



GLOBAL
CENTER ON
ADAPTATION

Deltares

Water Adaptation Community Webinar

Resilient Delta Cities – Adaptation Analysis, Planning, and Implementation

16th June 2023, 13:00 CEST



Webinar Knowledge Kit

Knowledge Kit Content

- Background
- **Presentation:** Rotterdam Water Resilience
- **Presentation:** Delta Cities and Locally Led Adaptation
- **Presentation:** Resilient Urban Water Systems
- **Presentation:** Jakarta's Resilience Plans
- **Presentation:** Adapting coastal cities along the Paraná Delta
- **Presentation:** Rebuild by Design USA Urban Delta Resilience
- Related Links
- Stay Connected

Background

Chair:

Mr. Nishchal Sardjoe, Deltares Indonesia

Speakers:

- Dr. Hans Gehrels, Global lead on Urban Resilience, Deltares
- Mr. Arnoud Molenaar, Chief Resilience Officer, City of Rotterdam
- Mr. Andhika Ajie, CEO of the Center for Research & Innovation of Jakarta City and Chief Resilience Officer of Jakarta
- Ms. Verónica M.E. Zagar, Researcher at TUDelft, Argentinean Wing Coordinator - Delta Alliance International
- Mr. Chris Zevenbergen, Professor of Flood Resilience of Urban Systems UN-IHE
- Mrs. Amy Chester ReBuild by Design

Watch the recording [here](#).

- Marine transportation and ocean tourism are trillion-dollar industries. Without climate adaptation measures, damage to infrastructure, losses in crop production, and reduced fishing yields could cause average GDP losses of up to 19.5 percent in the world's deltas similarly, it is estimated that flooding due to climate change could affect 20% of global GDP. As the impacts of climate change continue to intensify, flooding risk will increase, putting infrastructure valued between US\$7.9 and US\$12.7 trillion at risk, as well as the lives of hundreds of millions of people. With 40% of the global population living within 100 km of the coast and 11% living in low-lying coastal areas, the impacts of sea level rise could be felt as soon as 2050. Accelerating adaptation efforts is essential to protect people, landscapes, economies, and even the very existence of some islands and deltaic coasts.
- "Futureproofing Water and Climate Adaptation" is a webinar series focused on adaptation strategy, practices, and financing for deltas, urban deltas, small islands and coastal areas. The series is designed to support the ambition of the International Panel on Deltas and Coastal Areas - to build capacity for effective adaptation planning, governance and finance – through online knowledge sharing and creation. This series of webinars consists of sharing good practices, panel discussions and interactive community dialogues. The webinar, "Resilient Delta Cities," shares cases of good adaptation practices in urban deltaic regions.
- Learn more and join the Water Adaptation Community: <https://communities.adaptationportal.gca.org/>
- Learn more about the International Panel on Deltas and Coastal Areas: <https://deltasandcoasts.net/>

Rotterdam: Water & Climate Resilient City

- ❑ THE APPROACH
- ❑ THE LESSONS

Arnoud Molenaar

Chief Resilience Officer, City of Rotterdam

 @ResilientRdam

www.resilientrotterdam.nl

Water
Adaptation
Community



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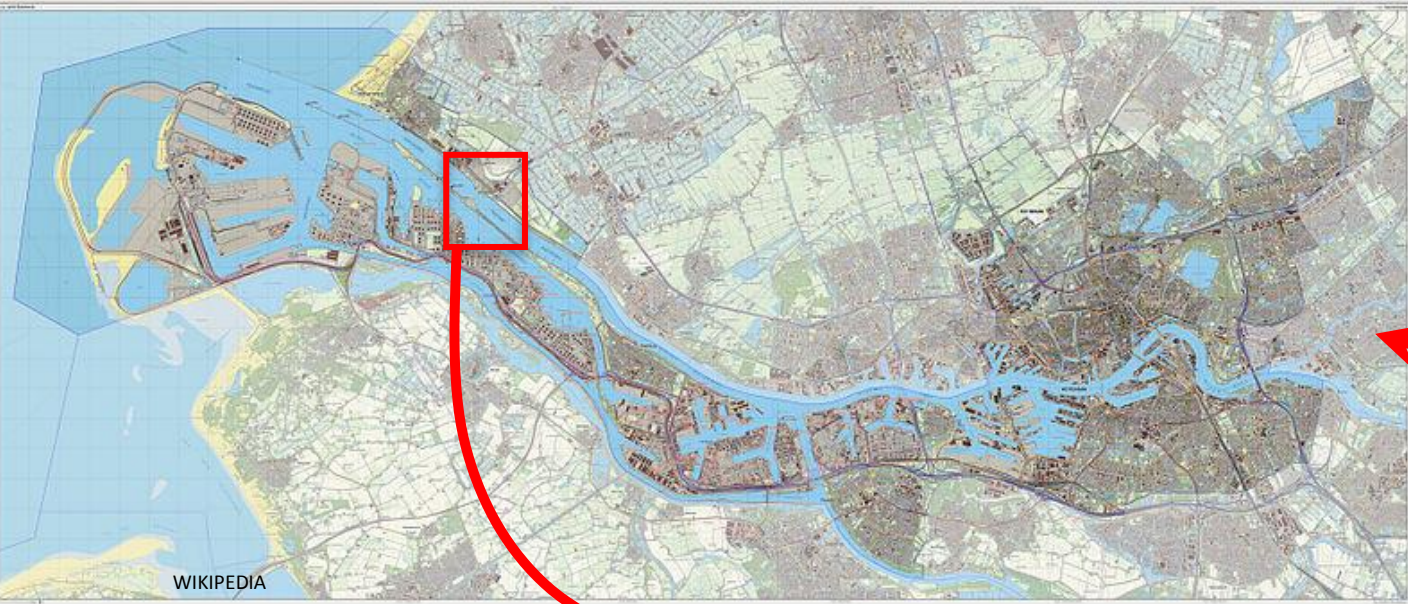
Rotterdam Delta and Port City

City

Area : 320 km²
Inhabitants: 650.000
Nationalities: 175
Municipal Budget: 4 billion Euro's

Port

Area: 105 km² (50 km² commercial sites)
Length of port area: 45 km.
Direct employment: over 70,000 jobs



WIKIPEDIA



Topo map: above
(brown) and below
(blue) sea level



+ 50.000 HOUSES



f/otografie

Effects related to Climate Change



Flooding Noordereiland



Water quality



Excessive rain fall



Levee breakthrough (drought)

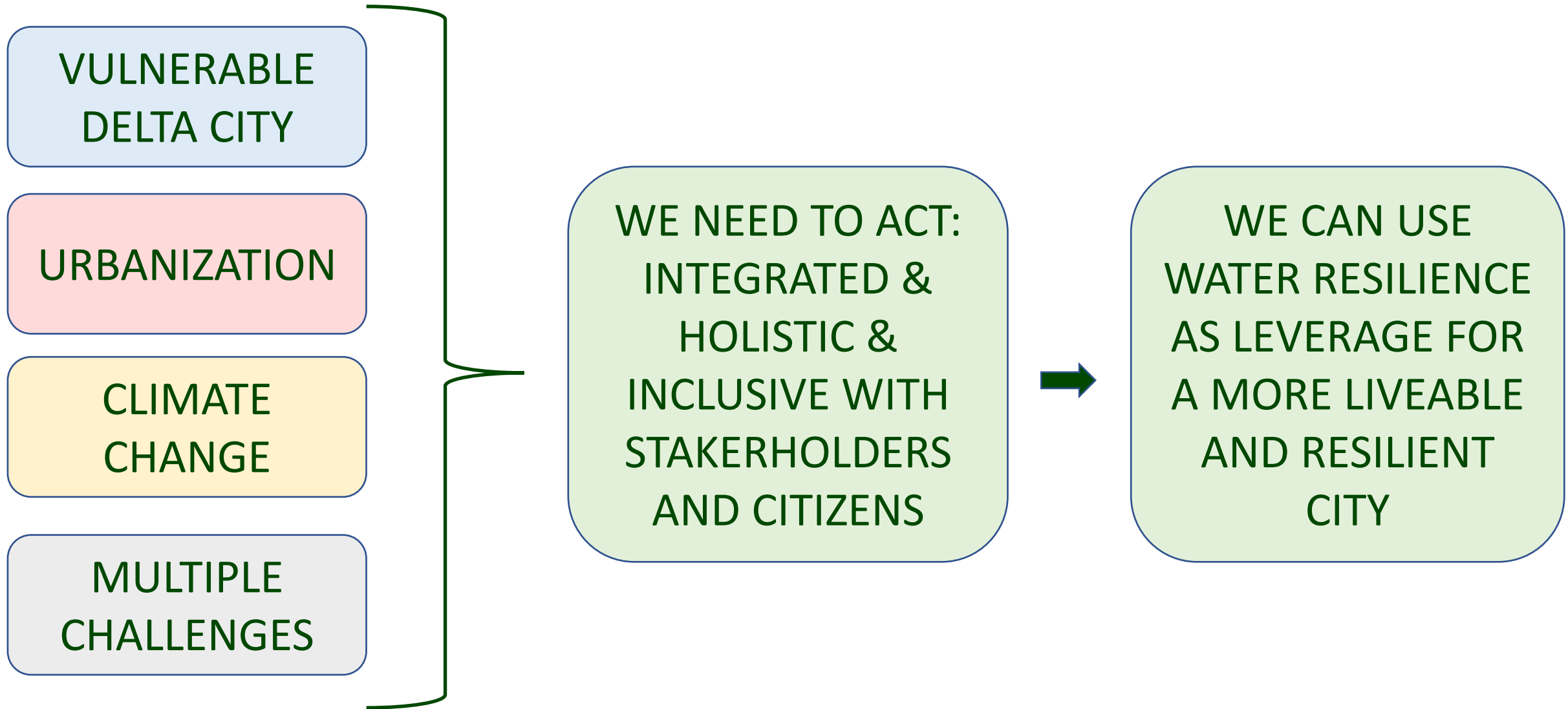


Inundated cellars



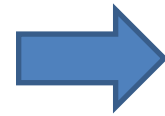
Heat waves

Integrated and Holistic approach is needed

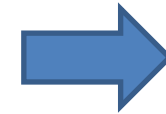


ROTTERDAM APPROACH: STAKEHOLDERS

2007



GOVERNMENTAL
ROTTERDAM
WATER
PLATFORM



Alliantie
Waterkracht
Regio Rotterdam - Capelle aan den IJssel

Werken aan
waterbeheer
van morgen

2023



TIMELINE ROTTERDAMS' TRANSITION-PROCESS TOWARDS A (CLIMATE) RESILIENT DELTA CITY



- Water: -----
- + Spatial Planning: -----
- + Climate Change: -----
- + Resilience (wide spectrum): -----

Rotterdam climate change adaptation strategy

Holistic, multi-level and multi-stakeholder strategy



Robust and resilient



Sewerage + watersquare



Protection and moving in tune



Dikes + adaptive building en design



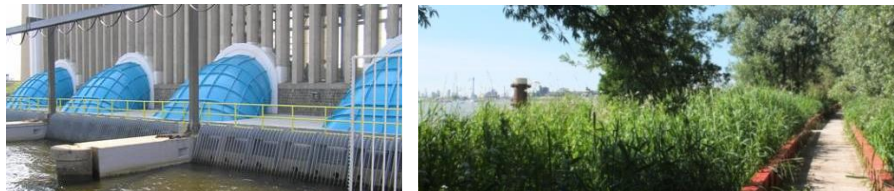
Delta works, small scale projects



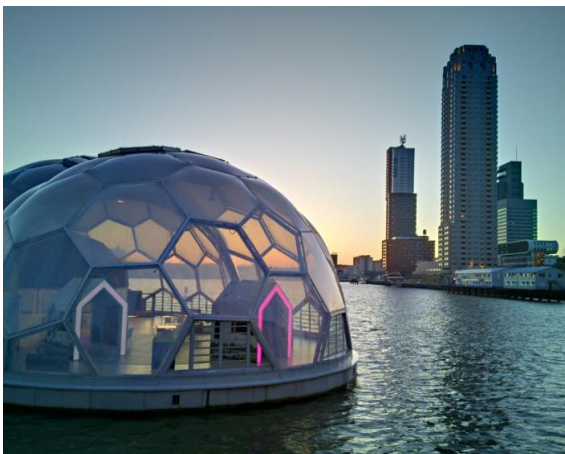
Storm surge barriers + 'Remove tile, plant greening'



Technology and nature based



Pumping + green river banks

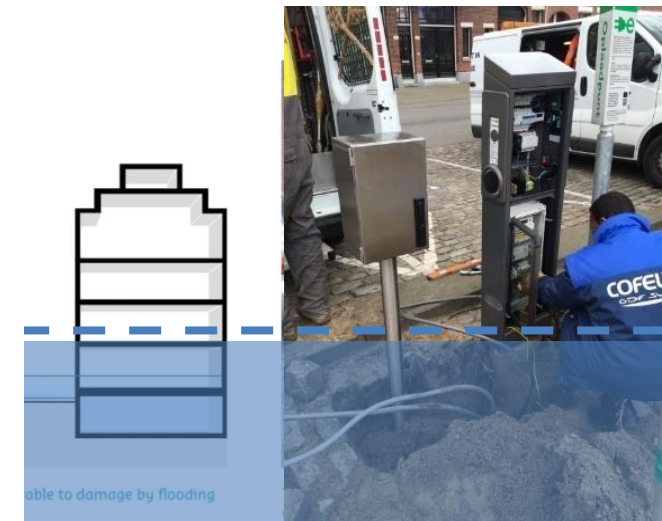


ACCELERATION SEA LEVEL RISE



**CLIMATE AND
CYBER RESILIENT
INFRASTRUCTURE IS
NEEDED**

**LONG TERM SCENARIO'S 3 METER SEA LEVEL RISE
WATER RESILIENCE < > ECONOMICAL RESILIENCE**





CITIES EXCHANGE!! WATER ADAPTATION COMMUNITY (GCA-WAC)

Accra, Ghana
Addis Ababa, Ethiopia
Cape Town, South Africa
Dakar, Senegal
Durban, South Africa
Kigali, Rwanda
Lagos, Nigeria
Luxor, Egypt
Nairobi, Kenya
Paynesville, Liberia

EUROPE AND THE MIDDLE EAST

Amman, Jordan
Athens, Greece
Barcelona, Spain
Belfast, U.K.
Belgrade, Serbia
Bristol, U.K.
Byblos, Lebanon
Glasgow, U.K.
Greater Manchester, U.K.
Lisbon, Portugal
London, U.K.
Milan, Italy
Paris, France
Ramallah, Palestine
Rome, Italy
Rotterdam, The Netherlands
Tbilisi, Georgia
Tel Aviv-Yafo, Israel
The Hague, The Netherlands
Thessaloniki, Greece
Vejle, Denmark

ASIA PACIFIC

Bangkok, Thailand
Can Tho, Vietnam
Chennai, India
Christchurch, New Zealand
Da Nang, Vietnam
Deyang, China
Huangshi, China
Jakarta, Indonesia
Kyoto, Japan
Mandalay, Myanmar
Melaka, Malaysia
Melbourne, Australia
Pune, India
Semarang, Indonesia
Seoul, South Korea
Singapore
Surat, India
Sydney, Australia
Toyama, Japan
Wellington, New Zealand

LATIN AMERICA AND THE CARIBBEAN

Buenos Aires, Argentina
Cali, Colombia
Colima, Mexico
Guadalajara, Mexico
Ciudad Juarez, Mexico
Medellin, Colombia
Mexico City, Mexico
Monterrey, Mexico
Montevideo, Uruguay
Panama City, Panama
Porto Alegre, Brazil
Quito, Ecuador
Rio de Janeiro, Brazil
Salvador, Brazil
San Juan, Puerto Rico
Santa Fe, Argentina
Santiago Metropolitan Area, Chile
Santiago de los Caballeros, Dominican Republic

NORTH AMERICA

Atlanta, U.S.
Berkeley, U.S.
Boston, U.S.
Boulder, U.S.
Calgary, Canada
Chicago, U.S.
Dallas, U.S.
El Paso, U.S.
Greater Miami & the Beaches, U.S.
Honolulu, U.S.
Houston, U.S.
Los Angeles, U.S.
Louisville, U.S.
Minneapolis, U.S.
Montreal, Canada
Nashville, U.S.
New Orleans, U.S.
New York, U.S.
Norfolk, U.S.
Oakland, U.S.
Pittsburgh, U.S.
San Francisco, U.S.
Seattle, U.S.
St. Louis, U.S.
Toronto, Canada
Tulsa, U.S.
Vancouver, Canada
Washington, D.C., U.S.



**Resilient Cities
Network**

A new global initiative

INTEGRATED/HOLISTIC APPROACH NEEDED!

ON ALL LEVELS WE HAVE TO BRAKE DOWN SILO'S

CREATE OWNERSHIP AMONGST KEY STAKEHOLDERS

BASED ON ACTIVE PARTICIPATION OF RESIDENTS

MULTI BENEFIT SOLUTIONS ARE NEEDED

COLLABORATE EN EXCHANGE WITH OTHER DELTA CITIES



www.resilientrotterdam.nl

[Resilient Rotterdam Strategy 2022-2027](#)

Resilient Delta Cities – Adaptation Analysis, Planning, and Implementation

Chris Zevenbergen

*FUTURE PROOFING WATER AND CLIMATE
ADAPTATION
webinar 20 June*



IHE
DELFT

Water and Development
Partnership Programme

Dhaka, Bangladesh (2022)



BANGLADESH
A DEVELOPED COUNTRY BY 2041



INVEST IN GROWTH, INVEST IN BANGLADESH

One of the fastest growing economies of the world.
One of the best emerging markets of the world.
A center of regional and global connectivity.
Massive improvement in infrastructure and energy supply.
55 million youth population.



Bangladesh Securities and Exchange Commission
বাংলাদেশ সিকিউরিটিজ অ্যান্ড এক্সচেঞ্জ কমিশন

Scan for more details



Tana Delta, 2022





**Rijnmond-Drechtsteden,
The Netherlands (2017)**

Urbanizing Deltas: Today's challenges*

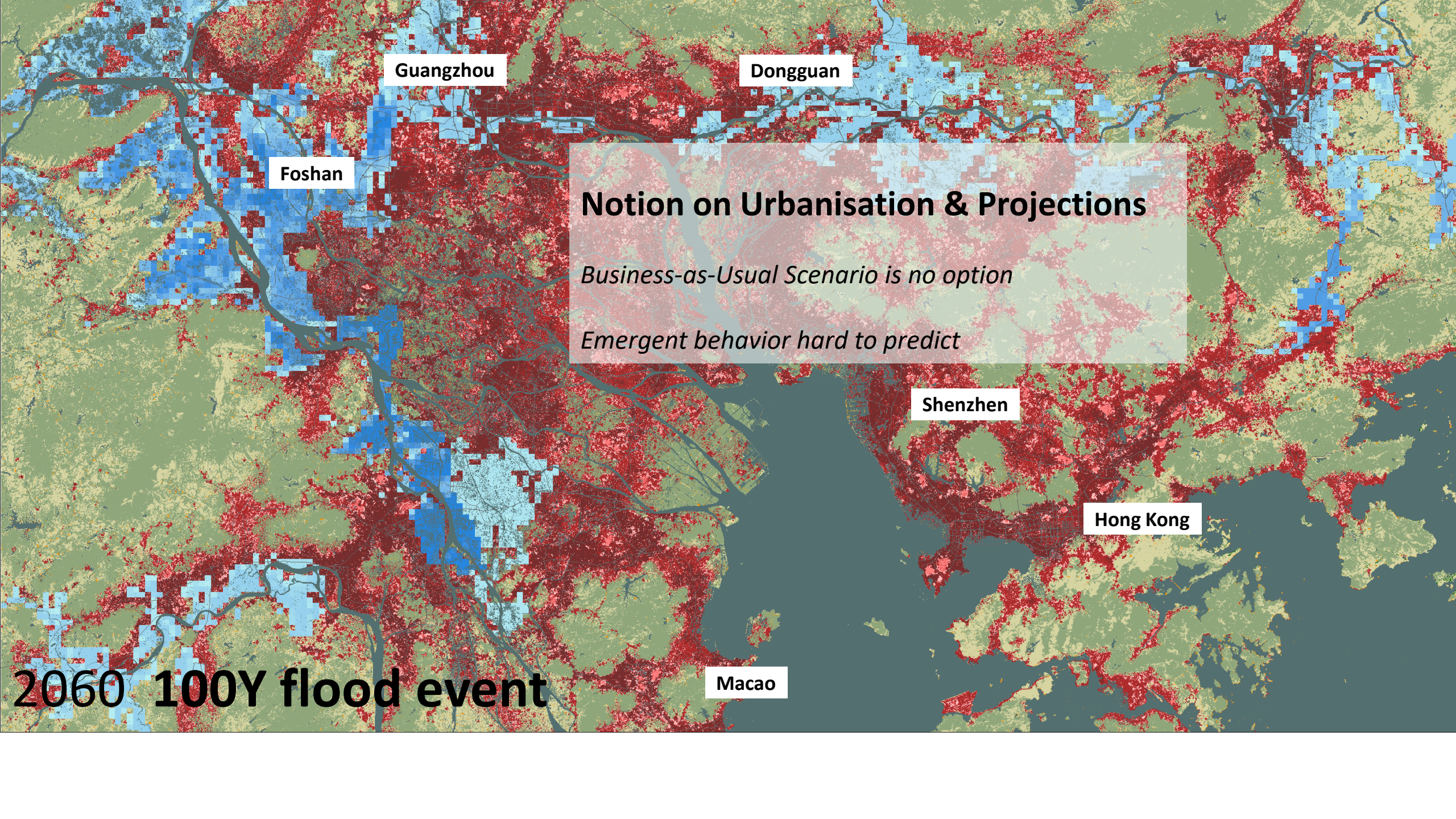
Current emphasis on short-term solutions

Urbanization, transition in energy & food production will likely be the dominant drivers shaping the future of our delta cities

Rapidly narrowing window of opportunity to enable climate resilient development (there is an opportunity for a 'reset' ?)

