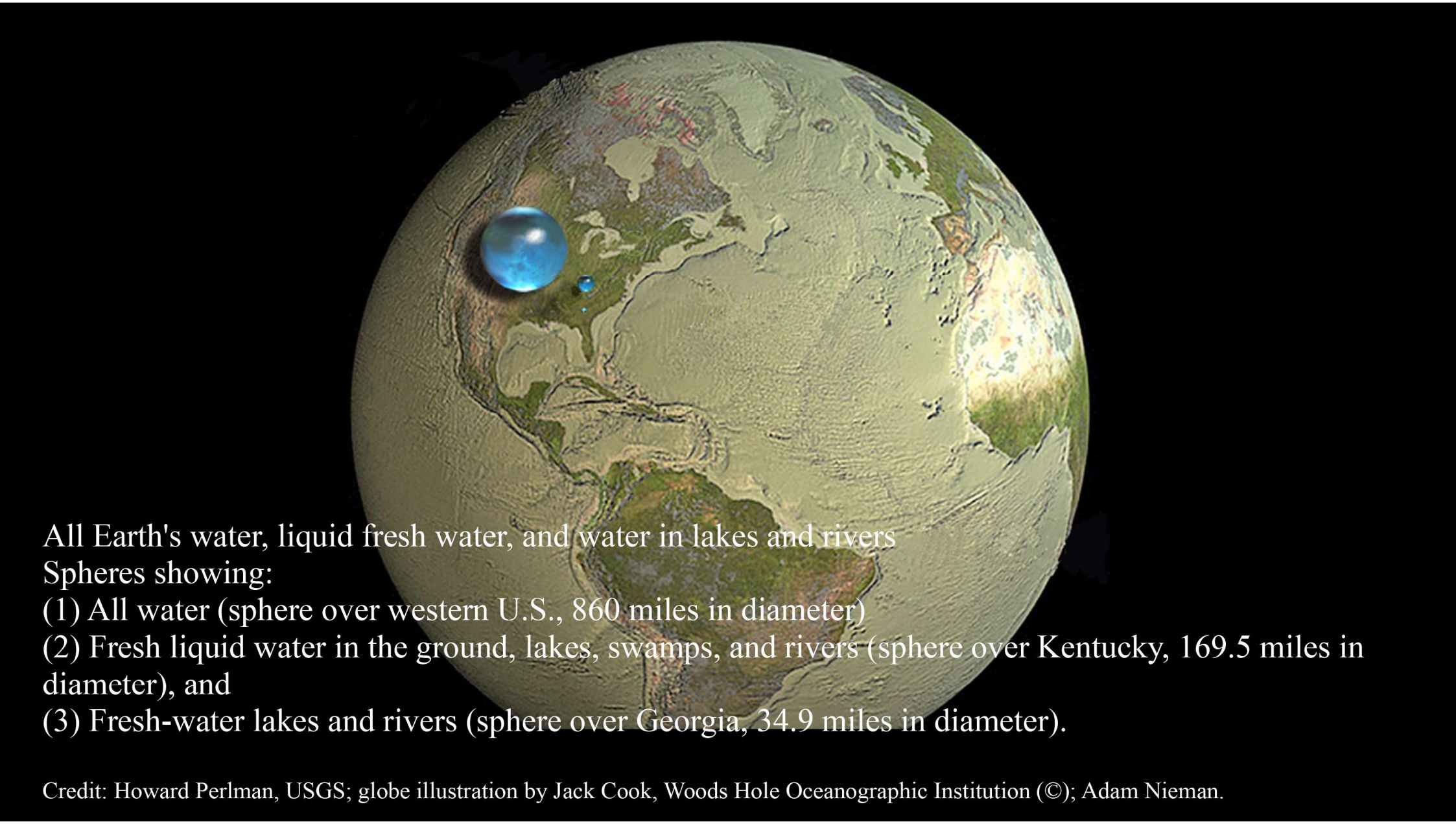
BLUE MARBLE Dec 7 1972, Apollo 17



All Earth's water, liquid fresh water, and water in lakes and rivers
Spheres showing:
(1) All water (sphere over western U.S., 860 miles in diameter)
(2) Fresh liquid water in the ground, lakes, swamps, and rivers (sphere over Kentucky, 169.5 miles in diameter), and
(3) Fresh-water lakes and rivers (sphere over Georgia, 34.9 miles in diameter).

Credit: Howard Perlman, USGS; globe illustration by Jack Cook, Woods Hole Oceanographic Institution (©); Adam Nieman.

© UNICEF Afghanistan/2016/Hamdard

A group of adolescent girls wash their hands with soap at a new handwashing station in their school in Kandahar, southern Afghanistan.


typhoon Mangkhut Philipines
droughts Africa
2018
wildfires California
floods Japan

Hurricane Dorian, Marsh Harbour Great Abaco Island, Bahamas, September 5, 2019. Al Diaz/Miami Herald/Tribune News Service via Getty Images

