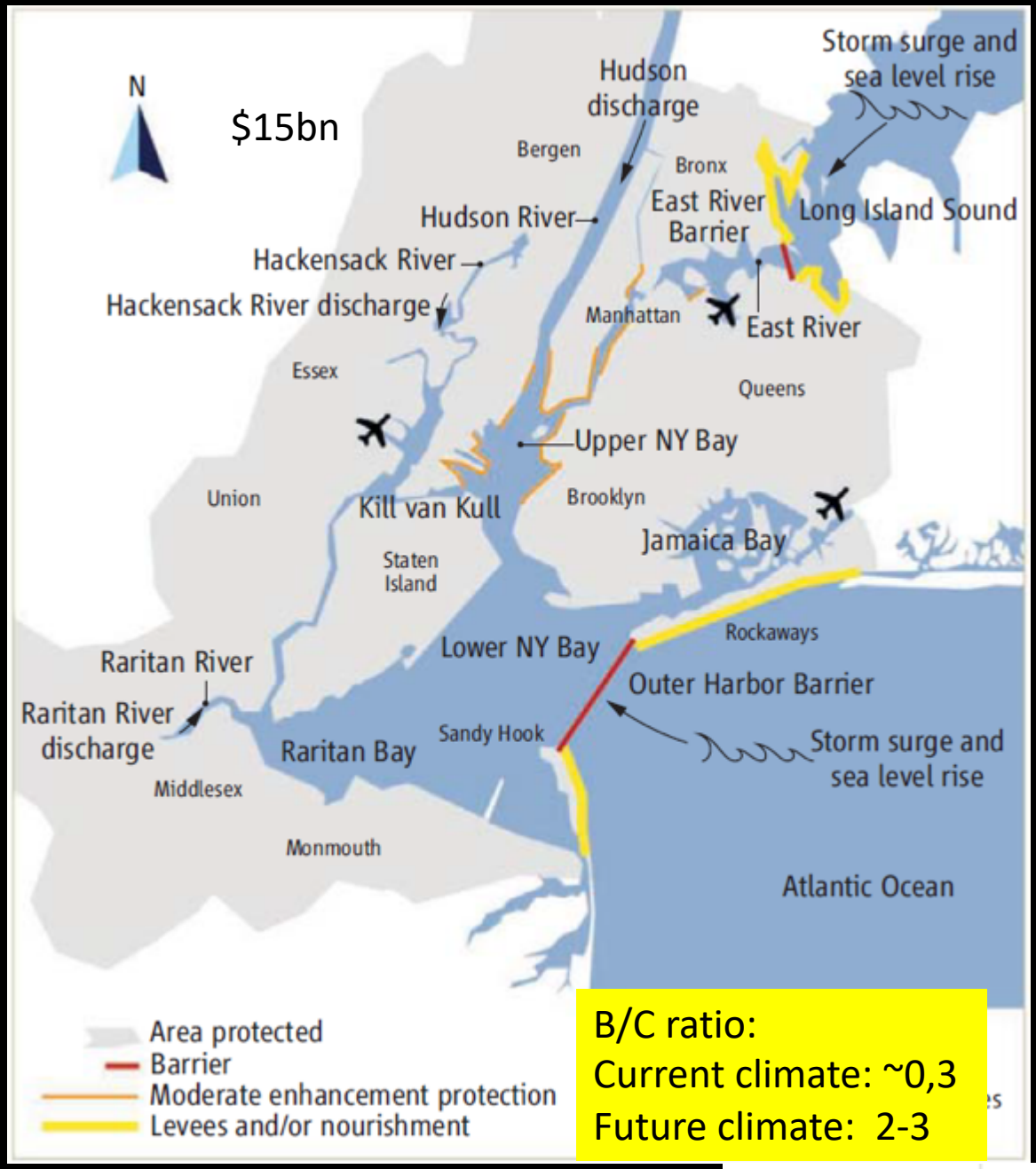

NYC 2012: Hurricane Sandy
Damage to infrastructure
JOHNNY
ON THE SPOT
KOMATSU

Manhattan (2019)


Flood damage
100 US $/m2
1000 US $/m2
1/100
1/500
Value at risk U$/sq ft
0. 10
10 - 20
20 - 50
50 - 100
100 150
150 200
200 400
400 1000



B/C ratio:
Current climate: ~0,5
Future climate: 2-3



B/C ratio:
Current climate: ~0,3
Future climate: 2-3

Aerts et al., 2014; Science

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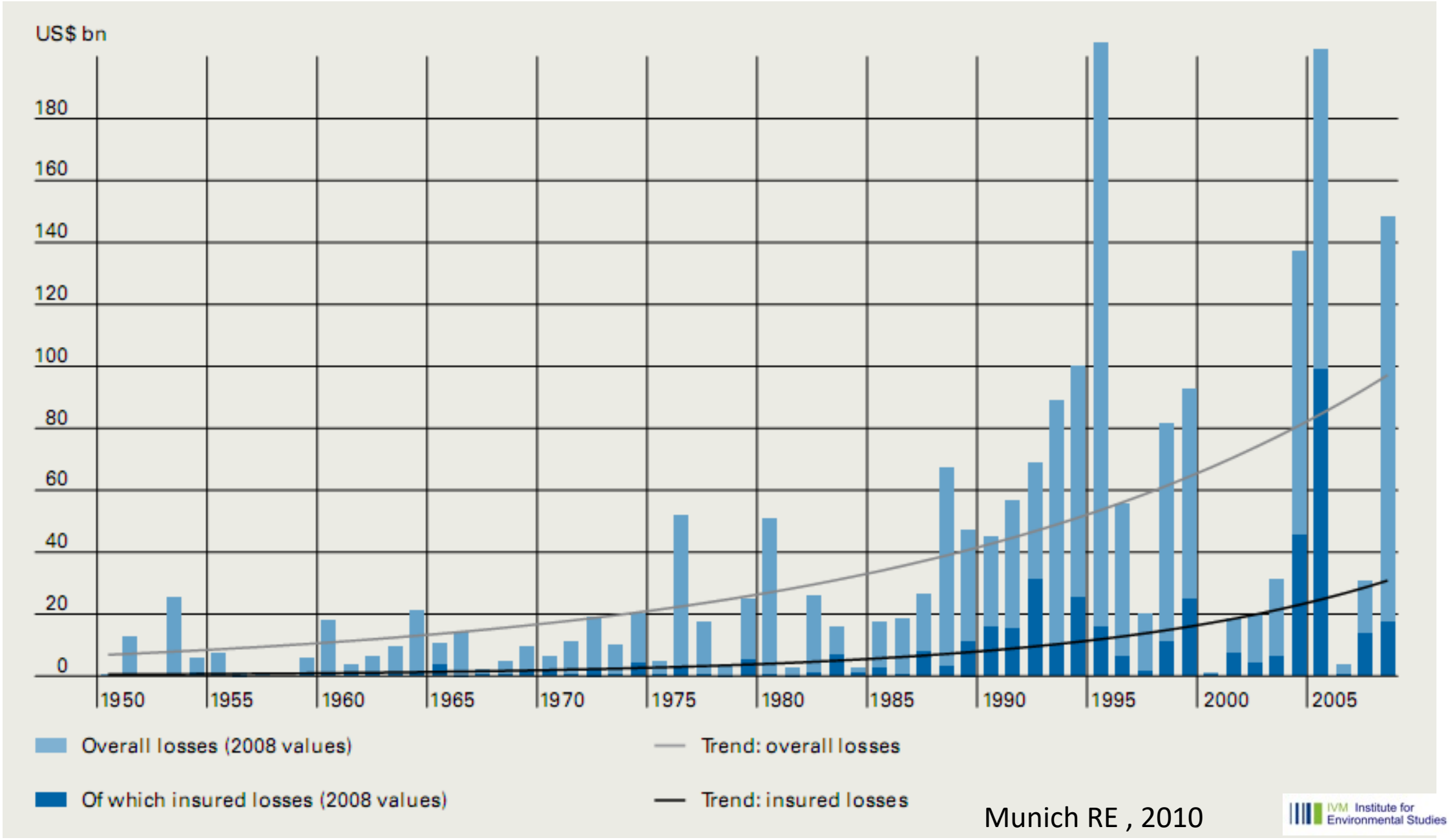
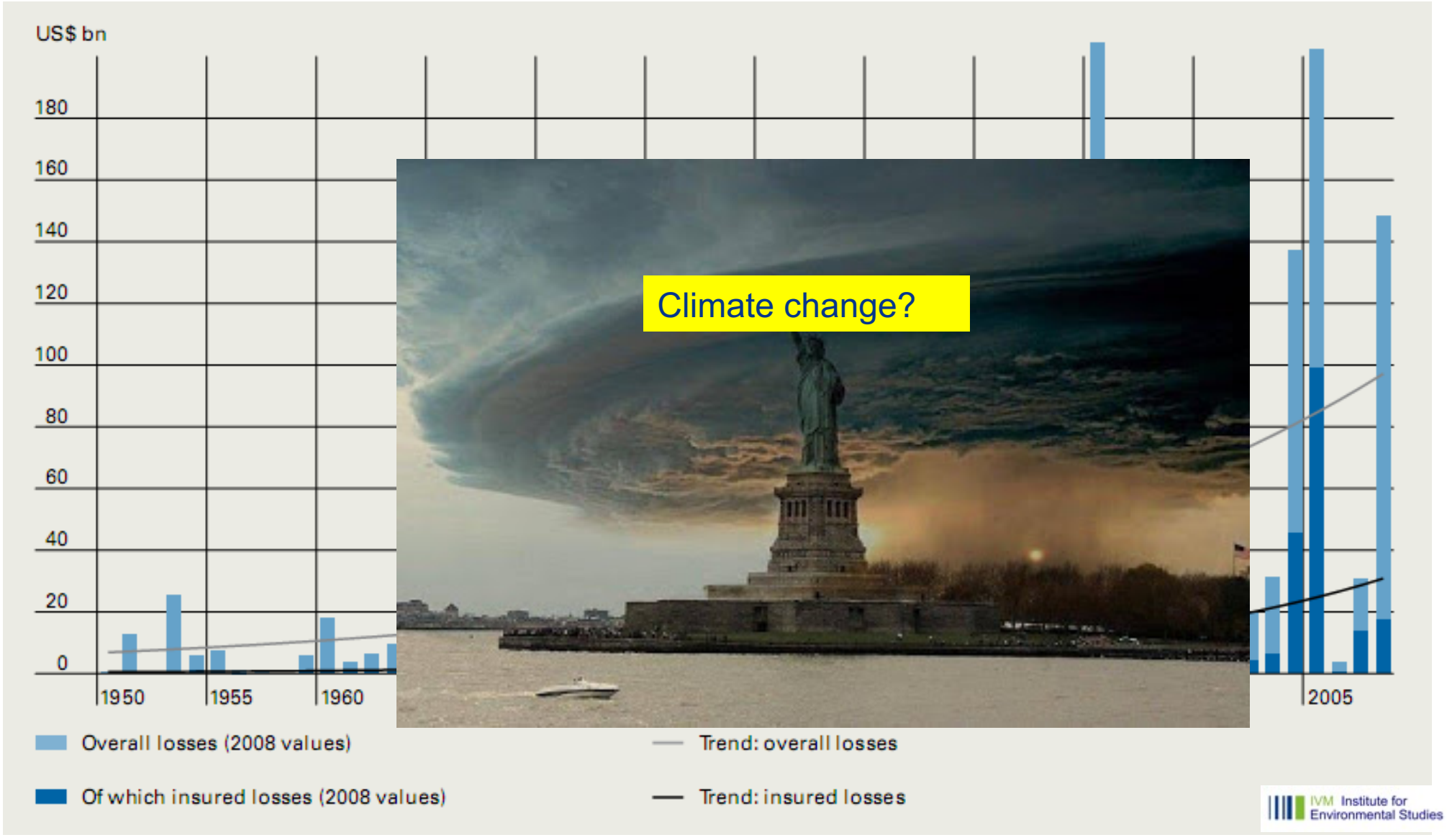
VU

Global losses due to natural diastasters



Munich RE , 2010

IVM Institute for Environmental Studies VU



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Manhattan (1664)

Manhattan (~1850)

Manhattan (~1915)


Manhattan (~1930)


Manhattan (~2013)


Manhattan (2019)

U.S. / NFIP- National Flood Insurance Program

- Is required for residents who:
  - Live in the 1/100 year flood plain (Special Flood Hazard Areas, SFHA)
  - Have a federally backed mortgage
- Residential coverage: $250,000 for buildings and $100,000 for contents

NFIP- Flood Management Rules

- Participating communities must adopt minimum floodplain regulations in the SFHA

- Raise base floor to BFE: Base Flood Elevation, of the 1/100 year flood
- A zones (River, inland flooding)
  → Mean premium A Zone: $1432/year;

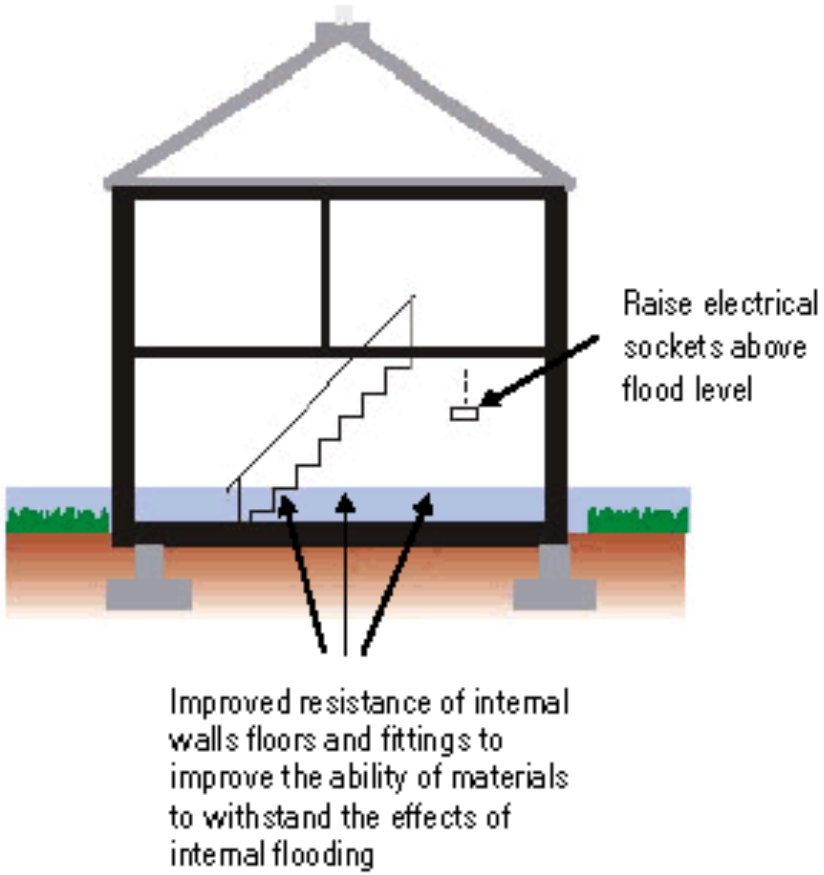
- V-zones (Coastal flooding)
  → Mean premium V-zone $ 4759/year (~1% of all NFIP policies)

Elevation

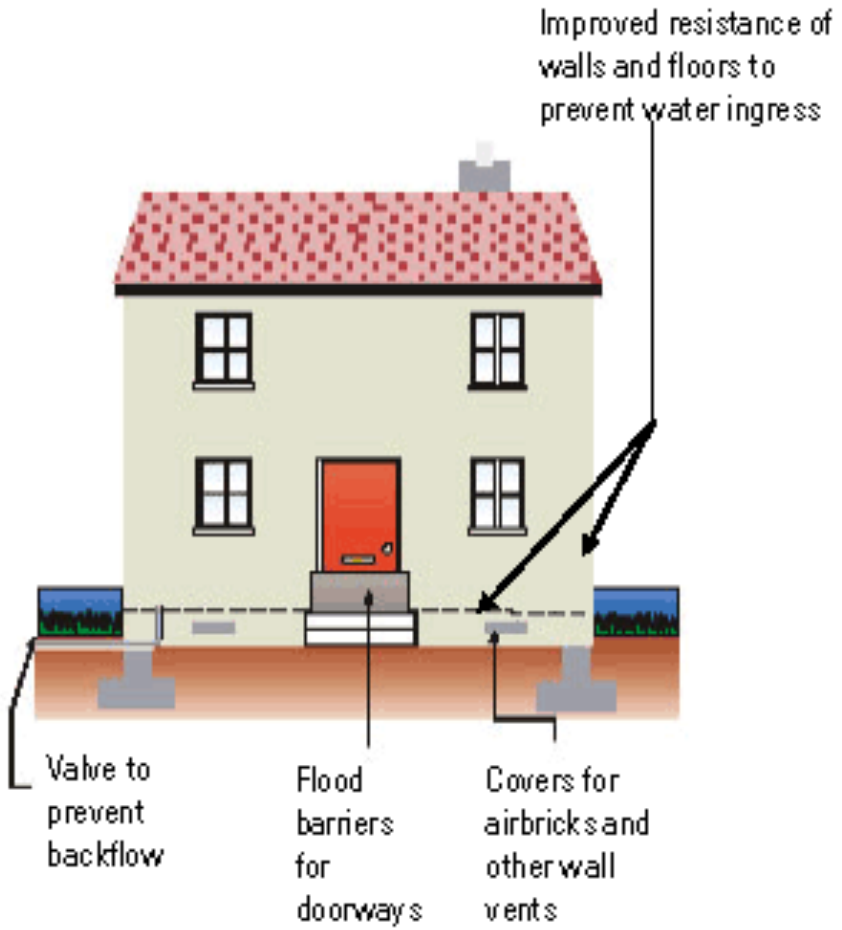
8 A pair of photos showing what locals refer to as the "Bird Houses", because of the building design, near Gilchrist Texas. The first photo was made Sept. 16, 2008, showing where Hurricane Ike's surge had washed sand and debris over Highway 87. The second photo was taken on Sept. 9, 2009. **[*click image to see it fade*]**
(AP Photo/Tony Gutierrez)#

Premium reduction: Flood Damage Mitigation Measures

Wet-flood proofing buildings

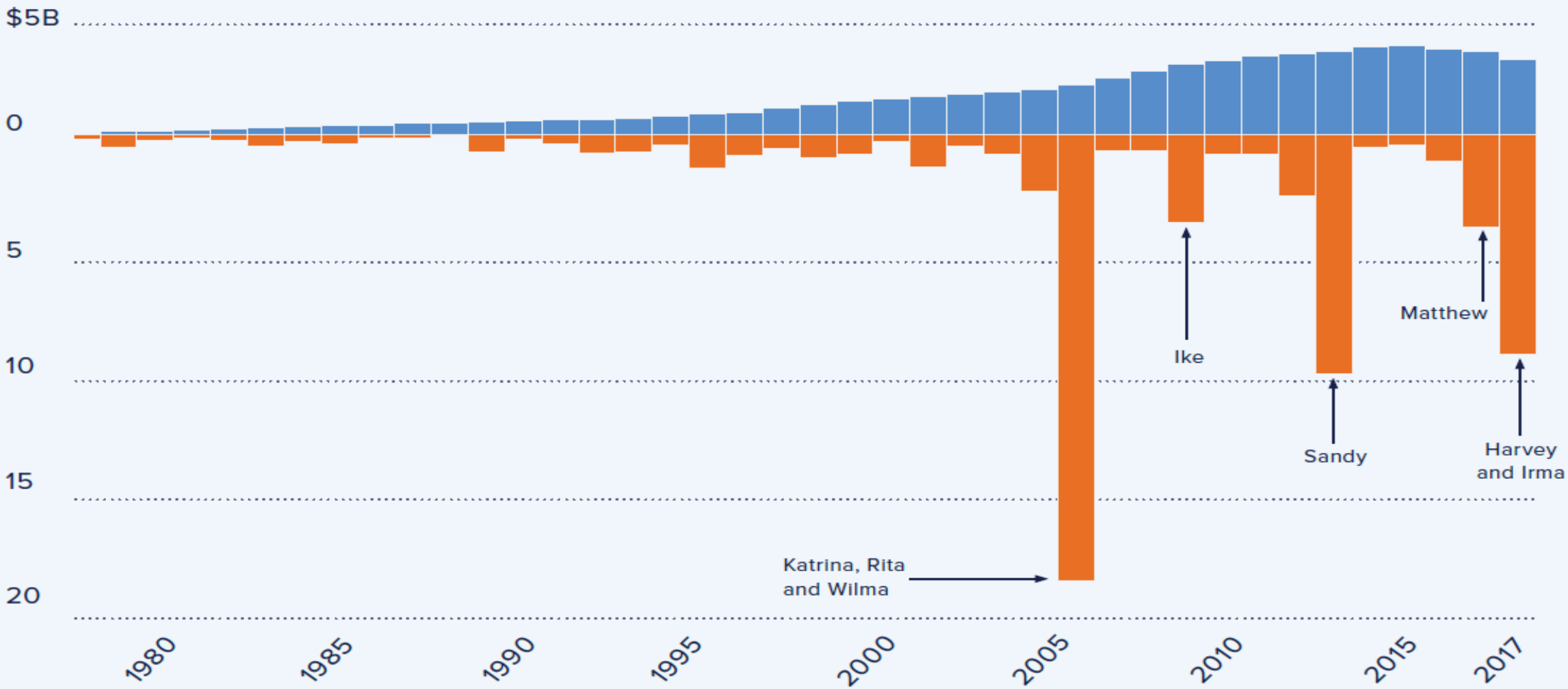


Dry-flood proofing buildings




SANDYBANK
FLOODGATE

NATIONAL FLOOD INSURANCE PREMIUMS VS PAYOUTS



Source: FEMA; First Street Foundation

After Trump Mocks a Sea Wall in New York, Plan Is Abruptly Shelved

In an unexpected move, the federal government halted a project that might have led to a multibillion-dollar barrier to protect the region from flooding.

Donald J. Trump
@realDonaldTrump

Follow

A massive 200 Billion Dollar Sea Wall, built around New York to protect it from rare storms, is a costly, foolish & environmentally unfriendly idea that, when needed, probably won't work anyway. It will also look terrible. Sorry, you'll just have to get your mops & buckets ready!

3:18 PM - 18 Jan 2020

Coastal Flood 1953: The Netherlands

~1800 fatalities


Is this enough?


There is always a residual risk
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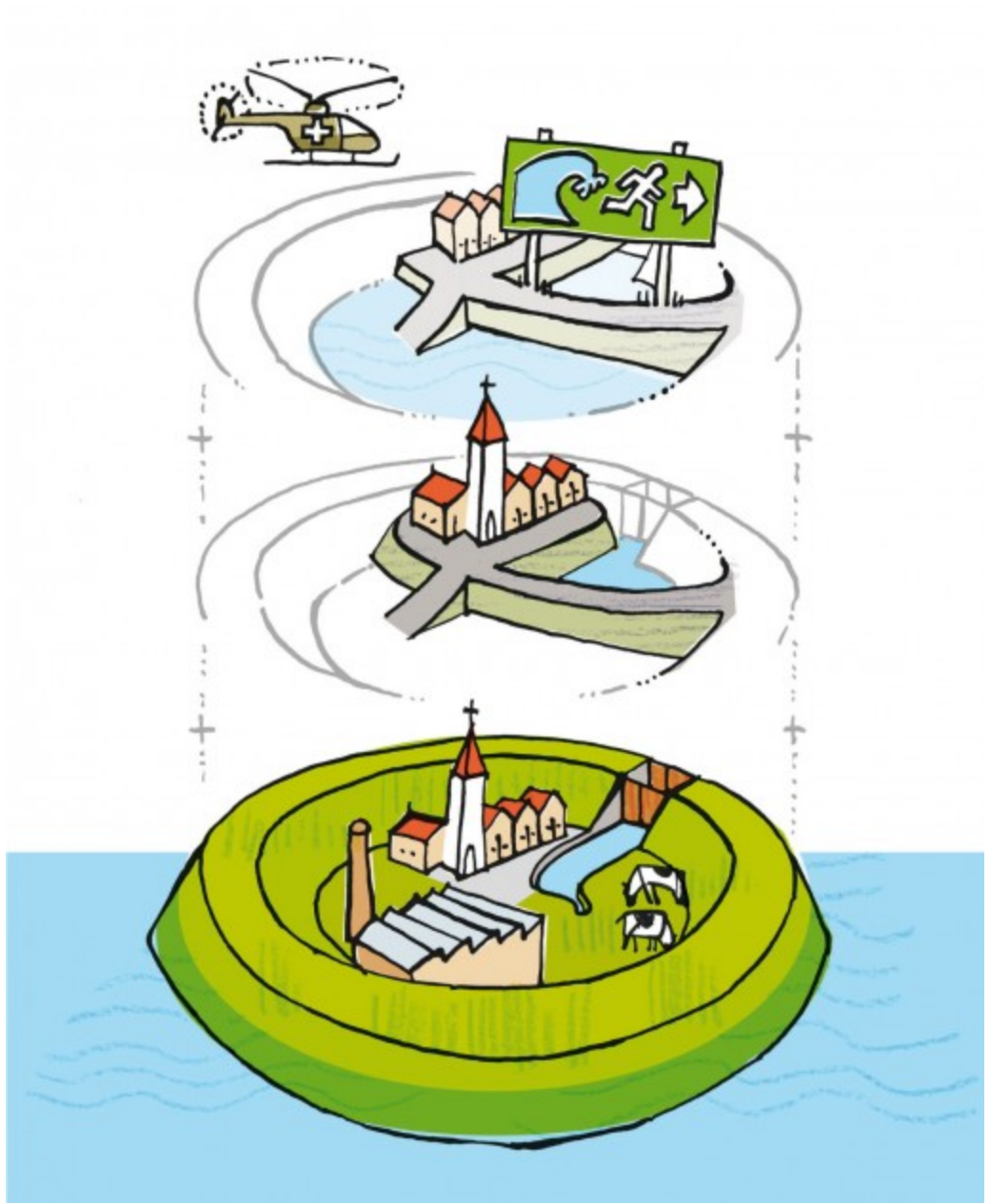
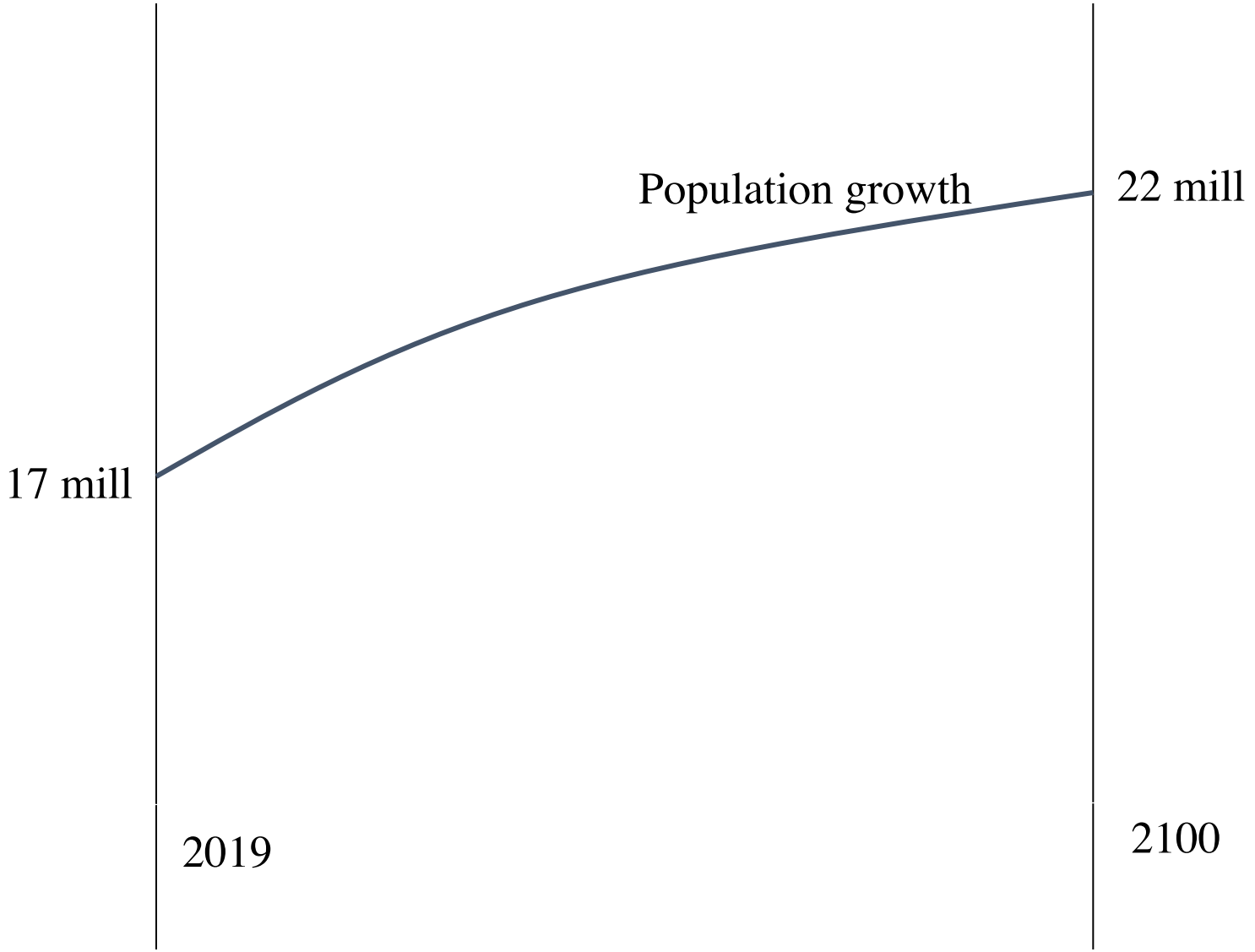
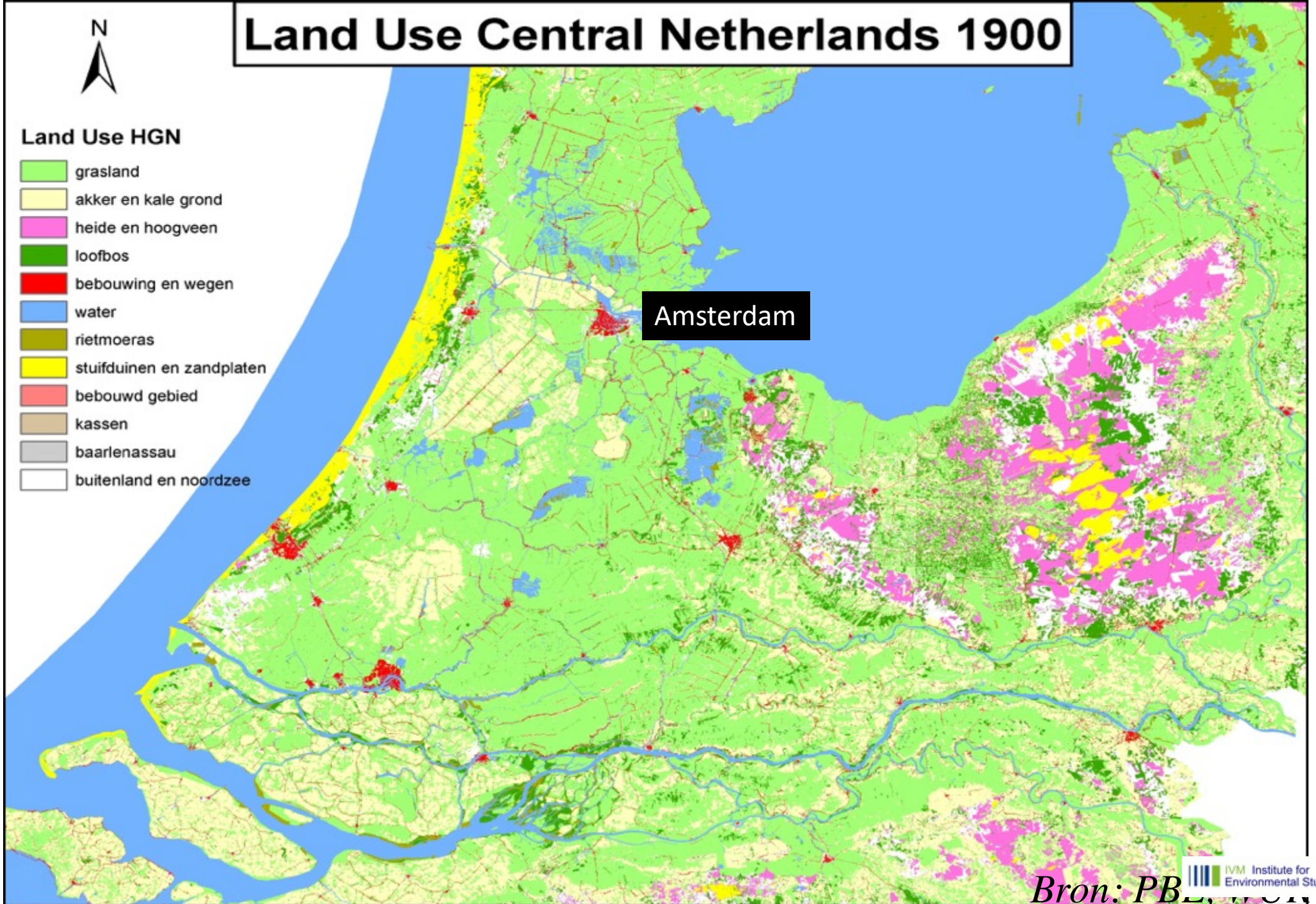
Multi Layer Safety