Vision on the future (and long-term strategy) is lacking

**based on interviews 50 (national & international) experts 2021*



Guangzhou

Dongguan

Foshan

Notion on Urbanisation & Projections

Business-as-Usual Scenario is no option

Emergent behavior hard to predict

Shenzhen

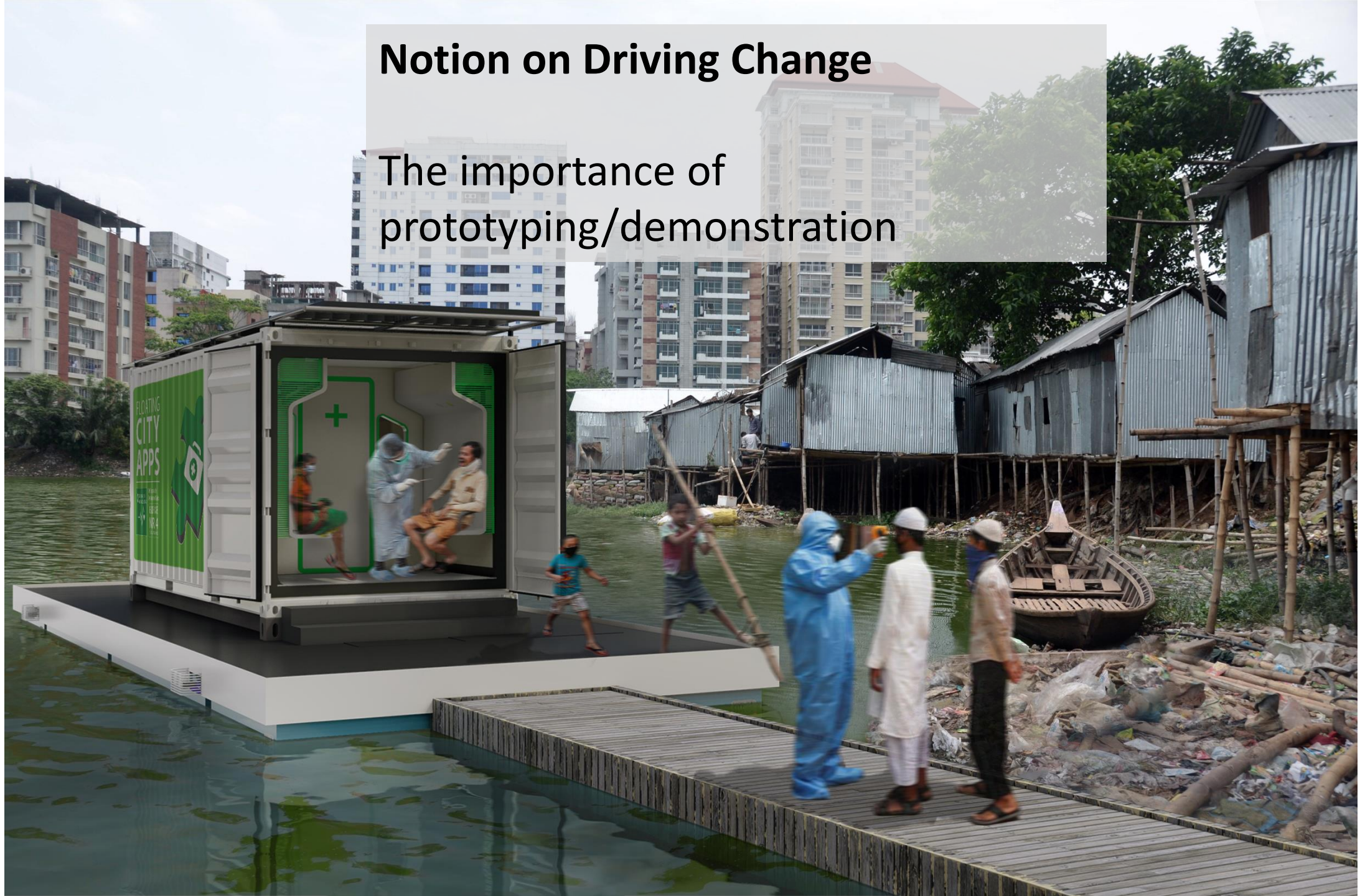
Hong Kong

Macao

2060 100Y flood event

Notion on Driving Change

The importance of
prototyping/demonstration



Notion on Looking for Opportunities

The importance of design to connect the spatial & temporal scales

Understanding the urban dynamics to steer change



A man wearing a black cap, a blue surgical mask, and a dark jacket is pointing his right hand towards a city skyline across a body of water. The skyline features several tall, modern buildings. In the foreground, a child with long black hair and a pink headband is partially visible. The background shows a sandy beach and a few other people near the water's edge.

Notion on Local governments as actors

Setting framework conditions for investments in urban infrastructure

Driving local innovation

-> huge demand for capacity building: learning by doing

Example initiative: Urban Demonstrators



BDP 2100
INTERNATIONAL
CONFERENCE

- Start small, focus on implementation
- Green infrastructure & public space
- Short lead times (<1 yr), locally, demand driven
- Showcase innovations/change (incl financing)
- Build capacity by **learning by doing** (planning, financing, engineering, water/waste management) & **peer learning**



IHE
DELFT

Water and Development
Partnership Programme

Lessons learned RBD

- Captured public's imagination & support
- Generated results that government wouldn't have produces on its own
- A better process led to a better understanding of a diversity of needs. Responses were customized to each geography and community needs
- Multiple outcomes:
 - Flood mitigation
 - Improved recreational space
 - Employment opportunities
 - Educational engagement

Rainwater harvesting (roof)

Green roof treatment

Rainwater Reuse

Green wall treatment

Biofiltration system

Stormwater tank

Overflow deviated to drainage network

Green gardens to decrease the runoff coefficient

Collection by impermeable surfaces

Green wall treatment

Slow sand filtration



B2
EXTREME

Shifting paradigms

Start Deltaprogramme (2010):

Broadly shared convictions:

1. Climate change is slow, and might accelerate after 2050
2. We know how the water-system works; we can predict how it will react on different pressures in the future, so we can plan ahead and will gradually strengthen the present system.
3. By anticipating long term future-conditions we will prevent disastrous events

(Source: Pieter Bloemen)

Shifting paradigms

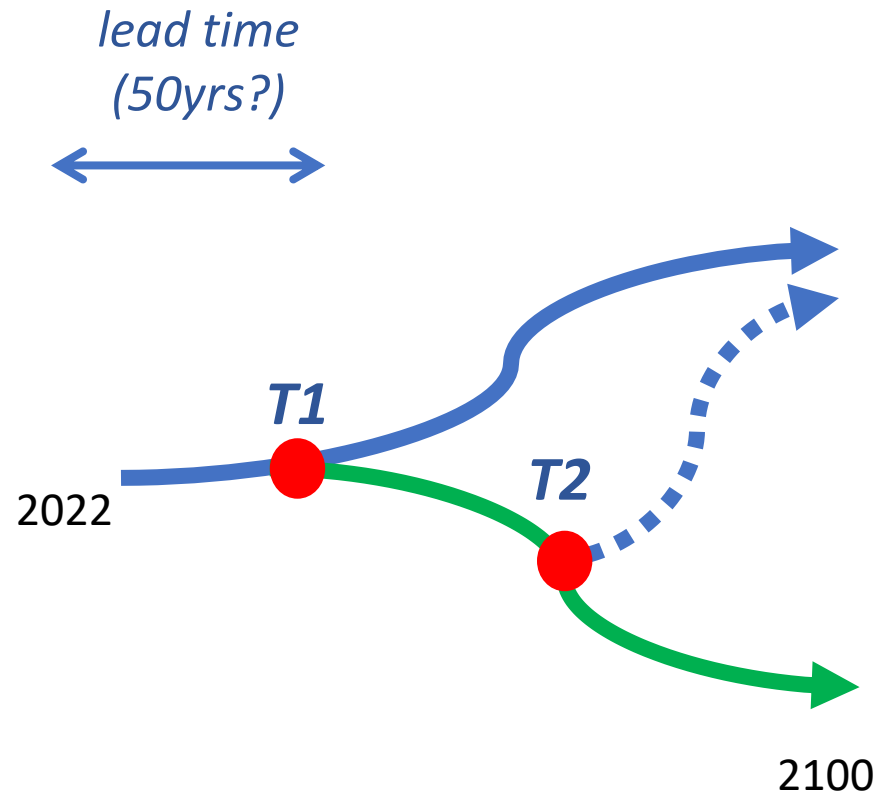
Deltaprogramme anno 2022:

But now, 12 years later, these convictions are subject to erosion

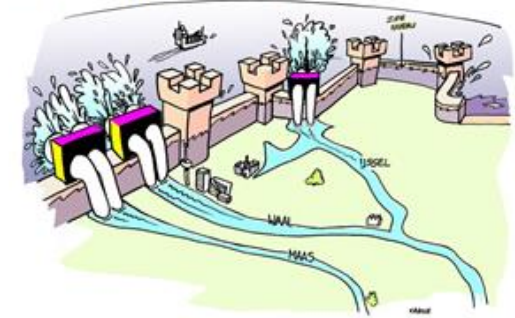
1. Climate change is happening now; and is not gradual
1. The water-system that we thought we knew so well reacts in a way we did not expect
2. We cannot guarantee that there will be no climate-change-induced disaster, certainly not when we limit our efforts to gradually strengthening the present system.

(Source: Pieter Bloemen)

Deltaprogramme: bifurcation point ?



A) Beschermen gesloten



“Protect”

D) Meebewegen



“Living with Water”

Resilient urban water systems for citizens and communities

*Cases of good adaptation
practices in urban deltaic regions*

Hans Gehrels

Global lead on urban resilience

Deltares



Contents

- Emerging trends and challenges
- Good practices and approaches
- Methods and tools
- Conclusion



Emerging trends and challenges

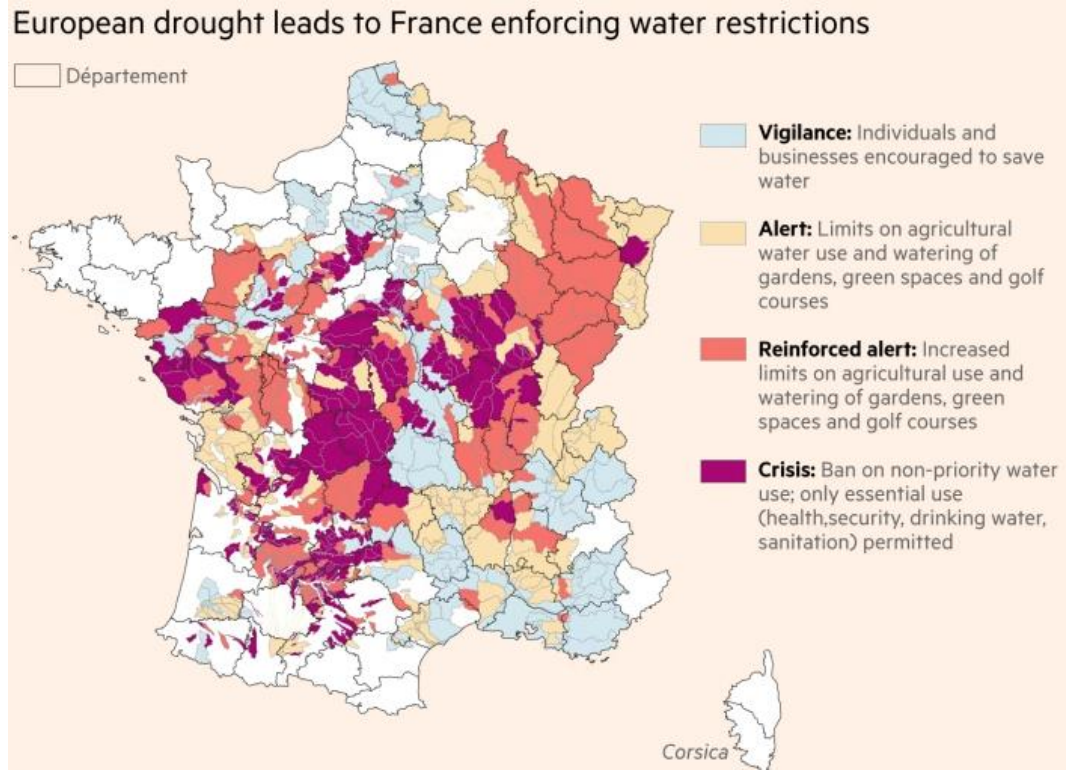
- Urbanization (megalopolises in Africa and Asia)
- Disruptive technology development (AI, ML, ...)
- Geopolitical transitions and shifting centers of gravity
- Acceleration of climate change (droughts, floods, heat, forest fires)

Aerial view of urban sprawl in and smog in Mexico City. Photo: Richard Ellis/Alamy; Guardian, 19 Mar 2018

Flooding in Belgium, Germany and The Netherlands



Water scarcity and drought in France and Italy



Water shortages and heatwaves: Europe confronts changing climate, Financial Times, 18 August 2020



Italy has declared a state of emergency because of drought, CNBC, 5 July 2020



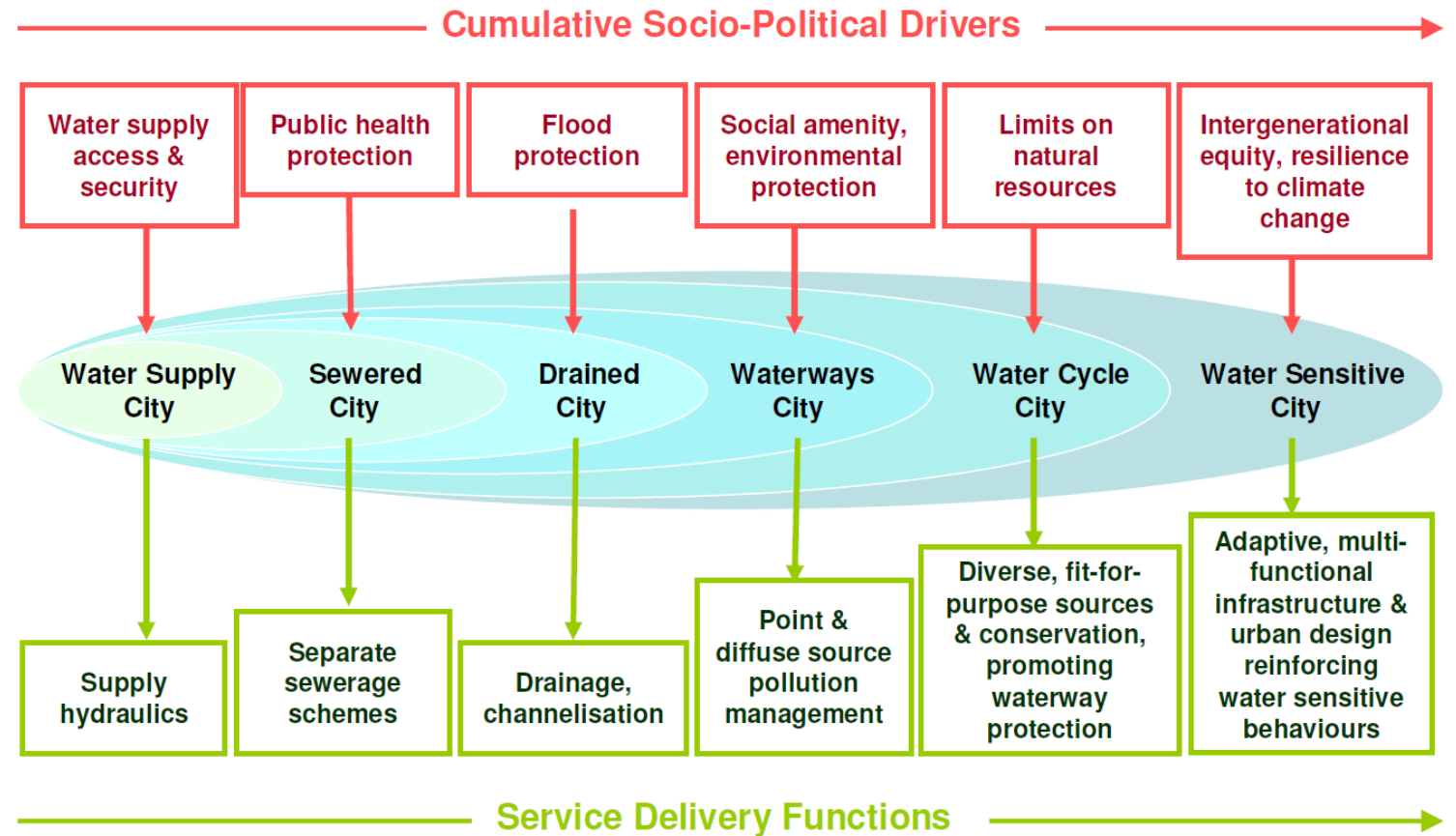
Good practices and approaches

THE GREEN VILLAGE

Approaches towards urban resilience

Requirements for any approach:

- Systems approach
- River basin perspective
- Integrated
- Inclusive
- Equitable
- Place-based
- Community-based
- Nature-based
- Climate adaptive
- Safe
- Resilient
- Sustainable









Brown et al 2008. *Transitioning to Water Sensitive Cities*

Singapore's Active, Beautiful, Clean Waters Programme



Deltares

Amsterdam Rainproof

	Gebouw
	Dak
	Tuin
	Straat
	Plein
	Buurt

Is jouw tuin al klaar voor de volgende hoosbui?