Women herding goats dry riverbed Dire Dawa City Ethiopia ©WILL BAXTER/CRS

2019

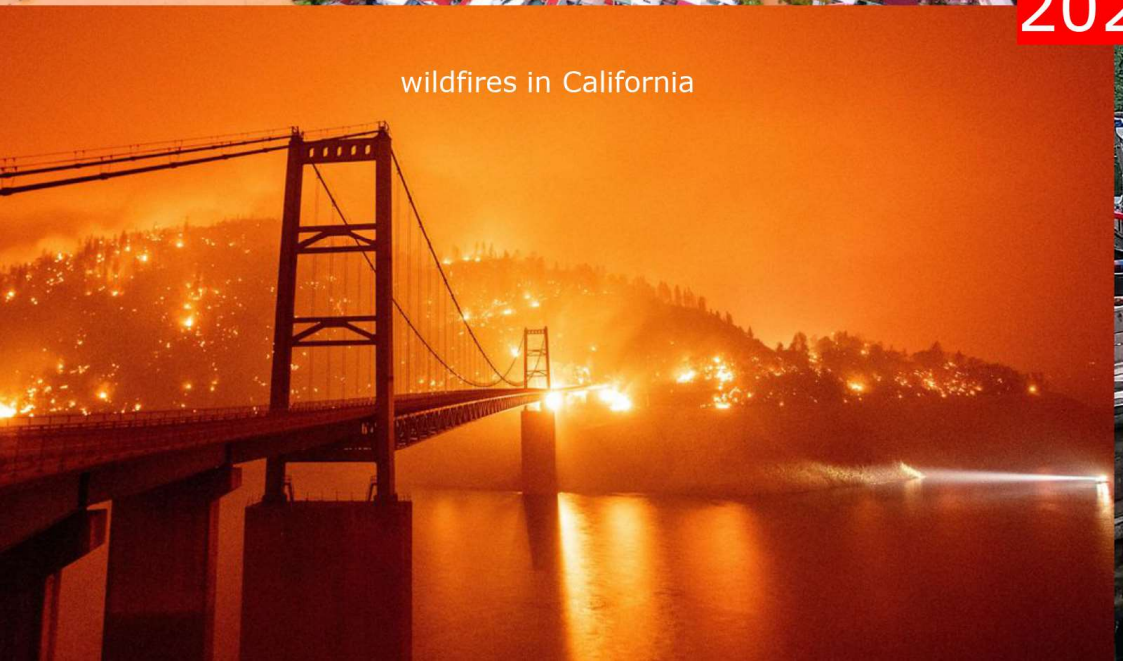
Wildfires Australia

Typhoon Hagibis - Japan

Vietnamese: Photos of floods in Central Vietnam in 2020 in Hue city

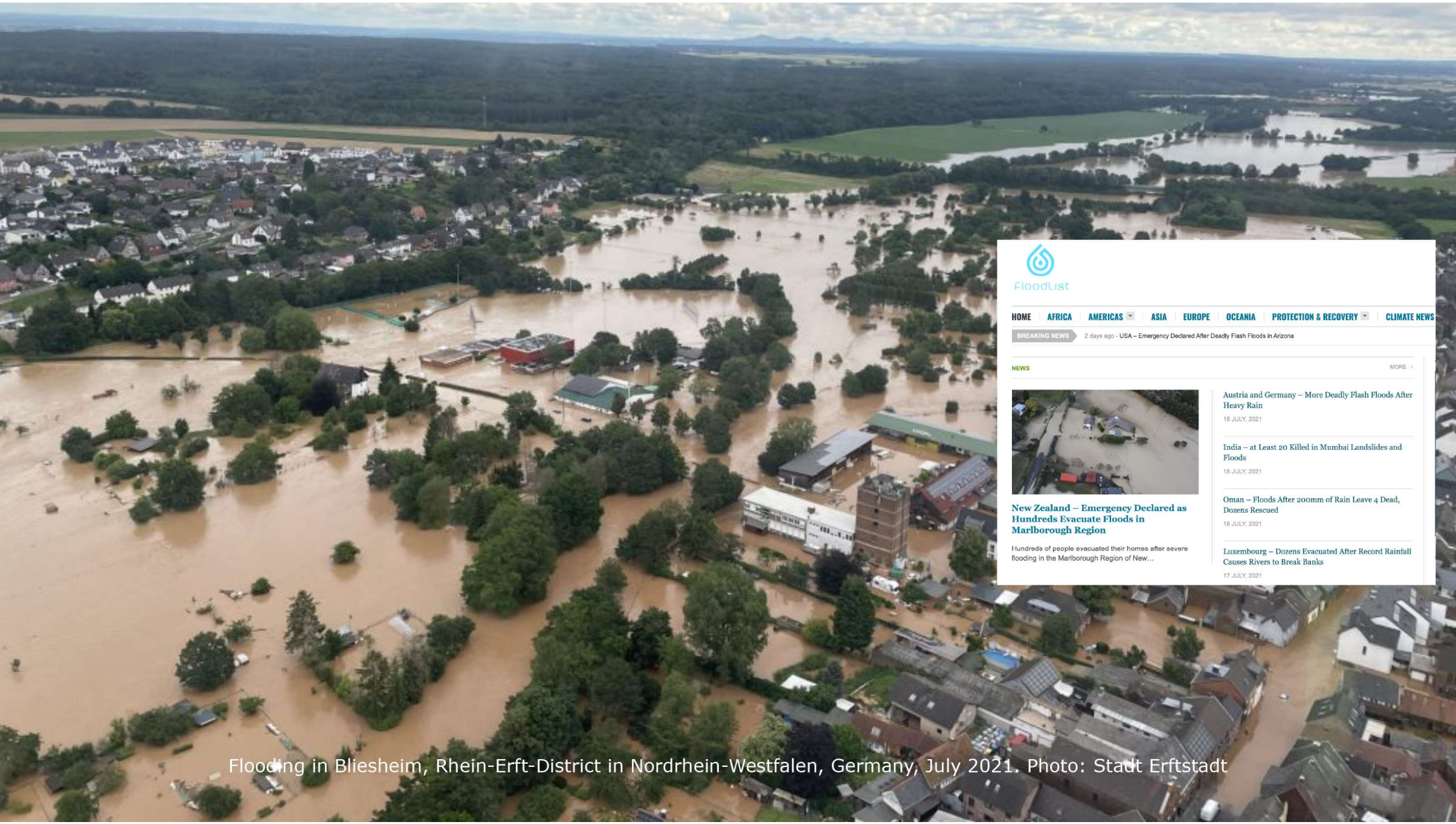
A rice field in An Phu Trung Commune of Ba Tri District in Ben Tre Province.

2020



wildfires in California

In Bangladesh, residents of the island of Bhola are moved to safety.
Photograph: District Administration of Bhola AFP via Getty Images



Flooding in Bliesheim, Rhein-Erft-District in Nordrhein-Westfalen, Germany, July 2021. Photo: Stadt Erftstadt

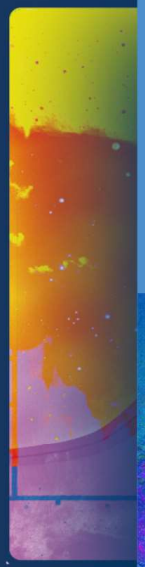
Unmanned remote wildfire camera owned by State of California.

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Global Warming of 1.5°C

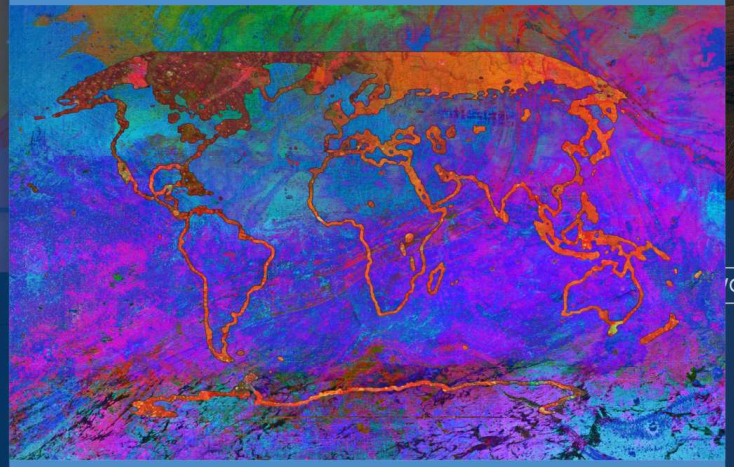
An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.



ipcc
INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis



WGI

Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

WMO UNEP

ipcc
INTERGOVERNMENTAL PANEL ON climate change

Climate Change and Land

An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems

Summary for Policymakers

WG II WG III

WMO UNEP

ipcc
INTERGOVERNMENTAL PANEL ON climate change

The Ocean and Cryosphere in a Changing Climate

This Summary for Policymakers was formally approved at the Second Joint Session of Working Groups I and II of the IPCC and accepted by the 51th Session of the IPCC, Principality of Monaco, 24th September 2019

Summary for Policymakers

WG I WG II

WMO UNEP

THE GEOGRAPHY OF DROUGHTS AND FLOODS

PBL Netherlands Environmental Assessment Agency

The impact of too little water

Drought occurrences 1996–2015
Droughts occur on all continents, but predominantly in the southern hemisphere.

Number of occurrences

10

Source: CRED

People annually affected by drought 1996–2015
Droughts lead to water scarcity for people, severe agricultural production loss, local food shortages, and wildfires.

Number of people affected, annually

10 million

Source: CRED

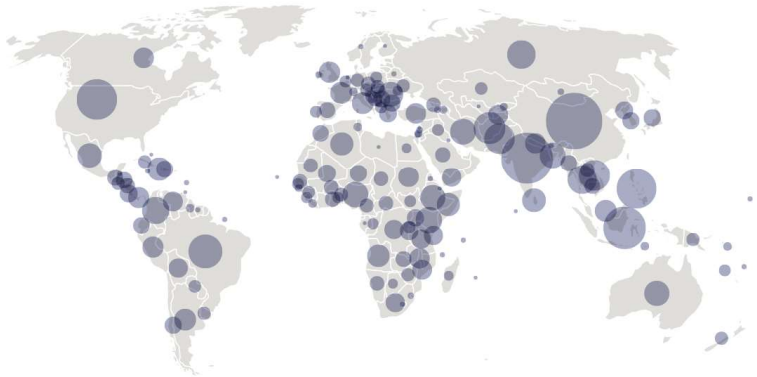
The impact of too much water

Flooding events 1996–2015
Flooding events lead to casualties, result in temporary displacement out of the area and high economic losses affecting both industries and households.