Population growth
22 mill
17 mill
2019
2100



Bron: PBL, VUA

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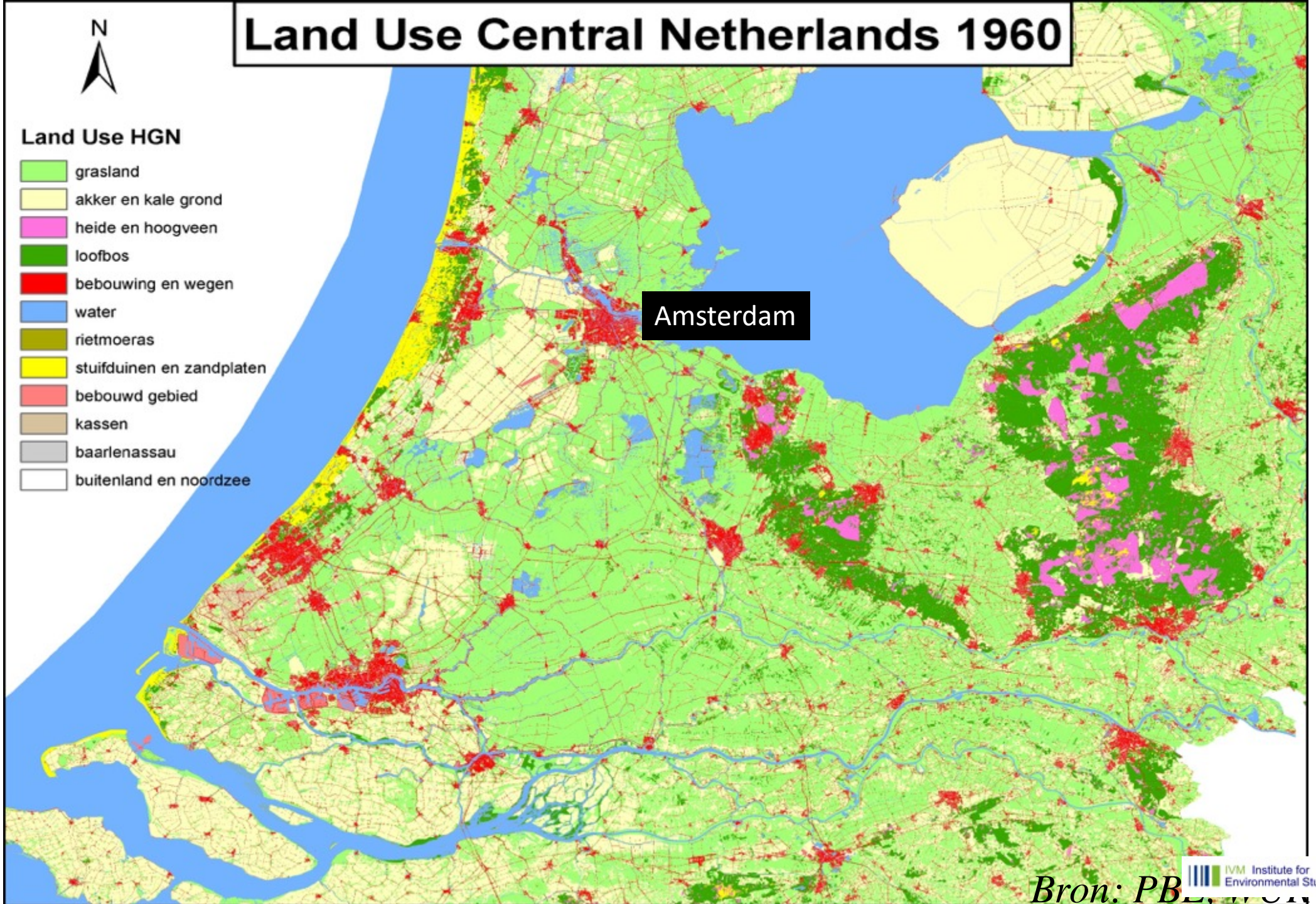

Bron: PBL, WUR

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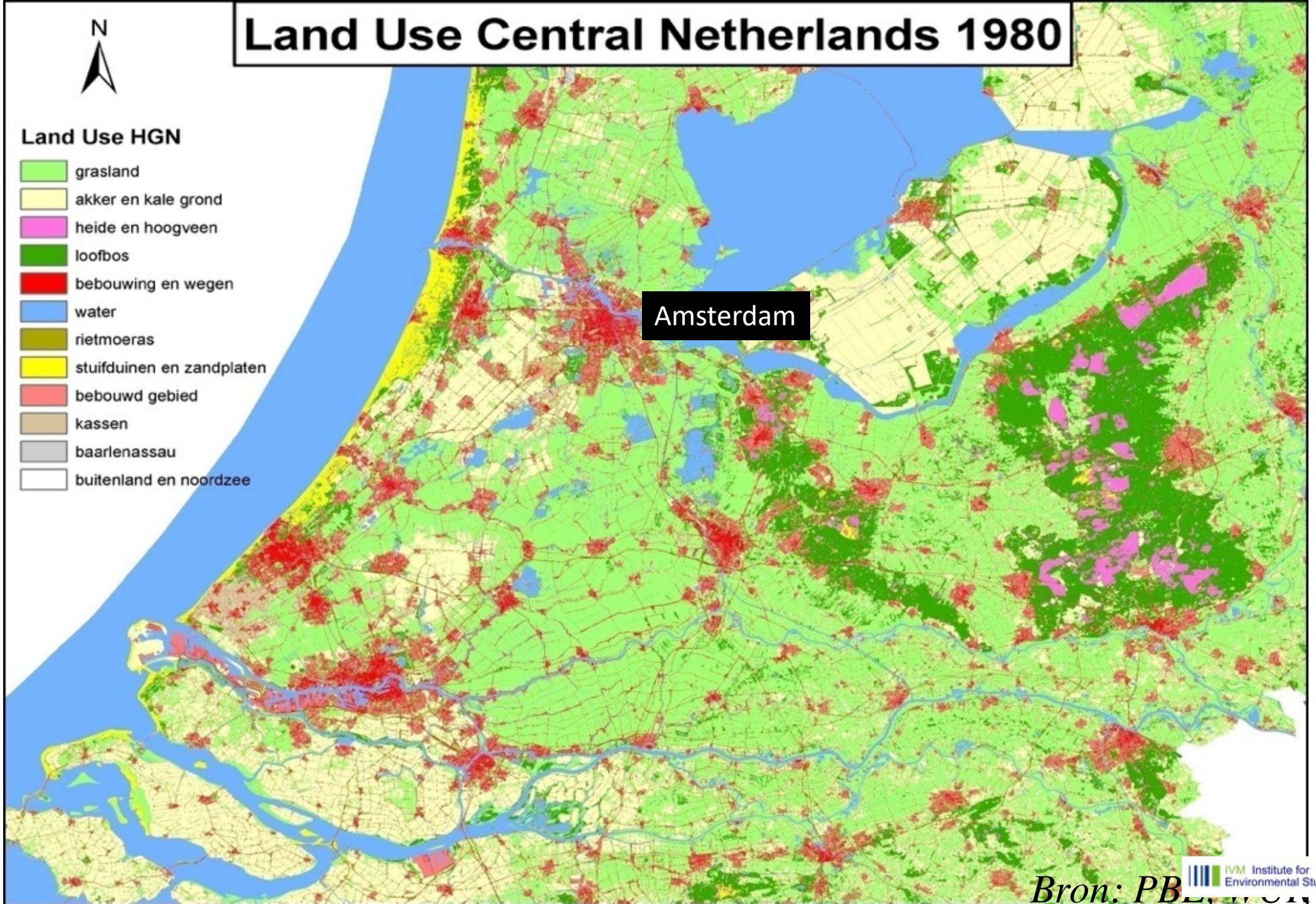

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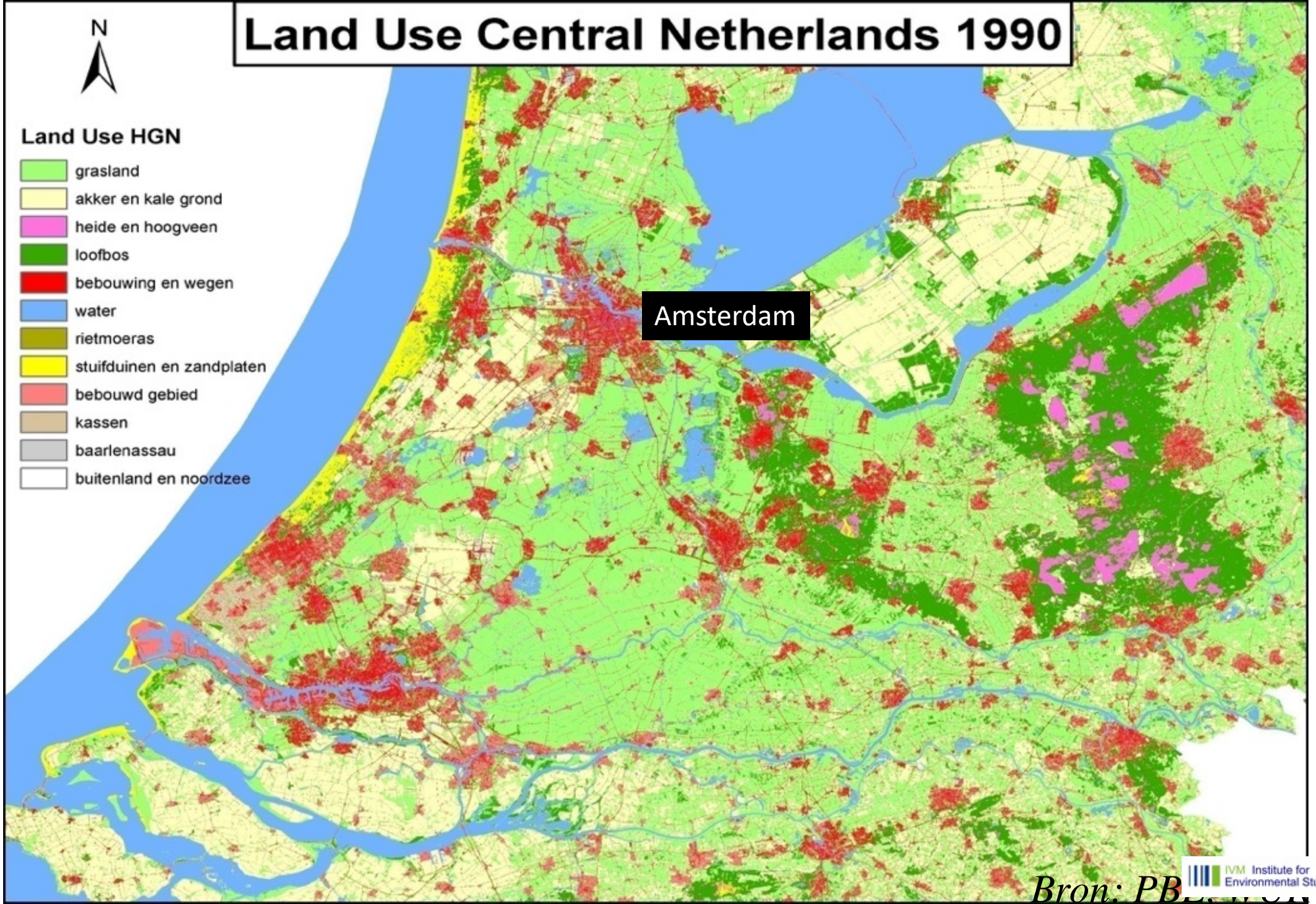

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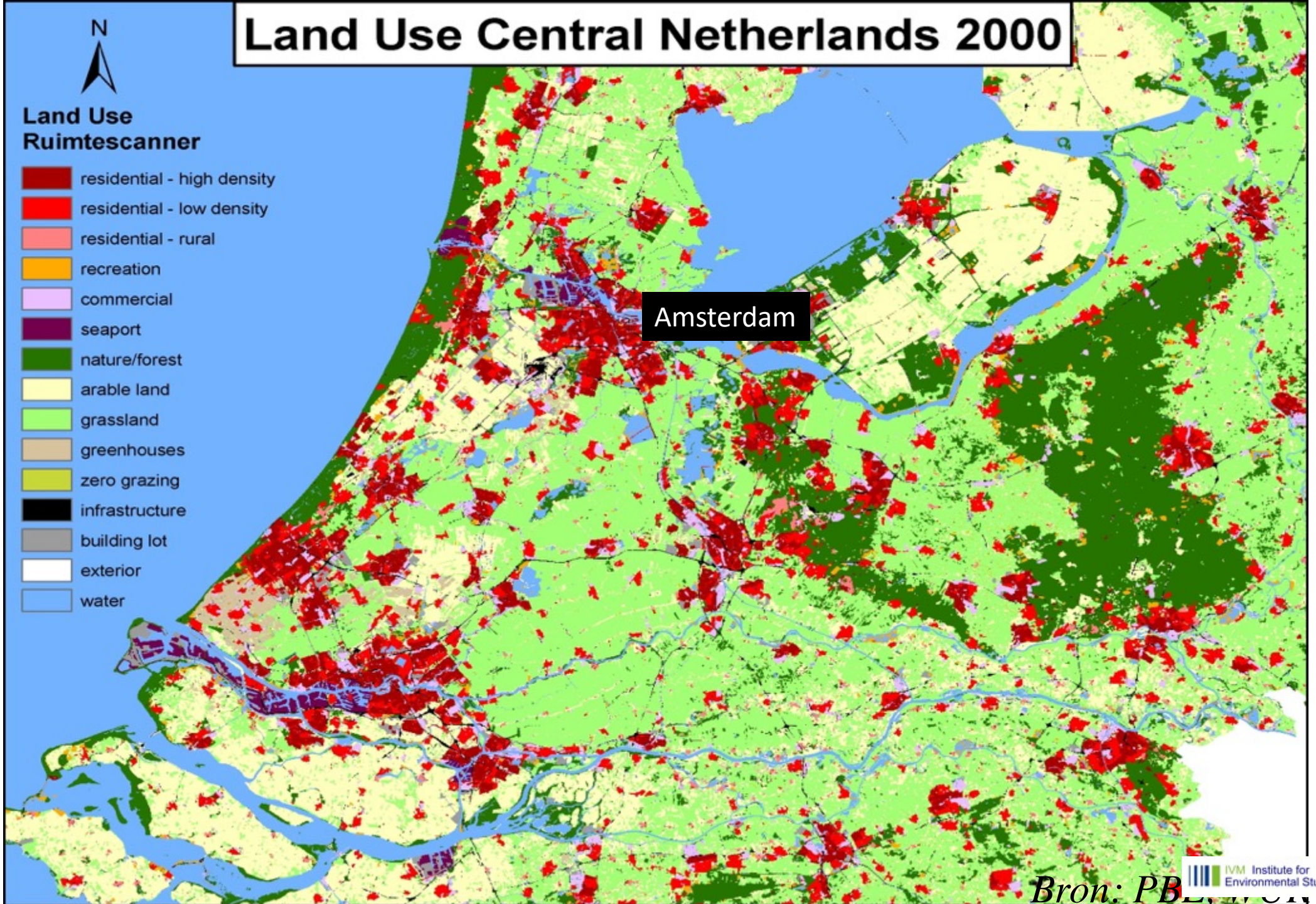

Bron: PBL, WUR

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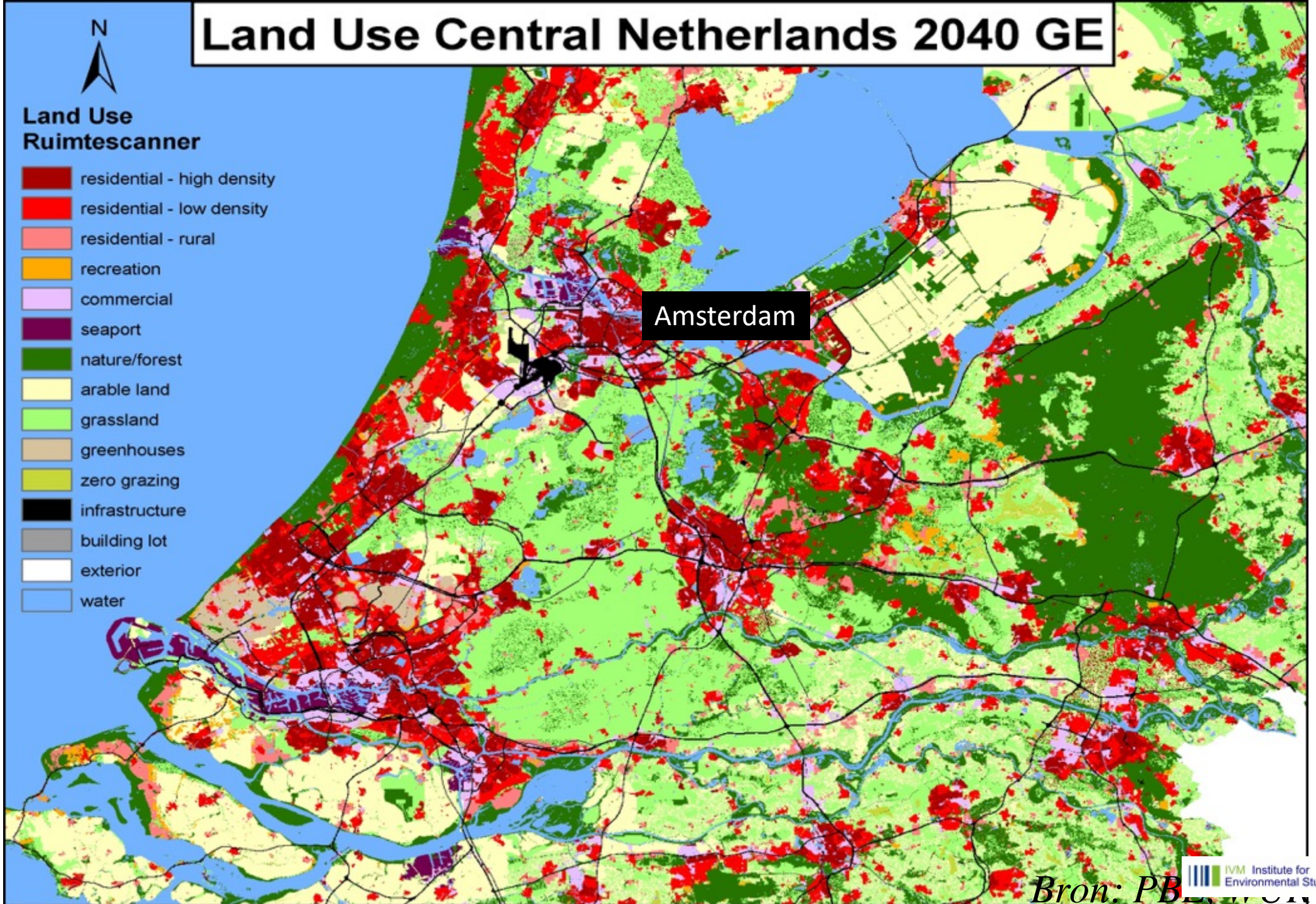

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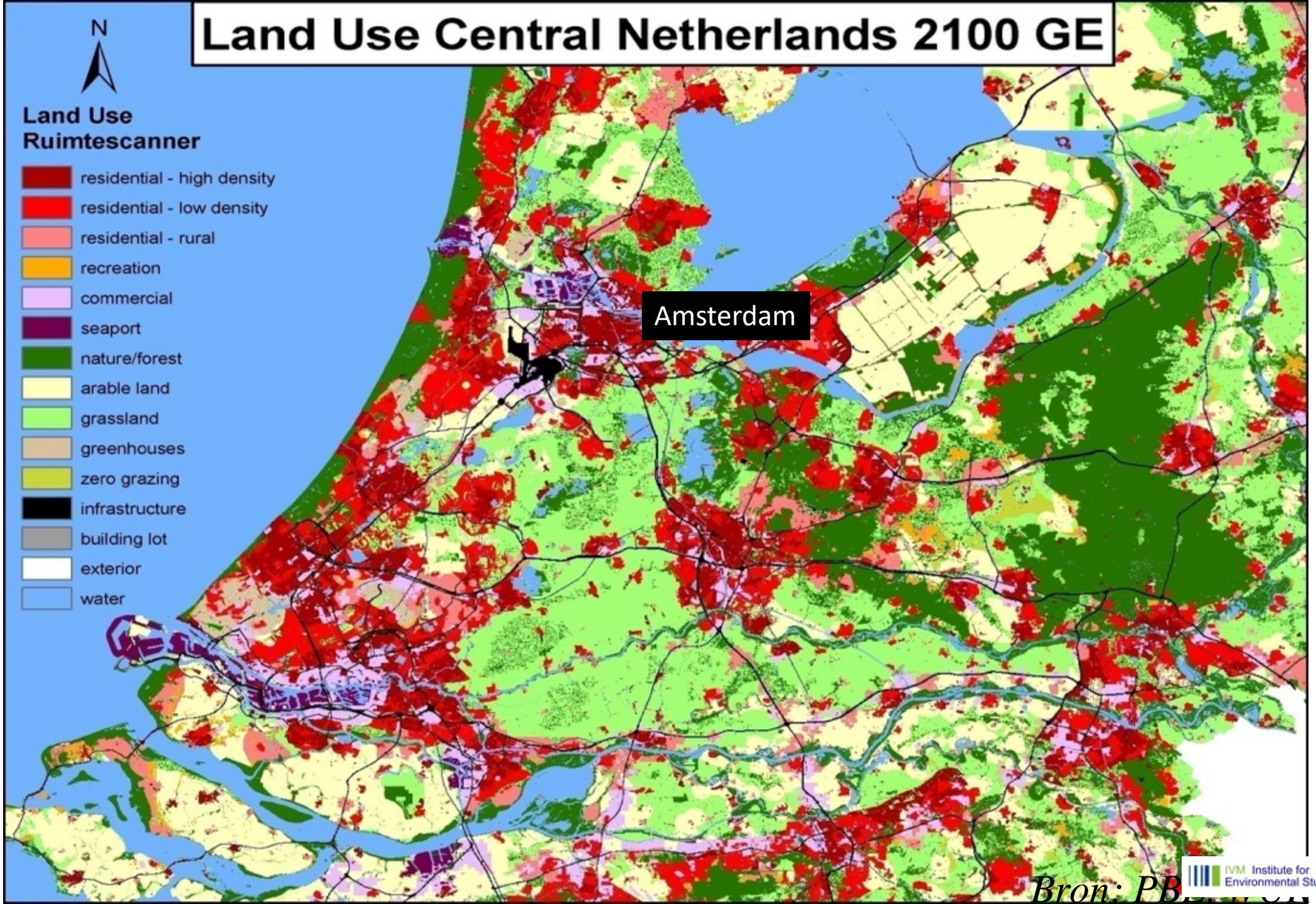