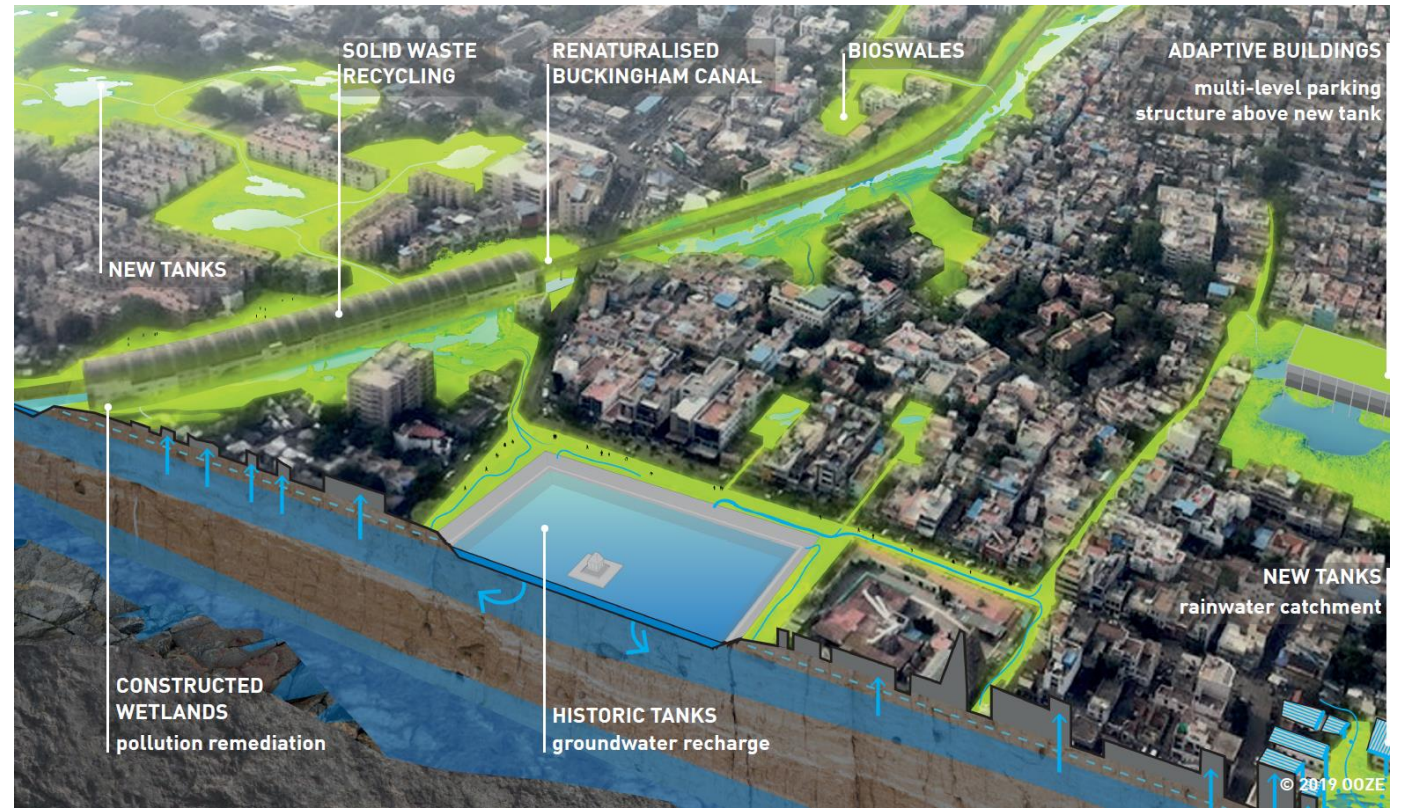
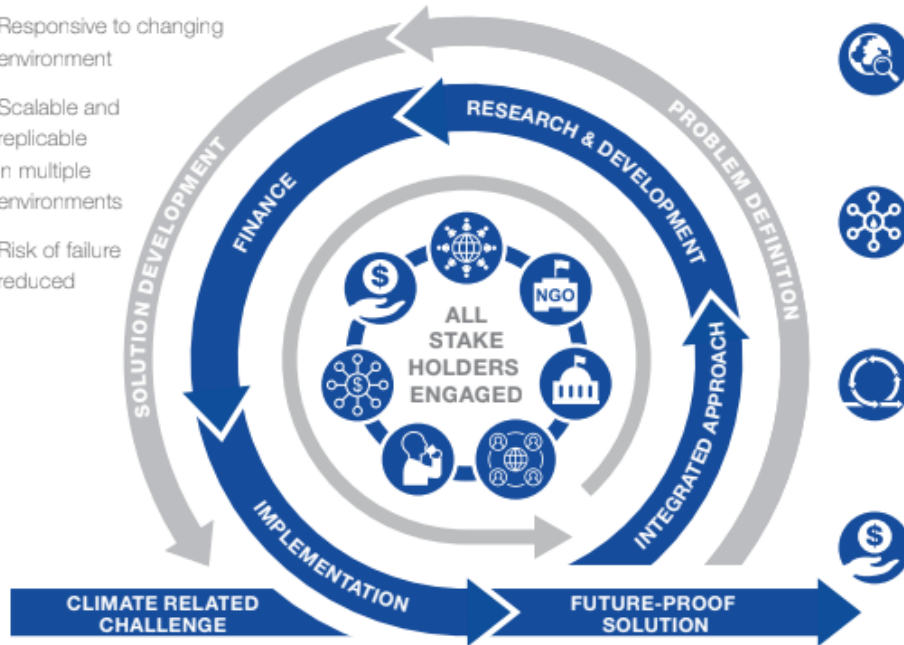


Water as Leverage

Integrated and inclusive methodology for transformative, design-driven solutions to urban water and climate challenges during pre-project preparation towards implementation

THE WATER AS LEVERAGE APPROACH

- ✓ All stakeholders involved from day one
- ✓ Responsive to changing environment
- ✓ Scalable and replicable in multiple environments
- ✓ Risk of failure reduced





Methods and tools

Analysis frameworks



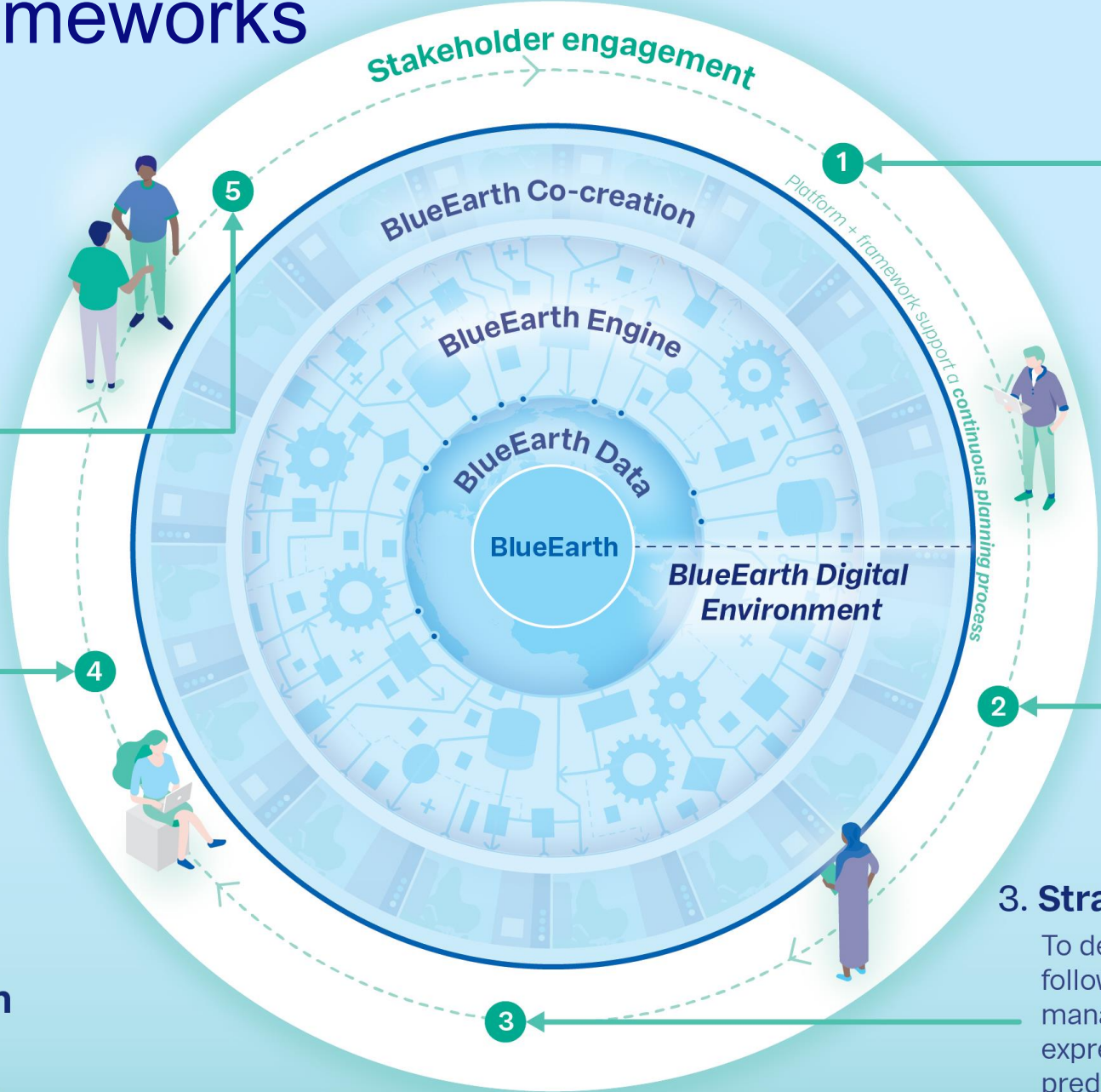
5. Implementation

To implement the measures, including monitoring and evaluation.



4. Prepare for implementation

To plan actions, implementation and finance.



1. Inception

To identify the decision context and to set objectives and criteria.

2. Situation analysis

To describe the present and future water resources system expressed in socio-economic effects.



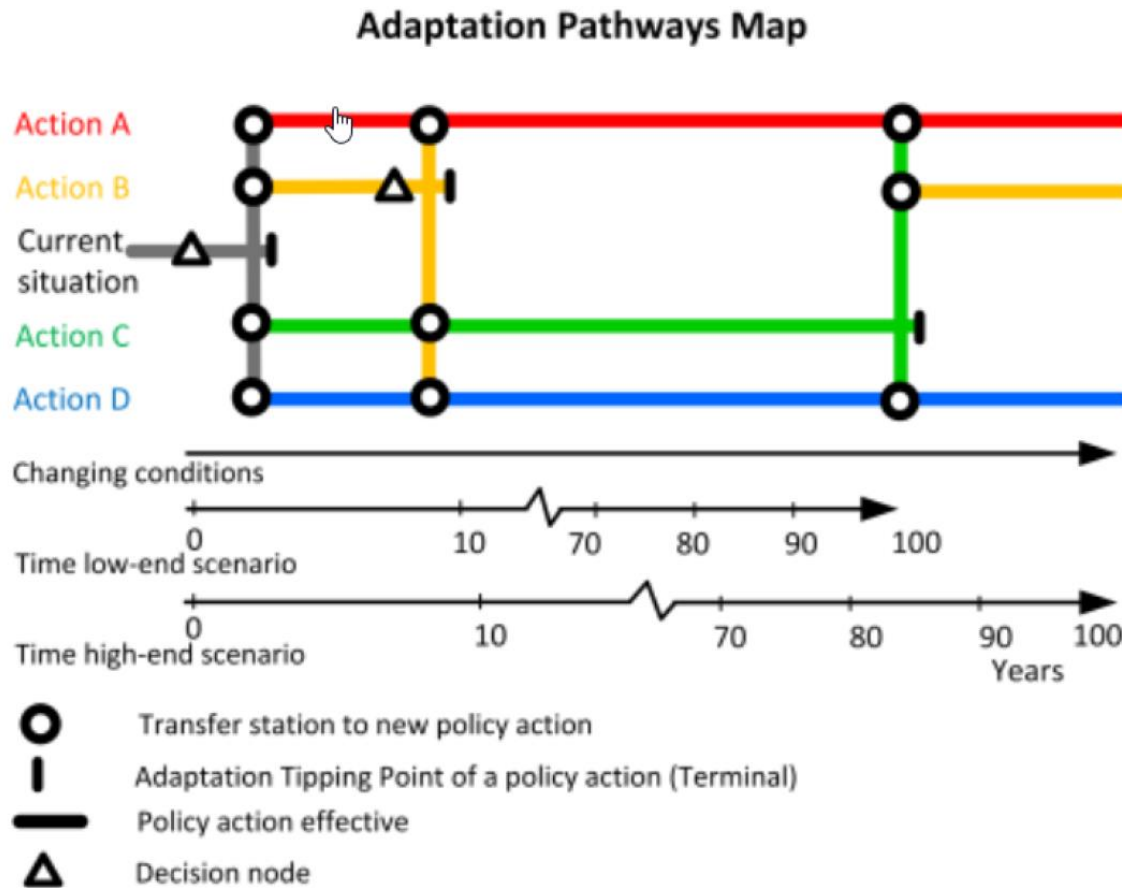
3. Strategy building

To develop strategies following an adaptive management approach, expressed in the predefined criteria.



Resilient urban water systems for citizens and communities

Dynamic Adaptive Policy Pathways



Costs and benefits of pathways

Time horizon 20 years

Time horizon 50 years

Time horizon 100 years

Pathway	Costs	Benefits	Co-benefits
1 ●	+++	+	0
2 ● ●	+++++	0	0
3 ● ●	+++	0	0
4 ● ●	+++	0	0
5 ●	0	0	-
6 ● ●	++++	0	-
7 ● ●	+++	0	-
8 ● ●	+	+	---
9 ●	++	+	---

Pathways that are not necessary in low-end scenario

Climate Resilient Cities Toolbox (CRCTool)

Climate Resilient City Toolbox

Applied Measures

- Adding trees to streetscape
- Urban wetland
- Bioswale (with drainage)
- Green roofs
- Permeable pavement systems (infiltration)
- Water roof
- Water square
- Storage tank or underground water storage

Map window

Legend

Stormwater flooding (KEA)

- 5 - 10 cm
- 10 - 15 cm
- 15 - 20 cm
- 20 - 30 cm
- > 30 cm

Luchtfoto (PDOK)

Results

Climate

- Storage capacity (m³)
- Groundwater recharge (mm/year)
- Evapotranspiration (mm/year)
- Heat reduction (°C)
- Cool areas (number)
- Return Time Factor (-)

Cost

- Construction (€)
- Maintenance (€/year)

Water quality

- Pathogen reduction (%)
- Nutrient reduction (%)
- Adsorbing pollutants (%)

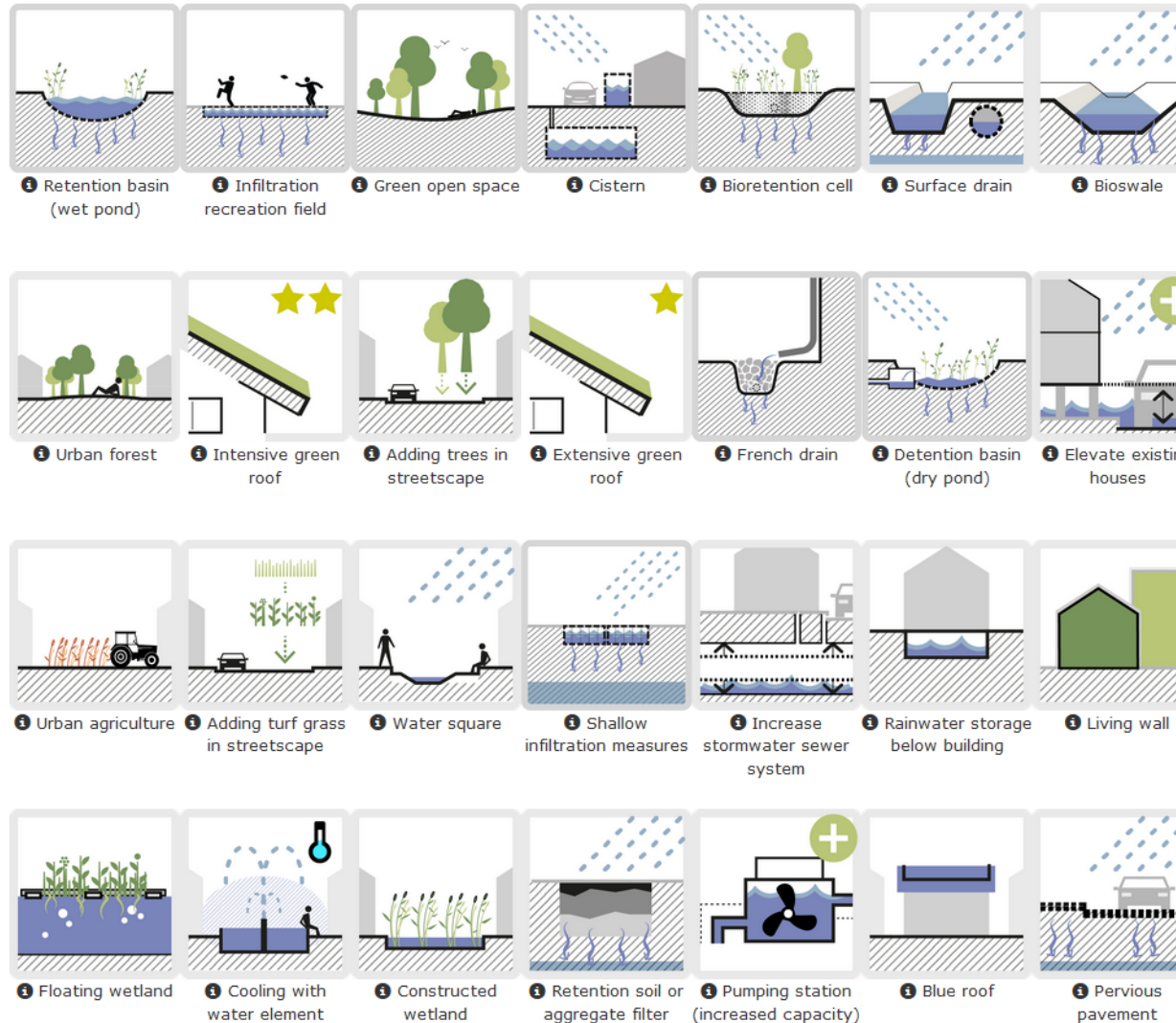
VIEW AS TABLE

Applied measures

Map window

Key performance indicators

CRCTool and database of GreenBlue Grids



Bioswale (with drainage)

Pluvial flooding Drought Heatstress

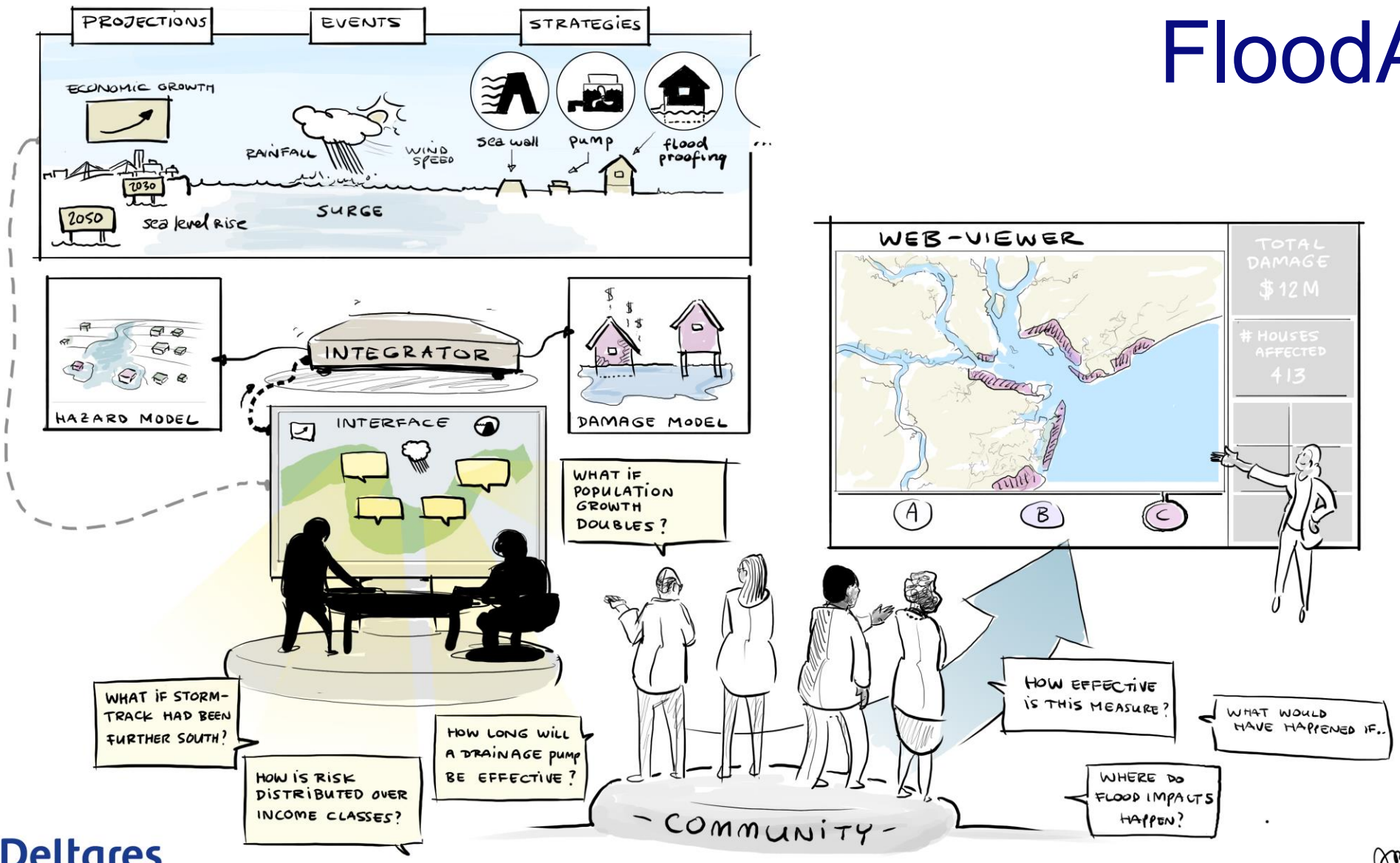
A bioswale is a ditch with vegetation, a porous bottom and below that a layer of gravel, packed in geotextile with an infiltration pipe/drainpipe. It allows rainwater storage, infiltration and transport while helping to enhance biodiversity and quality of life.