Number of occurrences

100

Source: CRED



People annually affected by flooding 1996–2015
Flooding occurs all over the world, but the majority of the people affected live in Southeast Asia.

Number of people affected, annually

35 million

Source: CRED

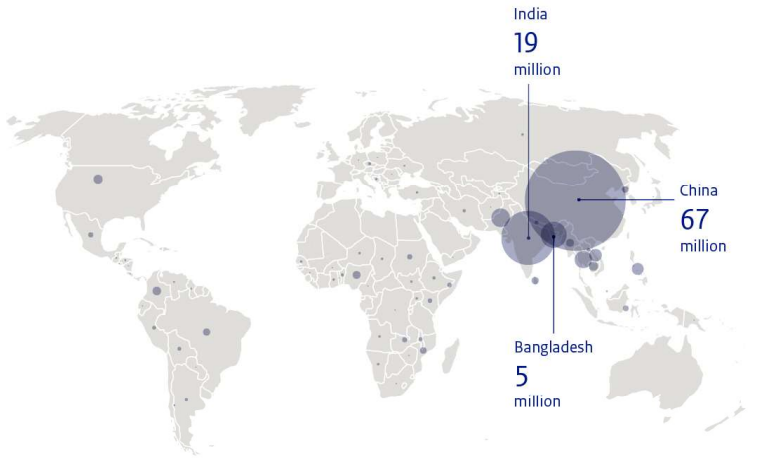


Figure 8. Links between loss of land, livelihood and habitat security, and migration

FORCED MIGRATION → ← INDUCED (VOLUNTARY MIGRATION)

Lost land security	Lost livelihood security	Habitat security severely reduced	Land security partly lost	Livelihood security severely disrupted	Livelihood security significantly but not severely disrupted	Land and livelihood security disrupted periodically
Community relocation	**Community relocation**	**Community relocation or individual migration**	**Community relocation or individual migration**	**Individual migration**	**Individual migration**	**Short-term migration**
Atoll submerged and or eroded Coastal sites submerged and/ or eroded Delta sites eroded and/ or inundated (coastal and/or river bank)	Salinization • Water polluted • Crop failure Persistent Drought • Water reduced • Crop failure	Changes in disease vectors such as malaria, dengue, ciguatera Changes in water borne incidence Temperature related illnesses	Severely but not completely reduced land available for settlement or livelihoods	Severe reductions in • water supply • food production	Moderate reductions in: • water supply • food production Moderately but completely reduced land available for settlement or livelihood	Increased frequency and or magnitude of climatic extremes Atolls/coastal land temporarily inundated

Source: UN-ESCAP 2014[36].

Somali refugees wait outside a UNHCR processing center at a refugee camp outside Dadaab, eastern Kenya, on Aug. 5, 2011. Climate change contributed to low rain levels in East Africa in 2011, making global warming one of the causes of Somalia's famine.

Somali refugees displaced from their homes by floods cross a swollen river in Kenya

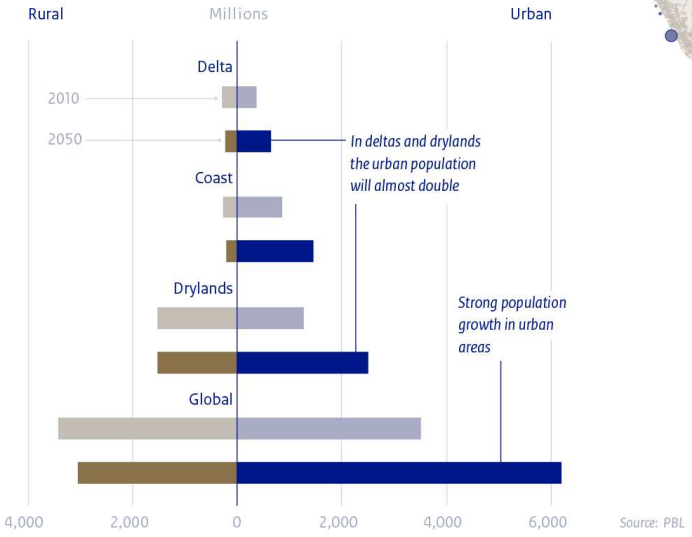
URBANISATION CHANGES GLOBAL VULNERABILITY

Because of continued global urbanisation, water-related risks will increasingly be concentrated in cities.

In the urbanising world, cities will increasingly become centres of population growth and economic development. By 2050, 70% of the world population is projected to live in an urban environment, and the 600 major cities in the world are expected to provide 60% of global GDP. The global urban area is expected to expand by more than 70%, not only in riparian and coastal areas and in deltas, but also in water-stressed regions, such as drylands. By 2050, 70% of the global population will be living on 0.5% of the global land area.

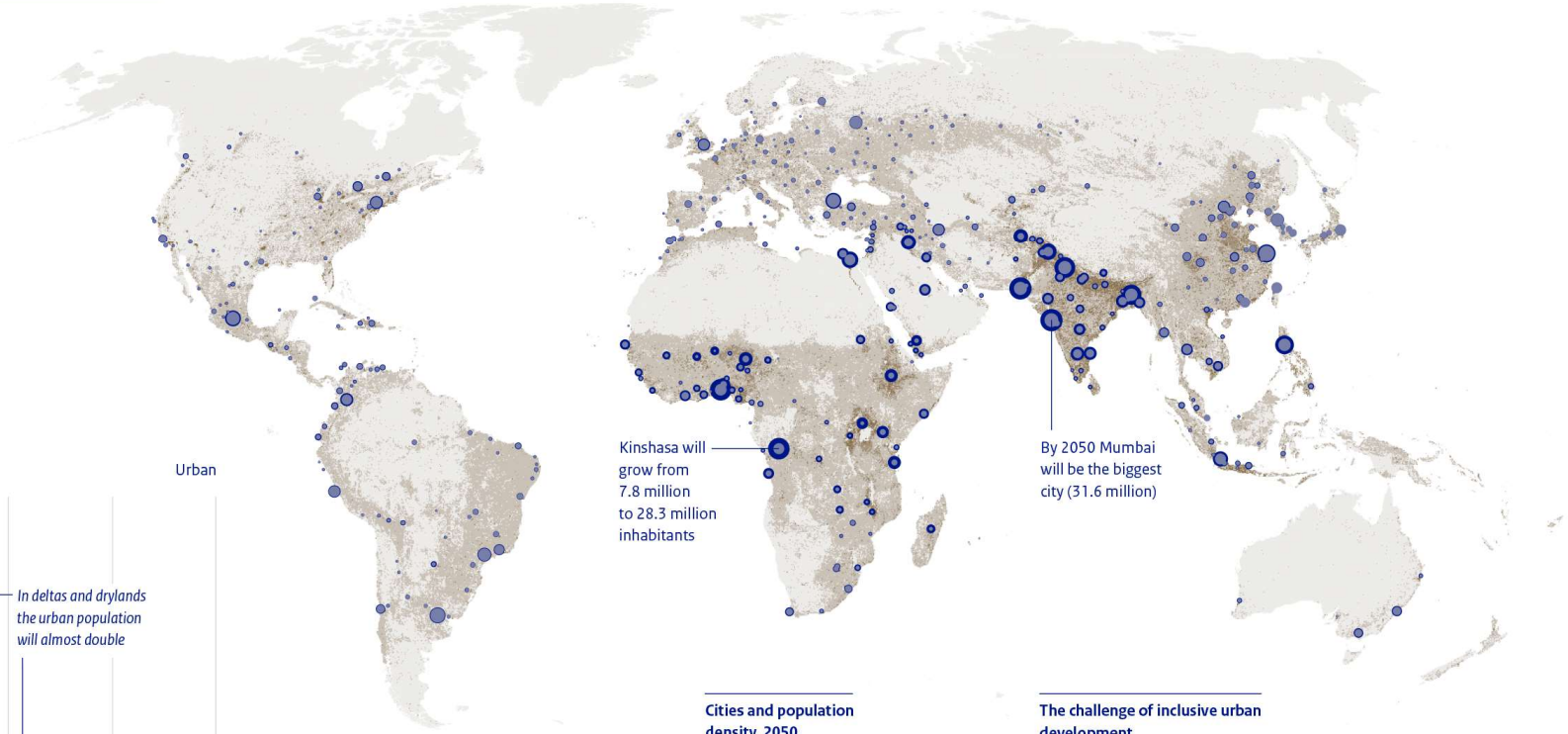
Change in urban and rural populations, per type of area, 2010–2050