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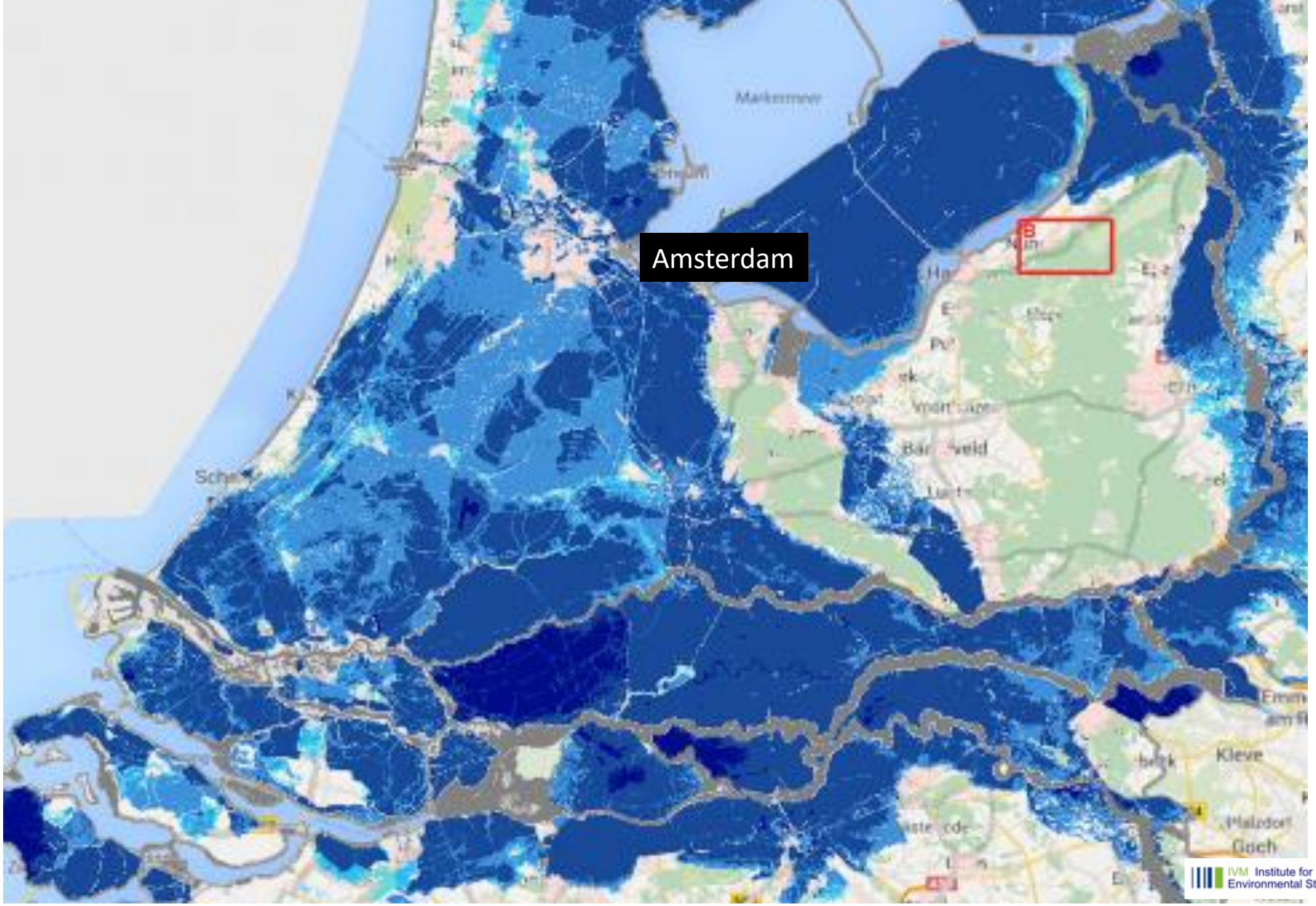

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Multi functional dike

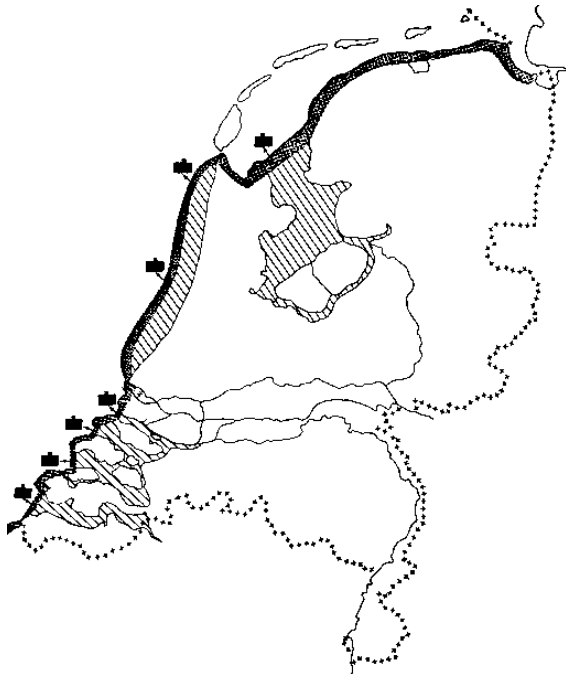
Dike in Dune


Floating houses, River Maas, The Netherlands
IVM Institute for Environmental Studies
VU

25 million inhabitants in 2100

Do we have space for flood management investments ?

Climate Change or Spatial Planning as a game changer for water management?



VenW, 1986

Geuze, 2006

Islands for the Belgium coast (2018)

Airport Schiphol in the North Sea (Volkskrant 2019)

Jeroen.aerts@vu.nl

IVM Institute for Environmental Studies
VU

Modelling Climate Risk: Current Practice

RMS

Arnaud Castéran

EXPERT MEETING
URBAN REAL ESTATE & INFRASTRUCTURE
CLIMATE RISK MANAGEMENT

Arnaud Castéran
Senior Analyst, Capital & Resilience Solutions, RMS

AGENDA

- Introduction to RMS
- Case studies
  - Delaware Department of Transportation (DelDOT)
  - Flood Re

INTRODUCTION TO RMS

WHO WE ARE

Founded in 1988 from Stanford University

1,300 employees in 11 global offices

Employ over 250 experts in hazard research, actuarial science, and engineering

Over 60% of staff hold advanced degrees

Our mission is to create a more resilient and sustainable global society through a better understanding of catastrophic events.

From earthquakes, hurricanes, and floods, to terrorism and infectious disease, we help financial institutions and public agencies understand, quantify, and manage risk.

WHO WE SERVE

(Re)insurers

Capital Markets

Brokers and Reinsurance Intermediaries

Corporations

Governments and NGOs

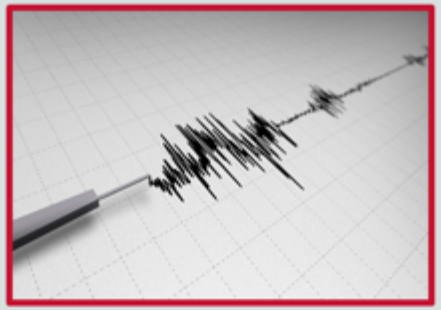
Financial Services Institutions

Over 400 institutions trust RMS models, analytics, and services

- **9** of the Top **10** U.S. Commercial Insurers
- **7** of the Top **10** U.S. Personal Line Insurers
- **8** of the Top **10** Global Reinsurers
- **16** of the Top **20** ILS funds
- **All** the Top 5 Reinsurance Brokers

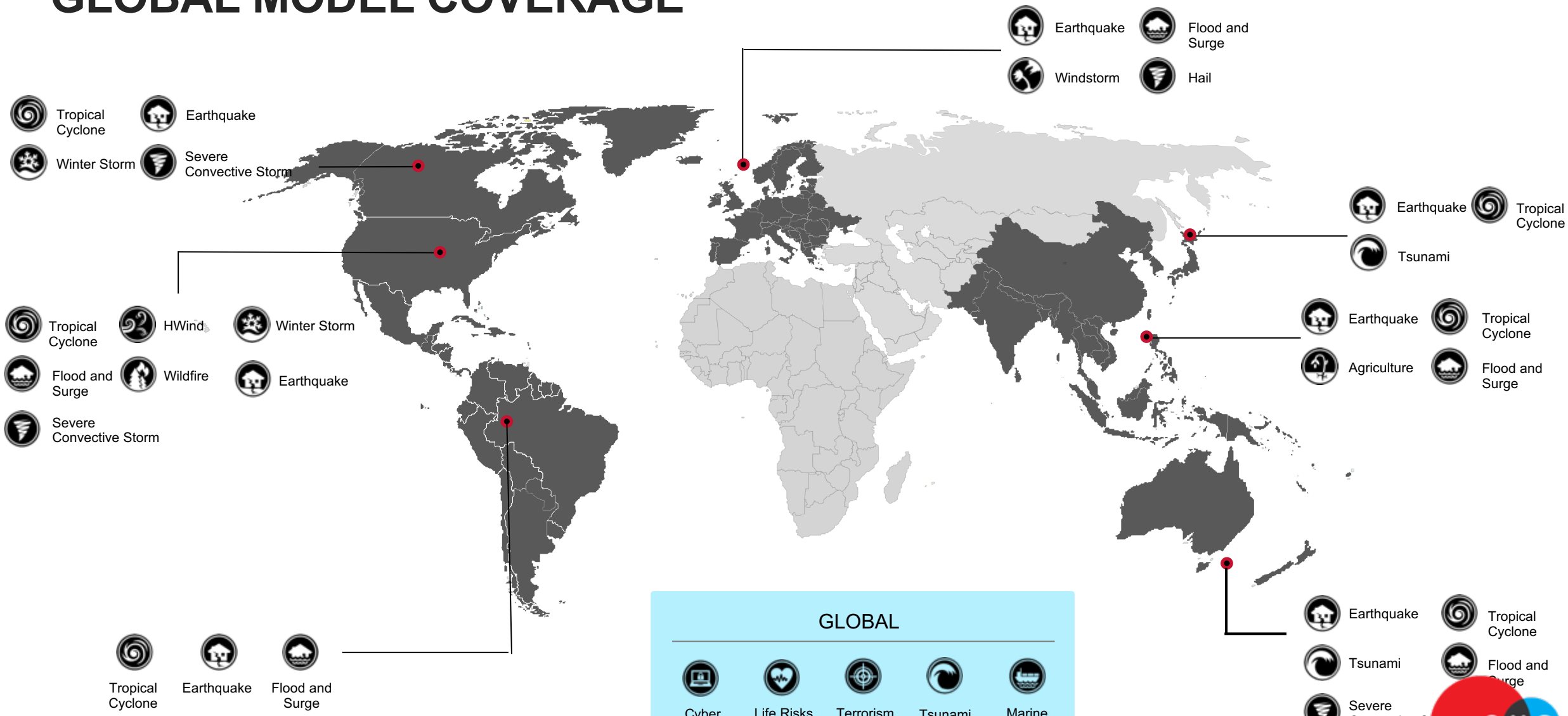
400+ models, 250+ customers

CATASTROPHE MODELLING FRAMEWORK



Define Peril	*Apply Exposure*	*Assess Hazard*	*Calculate Damage*	*Quantify Financial Loss*
Stochastic Event Module	**Geocoding Module**	**Hazard Module**	**Vulnerability Module**	**Financial Analysis Module**

GLOBAL MODEL COVERAGE



CASE STUDY #1
FLOOD RE (THE VALUE OF FLOOD DEFENSES IN THE UK)

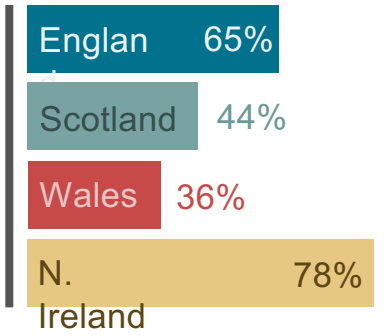
CASE STUDY #1 – FLOOD RE

- About Flood Re
  - **UK reinsurance pool launched in 2016**
  - **Objective: keep flood insurance premiums affordable for households in high-risk areas (~250k homes)**
- Motivations
  - **Encourage the UK government to increase investments in flood defence**
  - **Demonstrate the value of the current flood defence system**

CASE STUDY #1 – FLOOD RE

Flood defences reduce UK fluvial flood losses by **£1.1bn annually**, *on average*

More **deprived households** *benefit from* **70%** *of the loss reductions*

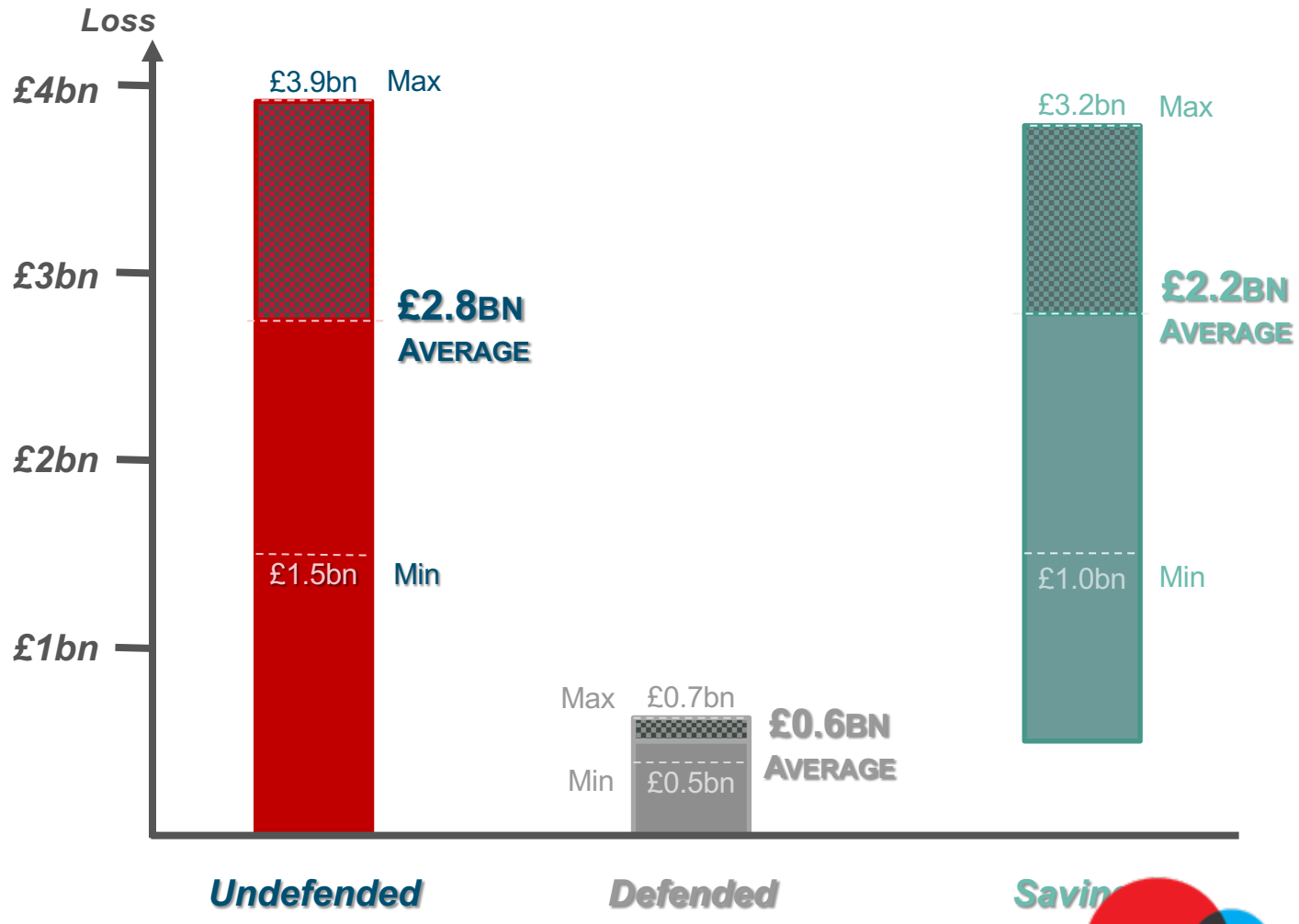


CASE STUDY #1 – FLOOD RE

Modelled **undefended** *losses from Desmond (2015): £1.5bn to £3.9bn*

Modelled losses with **current flood defences***: £0.5bn to £0.7bn*

Savings: £1.0bn to £3.2bn



CASE STUDY #2
DELAWARE DOT (DEPARTMENT OF TRANSPORTATION)

CASE STUDY #2 – DELAWARE DOT

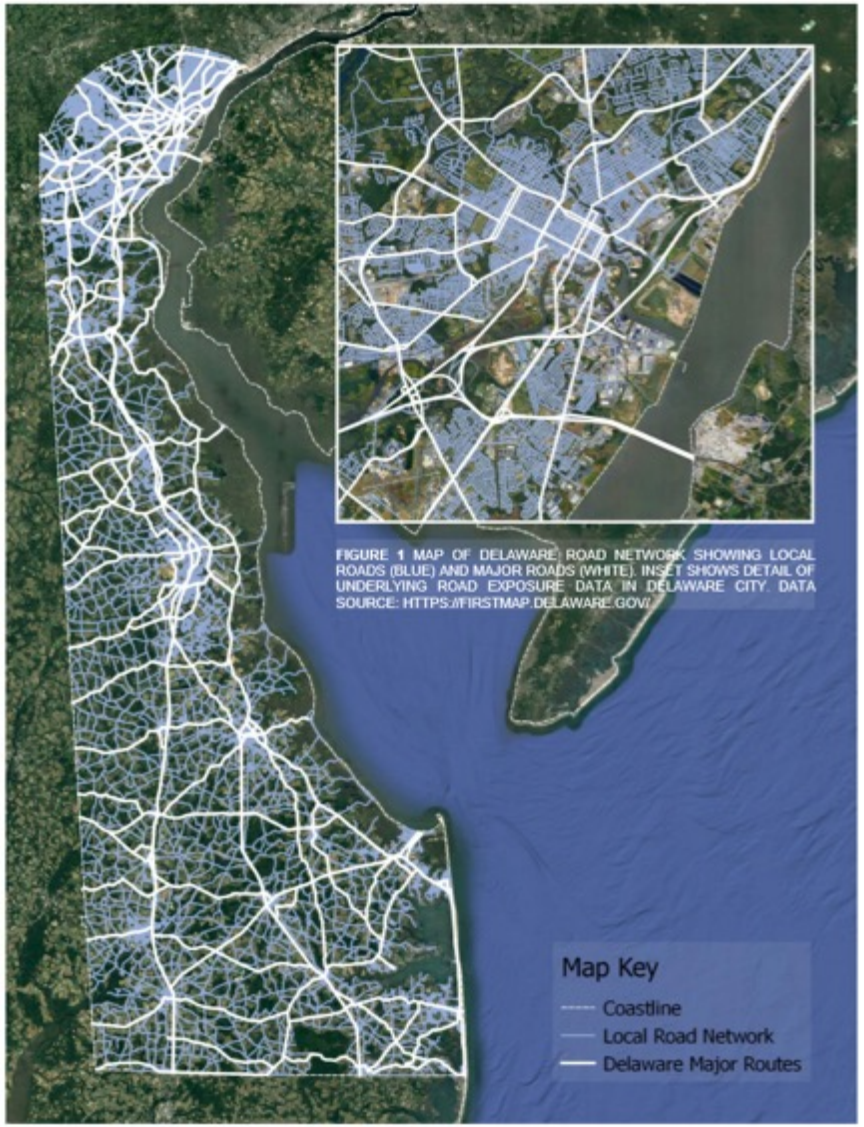


FIGURE 1 MAP OF DELAWARE ROAD NETWORK SHOWING LOCAL ROADS (BLUE) AND MAJOR ROADS (WHITE). INSET SHOWS DETAIL OF UNDERLYING ROAD EXPOSURE DATA IN DELAWARE CITY. DATA SOURCE: HTTPS://FIRSTMAP.DELAWARE.GOV/.

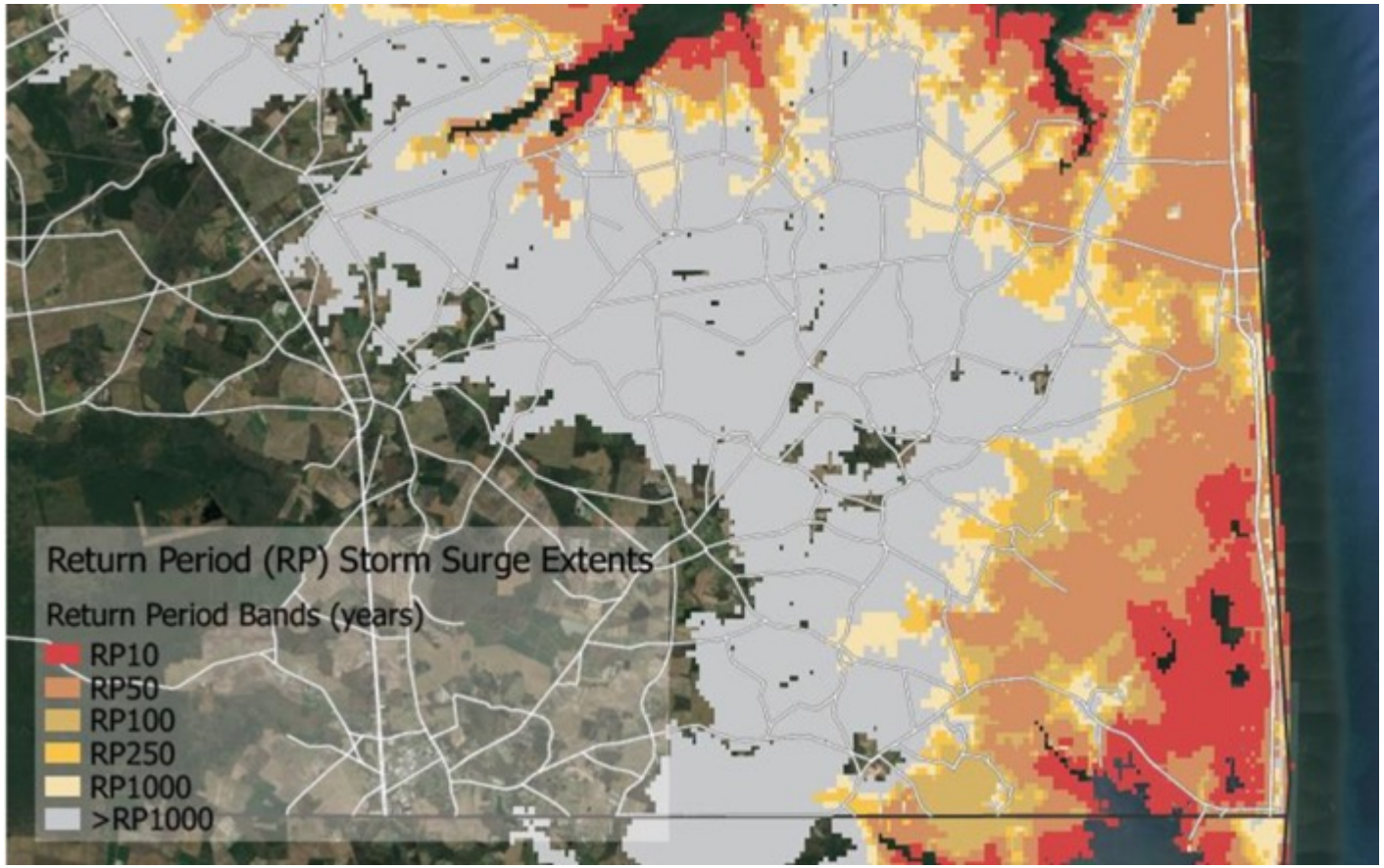
- Motivations: DelDOT Risk and Resilience Framework
  - *#1 Strategic priorities (safety, performance, environmental & financial sustainability)*
  - **#2 Risk quantification (assess hazard and impact severity to assets/network)**
  - **#3 Define resilience targets (cost of inaction, cost-benefit of mitigation measures)**
  - *#4 Implementation (risk retention vs risk transfer)*
- Context: Climate Change
  - **Define long-term strategy based on a range of sea-level rise scenarios**

CASE STUDY #2 – DELAWARE DOT

50% *of annual average* **repair cost** *for SR9 comes from* **13% of the road length**

The sections of road the **most at risk today** *are expected to see the* **greatest increase** *in risk in the future*

Annual average repair cost x5.5 *in 2100 if no mitigation measures are implemented*



CHALLENGES OF APPLYING RISK MODELS TO DECISION-MAKING

RISK MODELS TO DECISION-MAKING

Communication *of risk modelling methodology and results*

Different ***clients*** *have different* ***needs***

Taking ***"binary" decisions*** *based on complex data*

Reactive *vs* ***Proactive*** *decision-making*

THANK YOU FOR YOUR ATTENTION

Climate Risk in NL - statements of urgency

Bouwinvest

Nicolette Klein Bog

Delta Commissioner

Lilianne van Sprundel

Nicolette Klein Bog: Klimaatrisicomanagement

Klimaatrisicomanagement is essentieel voor institutionele beleggers

Samenwerking overheden, kenniscentra en belanghebbenden uit de markt is essentieel

FINANCIËLE STABILITEIT
Pensioenfondsen

- Waardevastheid portefeuilles om toekomstige pensioenen uit te kunnen betalen
- Toezichthouder Nederlandse bank verankert klimaatrisico's in toezicht

INZICHT KRIJGEN
In risico's

- Op coördinaten niveau impact op portefeuille in kaart brengen
- Visie en kennisontwikkeling n.a.v. risico's