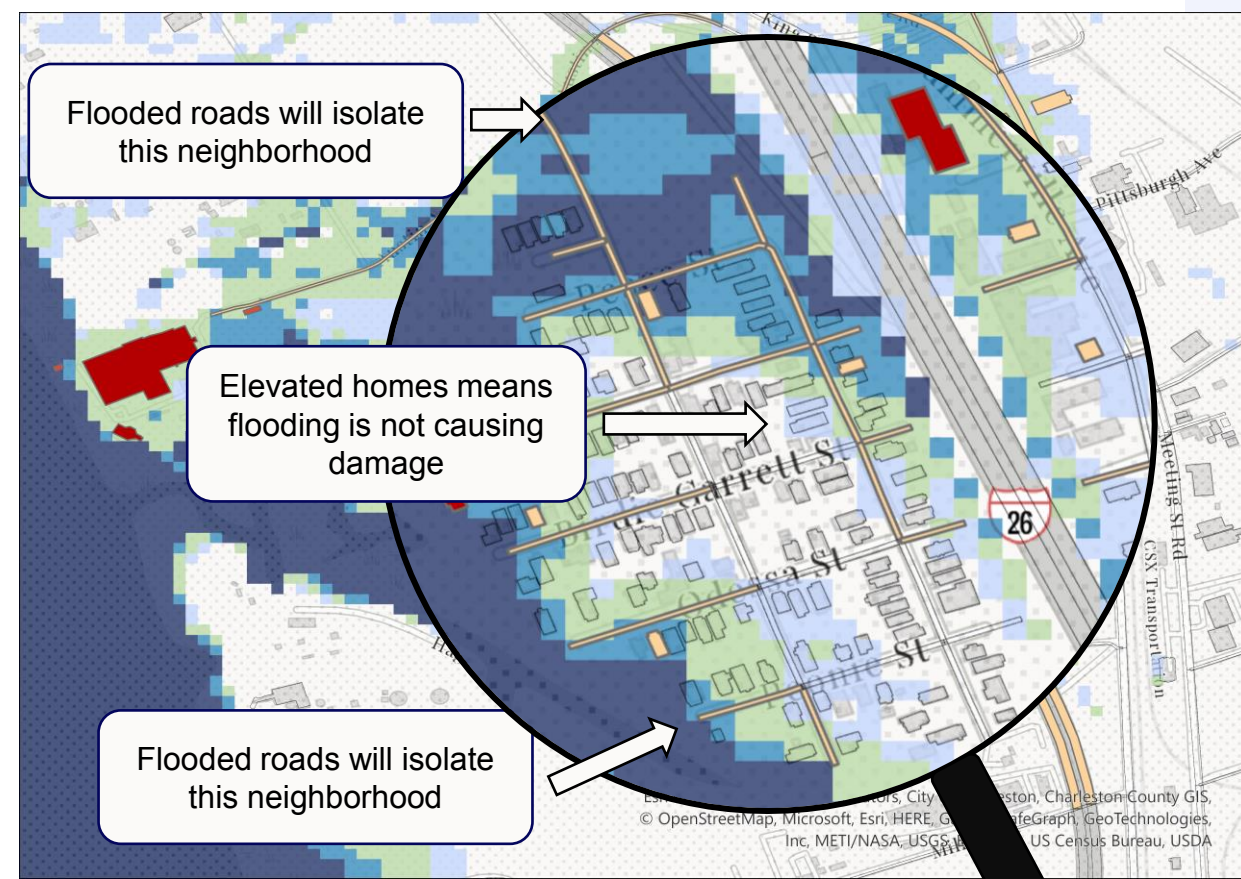
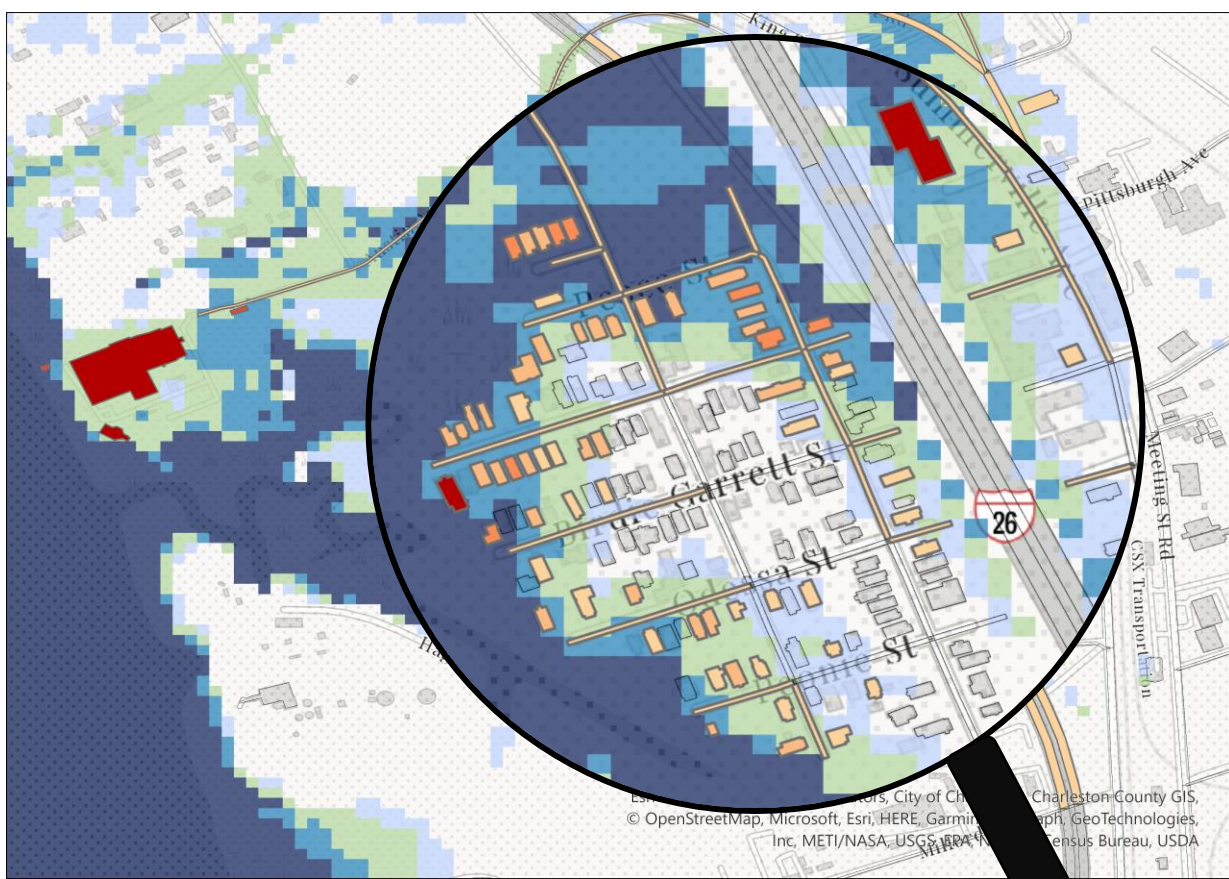


[For more information click here](#)

COMMUNITY FLOOD RESILIENCE SUPPORT SYSTEM

FloodAdapt





Water depth
 0 - 1 ft.
 1 - 3 ft.
 3 - 5 ft.
 > 5 ft.

Before measure

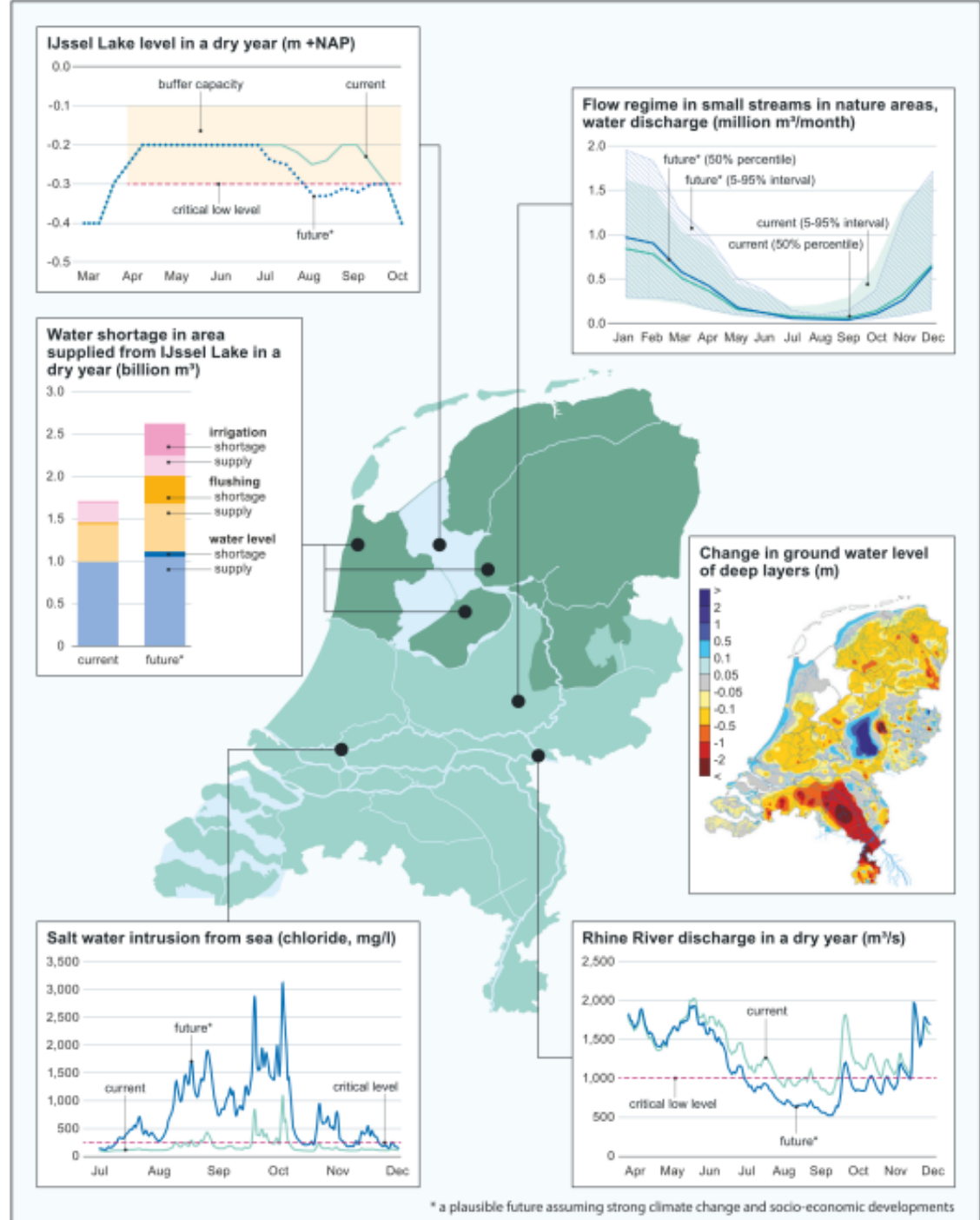
Damages
 No damage
 <\$20K
 \$20K - \$60K
 \$60K - \$150K
 \$150K - \$400K
 >\$400K

After measure

12-FOOT WATER LEVEL (+NAVD88)

National Water Model for water supply and distribution

- Groundwater system
- Subsurface processes (soil moisture)
- Surface water (rivers, canals, water distribution)
- Human influence (irrigation, extractions, water management)
- Hydrodynamic simulation including salt concentration and temperature



* a plausible future assuming strong climate change and socio-economic developments

Conclusion

- Yes, we have to act
- Serious challenges and an increasingly changing climate ahead
- Good practices and approaches, methods and tools available
- And equally (if not more) important:
 - Data, modelling and monitoring
 - Governance and political will
 - Funds and funding mechanisms
 - Capacity and education
 - ...
- To accelerate project implementation





Building Resilience: Jakarta's Journey in **Climate Adaptation** and **Flood Mitigation**

JUNE 2023

Andhika Ajie

CEO of the Center for Research & Innovation of Jakarta City/ CRO of Jakarta City

Regional Development and Planning Agency of Jakarta

 sekretariat.sdgsjkt@gmail.com

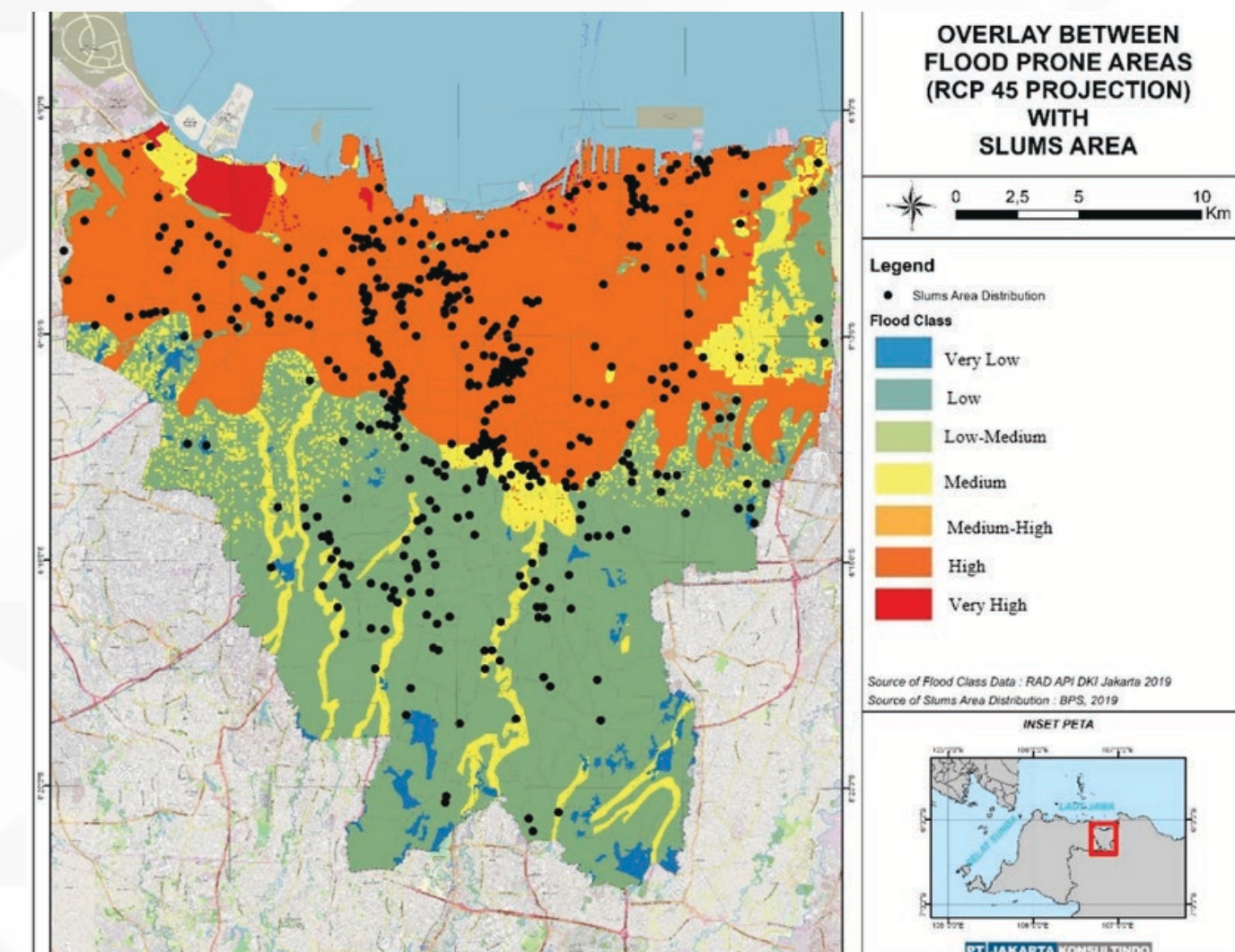
Jakarta
kota kolaborasi



Jakarta: A Coastal Metropolis



- Jakarta is home to **ten million people** with an area of 660 km square and is surrounded by satellite cities with a population density of 15.907/km.
- Jakarta is the economic heart of Indonesia and together with the surrounding Greater Jakarta Region (Jabodetabekpunjur), is the **fourth largest megacity** in the world.
- Jakarta is expected to experience a **1 cm/year** rise in sea levels.
- Around 40 percent of Jakarta sits below sea level.
- This has led Jakarta being vulnerable to flooding.