Fast urban growth, more than doubling city sizes, occurs especially in the developing countries of East and South Asia and Sub-Saharan Africa.



PBL Netherlands Environmental Assessment Agency

Cities Flood Risk Hotspots



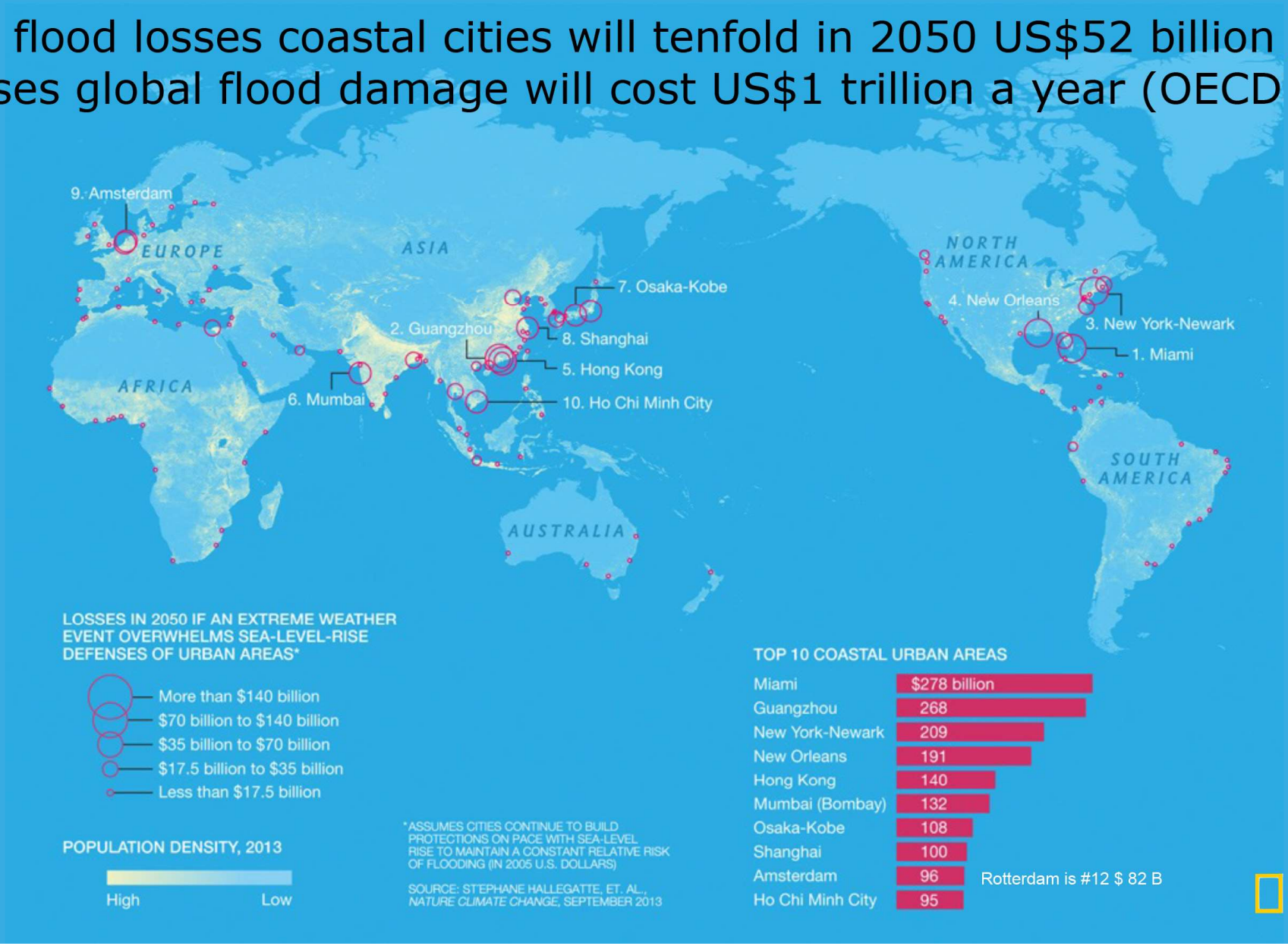
Cities and population density, 2050

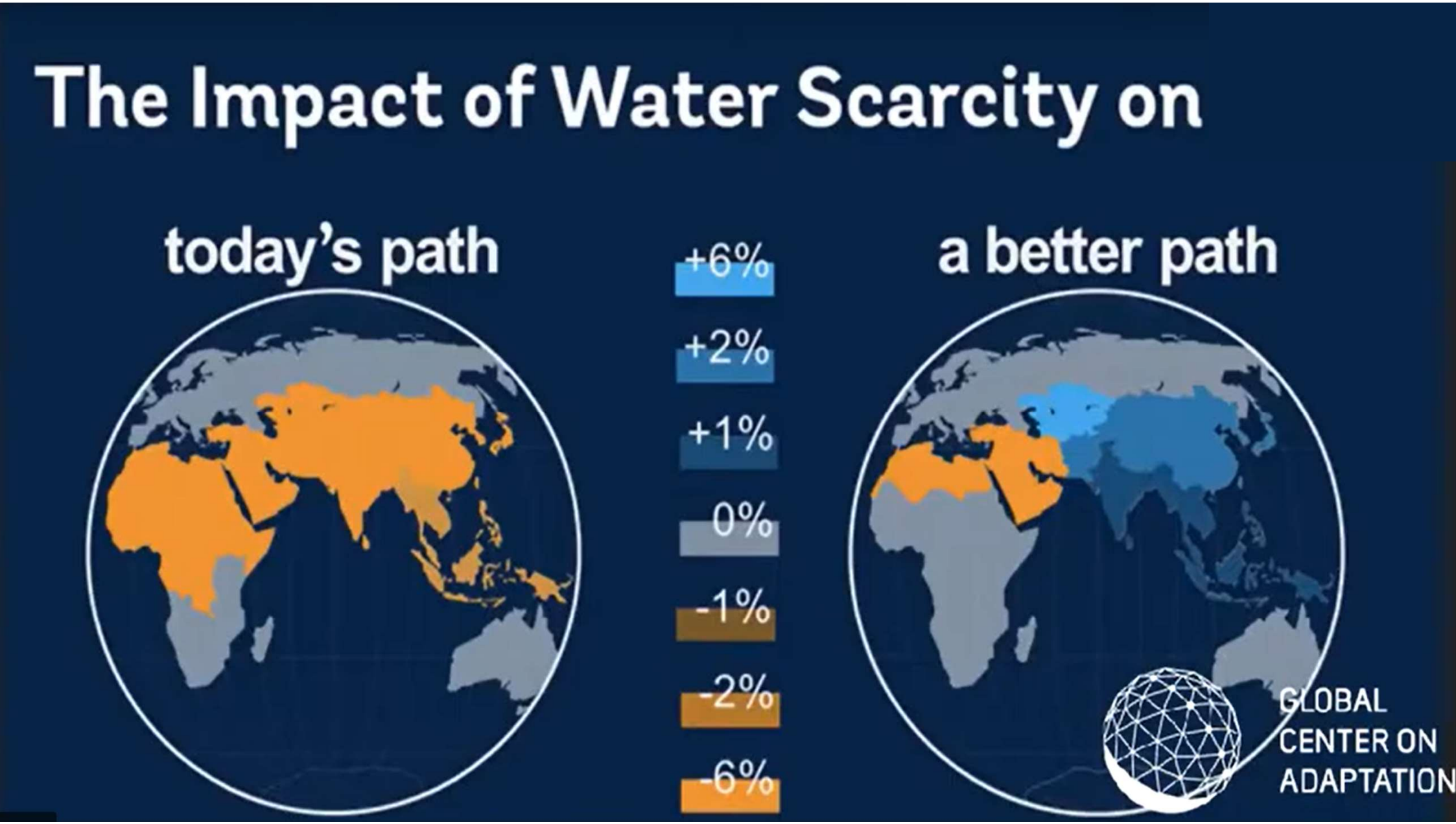
Source: PBL

The challenge of inclusive urban development

Today, about one billion people are living in urban slums. The rapidly growing urban population strongly increases the pressure on local resources, local environmental conditions, food availability, labour opportunities, and public services. Reducing inequality, insecurity and poverty in cities may be some of the major challenges, on the path towards 2050.

global flood losses coastal cities will tenfold in 2050 US$52 billion / year
all losses global flood damage will cost US$1 trillion a year (OECD / WB)



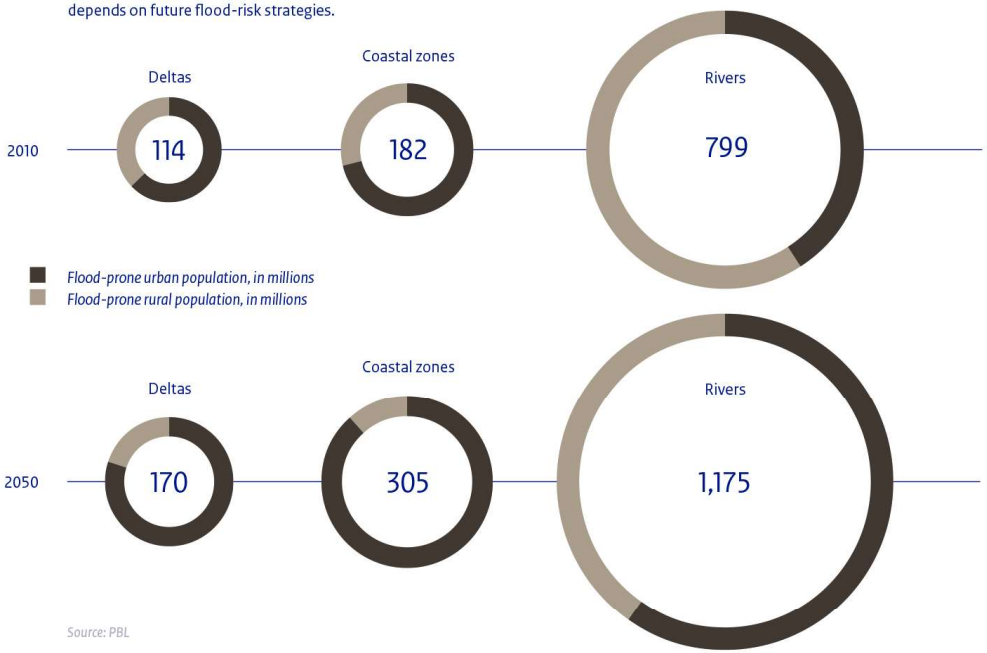

The Impact of Water Scarcity on
today's path
+6%
+2%
+1%
0%
-1%
-2%
-6%
a better path
GLOBAL
CENTER ON
ADAPTATION

UNEQUAL FLOOD RISKS WITHIN CITIES

The number of people in flood-prone areas in the developing world is expanding rapidly. Without attention, flood protection inequality between urban formal and informal settlements will increase.