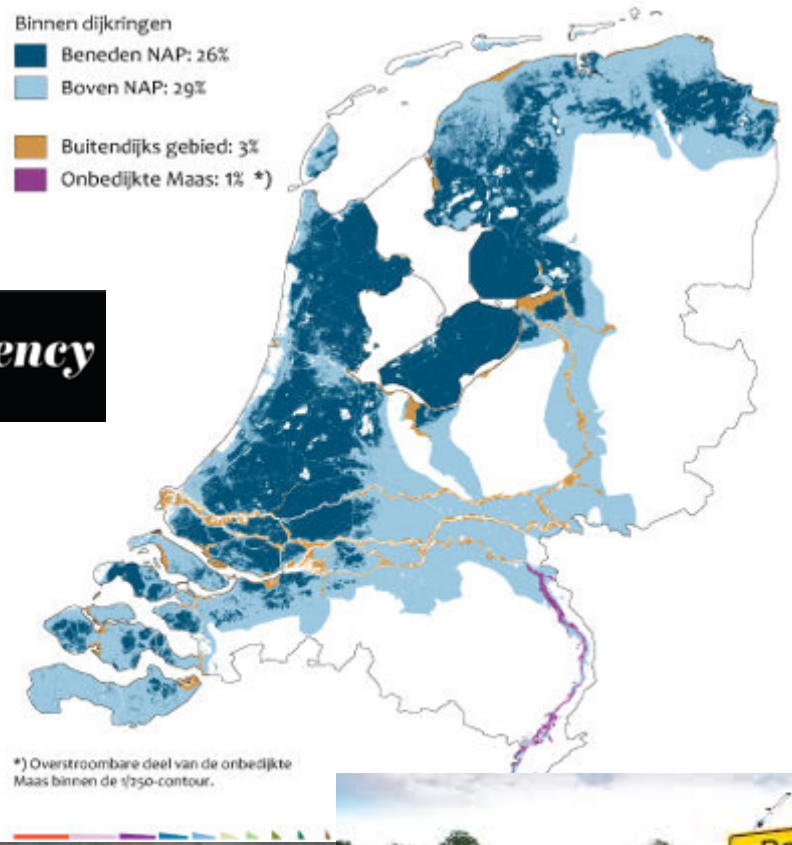
BELEID MAKEN

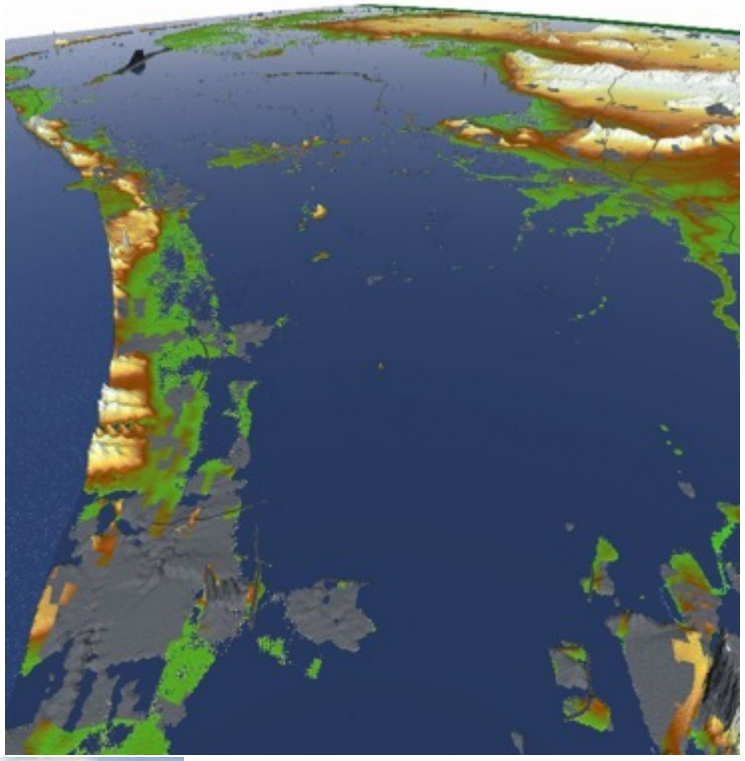
- Beleid bepalen
- Risico mitigerende maatregelen

UITDRAGEN

- Beleid uitdragen naar aandeelhouders en samenleving

Lilianne van Sprundel: Urgency





The Delta Programme

Aim:

- keeping NL a good, safe and attractive place to live and work for present and future generations (with a long term perspective)

Three Goals:

1. <u>safety against flooding</u>
   - 60% of NL / 10 million inhabitants
   - Sea level rise (also look at NL in 2150)
2. <u>fresh water supply</u>
   - 16% of Dutch economy
3. <u>climate proof urban environment</u> → spatial adaptation
   - cost of inaction: up to € 124 billion (2018-2050)

<u>No respons to a disaster but **IN ADVANCE**</u>:

- multigovernance, joint fact finding
- managing in uncertainty - scenario's, adaptive strategies, flexible measures
- continuity, legally defined, funds (> 1 billion yearly)

Q&A and discussion

TU Delft

Co Verdaas

Idea-board; ideas, questions, comments

Visit:
www.menti.com
Use code:
28 72 28

Expert Meeting

Urban Real Estate & Infrastructure Climate Risk Management

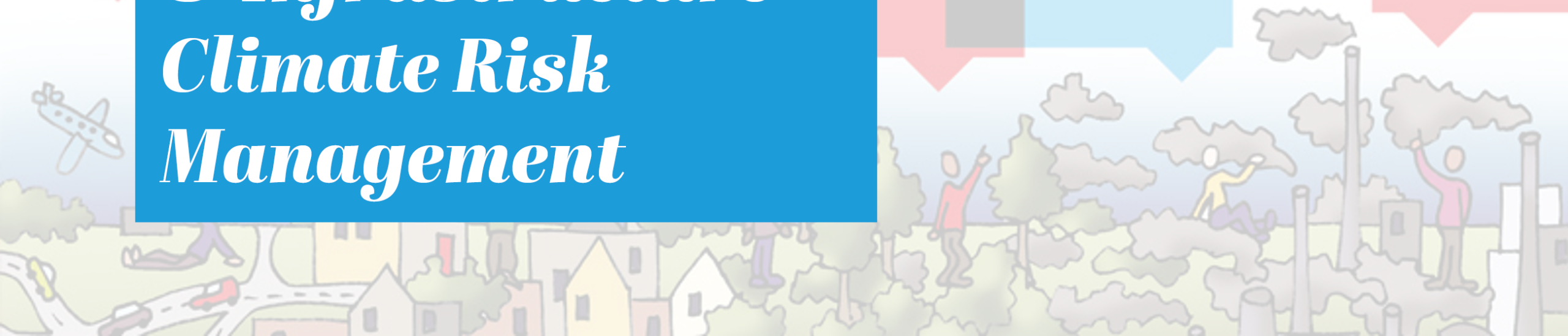
Thursday 12 March

13.00 – 18.00 walk-in from 12.00

Delft

Berlagezaal

Julianalaan 134, Delft



Round 2

Emerging Management Practices in the Netherlands

Introduction to Amsterdam's Assets Management Approach and Program

Delta Commissioner

Kasper Spaan

City of Amsterdam

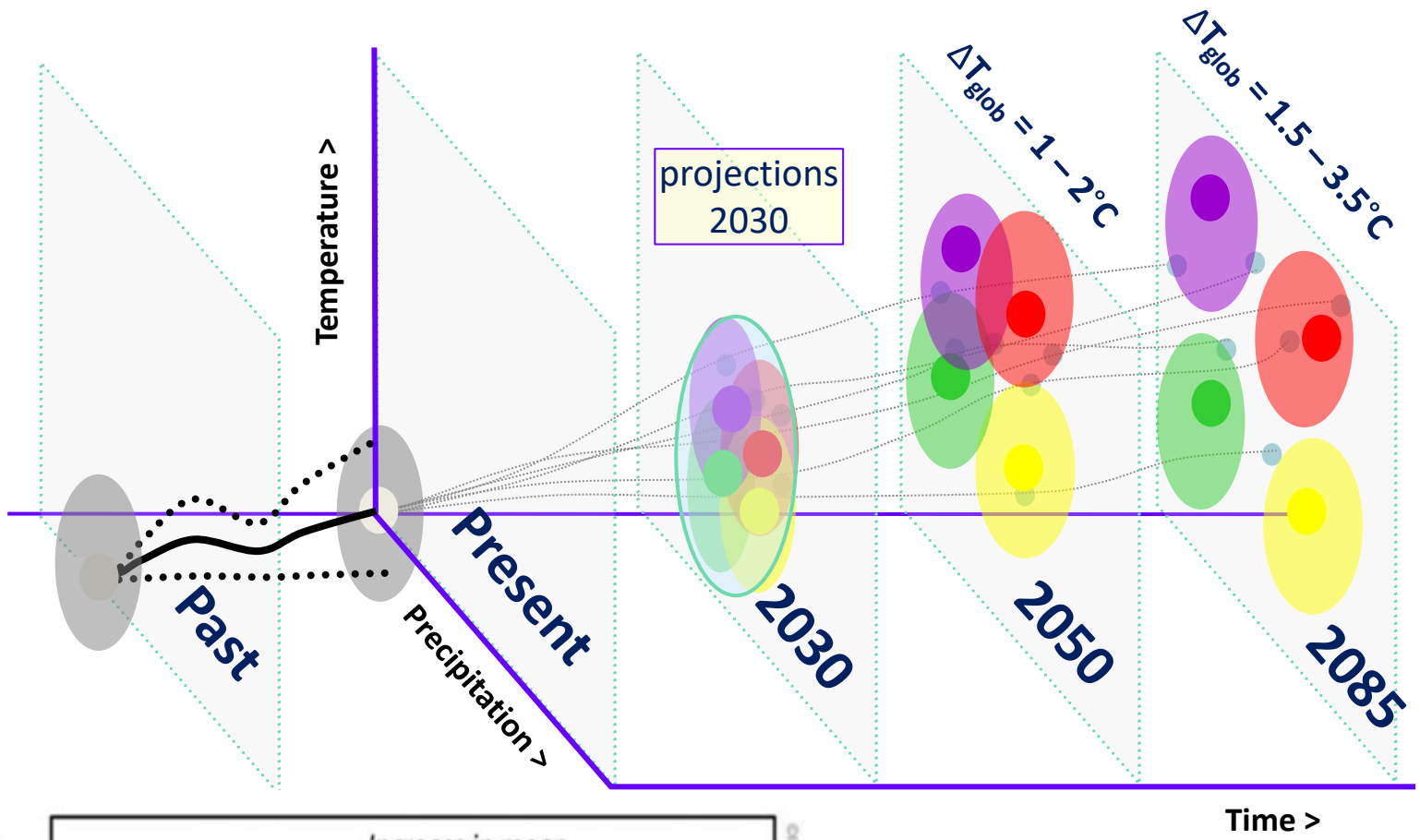
Sacha Stolp

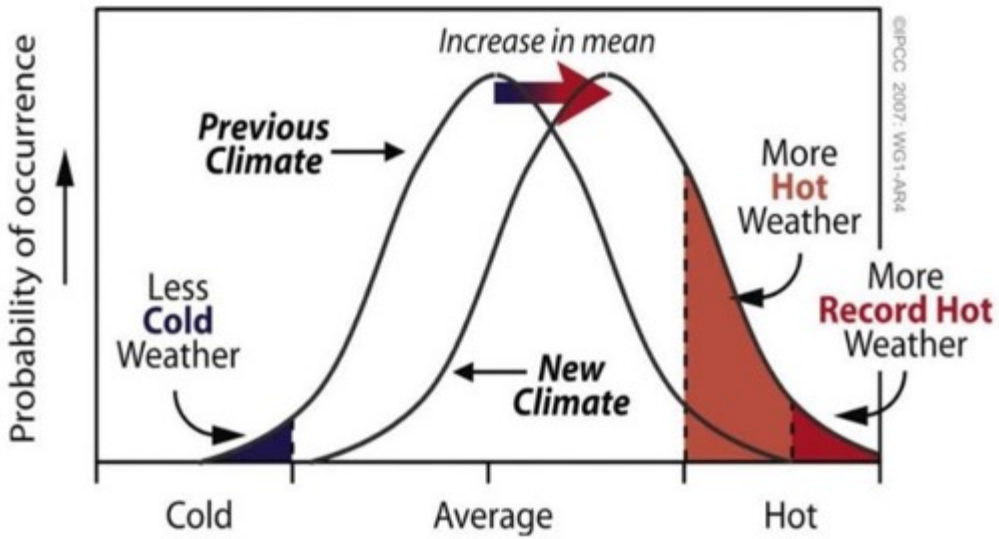
Investing in a delta under climate stress

a water management perspective

Dealing with uncertainties

- Speed
- Direction
- Impact





Dutch Watermanagement

Former perspective:

- Ancillary layer to spatial patterns of economical functions
- Resisting the dynamics of water

Future perspective:

- Central element in spatial differentiation of economical functions
- Embracing the dynamics of water

Right quantity

Right quality

Right time

Right place

Short term: reactive & opportunistic

- Sectoral + Business as usual
- Low-hanging fruit + Low costs
- Positive reframing
- Linking investments
- Developing new instruments - incremental

Amsterdam Rainproof

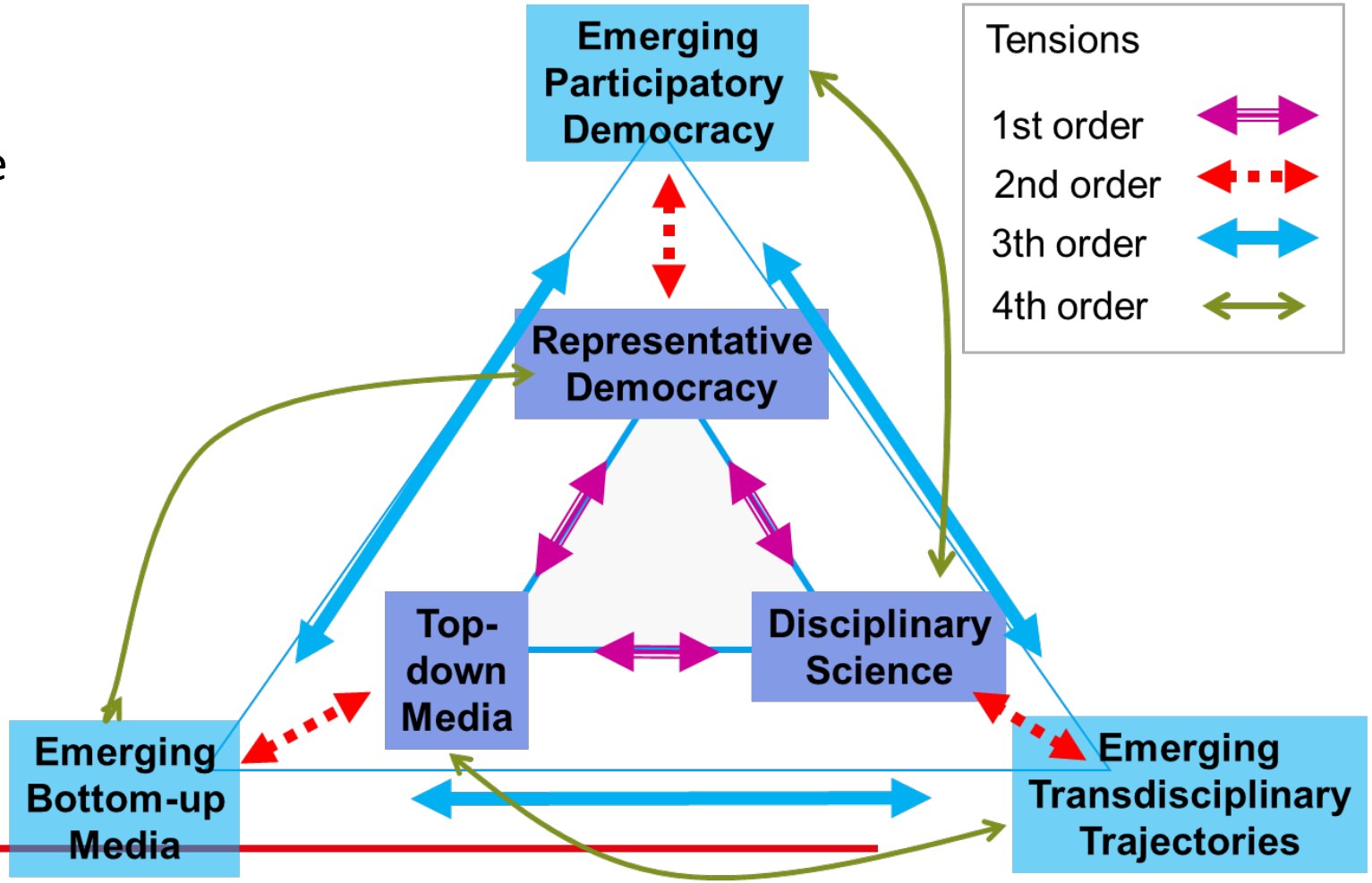
Growing complexity in society

- High tech urban fabric
- Decentralization vs globalization
- Interacting levels of scale - governance
- Interfacing transitional challenges: energy, raw materials
- ***Who is in charge?***

Knowledge democracy: Turbulence and unpredictability

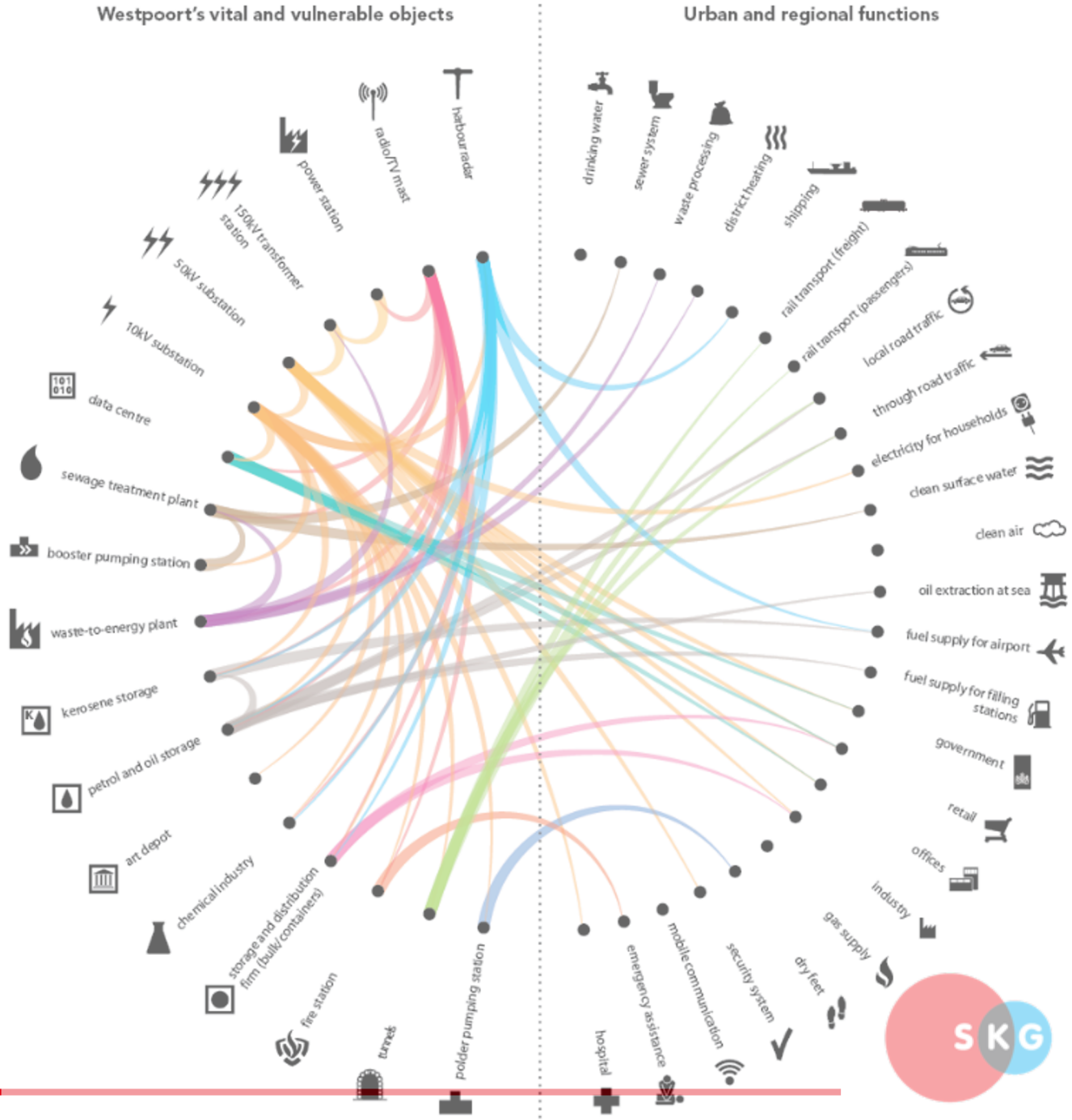
(Roel in 't Veld, 2010)

Tensions between old and new forms of politics, science and media



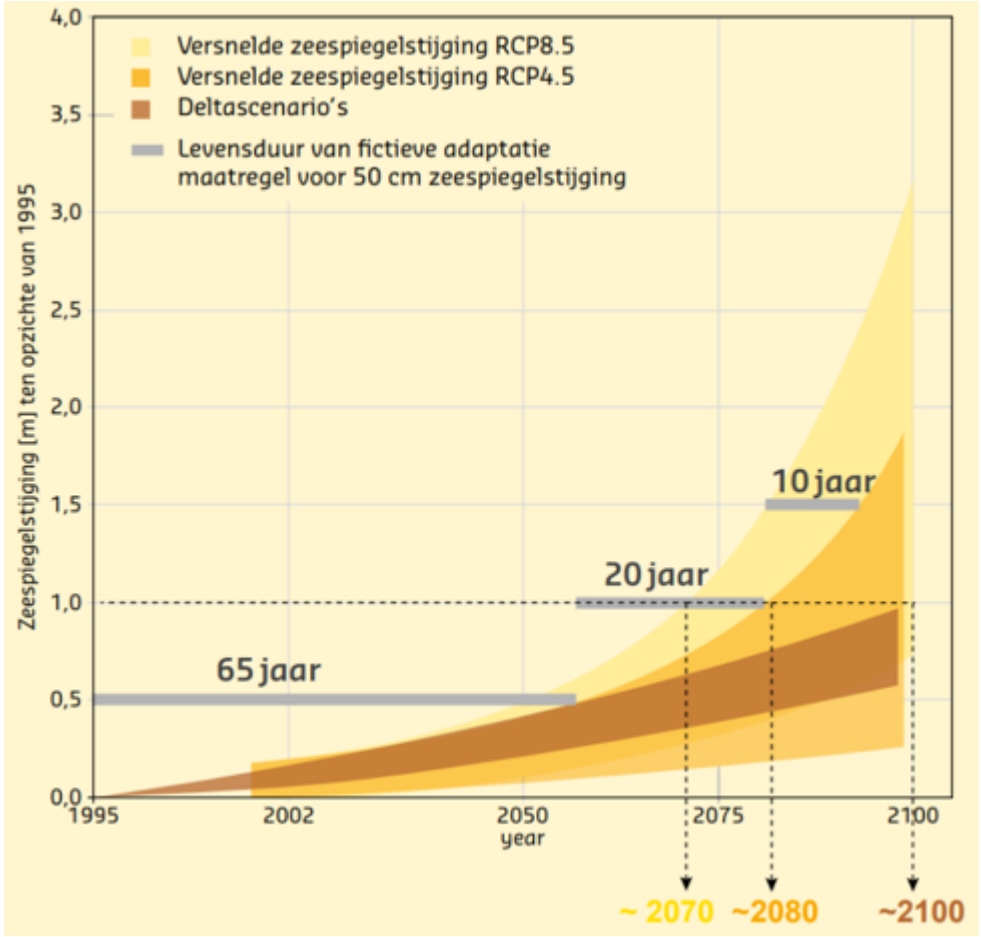
Mid-term challenges

- Necessary vs available knowledge
- Restructuring Research & innovation
- Interdependencies in infrastructure
- Incremental transition vs creative destruction
- Tipping points & System breakdown
- ***Are we in control?***

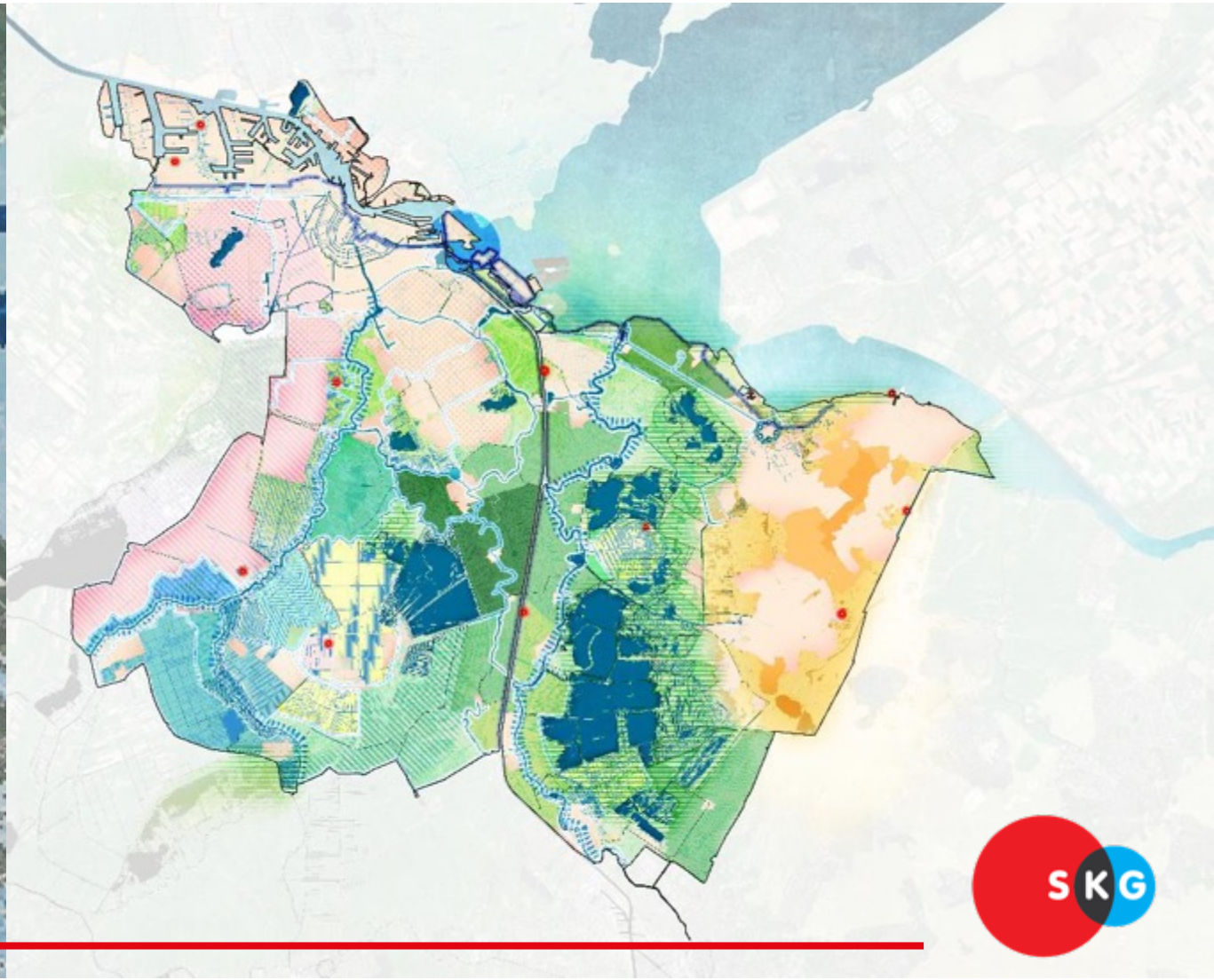


Fewly asked questions

- Sea level rise
- Balancing power:
  droughts and precipitation extremes
- Demand vs availability
- Unknown unknowns in tipping points
- Saline & heat stress in
  agriculture and ecology



Water stress + conversation map



FAQ2

- Available adaptation pathways
- Backcasting + Driver scoping
- **<u>Water perspective maps</u>**