Map of flood prone areas and the distribution of slum areas in Jakarta

Jakarta Coastal Problems

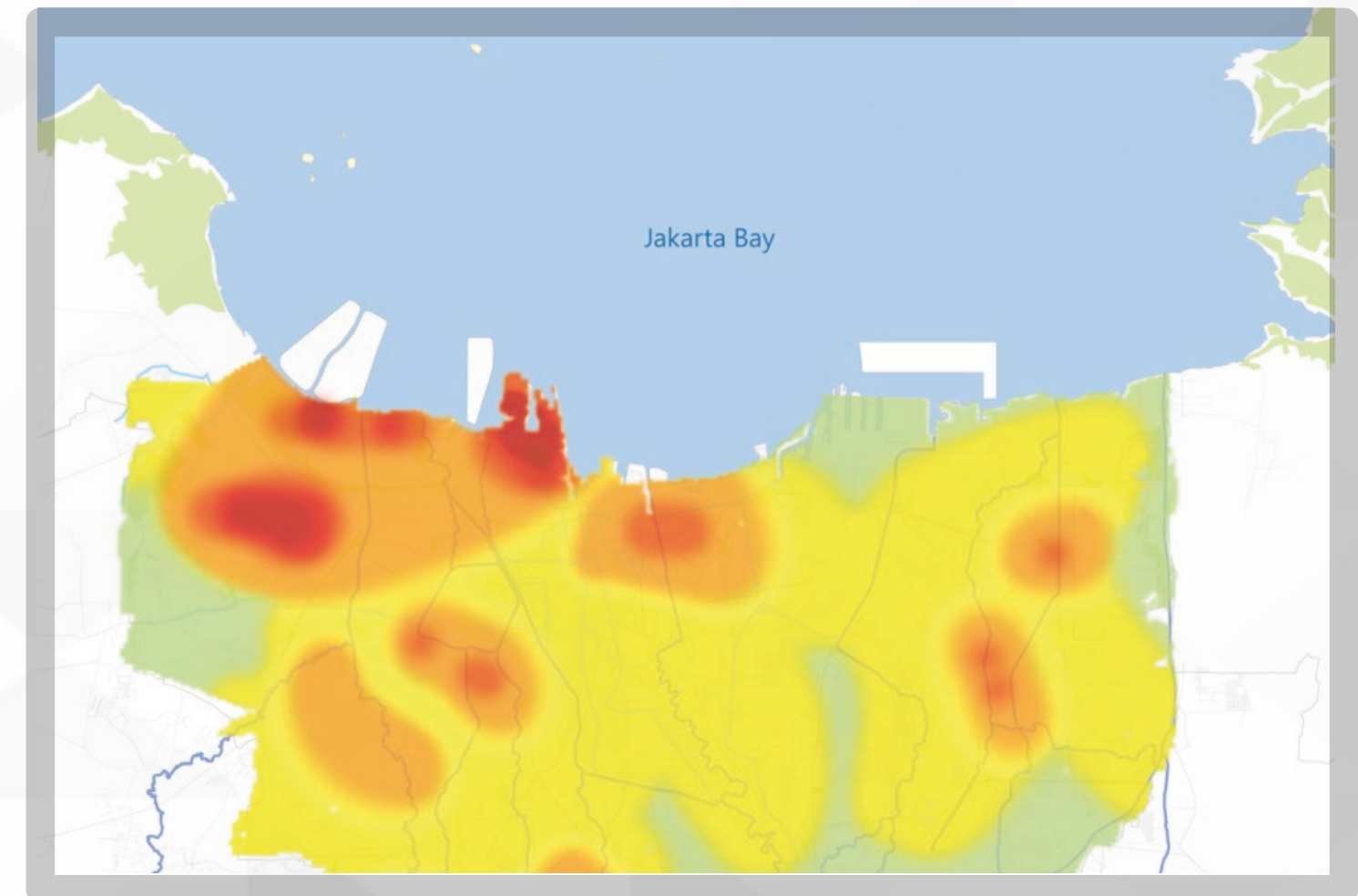


- sea level rise
- land subsidence
- coastal pollution (marine debris, untreated sewage discharge, and industrial waste)
- clean water and sanitation access
- waste management
- habitat degradation
- tidal flood



Legend

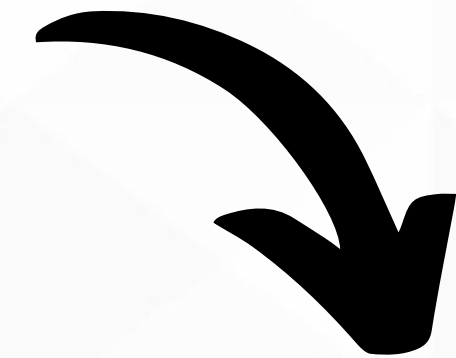
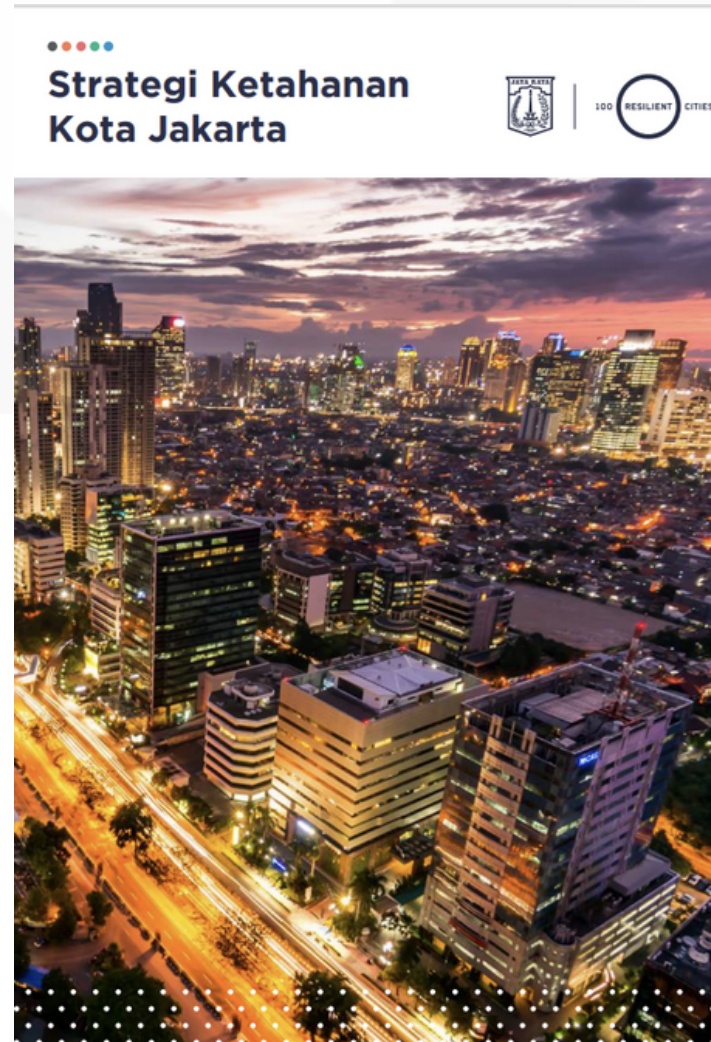
Land subsidence per year



Subsidence rates in North Jakarta (2020)

City Resilience Strategy of Jakarta

Jakarta has taken the steps to become a resilient city. These steps need to be improved in every possible methods, including implementing the City Resilience Strategy.

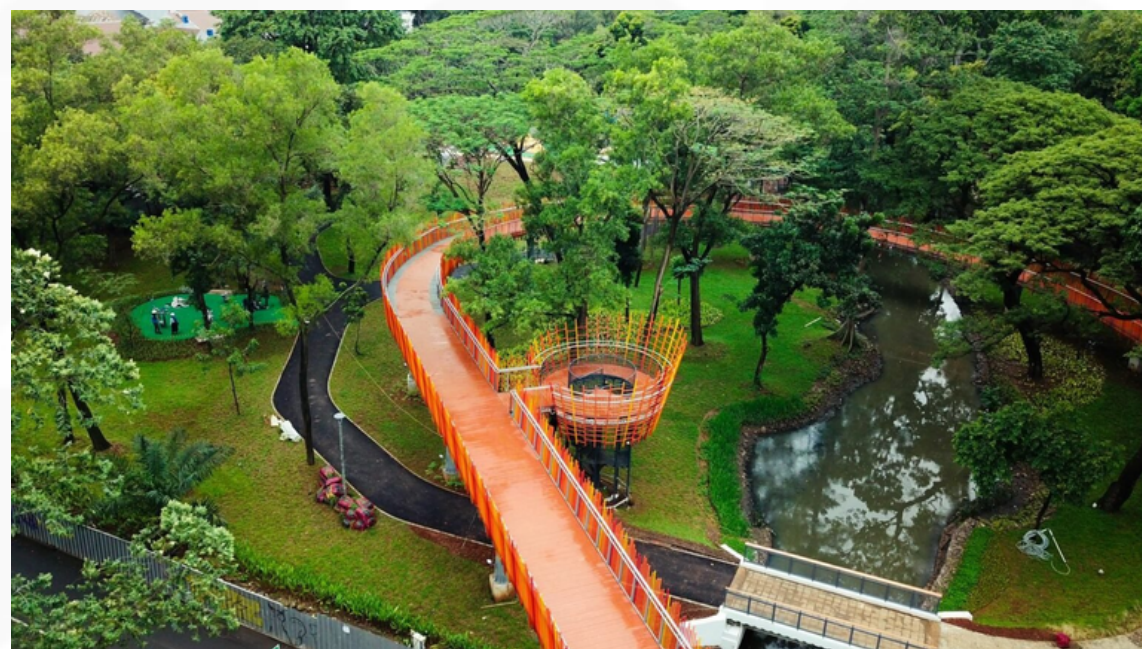



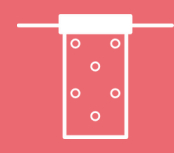


City resilience strategy of Jakarta already considered in the regional development plan document




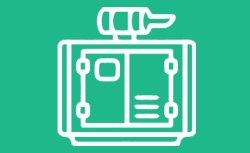
Jakarta's Effort to be Resilient







Various efforts have been made by Jakarta in reducing disaster risk and the impact of climate change. Some examples of activities carried out which are also included in our Regional Development Plan Documents are as follows:



-  Green Open Space/
(thematic public space)
-  Infiltration Wells/*Sumur Resapan*
-  Air Pollution Control
-  Food security

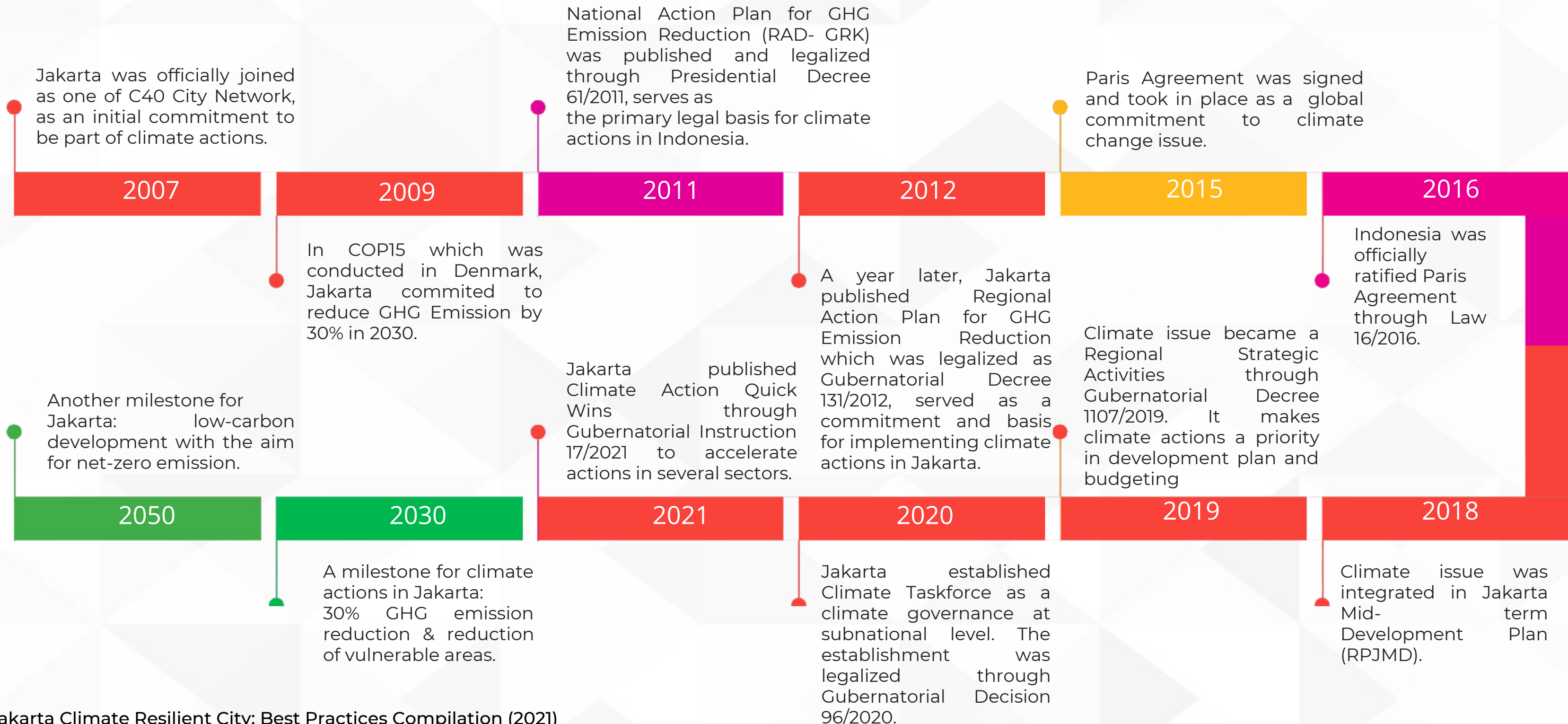
-  River Naturalisation
and Normalization
-  Rain Water Harvesting
-  Waste Bank/*Bank Sampah*
-  Intermediate Treatment
Facility (ITF)

-  TransJakarta
-  MRT
-  Electric Bus
-  JAKI App: integrated
system

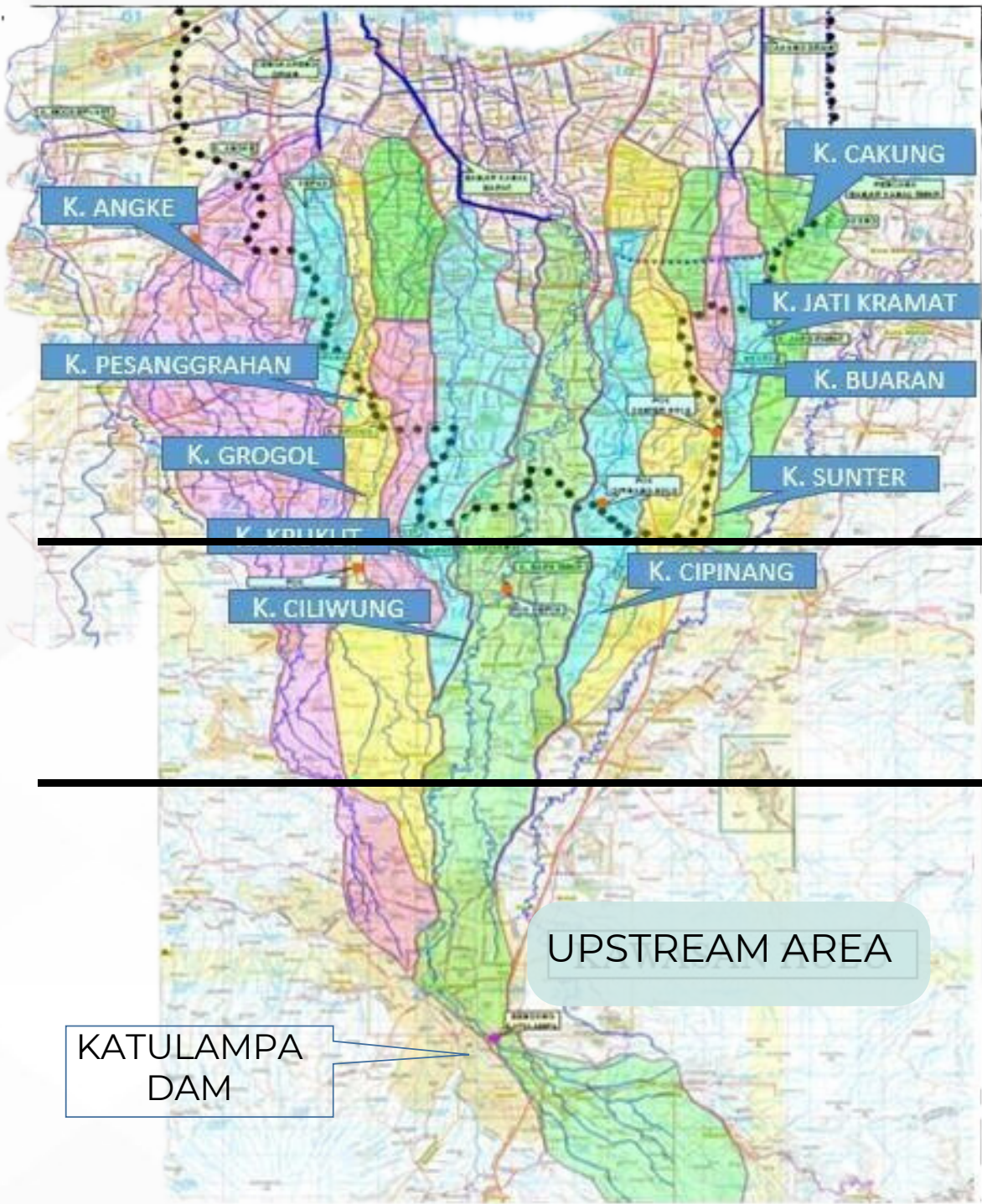
Jakarta Journey to be a Climate Resilience City



■ Actions at local level (Jakarta)
 ■ Actions at national level (Indonesia)
 ■ Actions at global level



Jakarta's flood control system

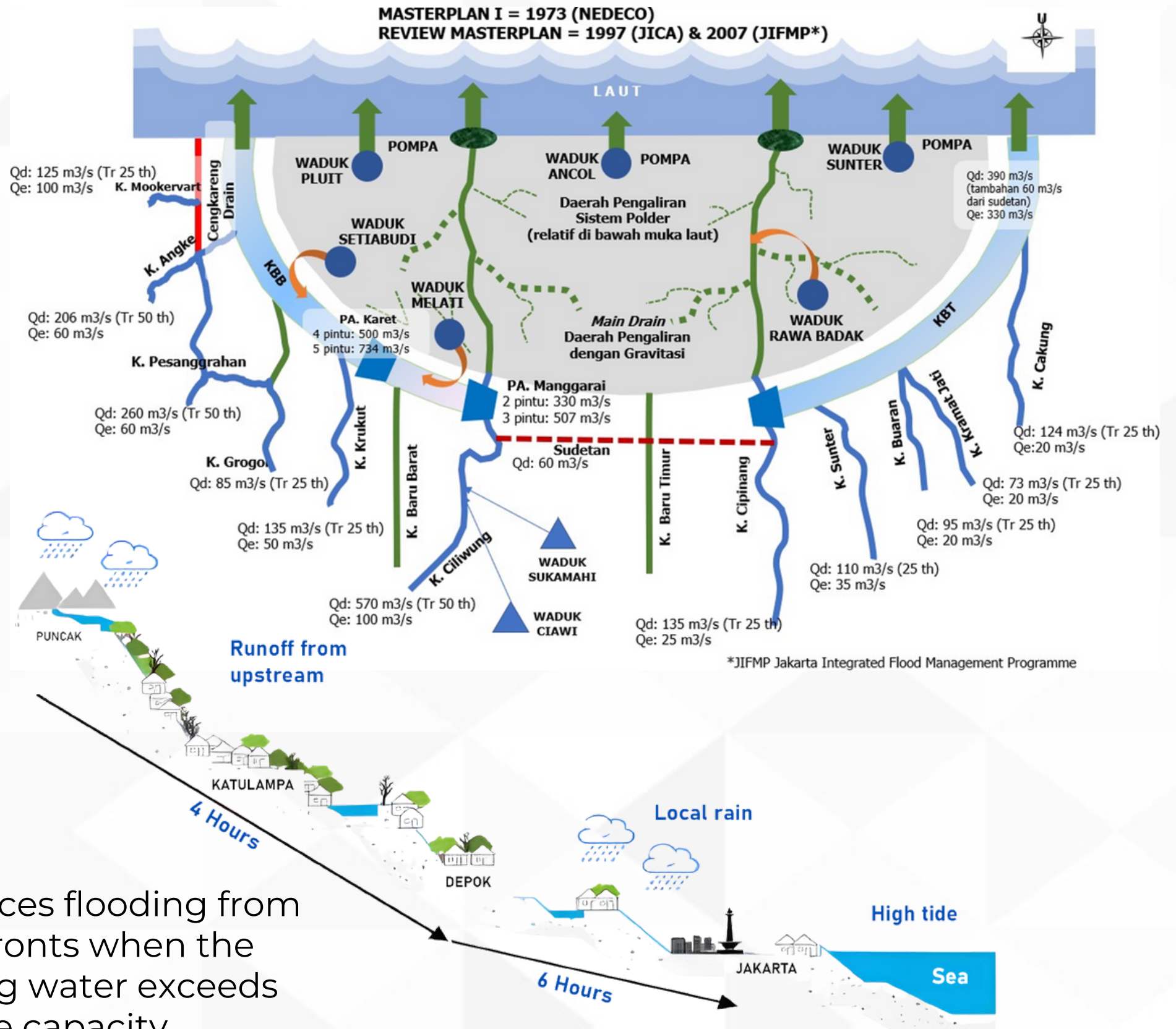


Catchment Area Jakarta 650 km²
 Catchment Area (upstream) 850 km²

lowland area

middle area

highland area



Jakarta faces flooding from three fronts when the incoming water exceeds the capacity.