Global population growth will concentrate in cities
Globally, the population is increasingly concentrated in cities, most of which are located near rivers or the coast. This trend is projected to continue, between now and 2050. How flood risks and protection of formal and informal settlements will develop, depends on future flood-risk strategies.

Most people potentially exposed to flooding live in cities along rivers.

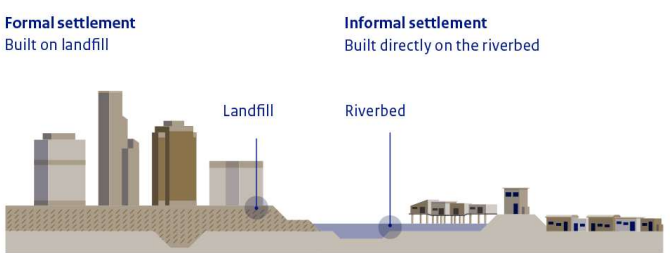


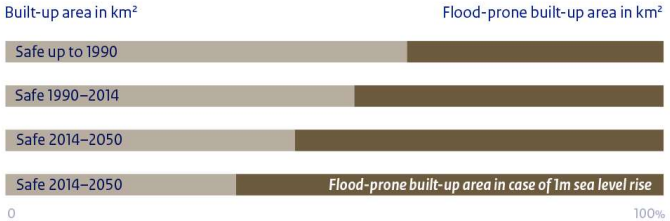
Source: PBL

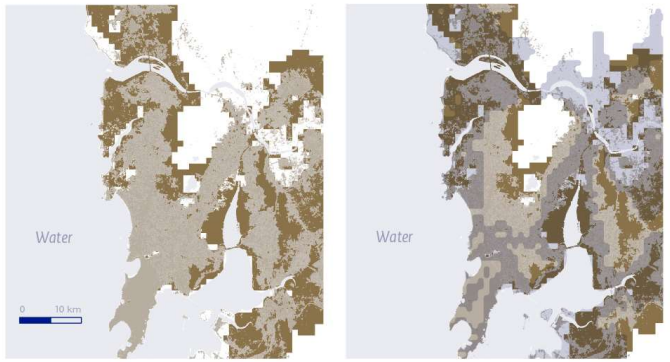
Informal settlements are the most exposed
In many cities, especially in developing countries, the inhabitants of informal settlements make up more than 50% of the urban population. Water- and climate-related disasters disproportionately affect people living in informal settlements.

Built-up and flood-prone areas in Mumbai
From 1990 to 2014, the built-up area of Mumbai expanded by 26%, with a relatively large share of the expansion in flood-prone areas. This trend is projected to continue towards 2050, by which time around 60% of Mumbai will be located in flood-prone areas.
If sea levels would rise by one metre, the flood-prone area would become even larger and the number of people potentially exposed would increase further.