WUR: Nederland na(ar) 2100

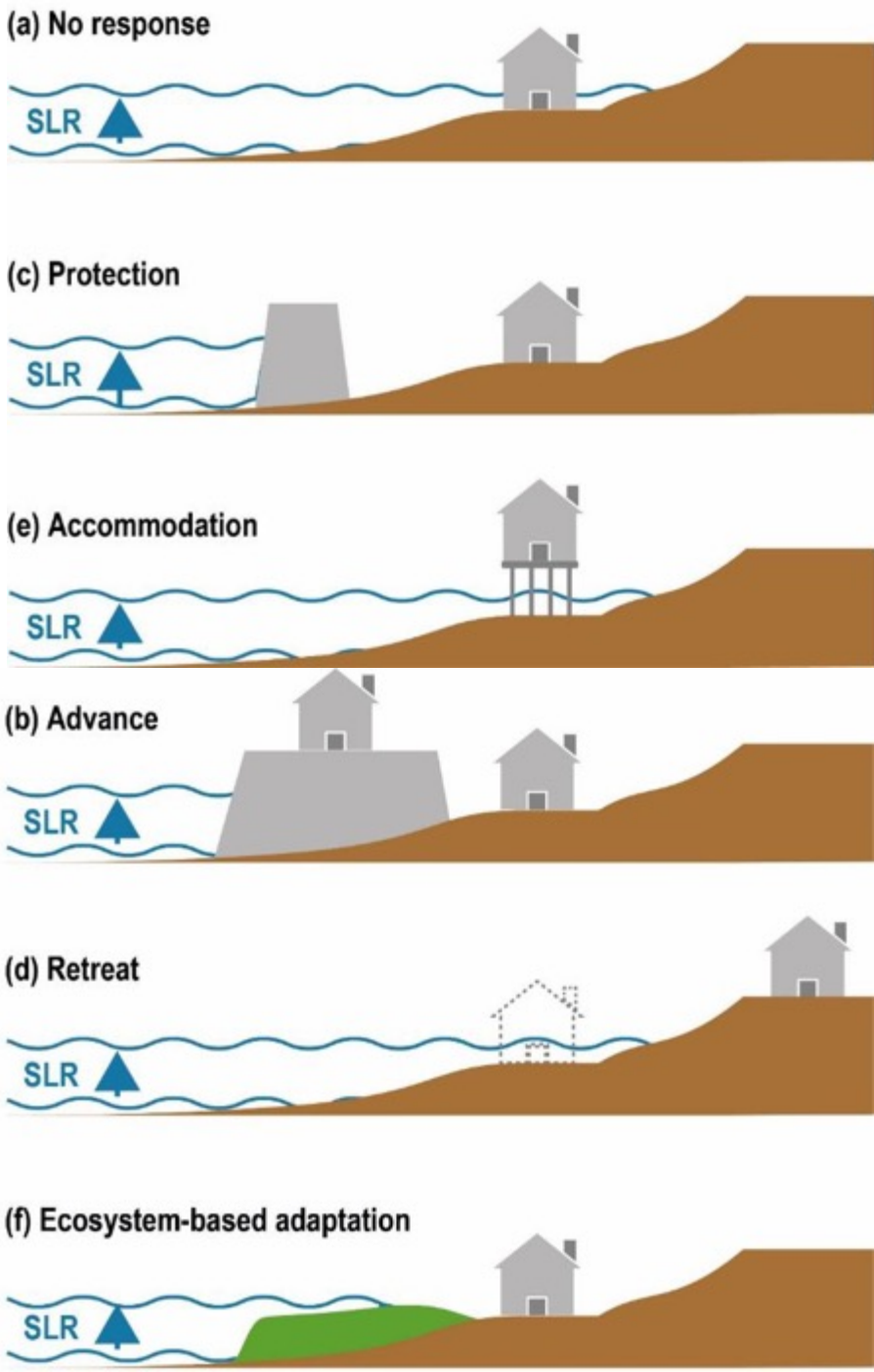
LOLA: Plan B

Drivers of change

- Economy:
  - Insurability
  - Financial rating
  - Financeability
- 'Events, my dear boy, events’
- Culture:
  - Acceptance
  - Adaptability
  - Feasibility
- …

Long term perspective + strategic agenda

- Creating opportunity
  - Landward vs seaward flood defences
- Cost benefit agenda + Costs of failure
- Balance public and private funding
- Maximal flexible strategy - avoid lock-ins
- Steering towards higher grounds
- Anticipating economical dynamics
- ***Not a technical agenda!***

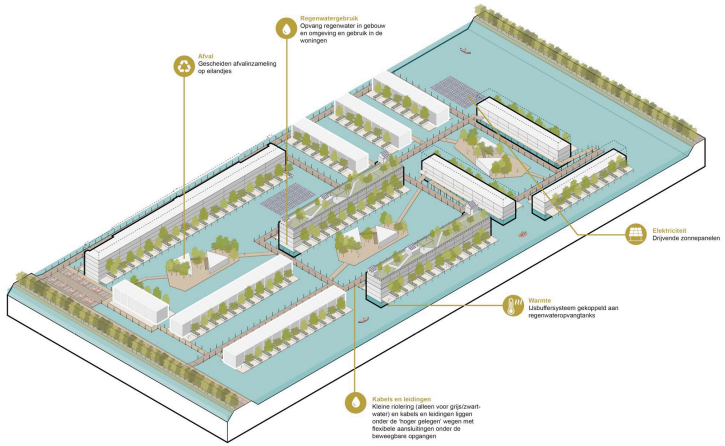


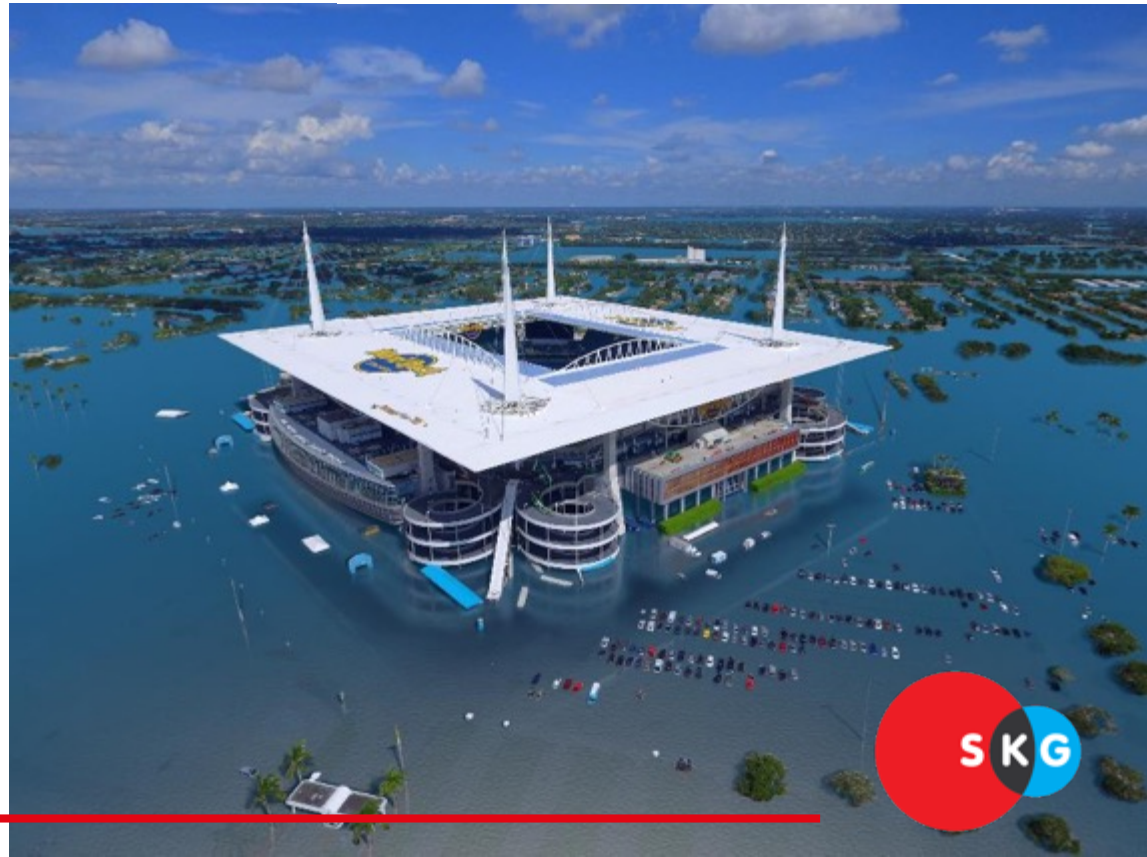
Setting the agenda: practical

- From reactive towards a proactive attitude
- New building typologies:
  - Compartmentation
  - Modular and moveable real estate
  - Floating real estate
- Salt stress on agricultural and ecology
- Micro water management
- Liftable spatial and urban fabric

Setting the agenda: theoretical

- Reducing flooding risks through acceptance: resistance vs resilience
- Vulnerability of complex systems (cross sectoral interdependencies)
- Known unknowns vs unknown unknowns
- Long term perspectives on bottlenecks and tipping points
- Cultural challenges: Aquatic society principles
  - Dry Dutch vs Aquatic Bajou





Introduction to Rotterdam's Climate Adaptation Plan

City of Rotterdam

Nora Prins

TU Delft

Fransje Hooimeijer

ROTTERDAM WEATHER WISE

Nora Prins: Rotterdam

Expert Meeting | TU Delft
Nora Prins

March 12

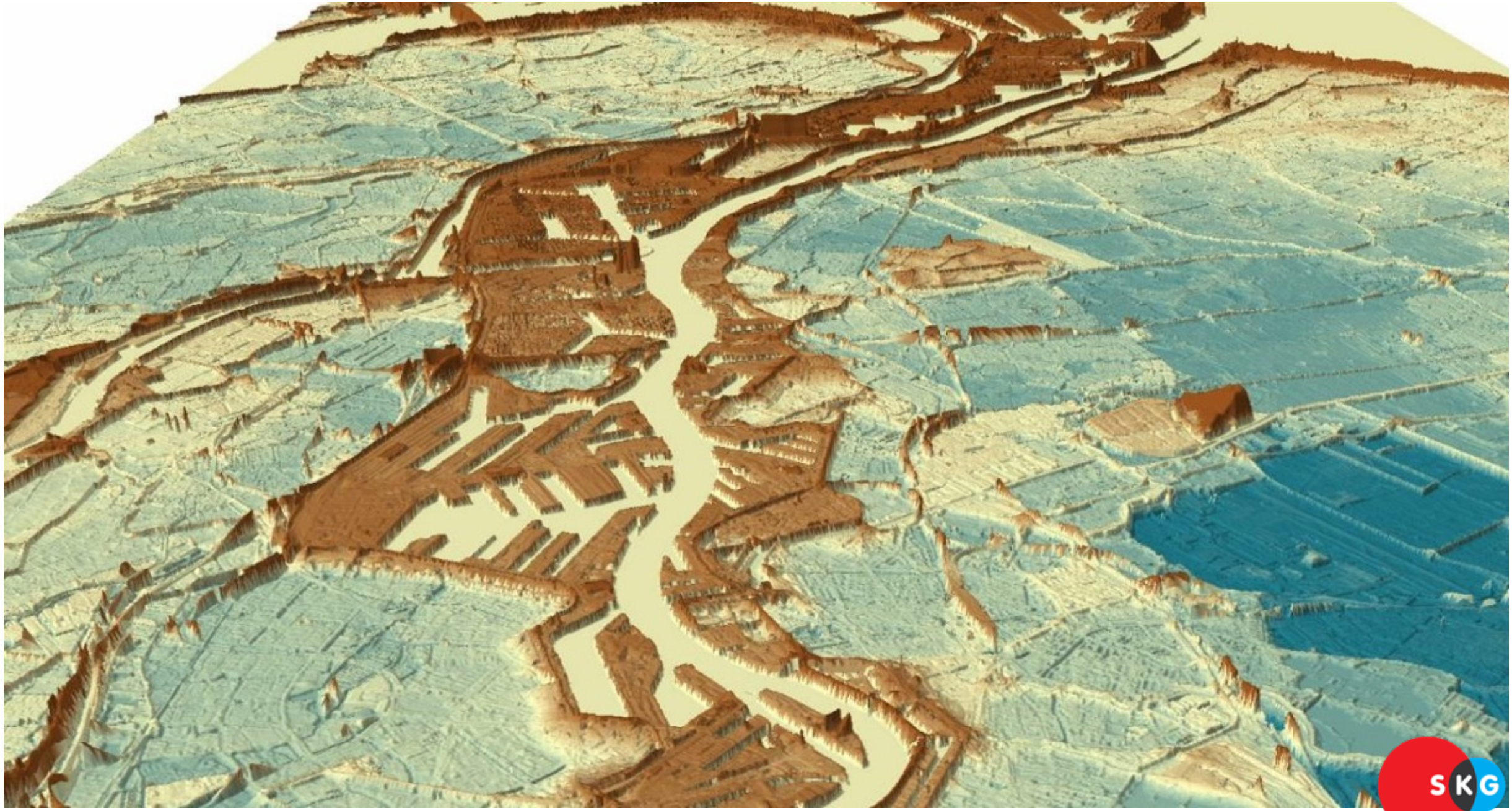
SKG

Rotterdam Delta City

1270

1854

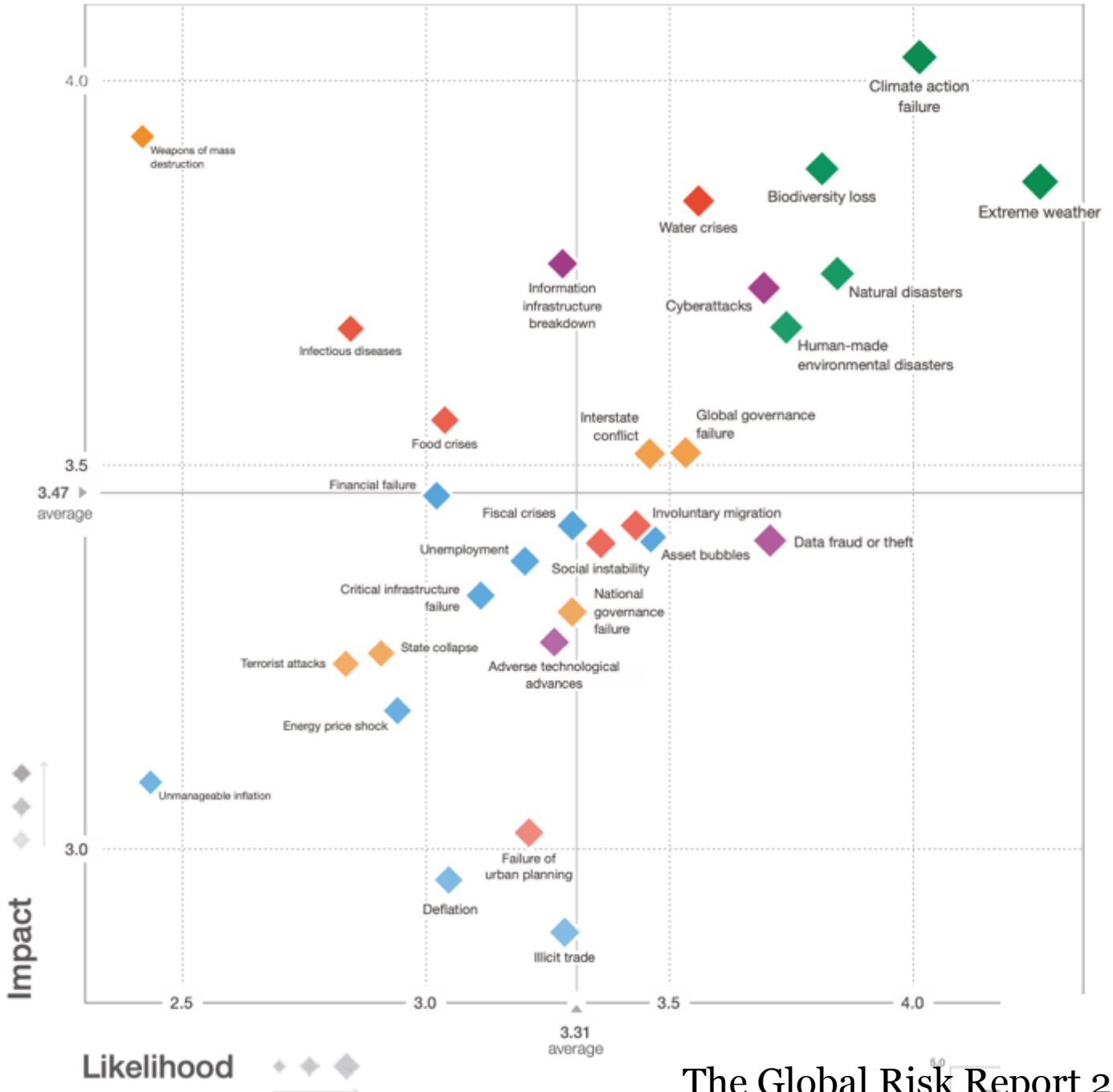

Precipitation
River
Sea
Groundwater




HANDEL

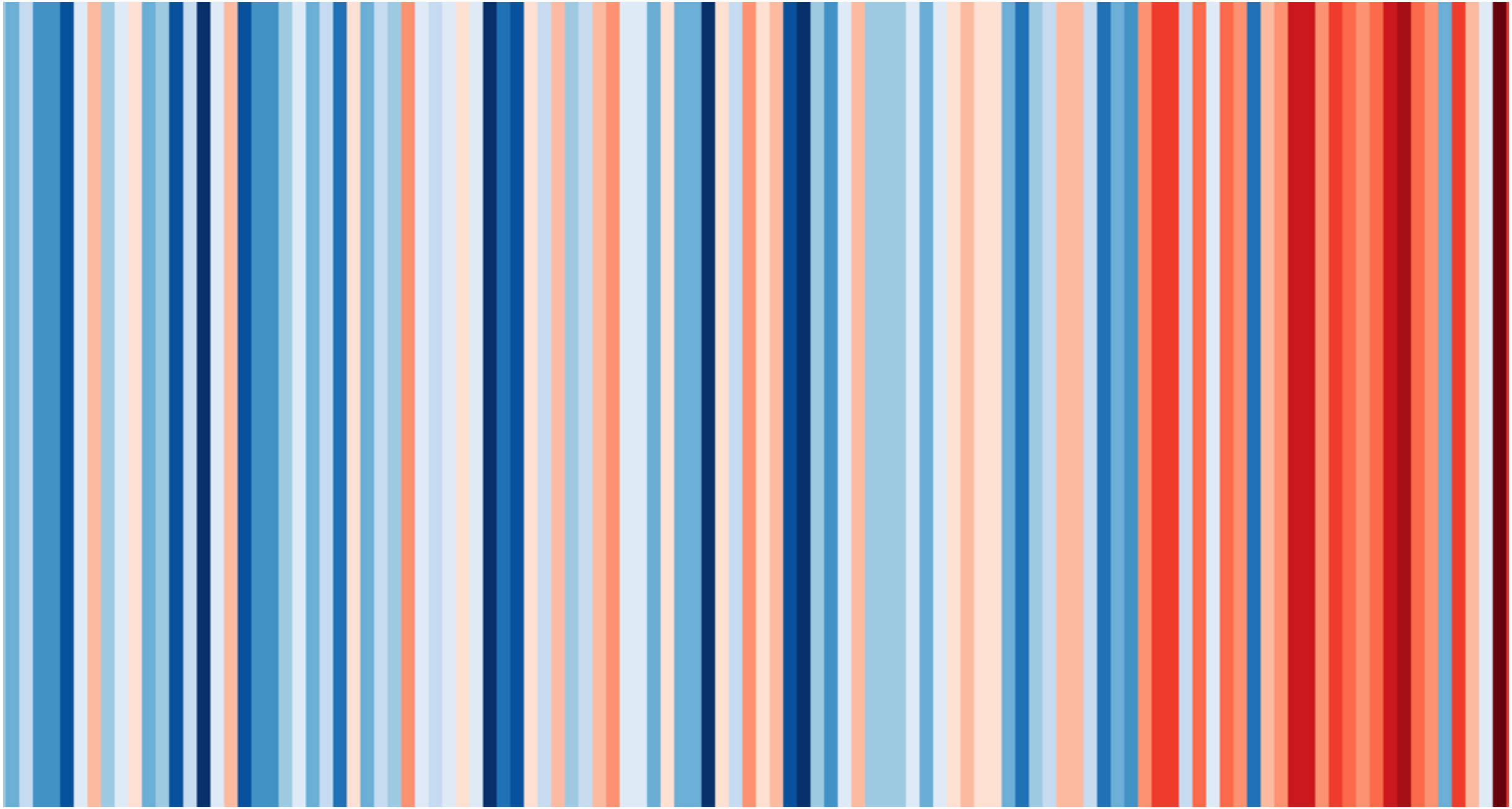

RAFIE
DIMENSION

Changing Climate



ROTTERDAM WEATHERWISE

The Global Risk Report 2020 – World Economic Forum



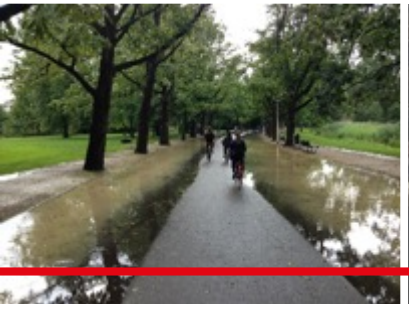
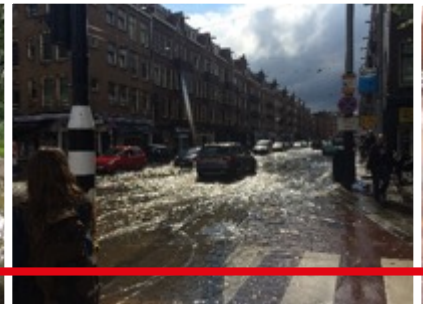
Yearly average temperature the Netherlands from 1901-2018 data from Berkeley Earth

Copenhagen – July 2
2011
150 mm in 2 hours

Amsterdam – August 24 2015
20 mm in 10 minutes

Berlin –June 29 2017
150 mm in 24 hours

Paris –July 9
2017
50 mm in 1 hour



Temperature
Average temperature rises from 22.1 C to 23.5C in 2050.
Maximum day temperature rises from 36 tot 39 C

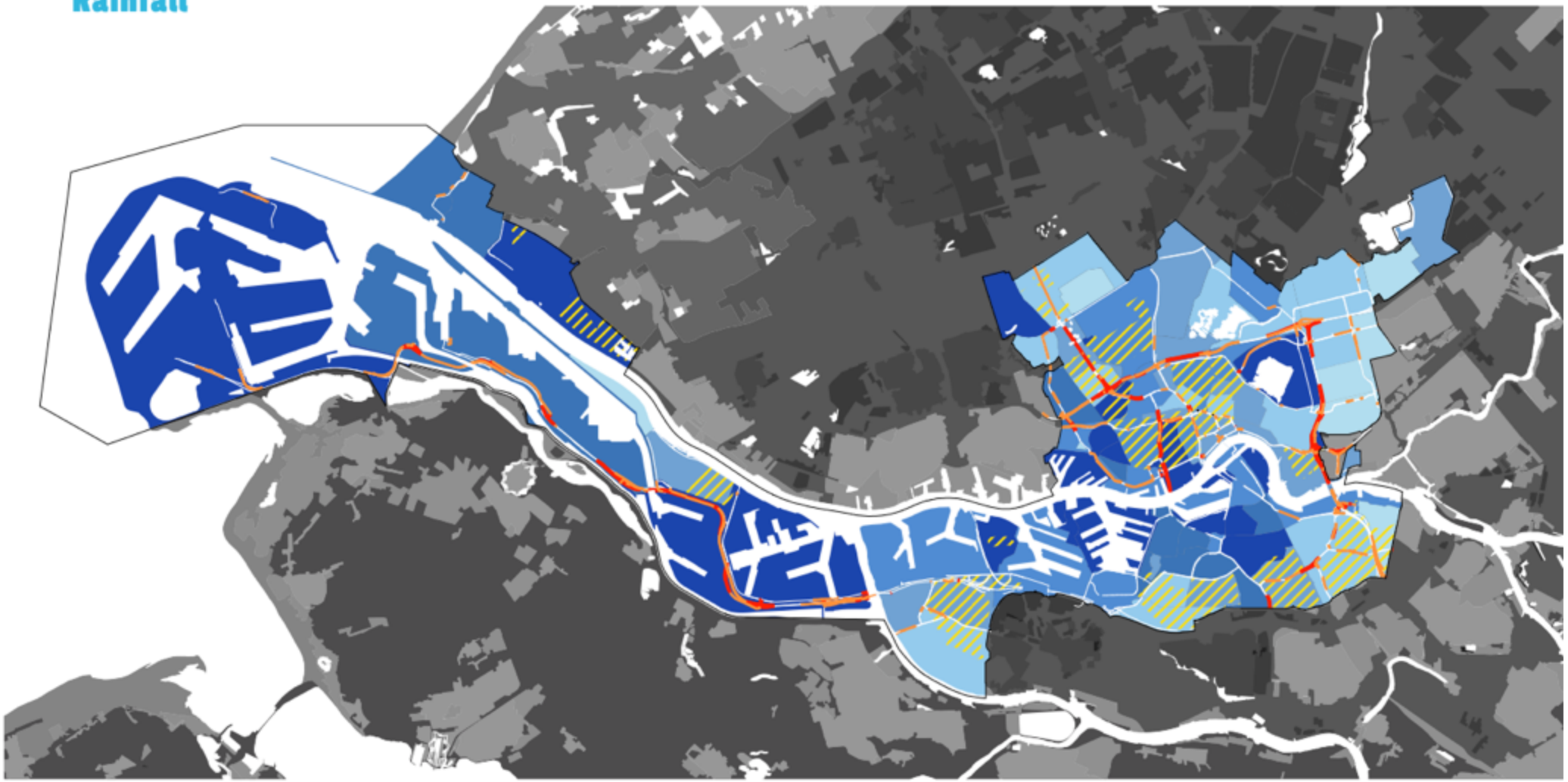
Tropical nights
From 7 nights > 20 C to 3 weeks in 2050

Precipitation
Maximum daily total rises to 94 mm in 2050. More days with > 50mm

Drought
Precipitation deficit rises from 230mm to 288mm in 2050

Sea level
Sea level rises with 40cm in 2050 en 100m in 2100.