Cooperation and Budgeting for Flood Control



	national government authority
	local government authority
	west flood canal
	cengkareng drain
	east flood canal

Existing ca...
1414 m3/s

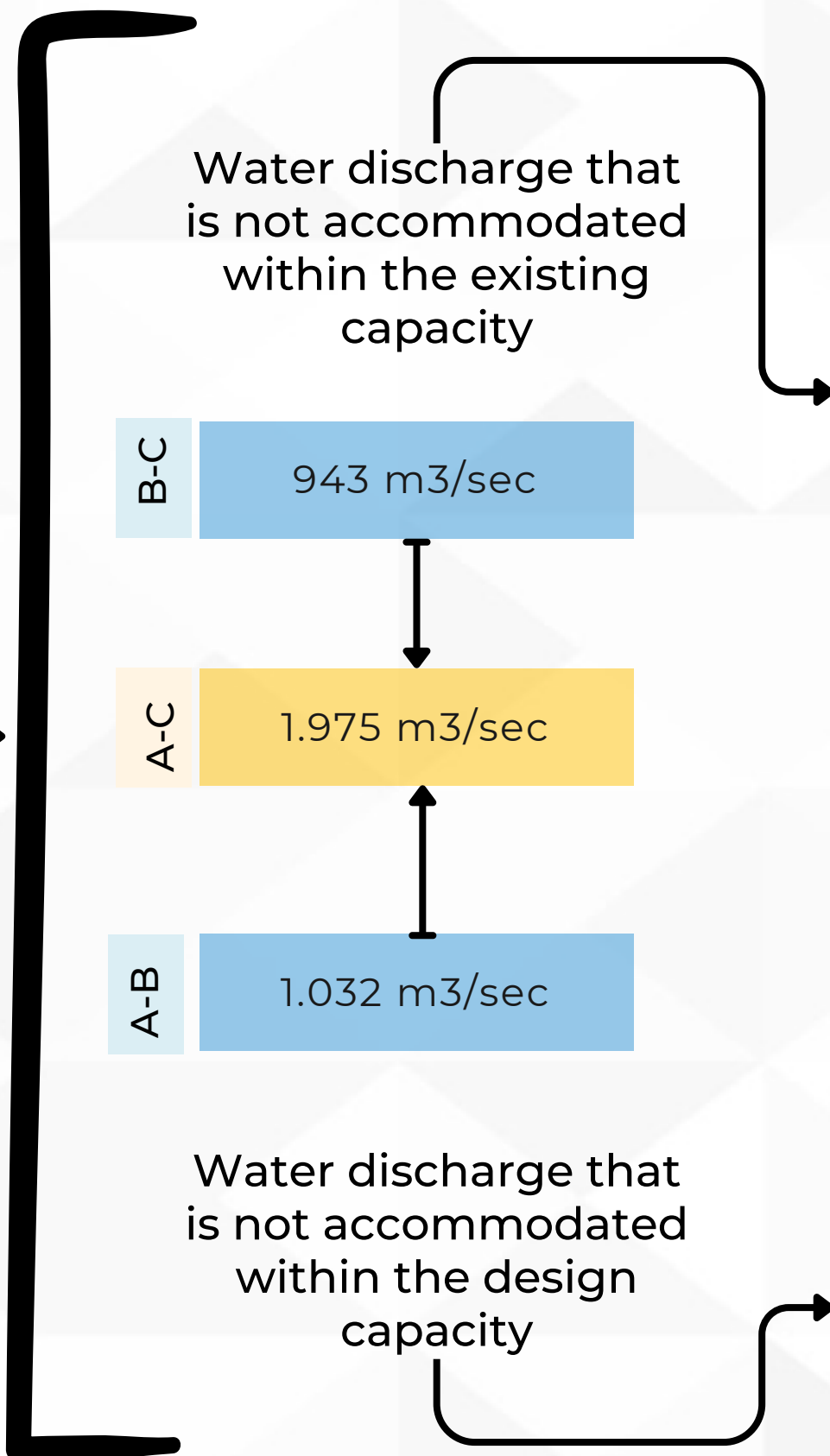
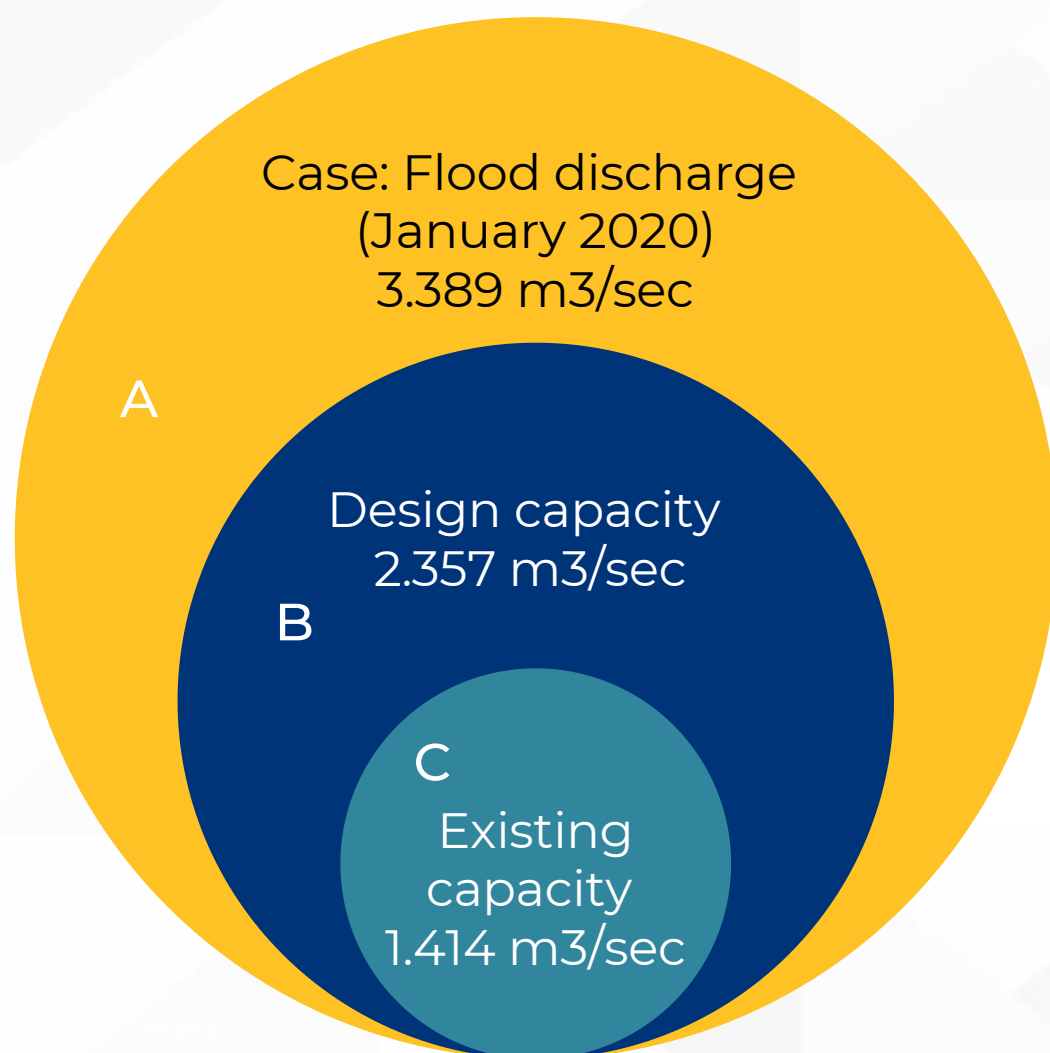


Network of rivers

Bridging the Capacity Gap for Integrated Flood Control

Flood management from time to time

Year	Max. precipitation intensity (mm/day)	Inundated area		Refugees	Death toll	Ebb time
		Number of district	Total area (km2)			
2020	377	390	156	31.232	19	4
2015	277	702	281	45.813	5	7
2013	100	599	240	90.913	40	7
2007	340	955	455	276.333	48	10



Infrastructure development in accordance with the master plan design:

- river widening
- Polder development and rehabilitation
- River Dredging
- Coastal Embankment Development

e.g. NCICD and 942 Programme

- building/revitalizing reservoirs, lakes, ponds;
- making vertical infiltration and drainage wells;
- building green and blue open spaces

NCICD and 942 Project

National Capital Integrated Coastal Development:

- Coastal Protection
- Land Subsidence Management
- It considers the interconnections between coastal protection, urban development, infrastructure, and water management



Project 942

9



Development of
9 polders,

4



4 reservoirs,

2



revitalization
of rivers

Three phases of project (NCICD) are as follows:

Phase A focuses on improving the existing coastal protection. This includes the reinforcement and development of the existing coastal dams of 30 kilometers in length and the development of 17 artificial islands on the Jakarta Bay. The first phase was launched in the beginning of September 2014. The construction is planned to begin in early 2016.

Phase B focuses on efforts to develop the west outer giant seawall planned to be constructed during 2018 through 2022.

Phase C focuses on constructing east outer giant seawall planned for after 2023. Several long-term developments in the east of the Jakarta Bay are conducted by closing part of the bay in order to anticipate if land subsidence in the east part of Jakarta cannot be avoided.

Building Coastal Community Resilience through Shell Waste Upcycling



As a neighborhood located in the north of Jakarta, Kalibaru is well-known for its green mussels industries which are distributed throughout the city. Despite its popularity, the process of the green mussel industry left several environmental issues due to the accumulation of shell waste, which has become one of the primary concerns in Kalibaru.



Project: Green Mussels Shell Waste Upcycling in Kalibaru

Innovation to address waste and livelihood challenges in coastal community.



THANK YOU

JUNE 2023



andhika.ajie@jakarta.go.id
prid@jakarta.go.id

FUTUREPROOFING AND CLIMATE ADAPTATION

Deltas, coasts and small islands – action, political will and financing



GLOBAL
CENTER ON
ADAPTATION

Deltares

Embracing Differences: Towards an Integrated Approach to Climate Adaptation Coastal cities along the Paraná Delta, Argentina



Parque Nacional Ciervo de los Pantanos National Park (APN 2021)

DeltaAlliance

TUDelft

FTDT

Paraná River

3rd largest river in America

Paraná river catchment area represents 50% of the entire La Plata basin (1.500.000 Km²)



3.100.000 km²

Medium discharge: 18.000 m³/sec¹

Sediment: 160 mt/year²
(28% clay, 56% mud, 16% sand)

- South America
- La Plata Basin
- Rivers
- Paraná River
- Paraná Delta

1. Pittau et al. (2004).

2. Sarubbi et al. (2006).



2,570 km

0 1000
Km Zagare (2018)

Paraná Delta

Location



Zagare, Carlino (2021)

Google Earth (2018)

Hydrology



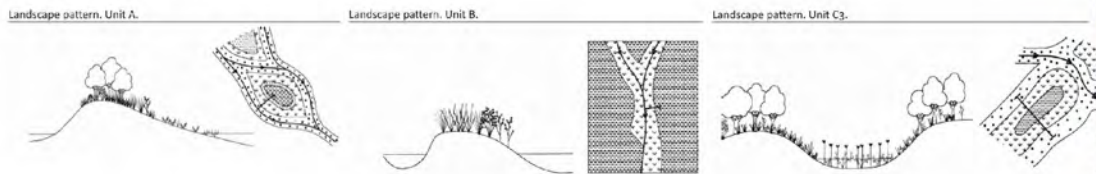
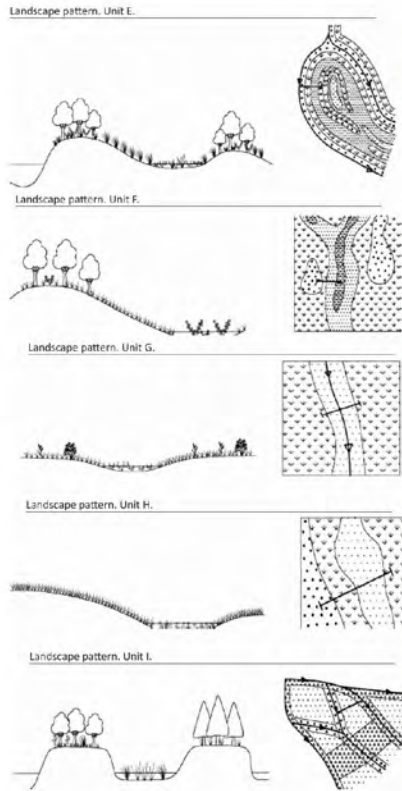
Google Earth (2018)

Paraná Delta

Wetland Mosaic



Malvarez (2007).



Data

Length	Width (variable)	Area
320 Km *	18-100 Km *	22.587 Km ² *

* PIECAS (2008).

Urban Corridor



LAND USES / PRODUCTION

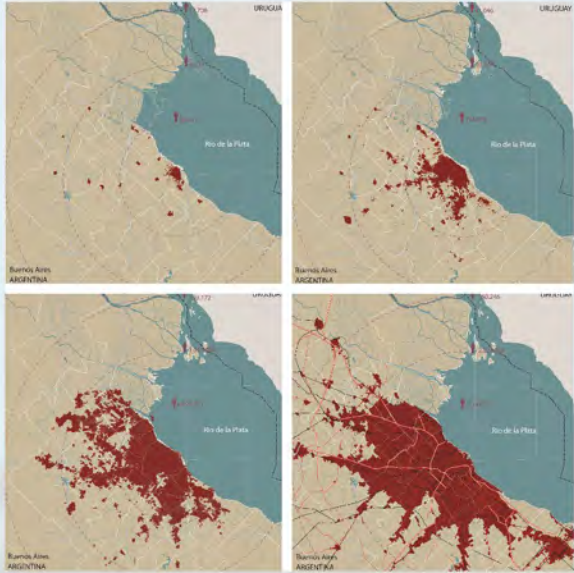


Islas de Victoria. Zagare (2019)

- Modification of the soil and hydrological cycles for productive purposes
- Expansion of the agriculture and livestock frontier towards the wetland.
- Introduction of practices and technologies from the Pampas into the wetland.



LAND USES / URBAN



- Increase of urban population (international trend)
- Increased demand for soil and safe water
- Lack of waste treatment and control, increase of pollution
- Unplanned urban expansion, social and spatial polarization
- Increase of private developments (gated neighbourhoods)-
New patterns in the islands.



Delta de Tigre. Zagare (2018)

MARKET / INFRASTRUCTURE AND TRANSPORTATION

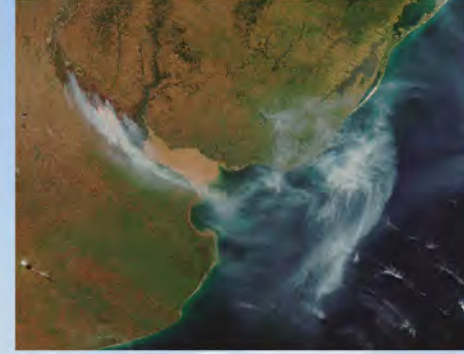
- Increased demand for commodities
- Paraná-Paraguay Waterway (connects the Delta with other areas of South America)
- Construction of highways and routes to connect bi-oceanic corridors.



Hidrovia. Radio Gráfica (2021)

CLIMATE CHANGE

- Regional: increase in temperature, precipitation, global warming.
- Local: climate variability, pulses of floods and droughts.
- Land-use changes, deforestation and unsustainable practices > changes in the natural dynamics.

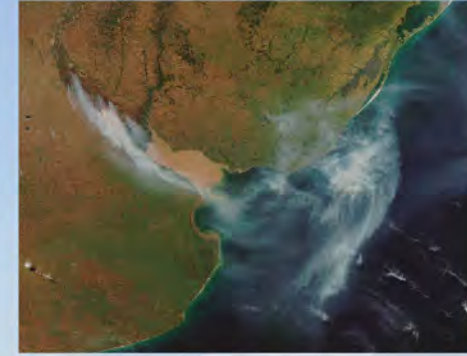


2023: SEVERE DROUGHT + FIRE OUBREAKS

Drought in Río Paraná. NEA Hoy (2021)

CLIMATE CHANGE

- Regional: increase in temperature, precipitation, global warming.
- Local: climate variability, pulses of floods and droughts.
- Land-use changes, deforestation and unsustainable practices > changes in the natural dynamics.



2023: SEVERE DROUGHT + FIRE OURBREAKS

2008 (2014/2019)- PIECAS-DP (Integral Strategic Plan for the Conservation and Sustainable Development of the Paraná Delta).

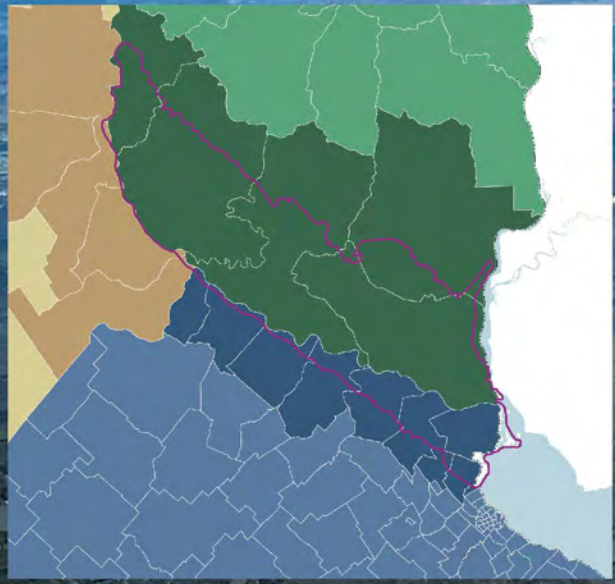
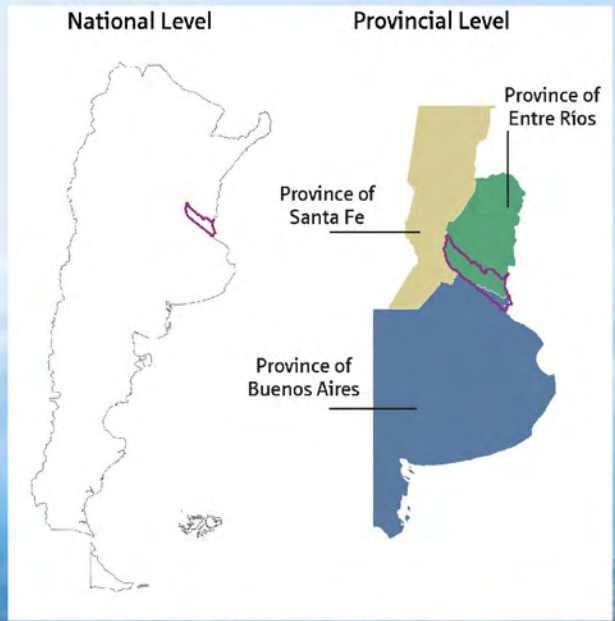
2021 - Working group for the development of the Regional Plan for Adaptation to Climate Change of the Parana River Delta (PRACC-DP).

2022 - National Plan for Climate Change Adaptation and Mitigation.

Drought in Río Paraná. NEA Hoy (2021)

GOVERNANCE

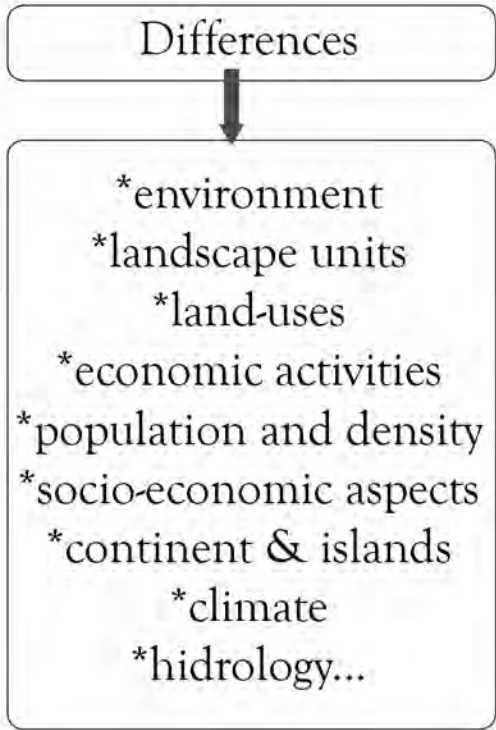
- A great number of actors, sectors and levels.
- Legal voids, excess of legislation, overlapping of legislation at different levels.
- Lack of agreements, and public participation.