Source: JRC, PBL







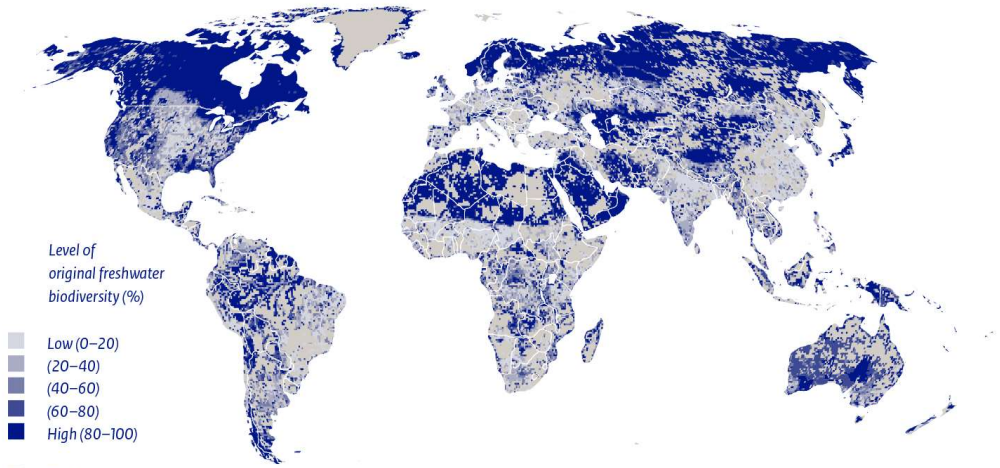
FURTHER BIODIVERSITY LOSS TOWARDS 2050

Under the Business-as-usual scenario, developments will result in further biodiversity loss in nearly 40% of the world's freshwater ecosystems.

Decrease in freshwater ecosystems with high levels of biodiversity
Tropical regions include the most biodiverse river basins. High-quality ecosystems in these regions, however, are already severely affected and will further decline in quality, between now and 2050. The strongest decline in quality is projected for Sub-Saharan Africa and parts of Latin America and Asia. In developed regions, such as Europe, the in/Oceania, quality has all, natural served in orld's nder the nario.

Projected quality of freshwater ecosystems, 2050

In the sparsely populated northern regions, the quality of freshwater ecosystems will be least affected.

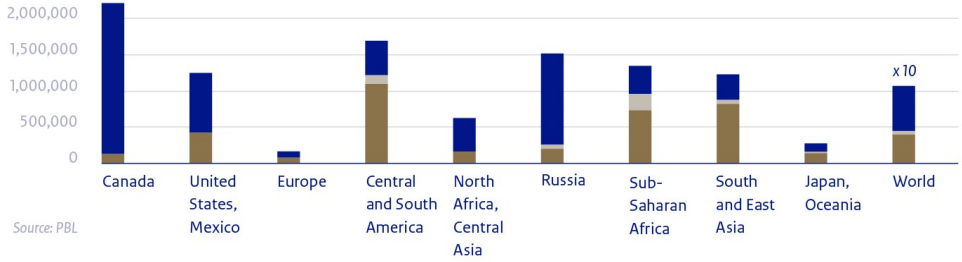


Source: PBL

Decline in freshwater ecosystems with high biodiversity levels *(in 1000 km²)*

Level of loss in 2010 *Loss by 2050* *Remaining in 2050*

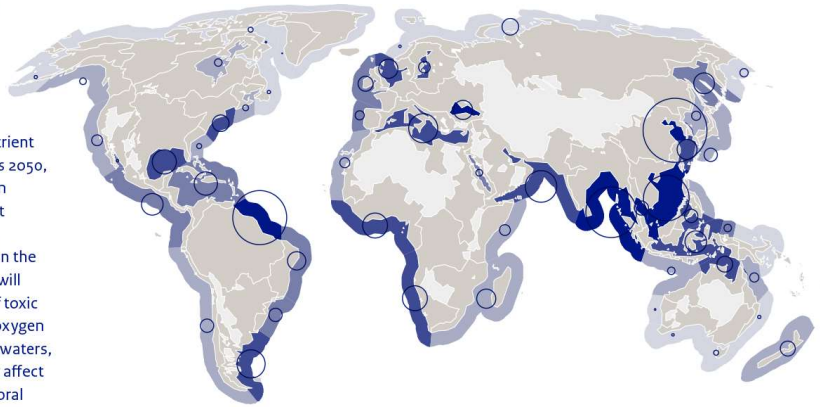
In the coming decades, most losses are expected to occur in the tropical and sub-tropical zones in Sub-Saharan Africa, Latin and Central America and South and East Asia.



Source: PBL

Quality of coastal seas threatened by increased nutrient loading

The increase in nutrient emissions, towards 2050, will also result in an increase in nutrient loading to coastal waters, especially in the Asian region. This will increase the risk of toxic algal blooms and oxygen depletion in those waters, and will negatively affect biodiversity (e.g. coral reefs) and ecosystem functions, such as aqua-culture and fisheries.