Rainfall



% of properties at risk per neighbourhood

- >25%
- 20-25%
- 15-20%
- 10-15%
- 5-10%
- 0-5%

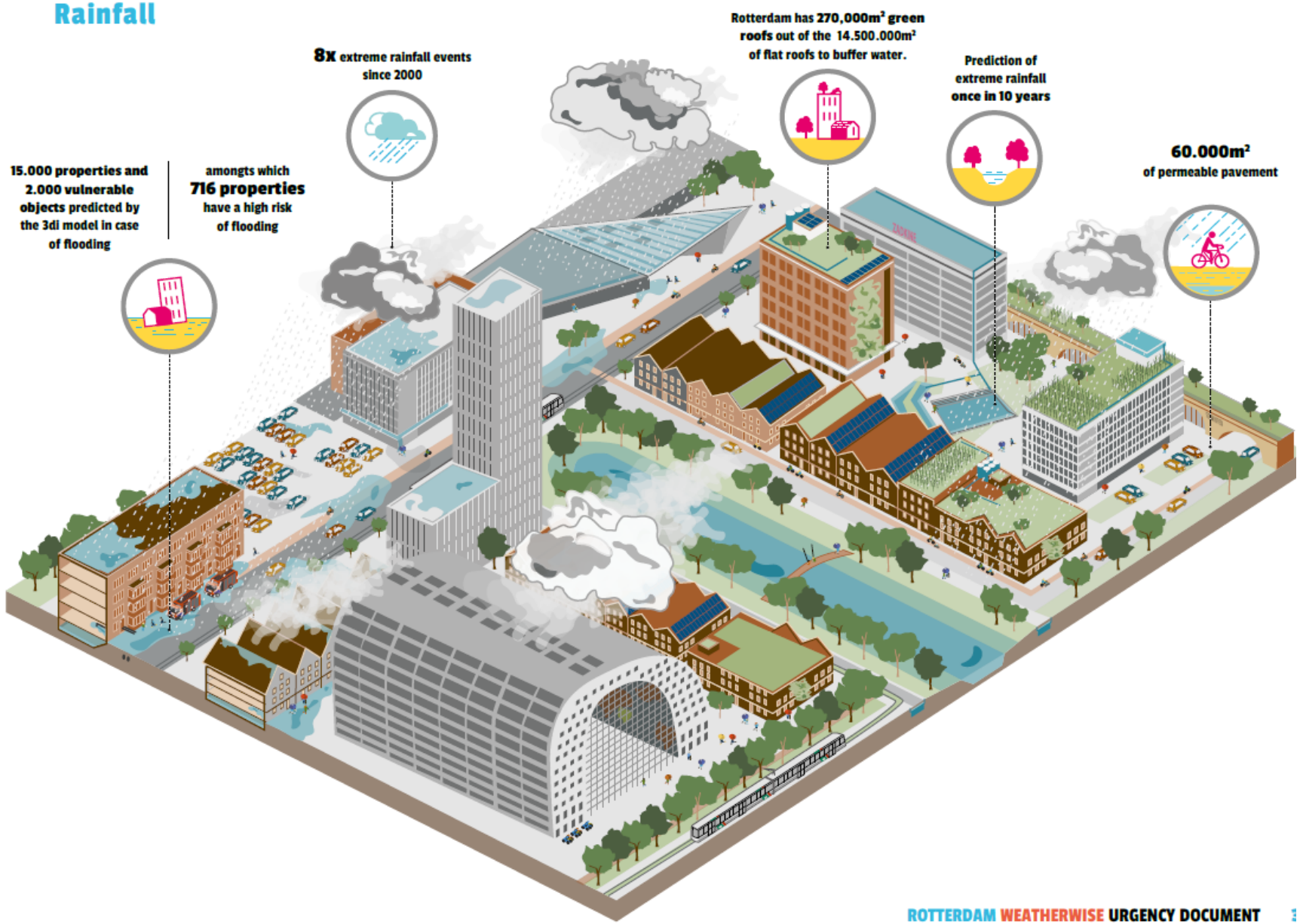
Vulnerable main roads

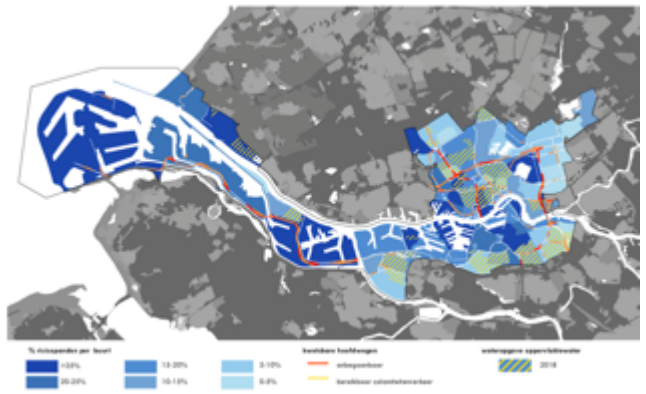
- impassable
- accessible to emergency vehicles

Lack of surface water storage capacity

- 2018

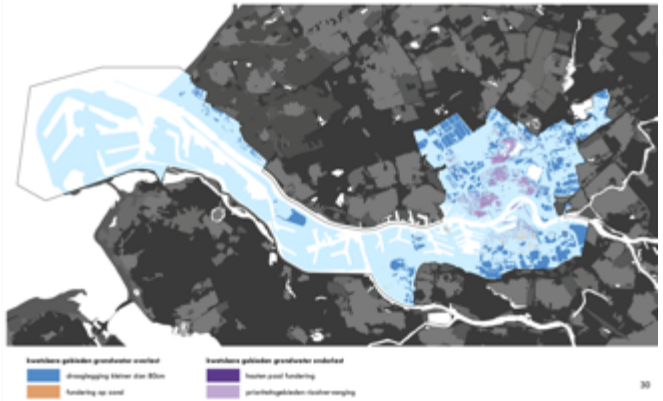
Rainfall


8x extreme rainfall events since 2000
Rotterdam has 270,000m³ green roofs out of the 14.500.000m² of flat roofs to buffer water.
Prediction of extreme rainfall once in 10 years
60.000m² of permeable pavement
15.000 properties and 2.000 vulnerable objects predicted by the 3di model in case of flooding
amongts which 716 properties have a high risk of flooding



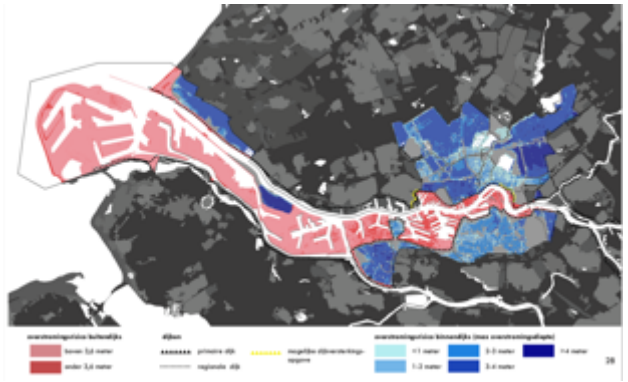
Precipitation

Heat

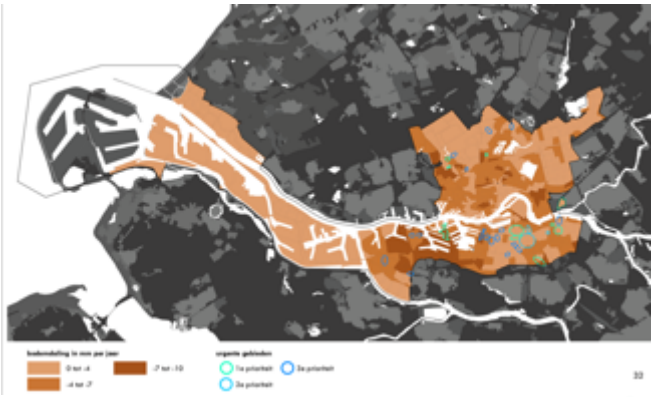


Groundwater

Drought

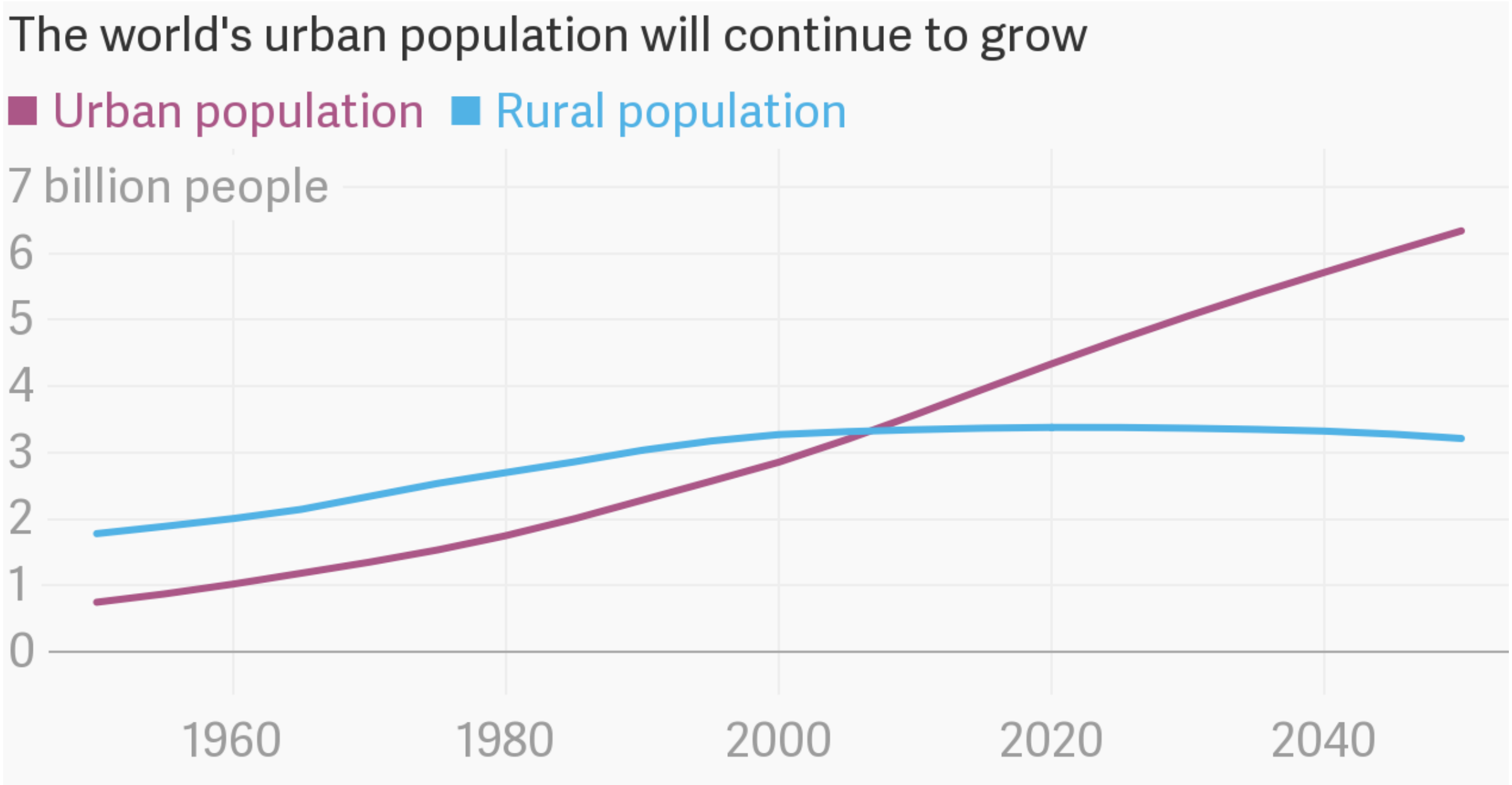


River/sea flooding

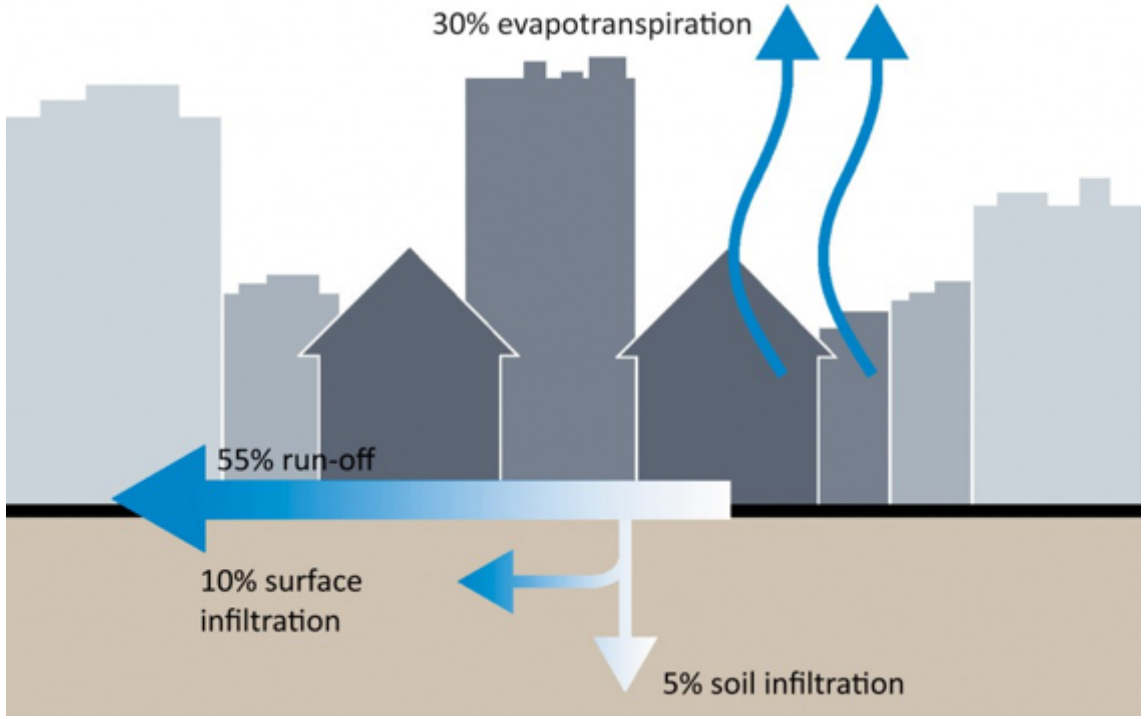


Land subsidence

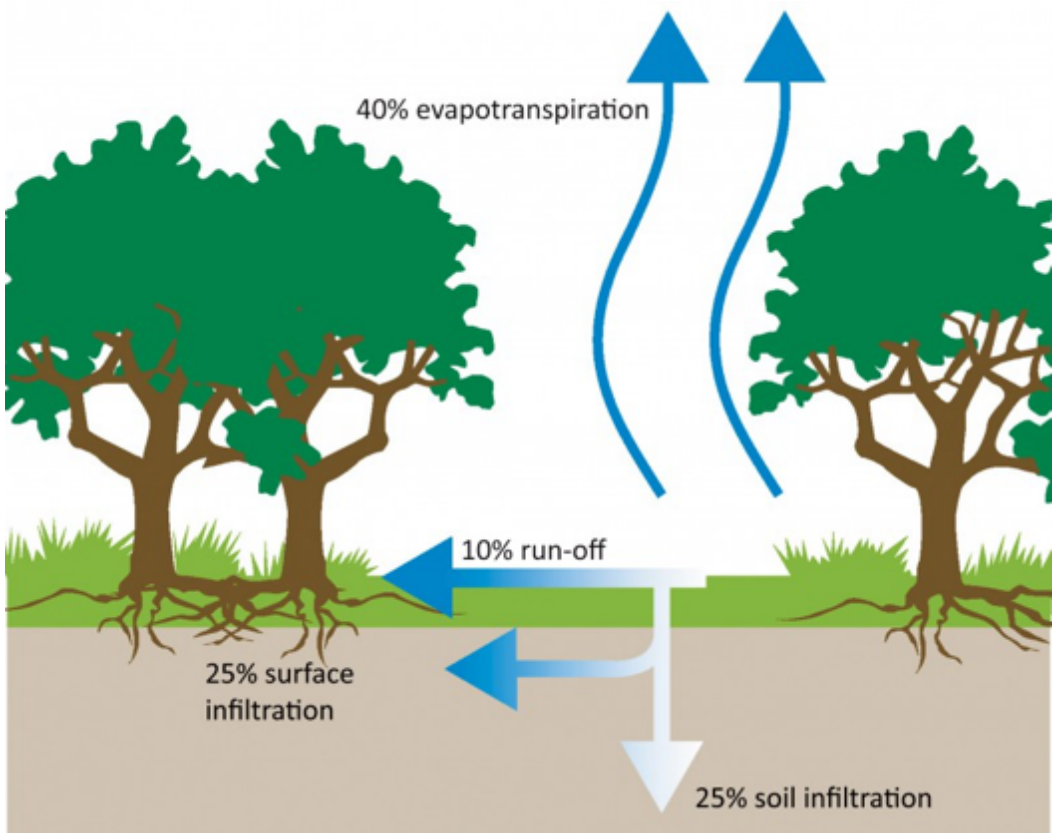
The changing City



Bron: United Nations Department of Economic and Social Affairs



Urban Environment



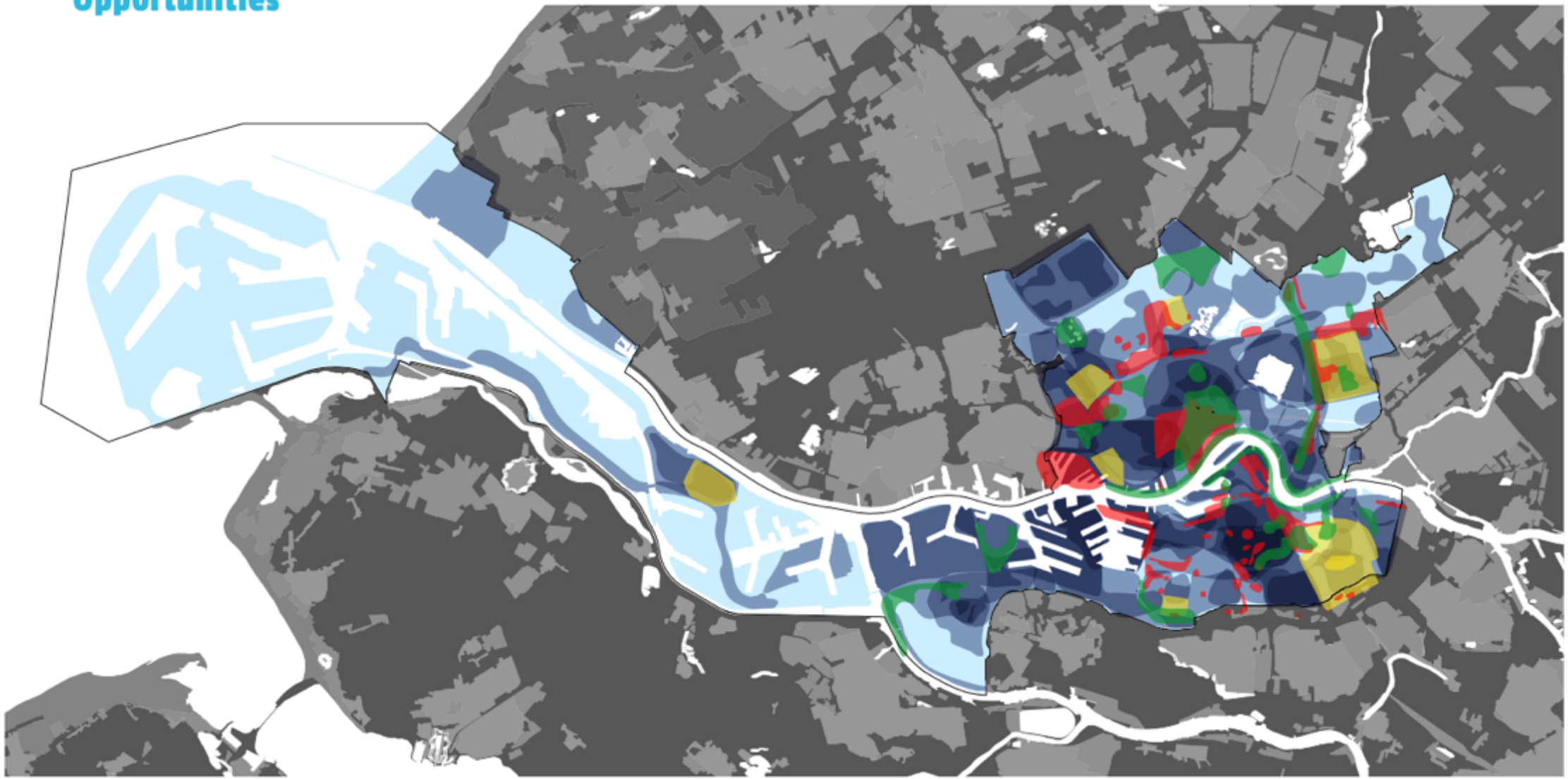
Rural Environment

NOS Nieuws Sport Uitzendingen TELETEKST AEX 3

New executive board Rotterdam wants to accelerate energy transition

26-06-2018, 15:55 AANGEPAST 26-06-2018, 16:27 BINNENLAND

Opportunities



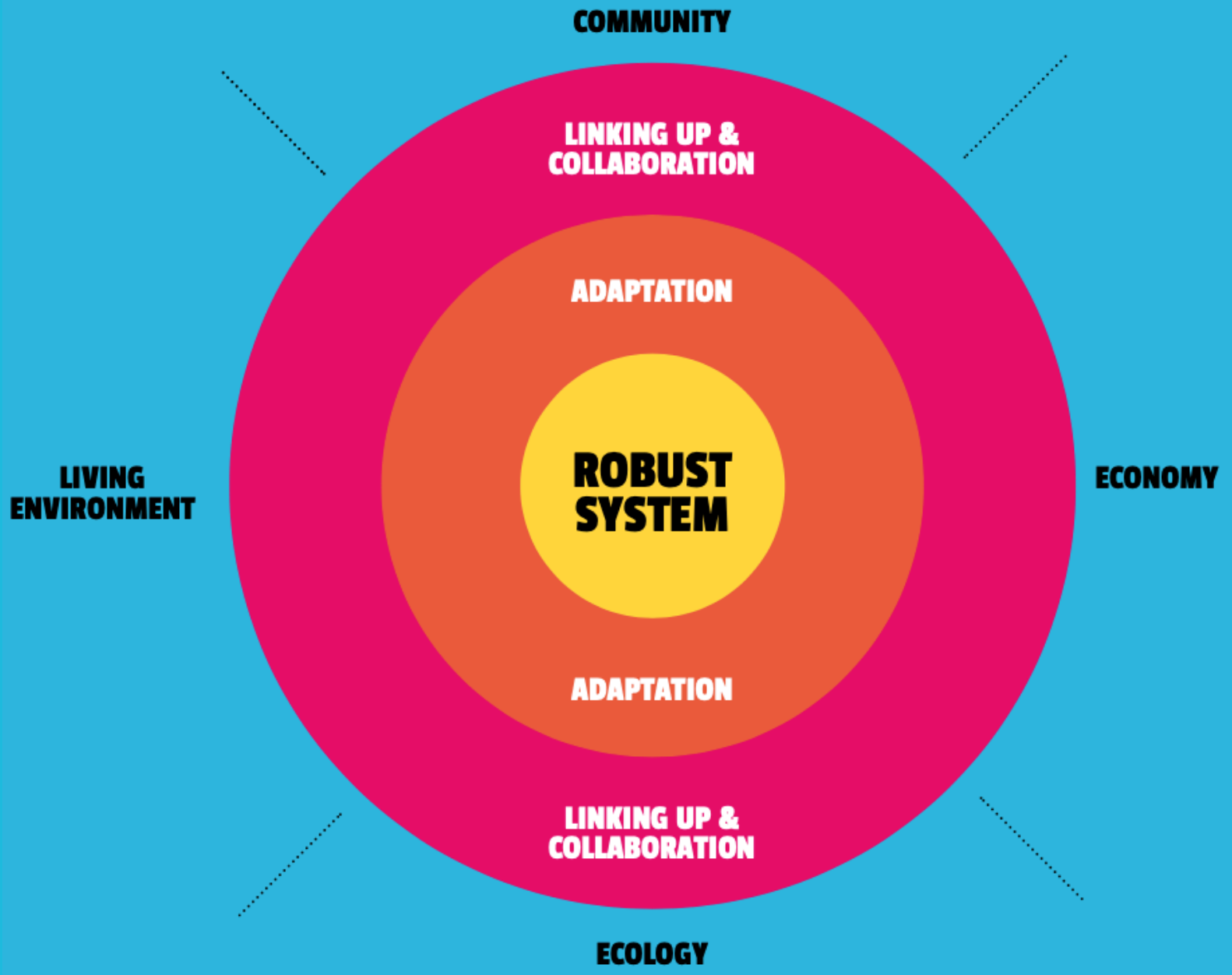
Number of climate themes per area

- 1 to 2
- 3 to 4
- more than 4

Links with other programmes

- energy transition
- housing densification
- introducing greenery

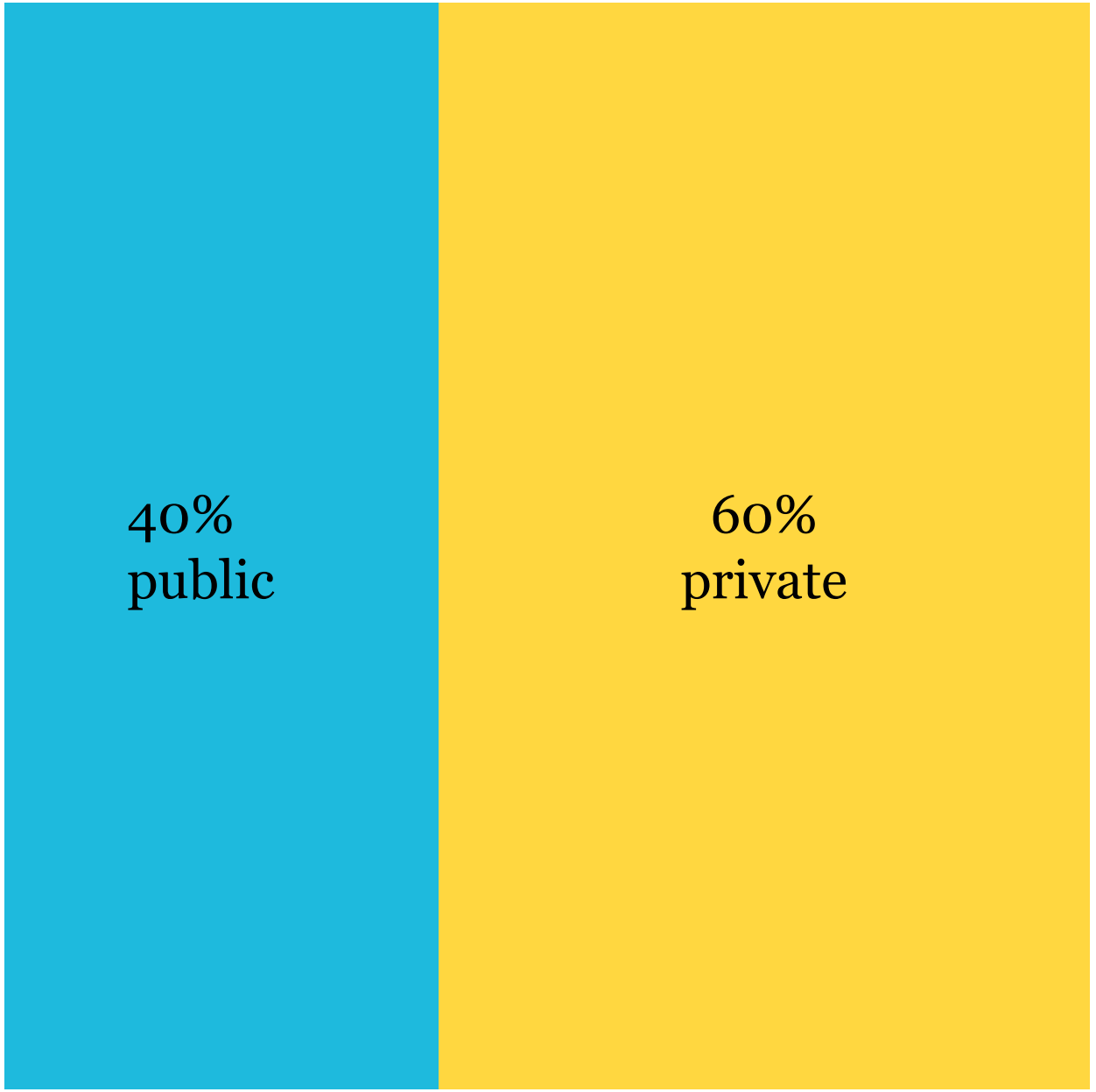
The adaptive city

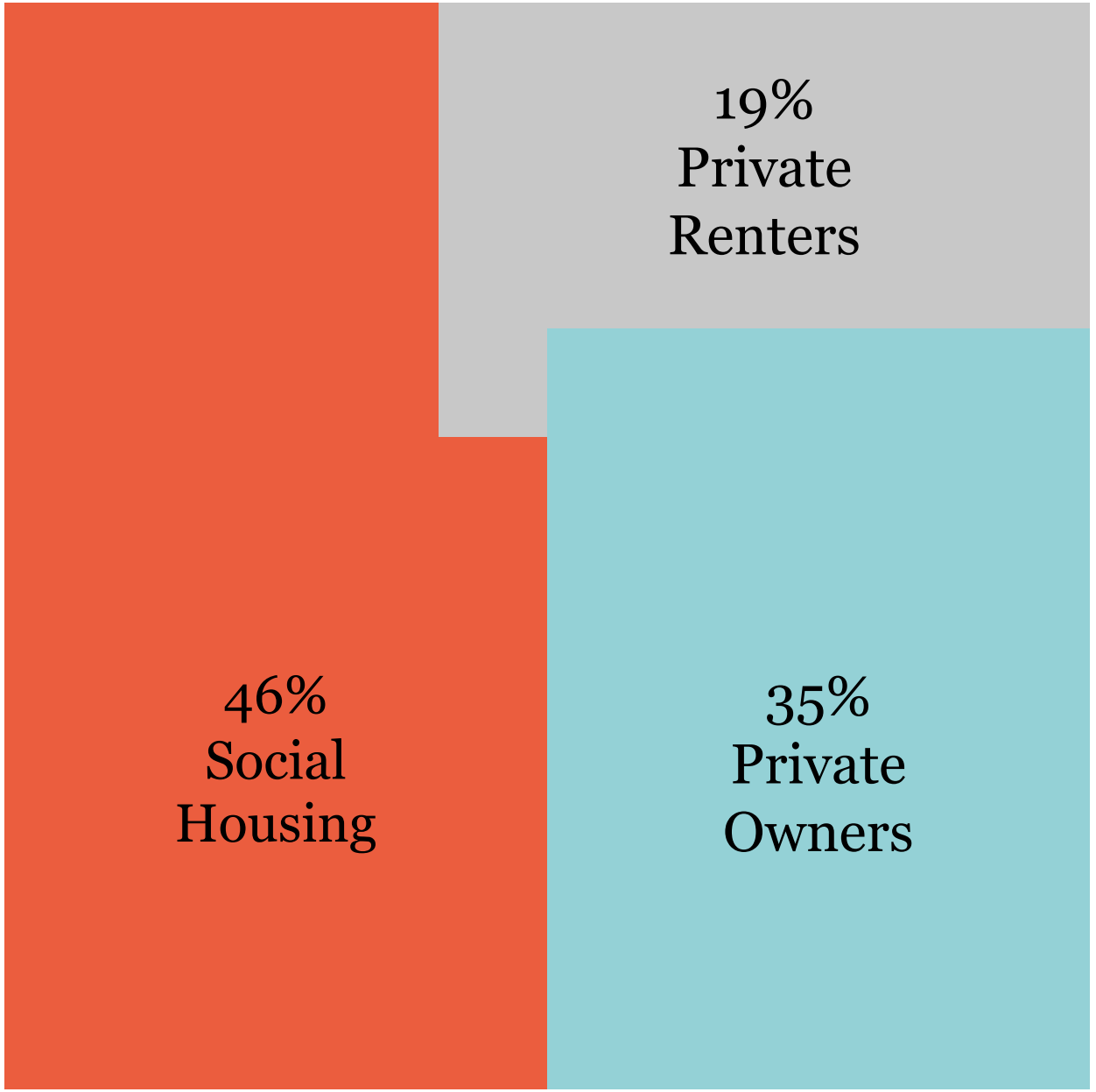

COMMUNITY
LINKING UP & COLLABORATION
ADAPTATION
ROBUST SYSTEM
ADAPTATION
LINKING UP & COLLABORATION
LIVING ENVIRONMENT
ECONOMY
ECOLOGY