Zagare (2019)

Embracing Differences: Towards an Integrated Approach to Climate Adaptation

Coastal cities along the Paraná Delta, Argentina





Delft University of Technology

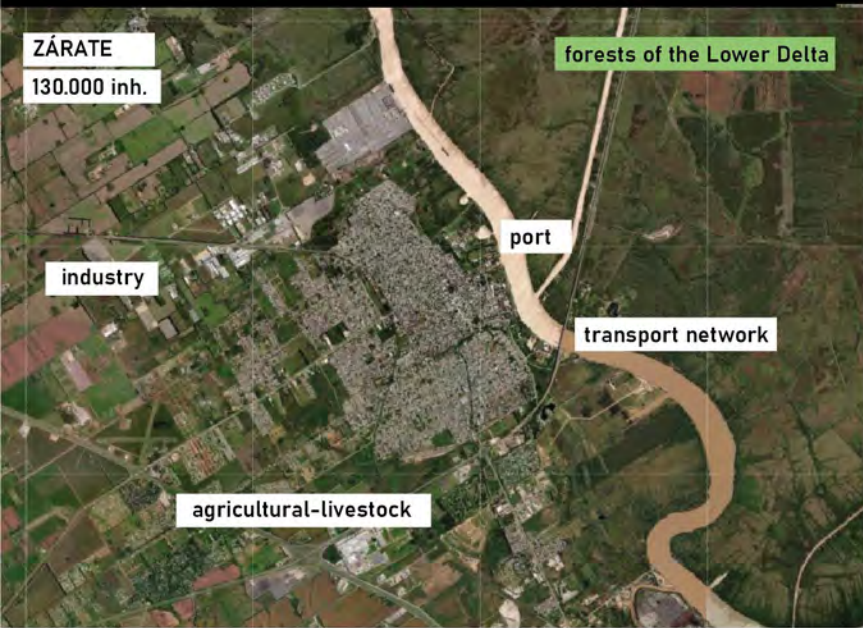
DELTA URBANISM

Interdisciplinary Research Program – TUDelft
Faculty of Architecture and the Built Environment

Team

Dr Diego Septúlveda Carmona
MSc Francesca Rizzetto
Dr Irene Luque Martin
Dr Verónica Zagare

Embracing Differences: Towards an Integrated Approach to Climate Adaptation



FUTUREPROOFING AND CLIMATE ADAPTATION

Deltas, coasts and small islands – action, political will and financing



GLOBAL
CENTER ON
ADAPTATION

Deltares



Thank you!
Dr Verónica Zagare
vzagare@deltasud.org

Parque Nacional Ciervo de los Pantanos National Park (APN 2021)

REBUILD BY DESIGN



REBUILD BY DESIGN

develops innovative research, collaboration, and design processes to catalyze equitable adaptation.

Because of the enormity of this challenge, the Rebuild by Design process was developed to find better ways of implementing designs and improving policy.

Bringing together interdisciplinary teams of internationally renowned designers, scientists, economists, and other experts with a diverse range of thousands of stakeholders, Rebuild by Design has developed innovative, equitable solutions that better protect residents from future climate risks, while strengthening everyday resilience within communities.

This graphic provides an overview of the Rebuild by Design process, from its June 2013 launch to the unveiling of final design proposals in April 2014 and beyond, as well as key themes and strategies. The following graphic includes detailed descriptions and images representing the design proposals.

REBUILD BY DESIGN

Lead Supporter
The Rockefeller Foundation

Additional Supporters
Deutsche Bank
Hearst Foundation
The JPB Foundation
Surdna Foundation
The New Jersey Recovery Fund

In collaboration with
the Institute for Public Knowledge at
New York University
Municipal Art Society of New York
Regional Planning Association
Van Alen Institute

Design Teams

BIG Team
BIG-1

HR&A Advisors w/ Cooper, Robertson & Partners
The Commercial Corridor Resiliency Project

Interboro Team

Living with the Bay: a Comprehensive Regional Resiliency Plan for Nassau County's South Shore

MIT CAU + ZUS + URBANISTEN
New Meadowlands: Productive City + Regional Park

OMA
Resist, Delay, Store, Discharge:
a comprehensive strategy for Hoboken

PennDesign / OLIN
Hunts Point Lifelines

Sasaki / Rutgers / Arup
Resilience + The Beach

SCAPE / Landscape Architecture
LIVING BREAKWATERS

WB unbridged with Yale ARCADIS
Resilient Bridgeport

WXY / WEST 8

Blue Dunes - The Future of Coastal Resiliency

Build by Design

Transforming the region and its future

4

Collaboration by Design

Form coalitions to innovate

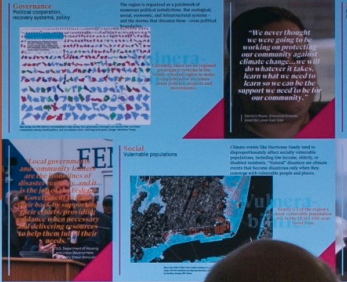
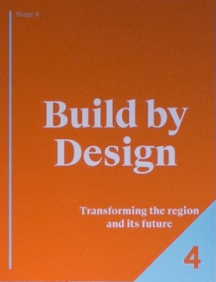
3



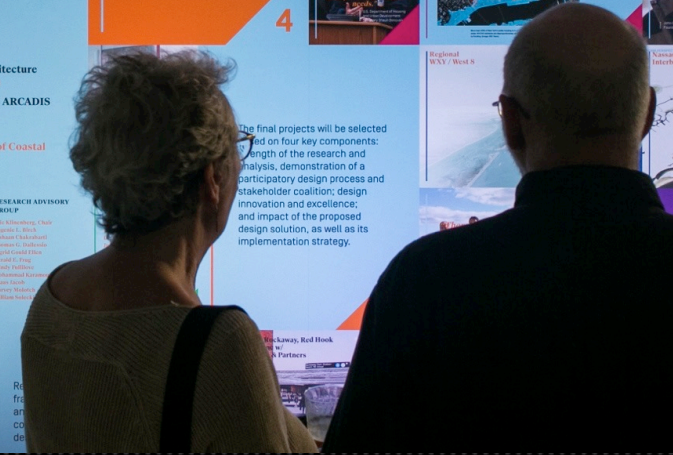
Design can catalyze...
comprehensive...
resilient...
resilient...



RESEARCH ADVISORY GROUP
John Schellinger, Chair
Phyllis K. Block
Victoria Chalkovskiy
Phyllis K. Block
Gordon L. Brown
Michael J. Brown
Michael J. Brown
Michael J. Brown
Michael J. Brown



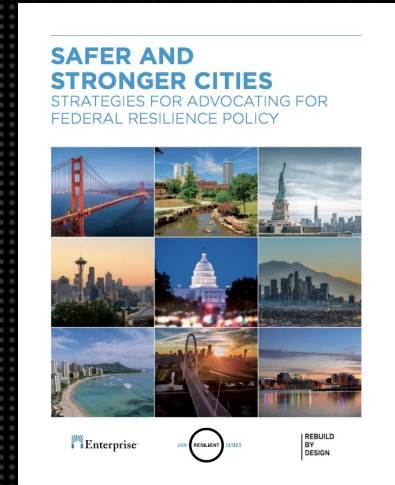
Sandy exposed vulnerabilities throughout the Northeast region that have existed for a long time: neglected infrastructure, fragile economic systems, and at-risk populations. The Design Teams researched these vulnerabilities - analyzing data, meeting with stakeholders, and learning through site visits, workshops, and conversations - and identified opportunities for design interventions.

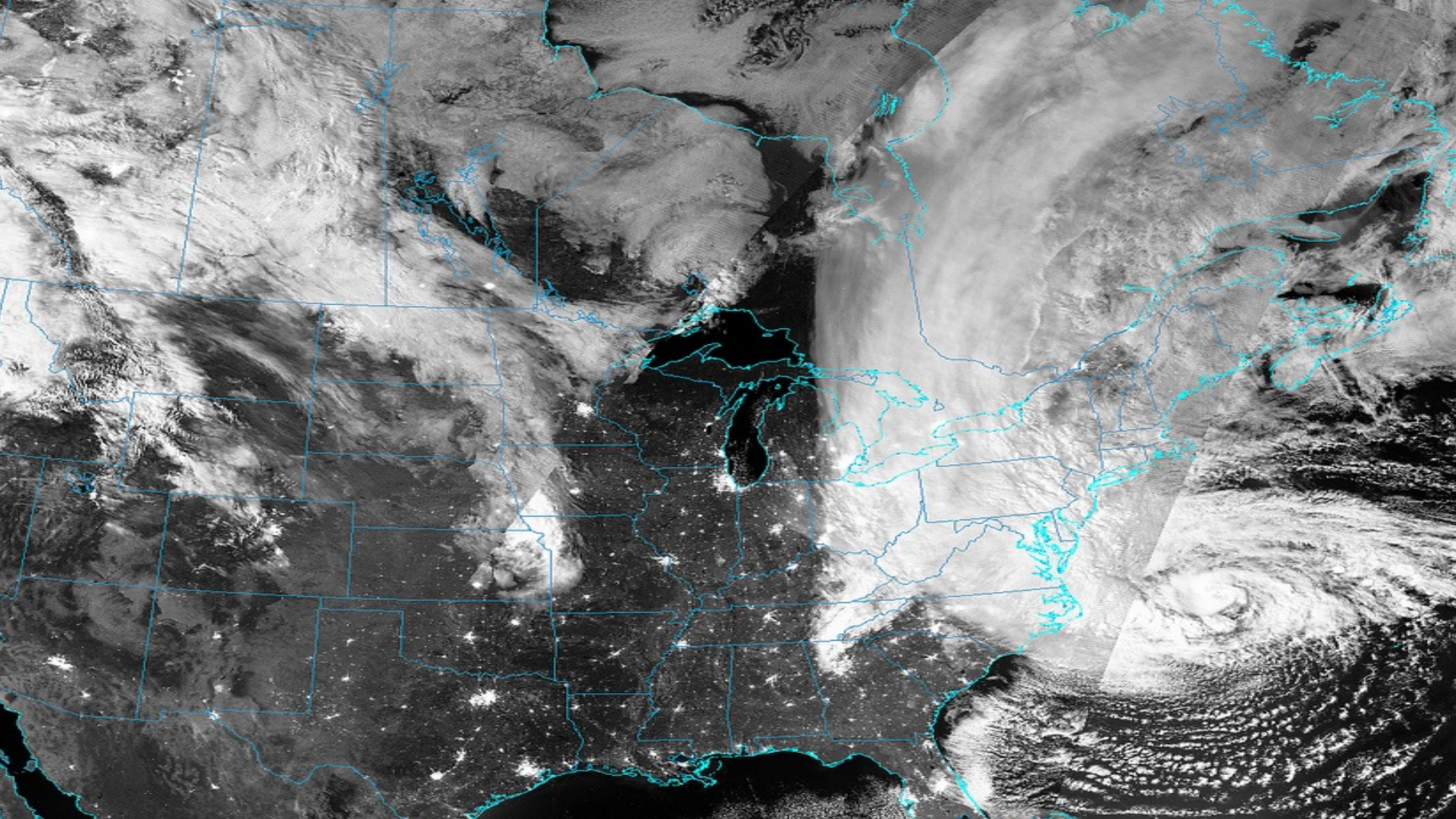


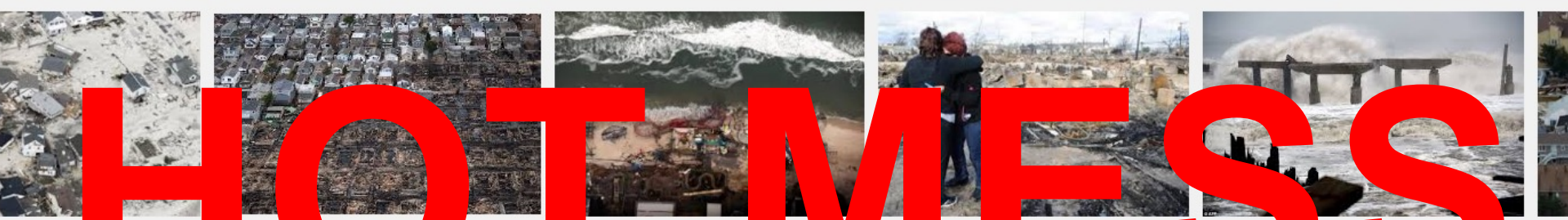
REBUILD BY DESIGN

WHAT WE DO

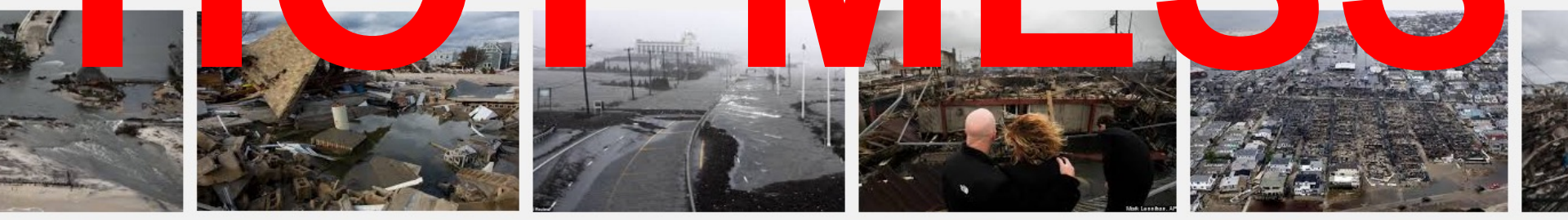
- 1 Large Scale Regional Design Competitions
- 2 Innovative Processes to Address Cities' Challenges
- 3 Research and Policy





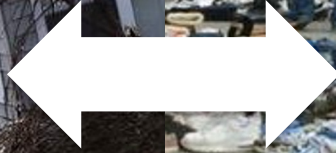


HOT MESS





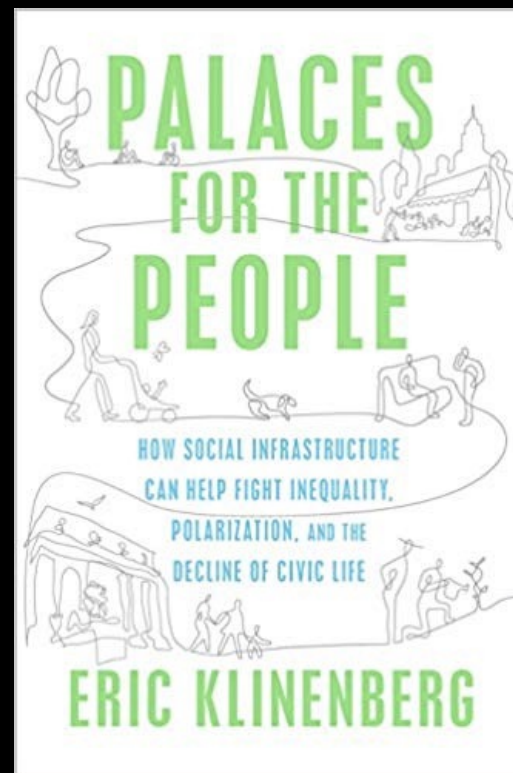
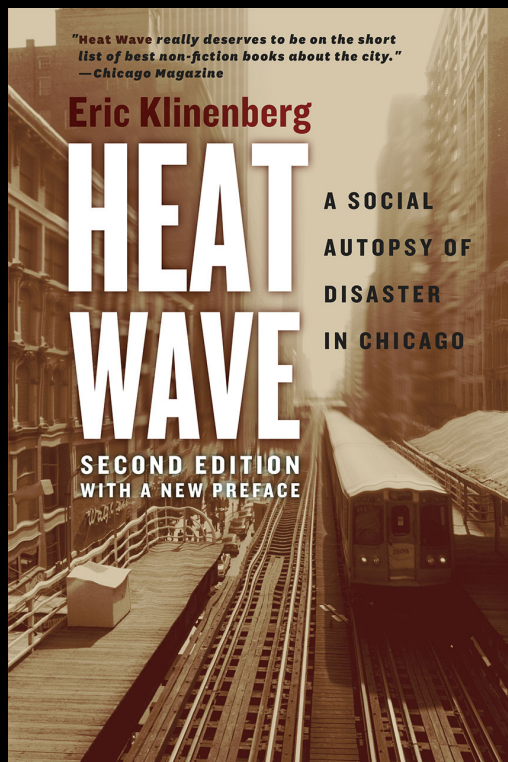
PHYSICAL



SOCIAL

SOCIAL RESILIENCE

1995 Chicago Heat
Wave Killed 700
people



TYPICAL DESIGN PROCESS

Site

Budget

Program

Square Footage

Timeline



DESIGN DETOUR



HURRICANE SANDY DESIGN COMPETITION JUNE 2013 – JUNE 2014

- 10 Interdisciplinary Teams
- Northeast United States
- Federal Disaster Dollars (CDBG-DR) to be awarded by HUD
- Focus on the Future, Not Returning to the Past
- Infrastructure should address multiple goals at the same time
- Judged on Innovation, Collaboration and Implementation





COLLABORATIVE RESEARCH



COLLABORATIVE DESIGN



STAGE 1: COLLABORATIVE RESEARCH



STAGE 2: COLLABORATIVE DESIGN



COLLABORATIVE DESIGN

- Analysis of All Stakeholders
- Government Agency Meetings
- Meetings w existing coalitions
- Forming new coalitions
- Creating unusual events (bike tours, dance parties, movie screenings, parade)
- Design Charrettes
- Brainstorming sessions
- Site tours
- Wholesale Presentations at existing meetings



Design + Program developed with stakeholders



EVENTS

**MARCH 13
2014 - 6:30 PM**

Innovating for a Resilient Rockaway

SOLUTIONS FOR SMALL BUSINESS

Hosted by the Beach 116th Street Partnership
Support from The Municipal Art Society of New York
Presentation by Rebuild by Design's HRA Advisors
and Cooper, Robertson & Partners team

What can I do to protect my small business?
How do I measure resilient improvements?
What are my options?

231 Beach 116th Street
Thursday-March, 13th
6:30 PM - 8:30 PM
www.shopbeach116.com/news-events/resilientrock/

BEACH 116TH STREET PARTNERSHIP
HRA

**firstannual hunts point
slam bake**

Hosted by the
Cooking
Channels Baron
Ambrosia

**Cooking
Competition
featuring the
Talent, Bounty and
Businesses of Hunts Point**

**Wednesday, March 19
5:00 PM - 8:30 PM**

banknote building

3rd Floor Event Space, 1231 Lafayette Avenue

Presentation of Dishes to Judges 5:00 PM
Slam Bake Public Tasting at 5:30 PM
Judges Announce Winners at 6:30 PM
Rebuild by Design Public Meeting 7:00 PM

Chickens, dinner, and Spanish-language translation will be provided

Presented by the PeerDesign / OUN Rebuild by Design teams. PeerDesign and OUN were selected through the U.S. Department of Housing and Urban Development's Rebuild by Design competition to identify and develop viable infrastructure strategies for protecting Hunts Point from adverse weather events. Rebuild by Design is aimed at addressing structural and environmental vulnerabilities that Sandy imposed in communities throughout the region and developing functional solutions to better protect residents and businesses in the future.

Judging and public tasting followed
Immediately by a public meeting to review
draft ideas for HUD's

Rebuild by Design:
**plans for new infrastructure
to protect Hunts Point
from the next
Superstorm**

Citymaking Bridgeport

**Saturday
March 15
1-4pm**

Bridgeport Public Library
Pop room, 1st. floor
925 Broad St, Bridgeport CT

Bike Tour Along the Pequonnock
Design Your Ideal City: Workshop
Bike Repair: Demonstration and Clinic
Living With Water: Urban Design Station
Hack Your Bike!
Bike Art
DJ and Live Music
Free food from Pantanal, Ms Thelma's,
and Rootsman
Win a Free Bike!!