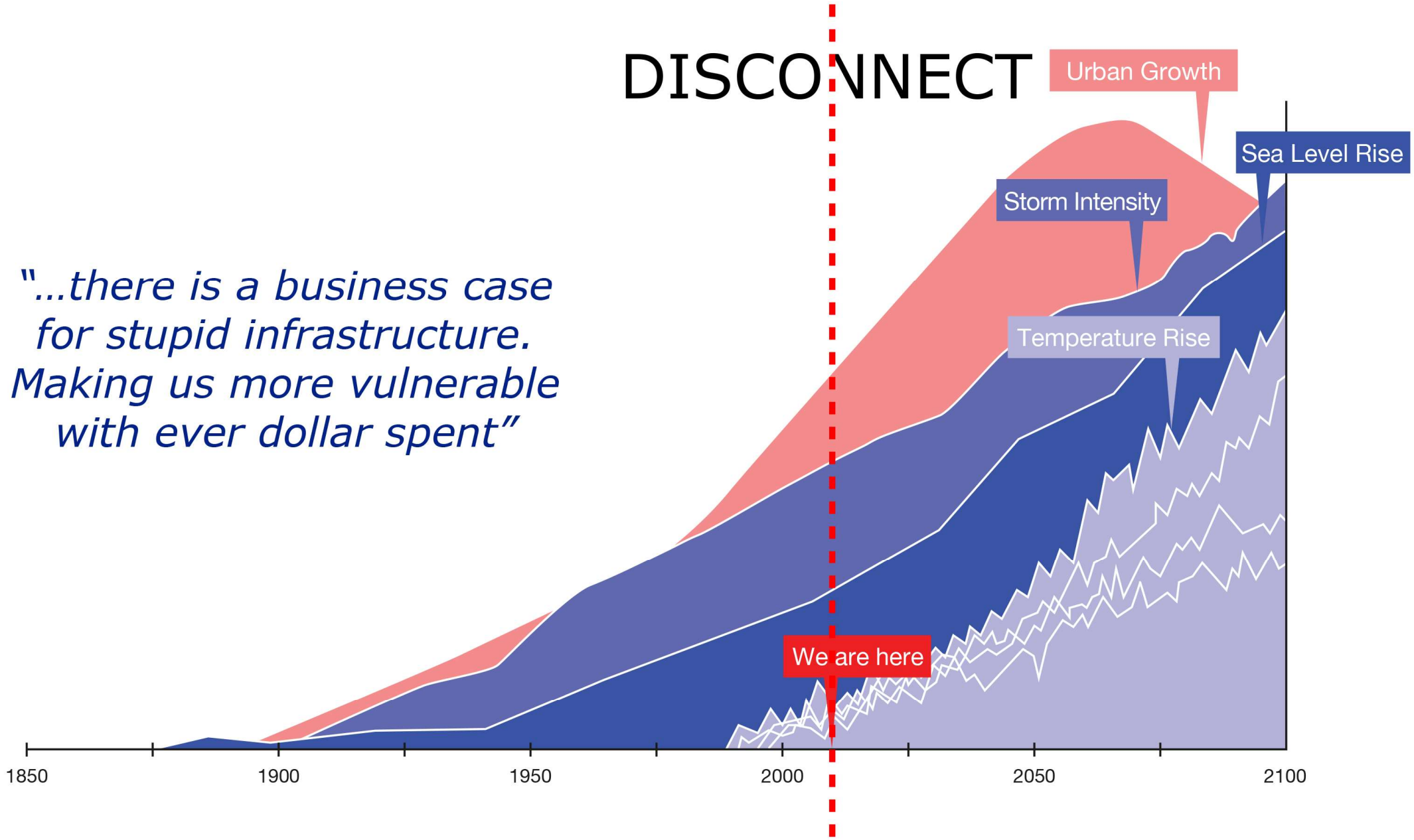


Nutrient loading to coastal seas, 2050 Absolute, x 1000 kg N

Nutrient loading, 2050 Relative

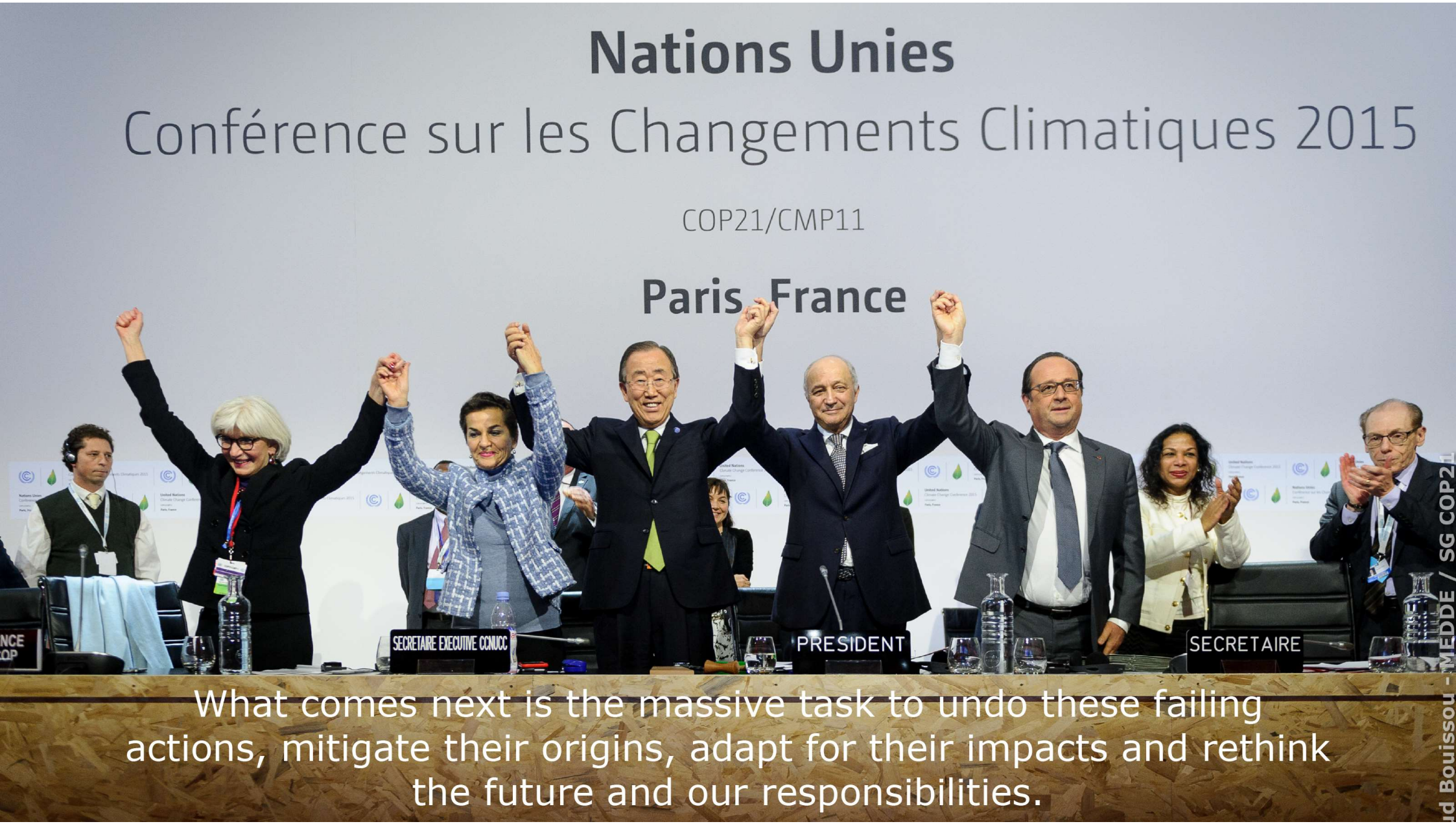
1,000,000 High Low Catchment No outflow areas