blue label
A
B
C
D
E
SKG


ZUHAUSE

The next step

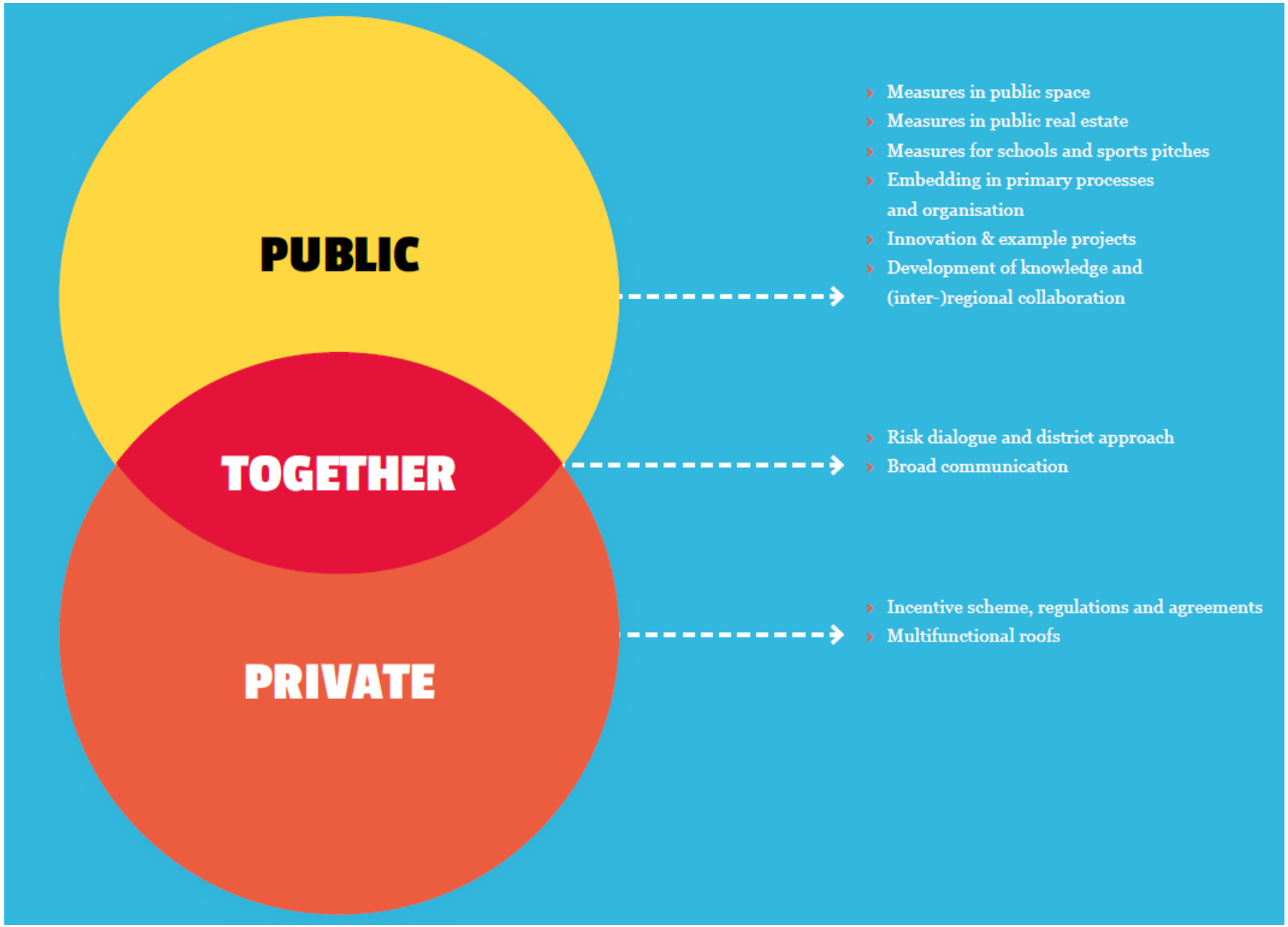

40%
public
60%
private


19%
Private
Renters
46%
Social
Housing
35%
Private
Owners

Social housing corporations

Real estate developers

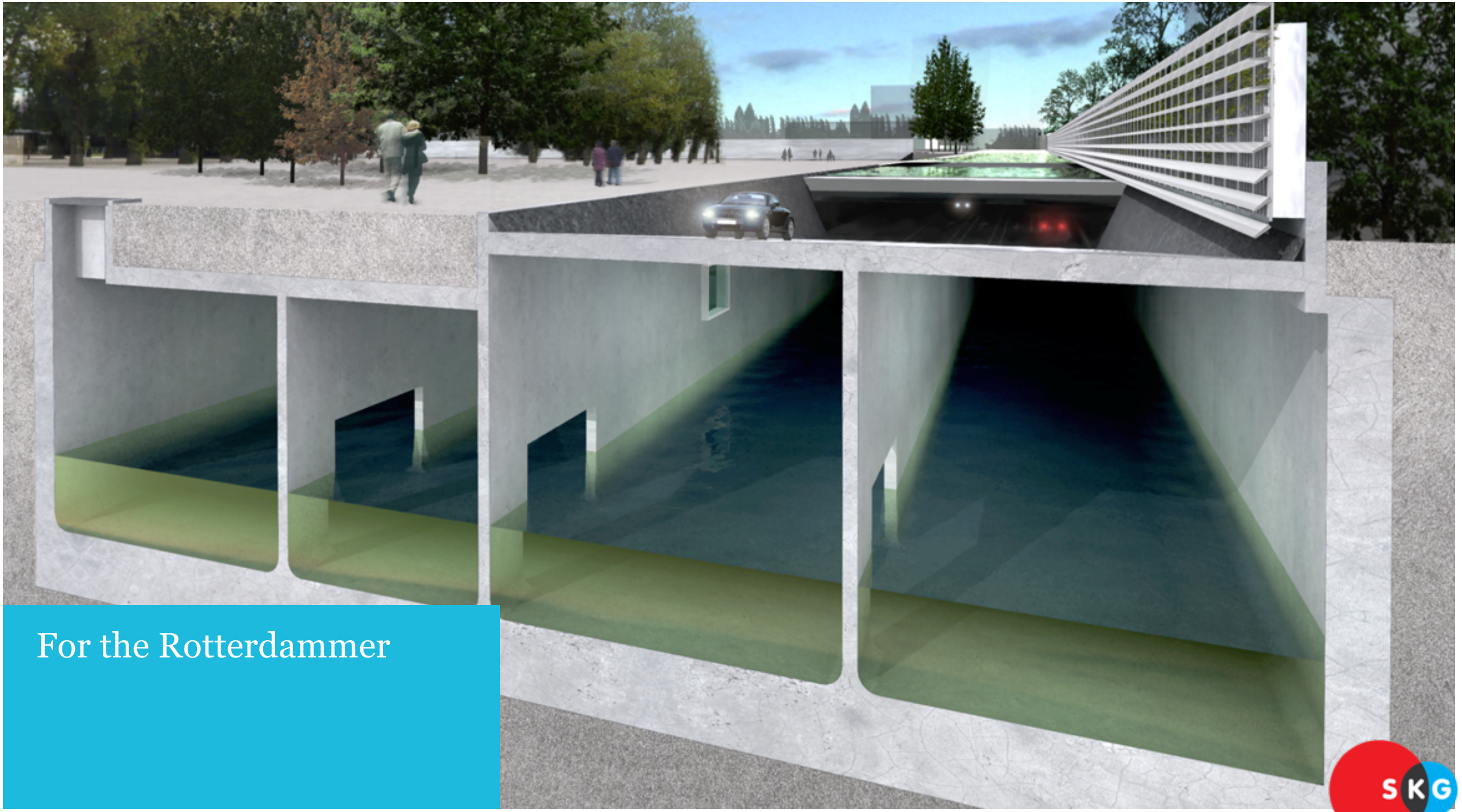
Home owners


PUBLIC
TOGETHER
PRIVATE
Measures in public space
Measures in public real estate
Measures for schools and sports pitches
Embedding in primary processes and organisation
Innovation & example projects
Development of knowledge and (inter-)regional collaboration
Risk dialogue and district approach
Broad communication
Incentive scheme, regulations and agreements
Multifunctional roofs

Club van 50

Rotterdam

SKG



For the Rotterdammer

With the Rotterdammer

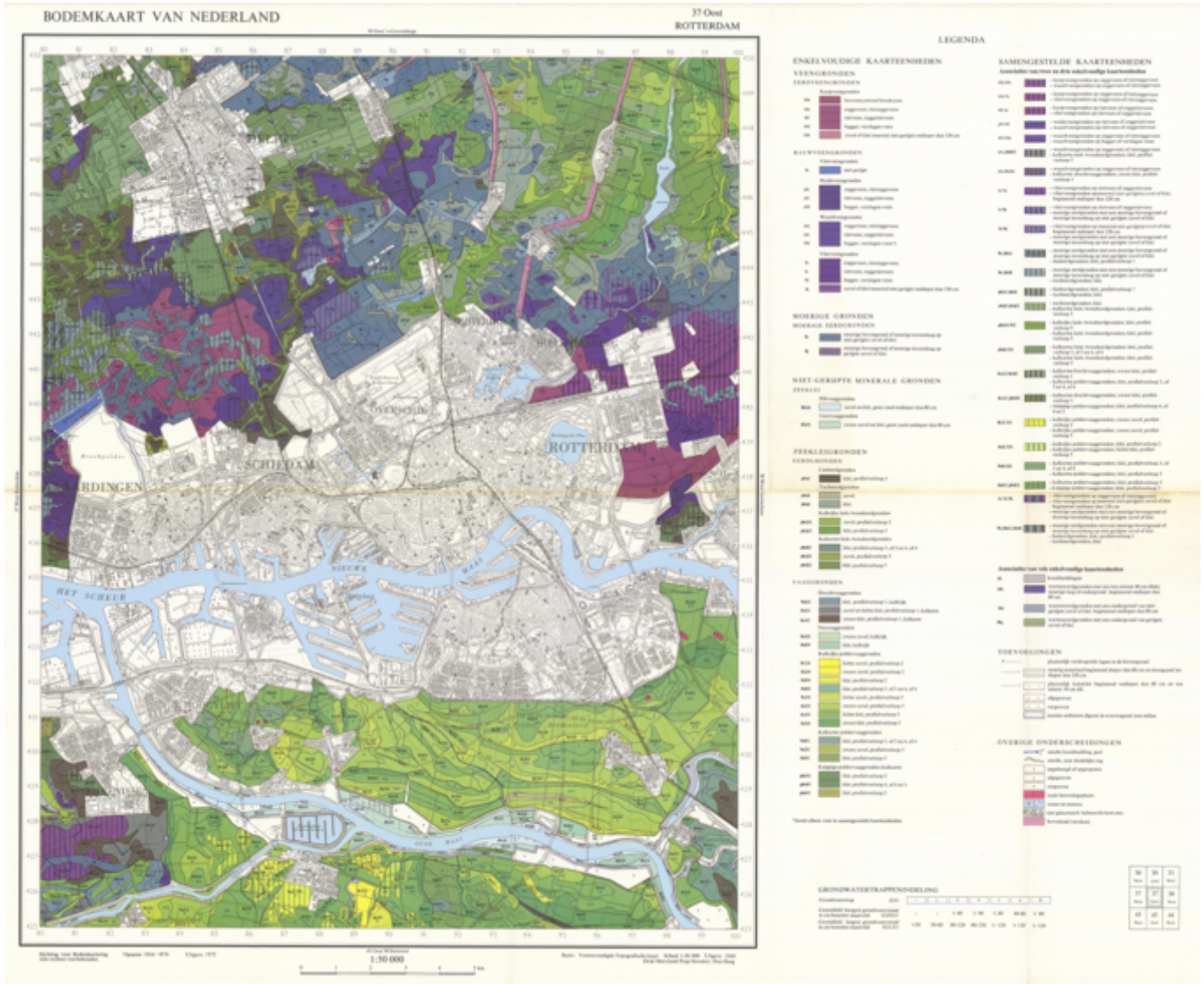
By the Rotterdammer

SUBSURFACE # REVISITED

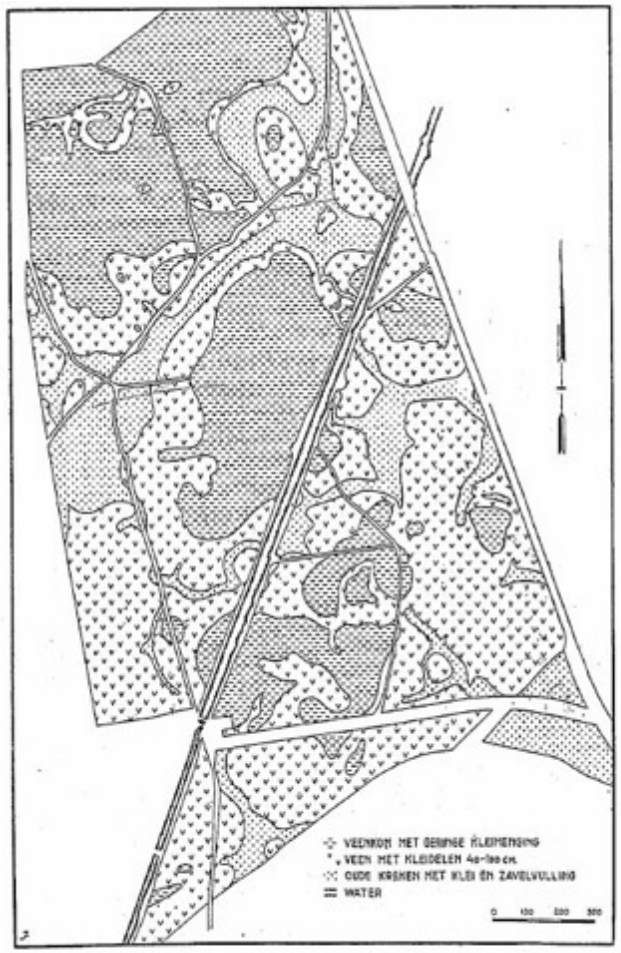
REAL ESTATE & INFRASTRUCTURE CLIMATE RISK MANAGEMENT

FRANSJE HOOIMEIJER

FREUD UNLIMITED, 1975, FROM THE NEW YORK SERIES. MADELON VRIESENDORP

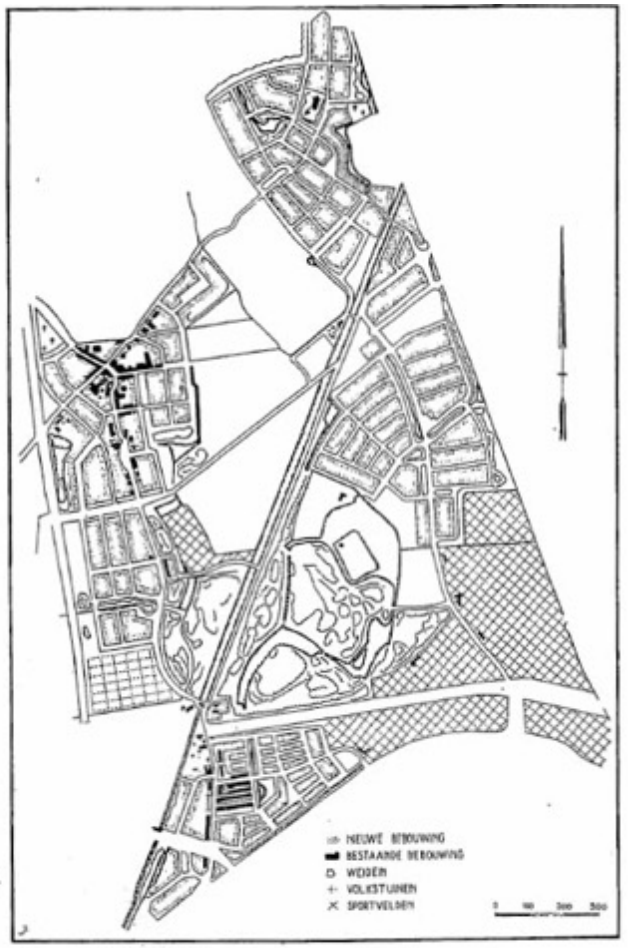


SOIL MAP OF THE NETHERLANDS



Kaart 1. Bodemkaart van Kethel en omgeving

Map 1. Soilmap of the village of Kethel (north of Schiedam)
Legend: 1. Peat. 2. Peat with clay. 3. Clay and sandy clay (old creeks). 4. Water.

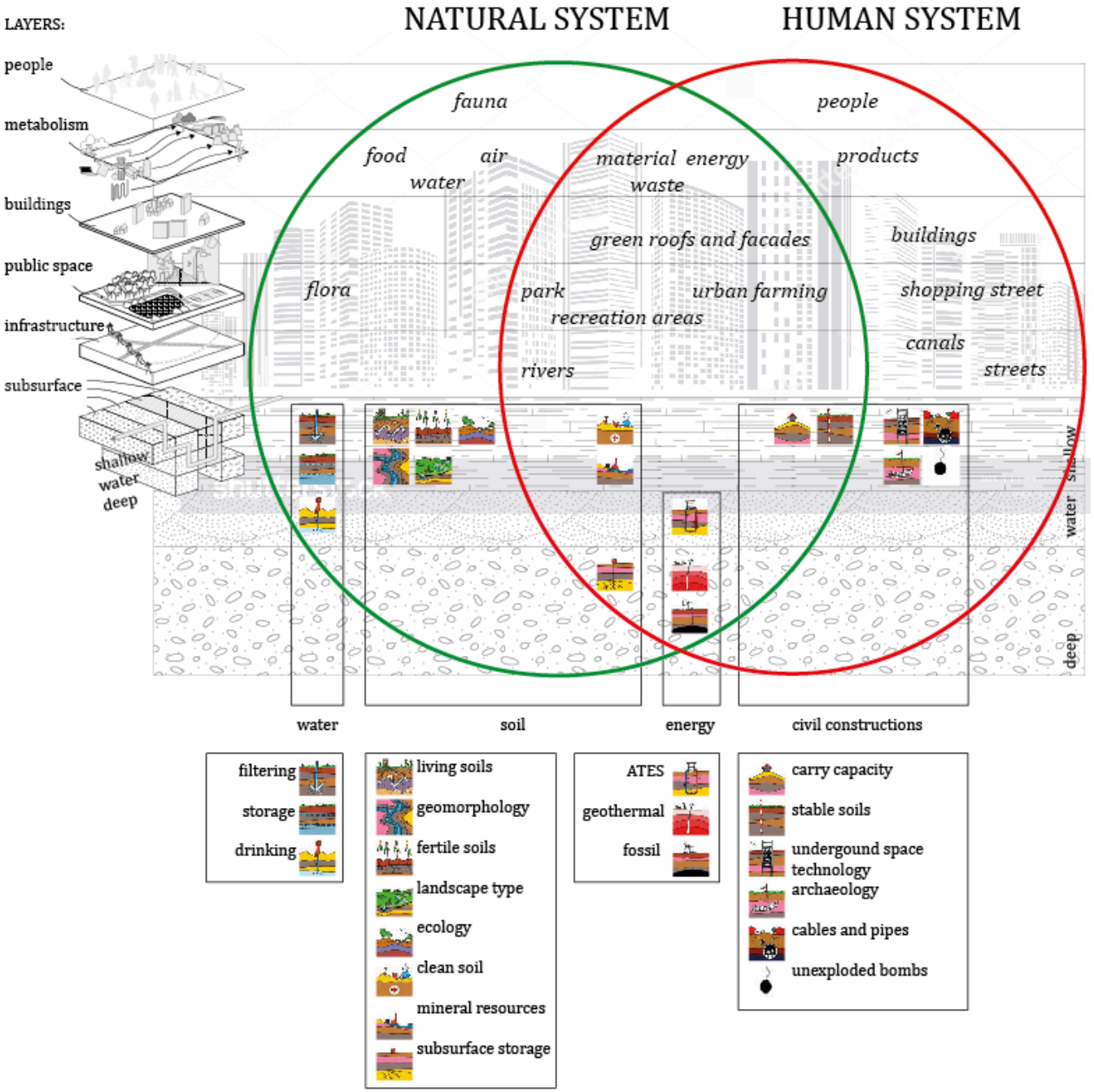


Kaart 2. Bebouwingsplan voor Kethel en omgeving

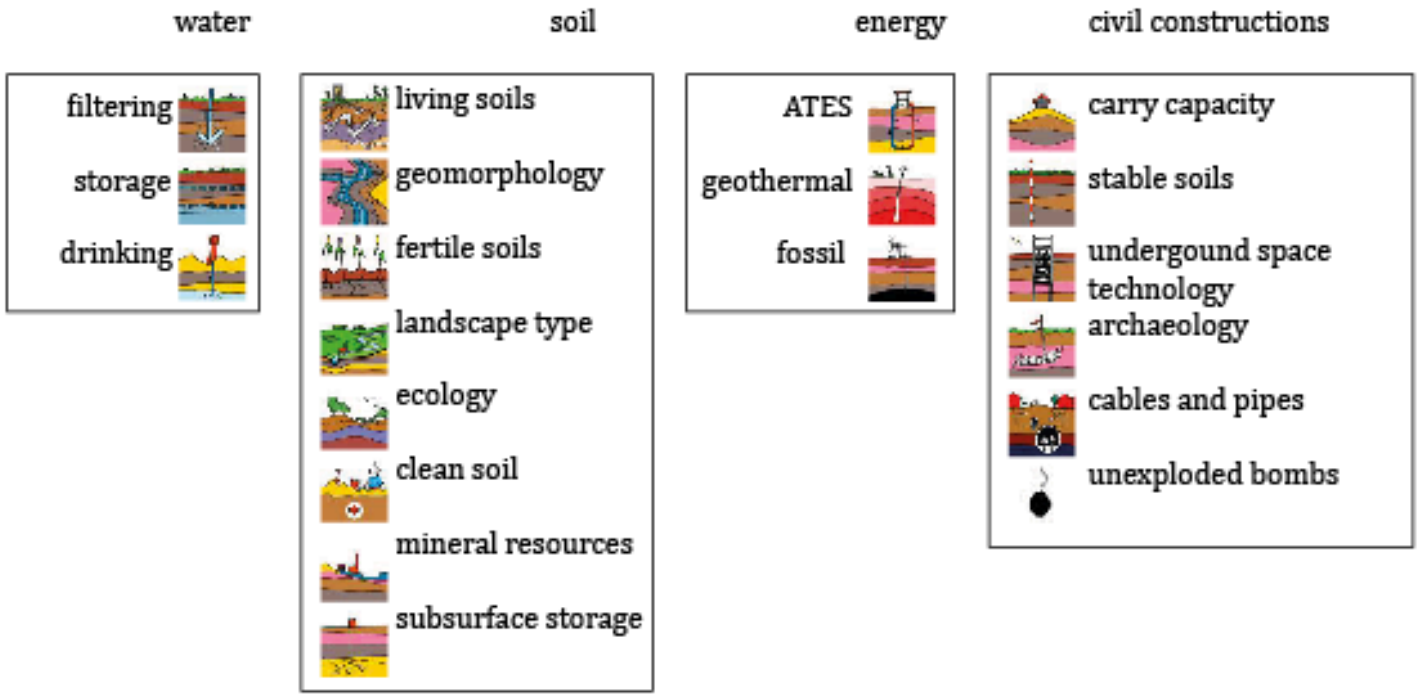
Map 2. Townplanning map of the village of Kethel
Legend: 1. New planned houses, 2. Existing buildings, 3. Pasture land, 4. Allotment gardens, 5. Playing-grounds

KETHEL BY EDELMAN AND BIJHOUWER (1959)