This afternoon festival highlights ways people around the city can take an active role in making

Citymaking Bridgeport is a coalition of Rebuild by Design, a design firm, and the U.S. Department of Housing and Urban Development's (HUD) rebuildbydesign.org

Contact: jchou@v
212-924-7000 x2

INCLUSIVE



5

Philanthropic
Fundors



4

Partner
NGOs



141

Neighborhoods



19

Universities



535

Community
Stakeholder Orgs



181

Government
Agencies

PROJECTS



A
BIG Team
 The BIG U
 Manhattan, NY

B
HR&A Advisors, Inc.
 with Cooper, Robertson
 & Partners
 Commercial Corridor
 Resilience Project
 Asbury Park, NJ; Rockaways, NY;
 Red Hook, NY

C
Interboro Team
 Living with the Bay:
 A Comprehensive Regional
 Resilience Plan for
 Nassau County's South Shore
 Nassau County, NY

D
**MIT CAU + ZUS +
 URBANISTEN**
 New Meadowlands: Productive
 City + Regional Park
 Meadowlands, NJ

E
OMA
 Resist, Delay, Store, Discharge:
 A Comprehensive Strategy
 for Hoboken
 Hoboken, NJ

F
PennDesign/OLIN
 Hunts Point Lifelines
 Bronx, NY

G
Sasaki/Rutgers/Arup
 Resilience + The Beach
 Union Beach, Asbury Park,
 Toms River, NJ

H
**SCAPE/Landscape
 Architecture**
 Living Breakwaters
 Staten Island, NY

I
**WB unabridged
 with Yale ARCADIS**
 Resilient Bridgeport
 Bridgeport, CT

J
WXY/West 8
 Blue Dunes - The Future of
 Coastal Protection
 Atlantic Coastline

-  Connecticut
-  New Jersey
-  New York

HURRICANE SANDY COMPETITION PROJECT TIMELINE

HURRICANE SANDY

REBUILD WINNING PROJECTS
ANNOUNCED

PROJECT IMPLEMENTATION BEGINS

OCT 2012 JUNE 2014 2016 2017 2018 2019 2020 2021



BRIDGEPORT, CT

AGREEMENT ON DRY EGRESS
STORMWATER PARK

30 % DESIGN

DEIS

CONSTRUCTION START



HOBOKEN, NJ

ALIGNMENT 3
SELECTED

EIS

DEIS

RECORD OF DECISION

SELECTION OF CONTRACTOR
(ANTICIPATED)

CONSTRUCTION START



HUNTS POINT, NY

RESILIENT ENERGY PILOT PROJECT AND FLOOD
RISK REDUCTION STUDIES BEGIN

30 % DESIGN
FOR ENERGY PROJECT

ENVIRONMENTAL REVIEW
COMPLETE

CONSTRUCTION START



LONG ISLAND, NY

DESIGN OF THE VARIOUS PROJECTS

DEIS

PRIORITIZATION OF
KEY PROJECTS

CONSTRUCTION START:
MULTIPLE PROJECTS

EIS

RECORD OF
DECISION

CONSTRUCTION CONTINUES FOR MULTIPLE PROJECTS



MANHATTAN, NY:
East Side Coastal Resiliency

NDRC WINNERS ANNOUNCED **

DEIS

FINAL DESIGN

RECORD OF
DECISION

EIS

CONSTRUCTION START



Lower Manhattan
Coastal Resiliency

STUDY LAUNCHED

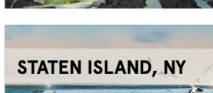
FINAL DESIGN
CONCEPT

DEIS

RECORD OF DECISION

EIS

CONSTRUCTION START



MEADOWLANDS, NJ

RECOMMENDATION OF
PREFERRED ALTERNATIVE

DEIS

EIS

RECORD OF
DECISION

CONSTRUCTION START
MULTIPLE CONTRACT AWARDS

CONSTRUCTION CONTINUES FOR MULTIPLE PROJECTS



STATEN ISLAND, NY

DEIS

PRELIMINARY
30 % DESIGN

EIS

PERMIT APPROVALS

CONSTRUCTION START

COMPLETE DESIGN

HURRICANE SANDY COMPETITION PROJECT TIMELINE

HURRICANE SANDY

REBUILD WINNING PROJECTS
ANNOUNCED

PROJECT IMPLEMENTATION BEGINS

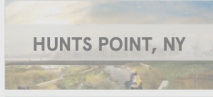
OCT 2012 JUNE 2014 2016 2017 2018 2019 2020 2021



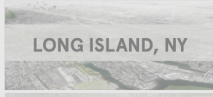
BRIDGEPORT, CT



HOBOKEN, NJ



HUNTS POINT, NY



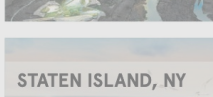
LONG ISLAND, NY



MANHATTAN, NY:
East Side Coastal Resiliency

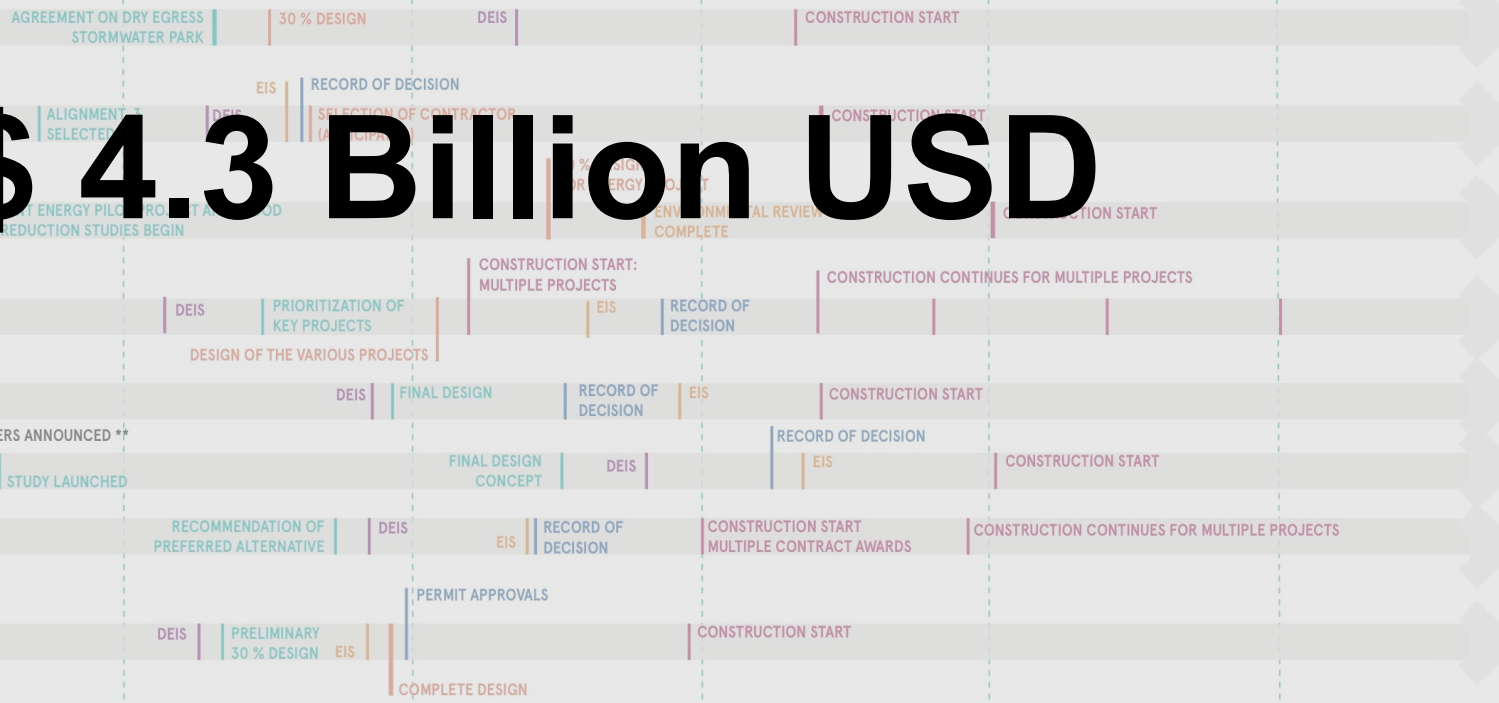


MEADOWLANDS, NJ



STATEN ISLAND, NY

\$ 4.3 Billion USD



NDRC WINNERS ANNOUNCED **

INFORMING SIMILAR APPROACHES

**REBUILD
BY
DESIGN**

2013

National Disaster
Resilience
Competition



2014



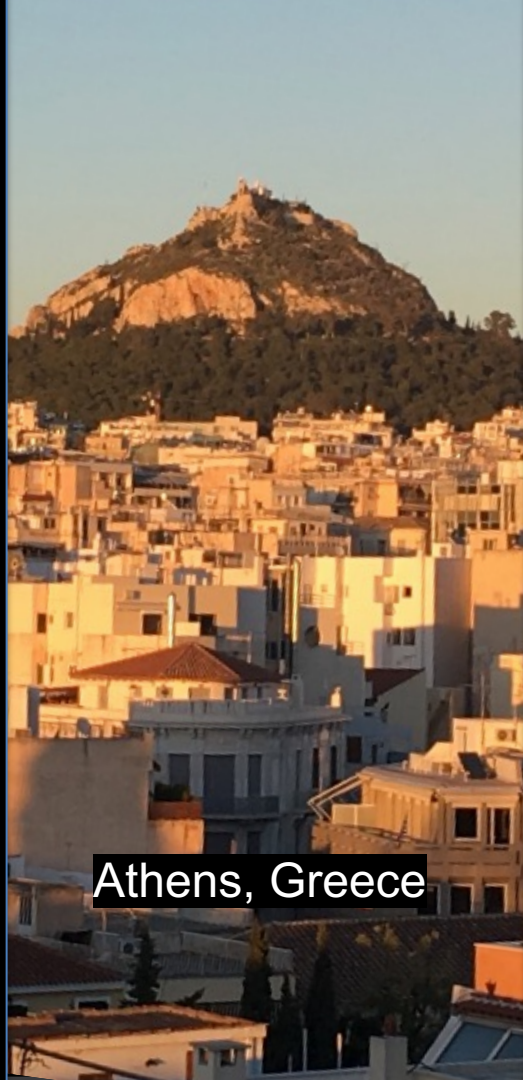
2018



2018



**San Francisco
Bay Area**



Athens, Greece



Mexico City, Mexico



Singapore

The BIG U

BIG (Bjarke Ingels Group)

One Architecture

Starr Whitehouse

Buro Happold

Level Agency for Infrastructure

James Lima Planning + Development

Green Shield Ecology

AEA Consulting, Arcadis

Project Projects,

Parsons School of Constructed

Environments



LIVING BREAKWATERS

SCAPE LANDSCAPE ARCHITECTURE

Parsons Brinckerhoff

Dr. Philip Orton

Stevens Institute of Technology Ocean & Coastal

Consultants SeArc Ecological Consulting

LOT-EK, MTWTF, The Harbor School and Paul Greenberg

LIVING BREAKWATERS

STATEN ISLAND + RARITAN BAY
HUD REBUILD BY DESIGN



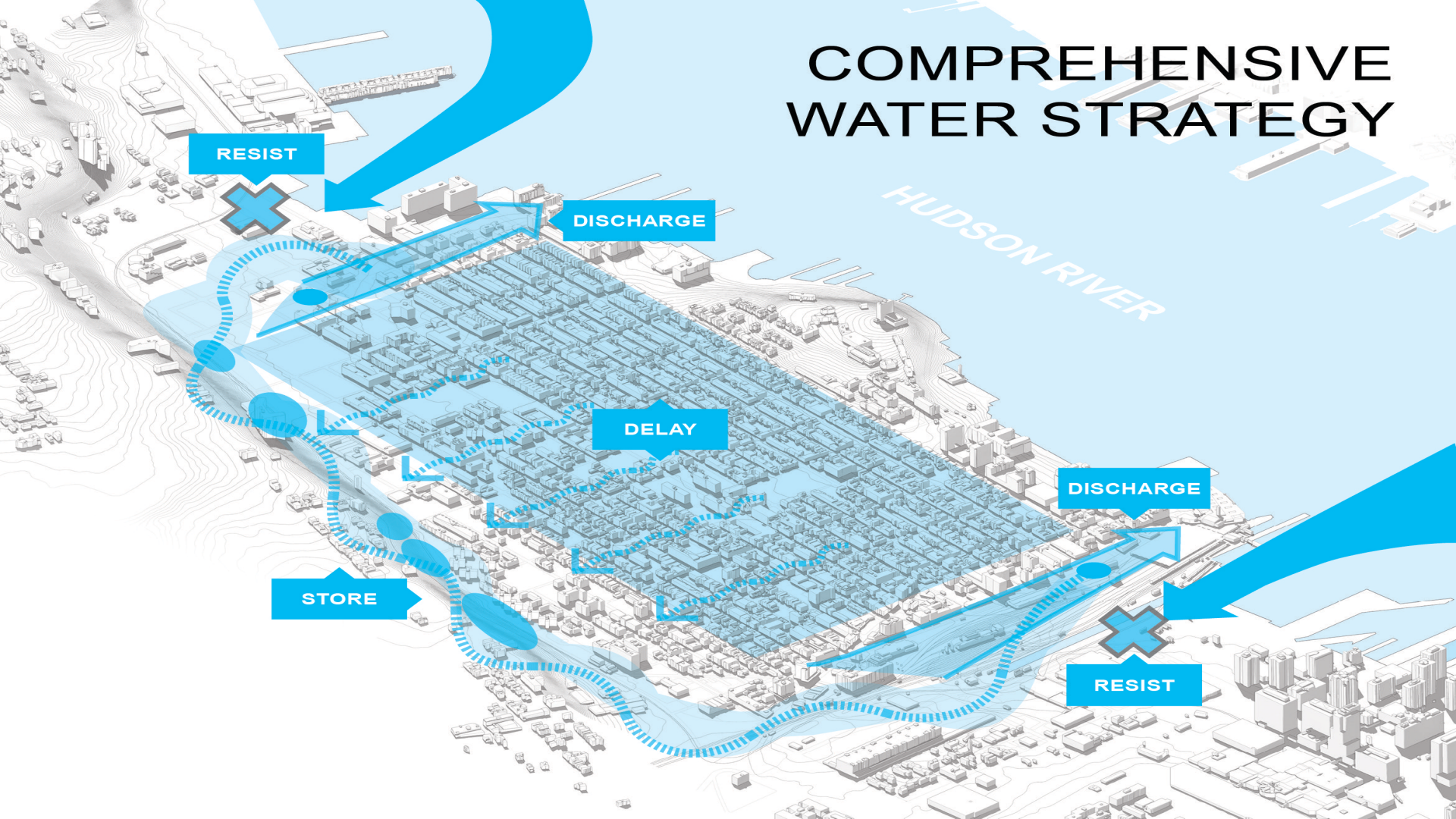
Resist, Delay, Store, Discharge: A Comprehensive Strategy for Hoboken



OMA

—
Royal HaskoningDHV
HR&A Advisors,
Balmori Associates

COMPREHENSIVE WATER STRATEGY



RESIST

DISCHARGE

DELAY

DISCHARGE

STORE

RESIST

WHAT HAVE WE LEARNED?

INTERDISCIPLINARY GROUPS CREATE BETTER OUTCOMES

- Architects
- Designers
- Engineers
- Scientists
- Academics
- Writers
- Artist
- Community Engagement Specialists
- Government
- NGO Leaders



THERE IS DISTRUST IN GOVERNMENT IS EVERYWHERE

But in most cases they are needed for
implementation

Designers in the lead with the government and
community assures that community and
government are kept separate and you are
working towards the goals of each.



PROCUREMENT IS HARD

The laws that were created to prevent corruption, also prevent innovation. Inflexible rules favors the status quo in:

- Using the same firms
- Using large multinational firms who can support the paperwork and reporting measures
- Prevents opportunities for younger and more diverse firms

The screenshot shows the NYC Environmental Protection website. At the top, there are COVID-19 alerts and a search bar. The main navigation includes 'Pay My Bills', 'About', 'Water', 'Environment', 'Recreation', and 'What's New'. Below this is a secondary navigation with 'Mission & Leadership', 'Working With Us', 'Publications', and 'Contact'. The 'Bids & Proposals' section is highlighted, featuring several links: 'Electronic Receipt and Processing for All Vendor Invoices', 'Notice for all Current Bids', 'Safety Practices of Public-Facing Contracted Personnel During The COVID-19 Crisis', and 'Notice to Contractors Regarding Safety Practices of Public-Facing Contracted Personnel During The COVID-19 Crisis'. A paragraph below these links states: 'We are the largest construction agency in the City, awarding more than \$1 billion in contracts for construction, construction related services and engineering services annually. Learn about our bids, request for proposals, project delivery procedures, and [prevailing wage](#).' At the bottom, there are buttons for 'Expand All' and 'Collapse All', and a list of categories: 'Bids', 'Request for Proposals', and 'Project Delivery Procedures', each with a plus icon.

REPLICABLE + TRANSFERABLE

Initial investment can have lasting payoffs to other locations in the same region and inspire others.

Examples:

- High Density
- Low Density
- Bay
- Barrier Island
- Wetland/Marsh
- Infill
- High Precipitation
- Drought



HAVING FAITH IN COMMUNITIES ALWAYS WORKS OUT IN THE END

They have great ideas
and their ideas can work!



PLANS CHANGE!

October 2019

Mayor announced a changed plan at a cost of \$700 million, which the City would fund

After Superstorm Sandy civic groups and foundations joined with the federal government to create Rebuild by Design, an international competition to develop creative, resilient new infrastructure to guard New York and New Jersey from climate change.

Seven projects, including one called the Big U, emerged and were awarded nearly a billion dollars from the federal government to start building.

Six years later, the Big U still hasn't broken ground, and the city has just abruptly announced major changes to the project with an expanded price tag and unclear additional benefits.

That's left many of the original stakeholders asking: Just how committed is the city to leading the way on resilience?

The Big U, which called for a series of berms and parkland that would act as a sponge during major storms, was designed to protect Lower Manhattan from flooding. This area houses more than 220,000 residents as well as a \$100 billion business sector; if it goes underwater, the whole country is in trouble.

The city's odd storm splurge

BE OUR GUEST
BY AMY CHESTER AND TOM WRIGHT

By 2015, the first two sections of the project — from E. 25th St. to the Brooklyn Bridge — received \$511 million in federal funding, later matched by \$542 million from the city, which also led dozens of meetings with residents to craft an intelligent, effective plan.

Then earlier this year, the city went dark.

A few weeks ago, after several months of silence, the mayor's office announced radical changes to the northern portion of this project. Instead of building a berm, or narrow shelf of land, alongside the FDR Drive, and leaving East River Park to act as a sponge during major storms, they now plan to completely raise the entire, recently renovated park 8 to 10 feet.

It's hard to determine whether the new design will be better or worse since the city hasn't released any details. We do know a few things: The northern portion of the Big U will now cost an additional \$700 million (bringing the price tag for this section to \$1.45

billion); offers no additional flood protection; no additional community amenities, and should have already been well underway.

Spending \$700 million to get a better park or more flood protection might be welcomed, but that's not what the city is offering. Instead, it seems, this money is buying the city out of having to grapple with two thorny problems.

The first, inconveniencing drivers on the FDR, which would require overnight closures to build the original design.

The second challenge is more complex. The original design called for East River Park to flood in the event of a big storm. Other privately managed parks including Brooklyn Bridge Park and Domino Park are designed to do this, and provide an extra layer of protection to their surrounding communities.

But the Parks Department doesn't have a maintenance budget or process to restore city parks after a major storm event. Instead of fixing that problem,

the city proposes to skirt it by lifting the whole park. That seems unwise.

The city has said that this new approach will shorten construction by six months, but for a project that is designed to last for more than a generation, that's already been slow-walked, let's make sure we get it right.

Mayor de Blasio should engage with the public to determine the best use of

an additional \$700 million. Perhaps that will mean using the funds to extend the Big U to the Battery, which was underfunded. Perhaps we should use the money to create a maintenance budget for the

city to maintain flood infrastructure over time.

If they want to insist their way forward is the best, let's hear them make the case.

Chester is managing director of Rebuild by Design. Wright is the president of Regional Plan Association, one of the original partners of the Rebuild by Design competition.

Why does Blaz want to spend \$700M more on a resiliency plan?

New York Daily News

THANK YOU!

Amy Chester, Managing Director
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Related Links

- [Global Center on Adaptation Report: Living with water: climate adaptation in the world's deltas](#)
- [Resilient Rotterdam Strategy 2022-2027](#)
- [Resilient Cities Network website](#)
- [Singapore's Active Beautiful Clean Waters Programme](#)
- [Strategy Brief: Resilient Jakarta](#)
- [Comprehensive Strategic Plan for Conservation and Sustainable Use in the Paraná Delta \(PIECAS-DP\)](#)
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