SUBSURFACE#REVISITED

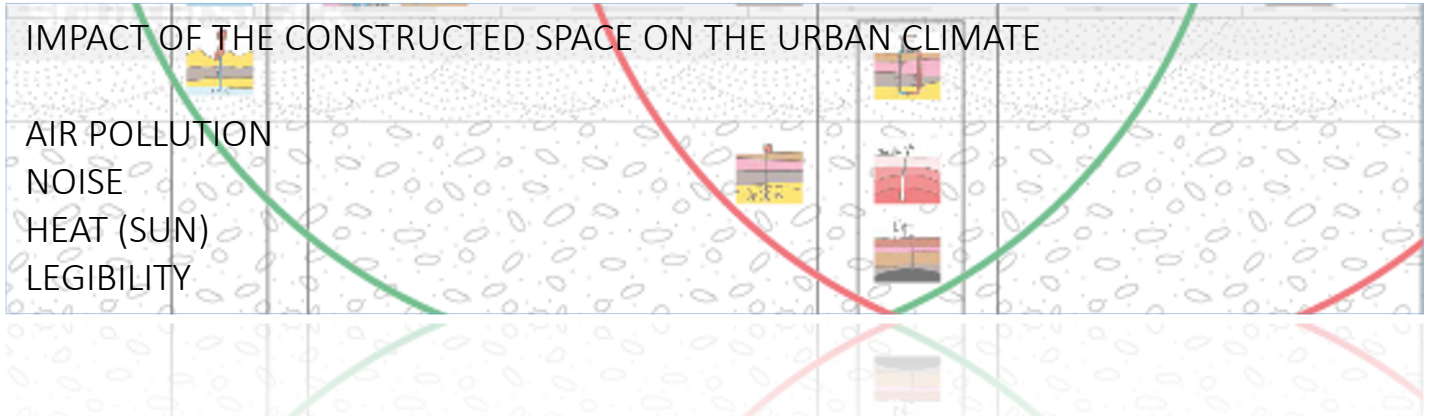


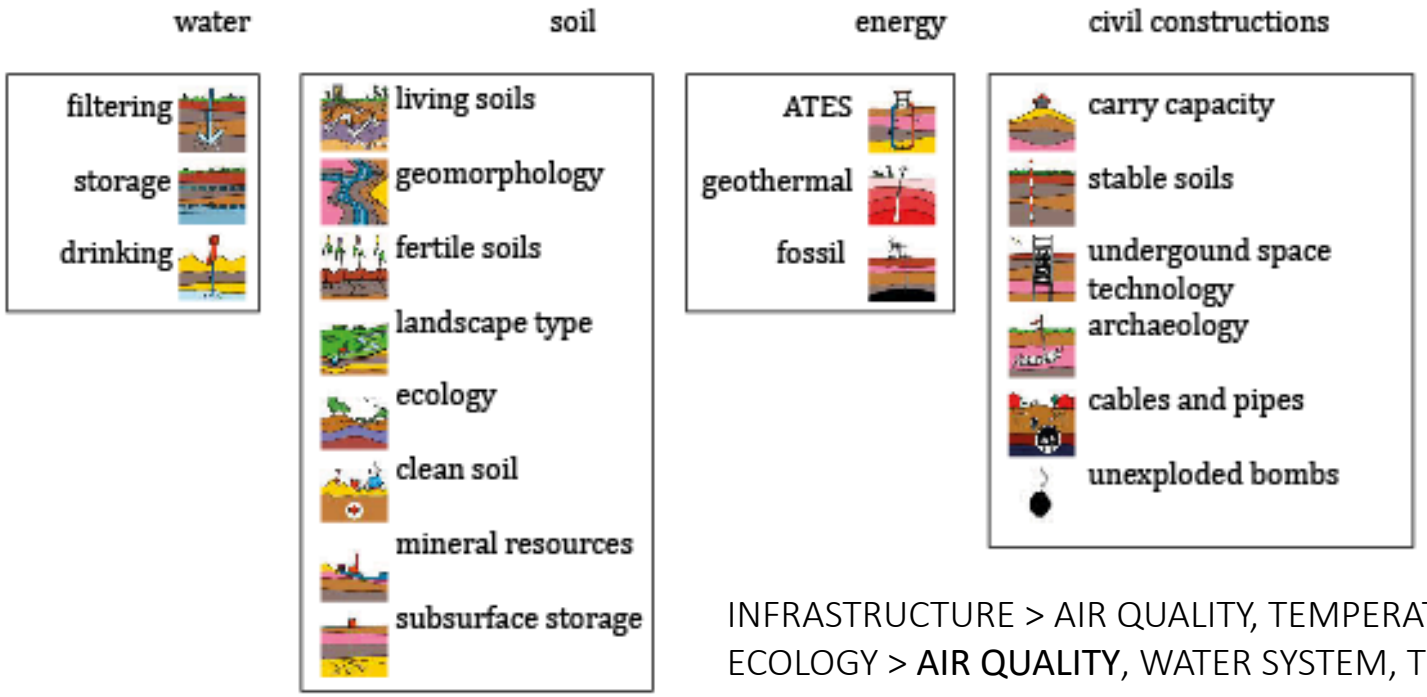
SUBSURFACE#REVISITED



SUBSURFACE#REVISITED

PLUVIAL FLOODING
ENERGY TRANSITION
BIODIVERSITY IMPROVEMENT





INFRASTRUCTURE > AIR QUALITY, TEMPERATURE, NOISE
ECOLOGY > **AIR QUALITY**, WATER SYSTEM, TEMPERATURE, LEISURE
OPEN SOIL >TEMPERATURE, AIR QUALITY, WATER SYSTEM
BUILDINGS > WATER SYSTEM

SUBSURFACE#REVISITED

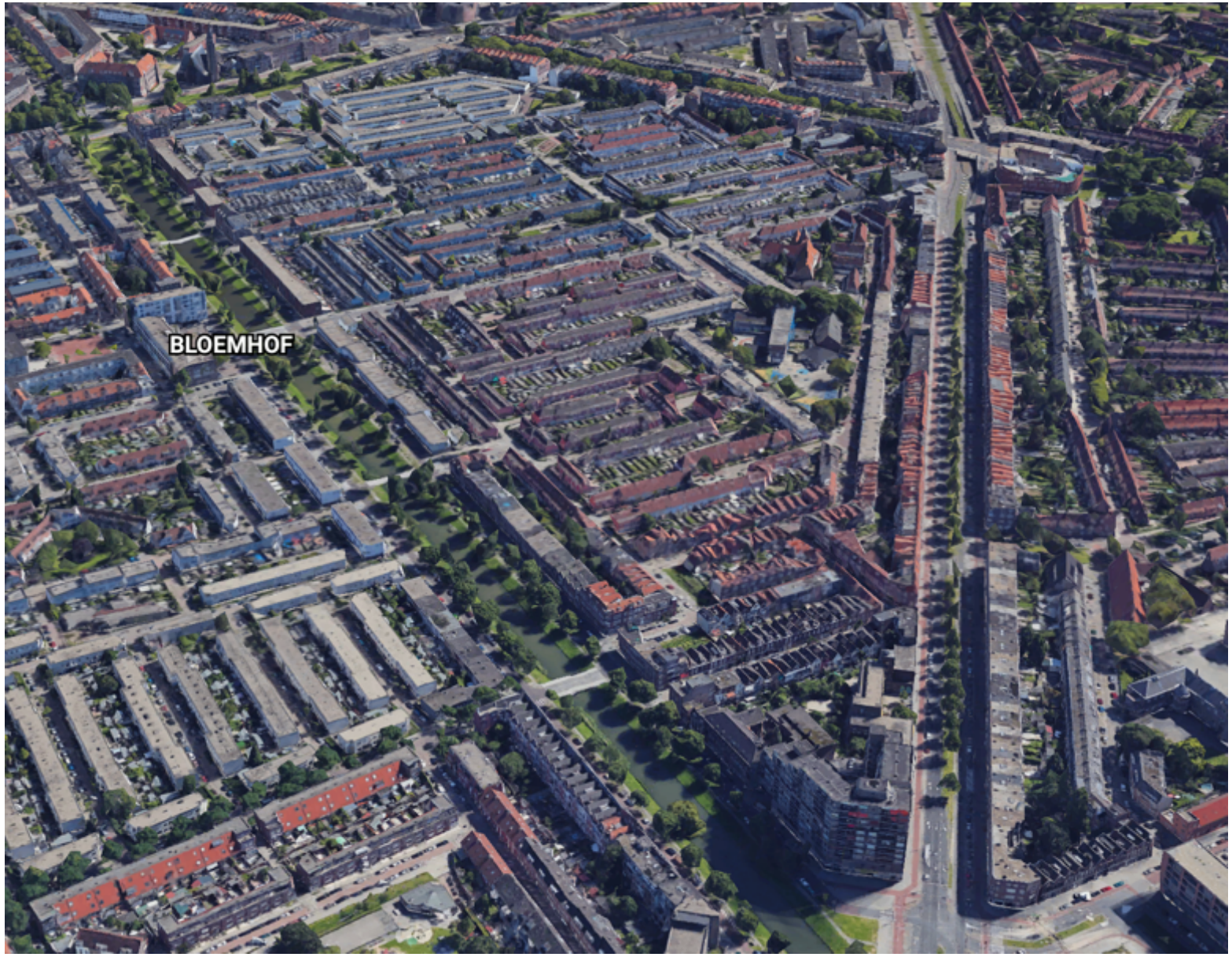
REVERSED ENGINEERING WITH NATURE

SUBSURFACE#REVISITED

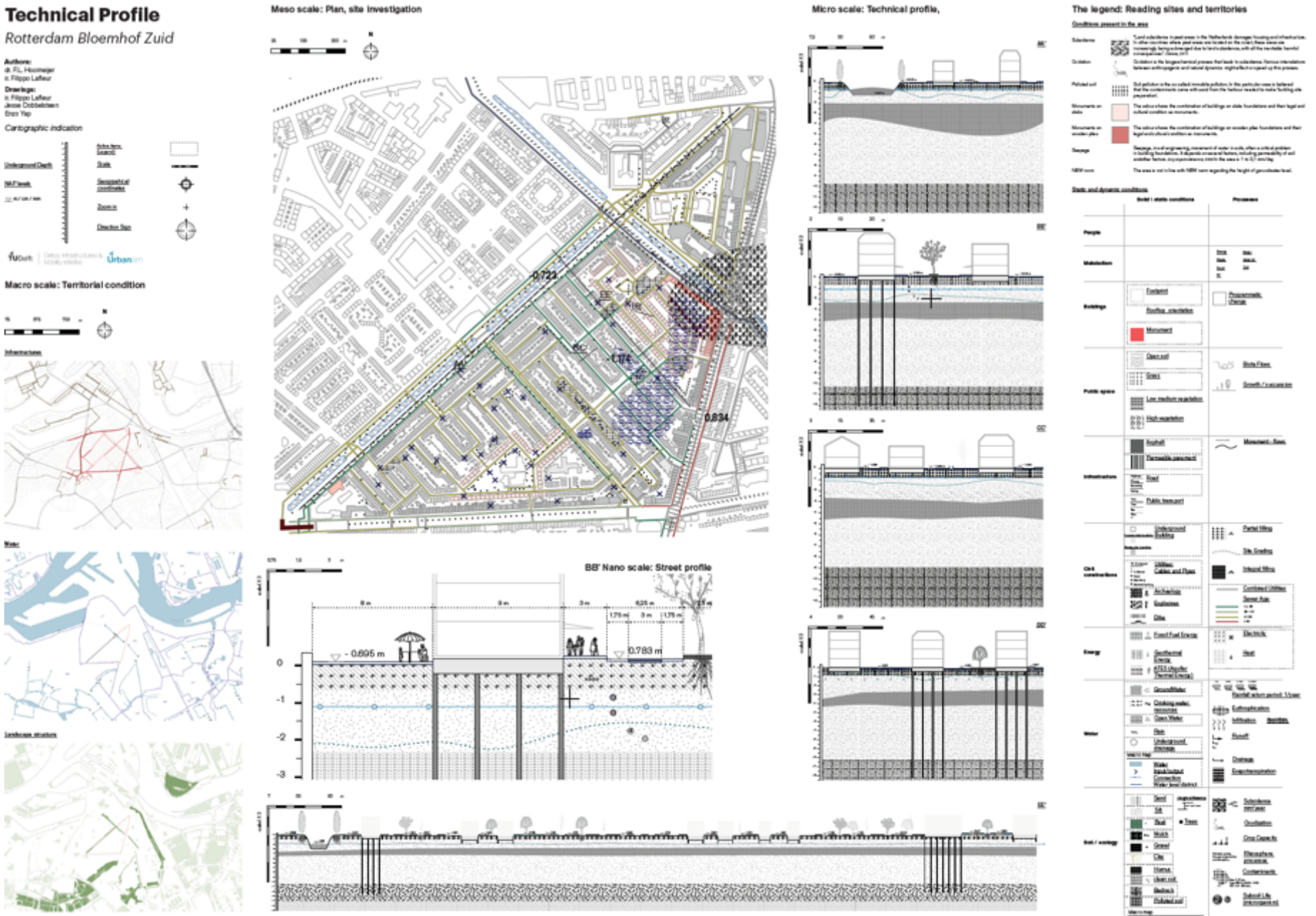
EGO

ECO

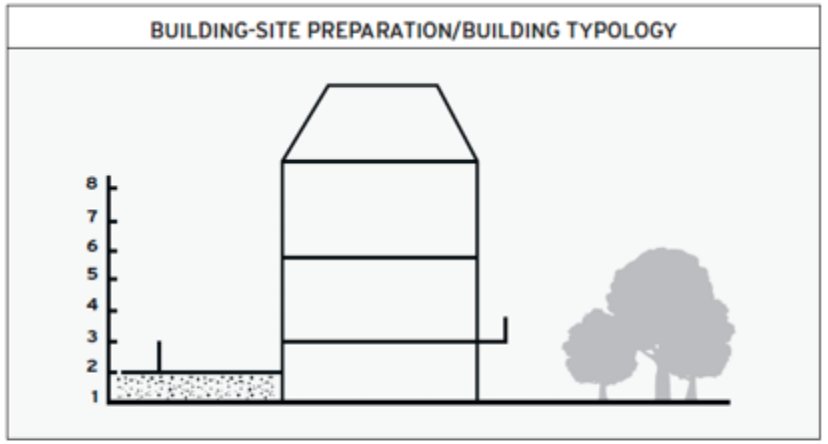
REVERSED ENGINEERING WITH NATURE


BLOEMHOF

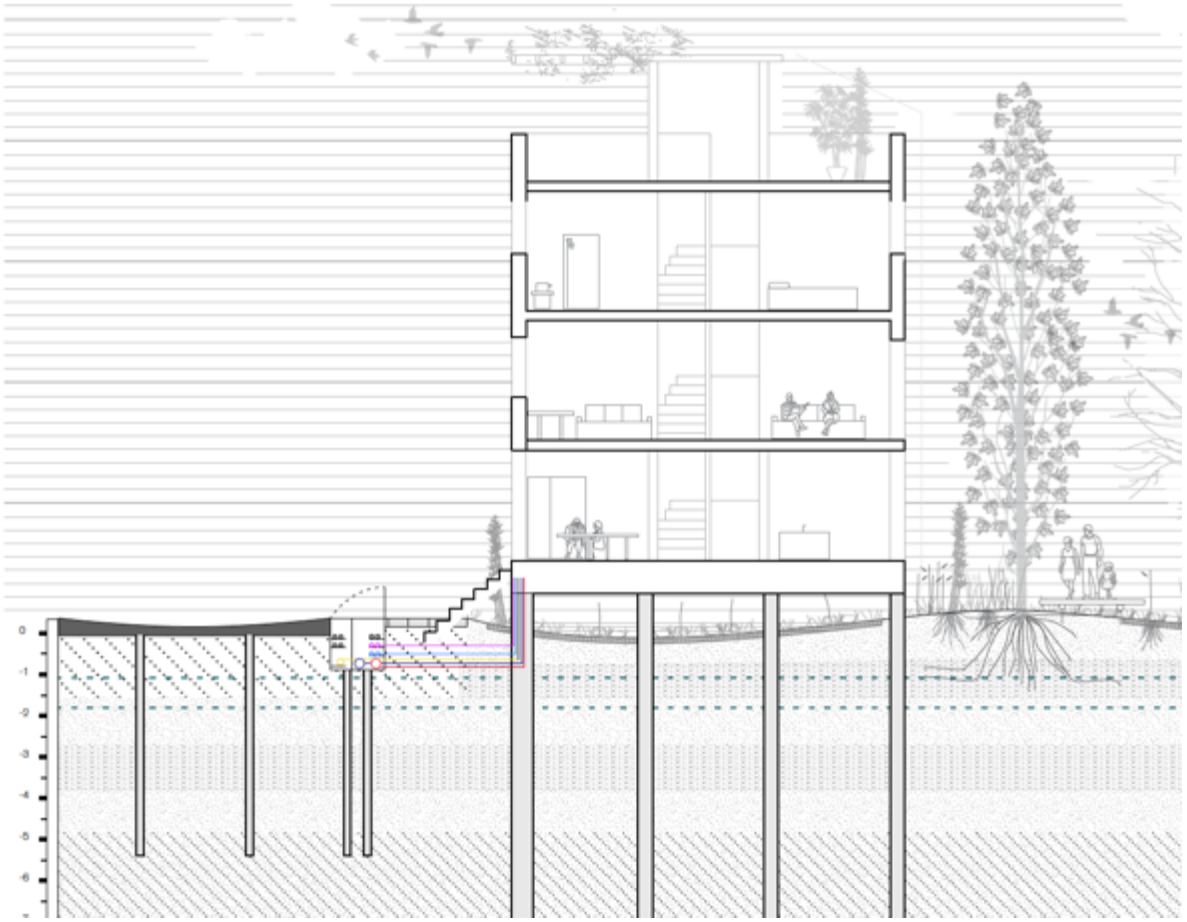
SUBSURFACE#REVISITED

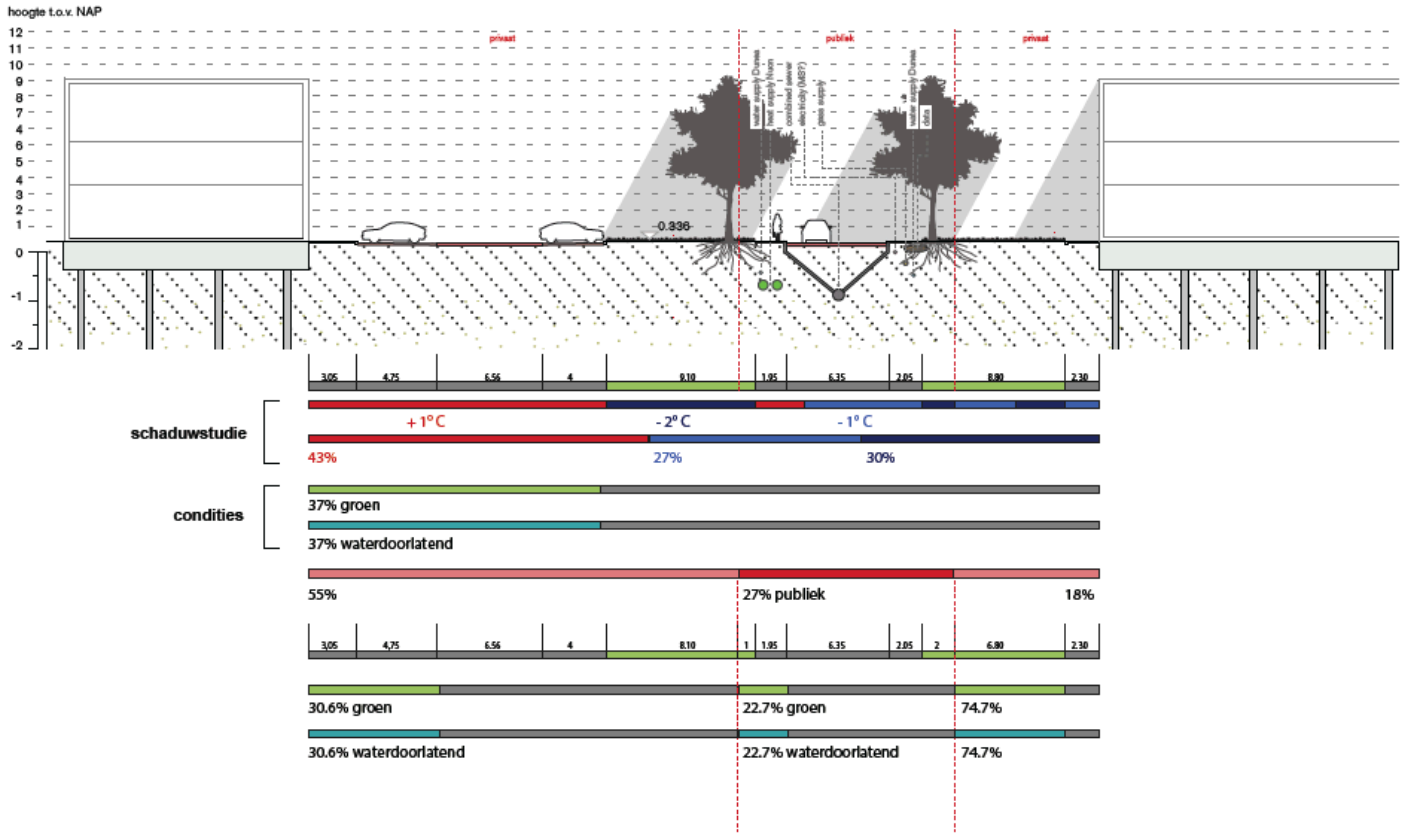


TECHNICAL PROFILE OF A CITY. LAFLEUR



Building-site preparation vs building typology
Due to the procedure that the streets were raised and the backyards were not, left room for housing developers to make a basement level. Source: Hooimeijer, drawn by Minke Themans




hoogte t.o.v. NAP
12
11
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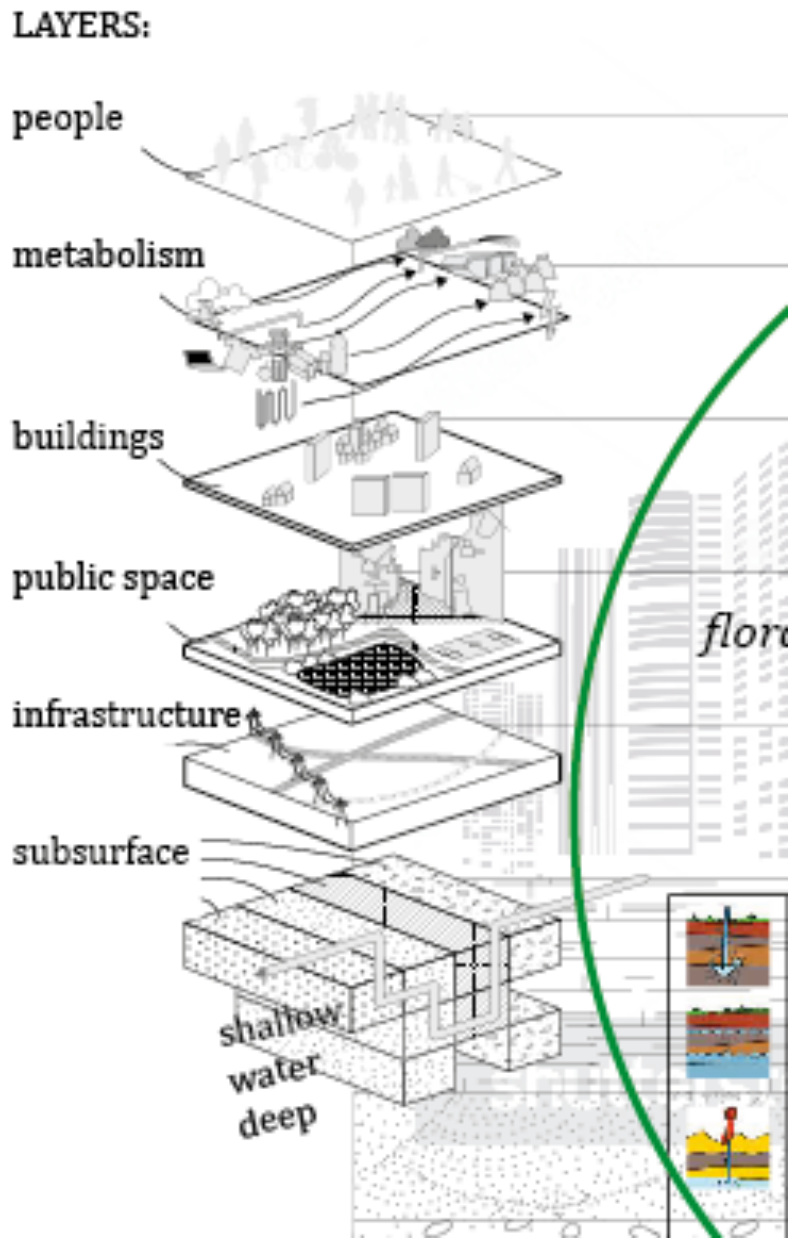
4
3
2
1
0
-1
-2
privaat
publiek
privaat
0.338
3.05
4.75
6.56
4
8.10
1.95
6.35
2.05
8.80
2.30
schaduwstudie
+1°C
-2° C
-1° C
43%
27%
30%
condities
37% groen
37% waterdoorlatend
55%
27% publiek
18%
3.05
4.75
6.56
4
8.10
1
1.95
6.35
2.05
2
6.80
2.30
30.6% groen
22.7% groen
74.7%
30.6% waterdoorlatend
22.7% waterdoorlatend
74.7%

Conclusion

- NEW EXCHANGE BETWEEN SCALE OF BUILDING AND INFRASTRUCTURE
- NEW PARAMETERS FOR COST VS BENEFITS CONSIDERING STAKEHOLDERS (PUBLIC VS PRIVATE) AND TIME FRAME (SHORT VS LONG BENEFITS)
- new arrangements
- new practice



Preparing our city for a more extreme climate together

ROTTERDAM WEATHERWISE

SKG

Setting the Agenda

Defining key insights, questions and follow-ups

I would like to:

- Collaborate on a research bid
- Serve on an advisory group for a future project
- Be a partner for sharing project outputs with practitioners
- Stay updated about further developments on the project
- Other (let us know!)

Expert Meeting

Urban Real Estate & Infrastructure Climate Risk Management

Thursday 12 March

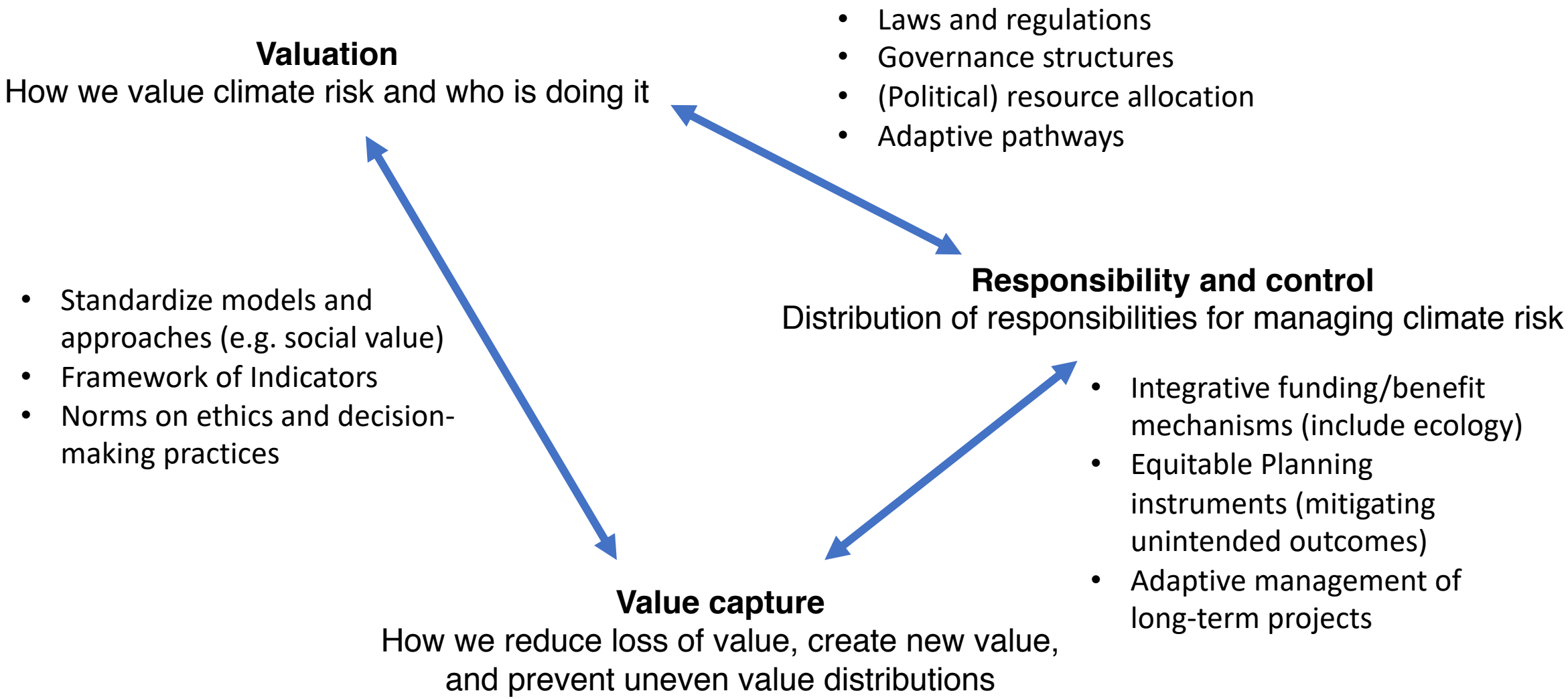
13.00 – 18.00 walk-in from 12.00

Delft

Berlagezaal

Julianalaan 134, Delft

Framework


Valuation
How we value climate risk and who is doing it
• Laws and regulations
• Governance structures
• (Political) resource allocation
• Adaptive pathways
Responsibility and control
Distribution of responsibilities for managing climate risk
• Standardize models and approaches (e.g. social value)
• Framework of Indicators
• Norms on ethics and decision-making practices
• Integrative funding/benefit mechanisms (include ecology)
• Equitable Planning instruments (mitigating unintended outcomes)
• Adaptive management of long-term projects
Value capture
How we reduce loss of value, create new value, and prevent uneven value distributions