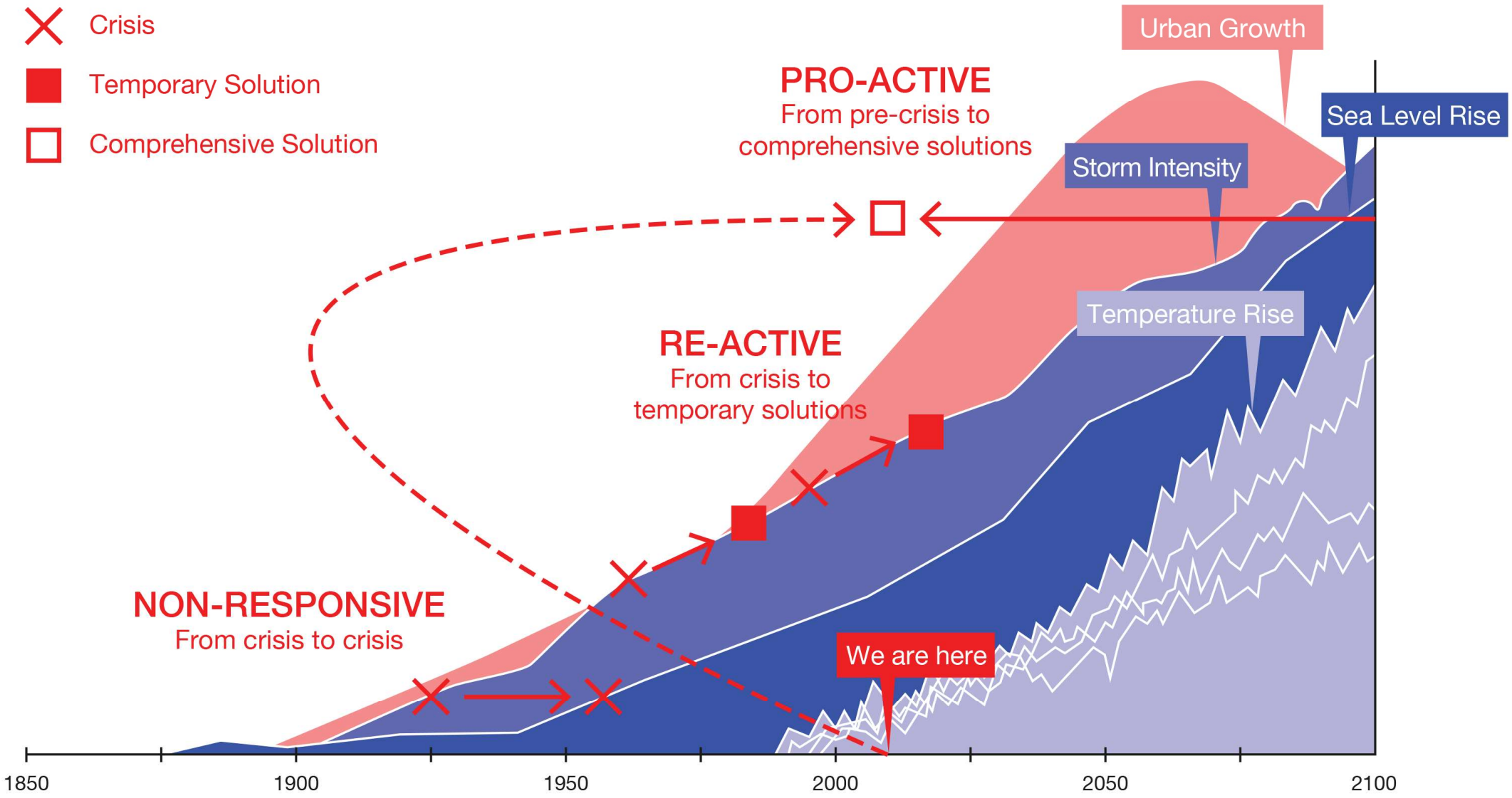
Source: PBL



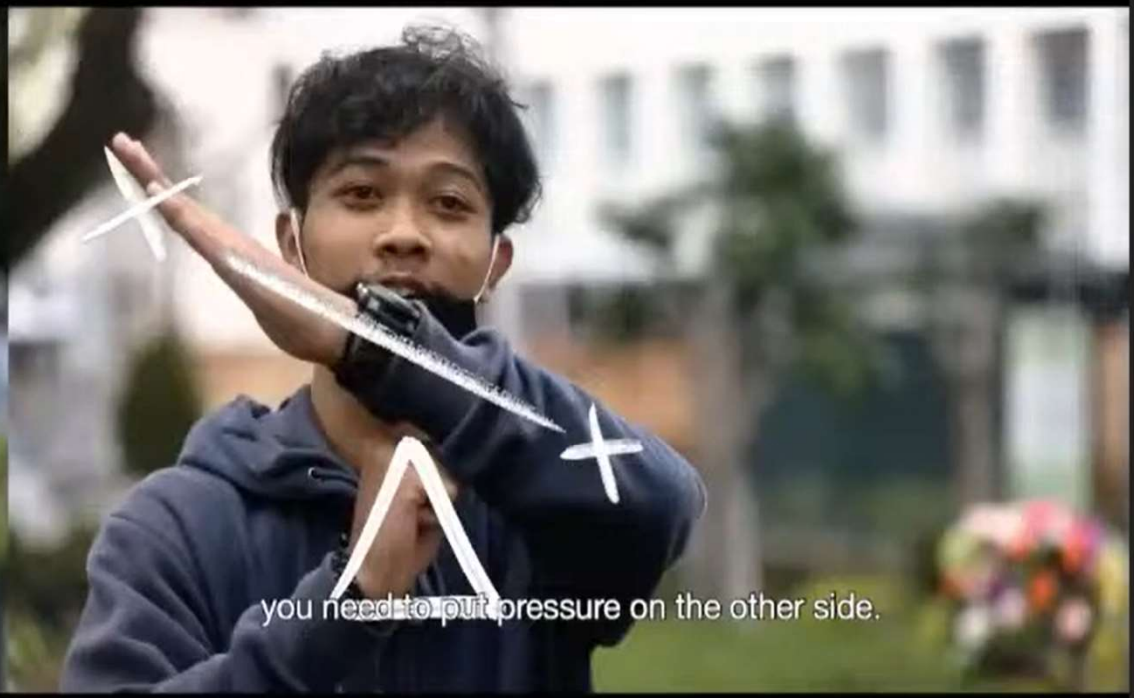
"...there is a business case for stupid infrastructure. Making us more vulnerable with ever dollar spent"


1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS


Nations Unies
Conférence sur les Changements Climatiques 2015
COP21/CMP11
Paris, France
SECRETAIRE EXECUTIVE CCNUCC
PRESIDENT
SECRETAIRE
What comes next is the massive task to undo these failing actions, mitigate their origins, adapt for their impacts and rethink the future and our responsibilities.


Crisis
Temporary Solution
Comprehensive Solution
PRO-ACTIVE
From pre-crisis to
comprehensive solutions
RE-ACTIVE
From crisis to
temporary solutions
NON-RESPONSIVE
From crisis to crisis
Urban Growth
Sea Level Rise
Storm Intensity
Temperature Rise
We are here
1850
1900
1950
2000
2050
2100


It's helps you lift something.

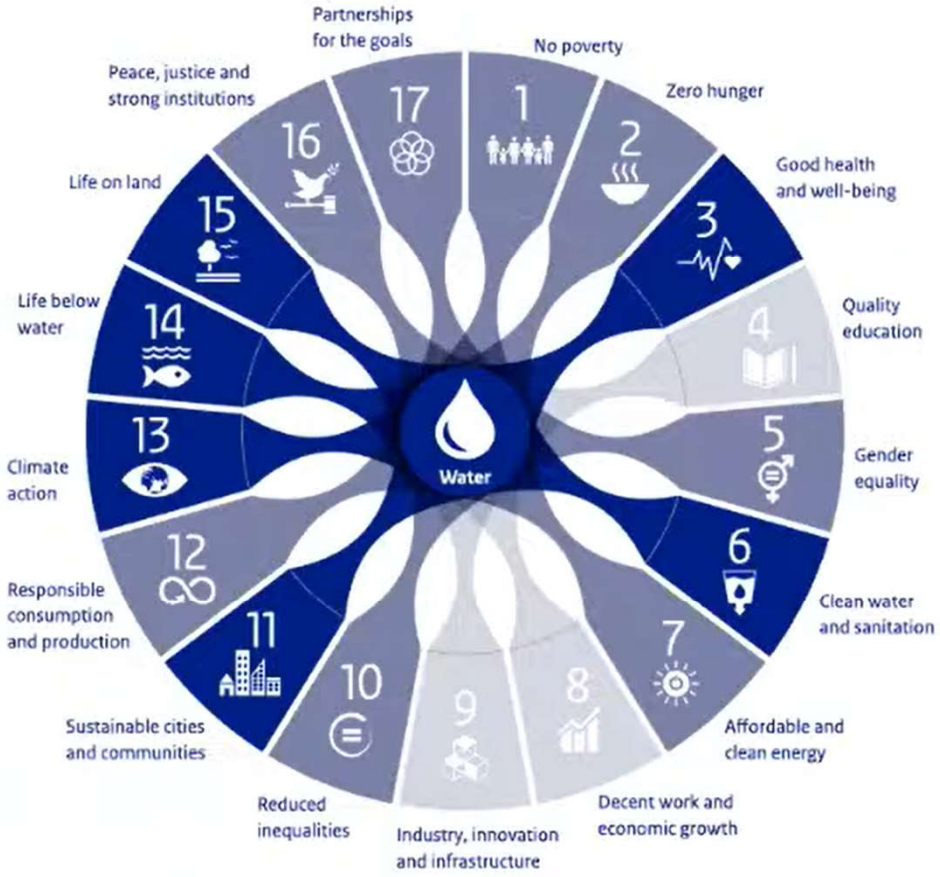

you need to put pressure on the other side.

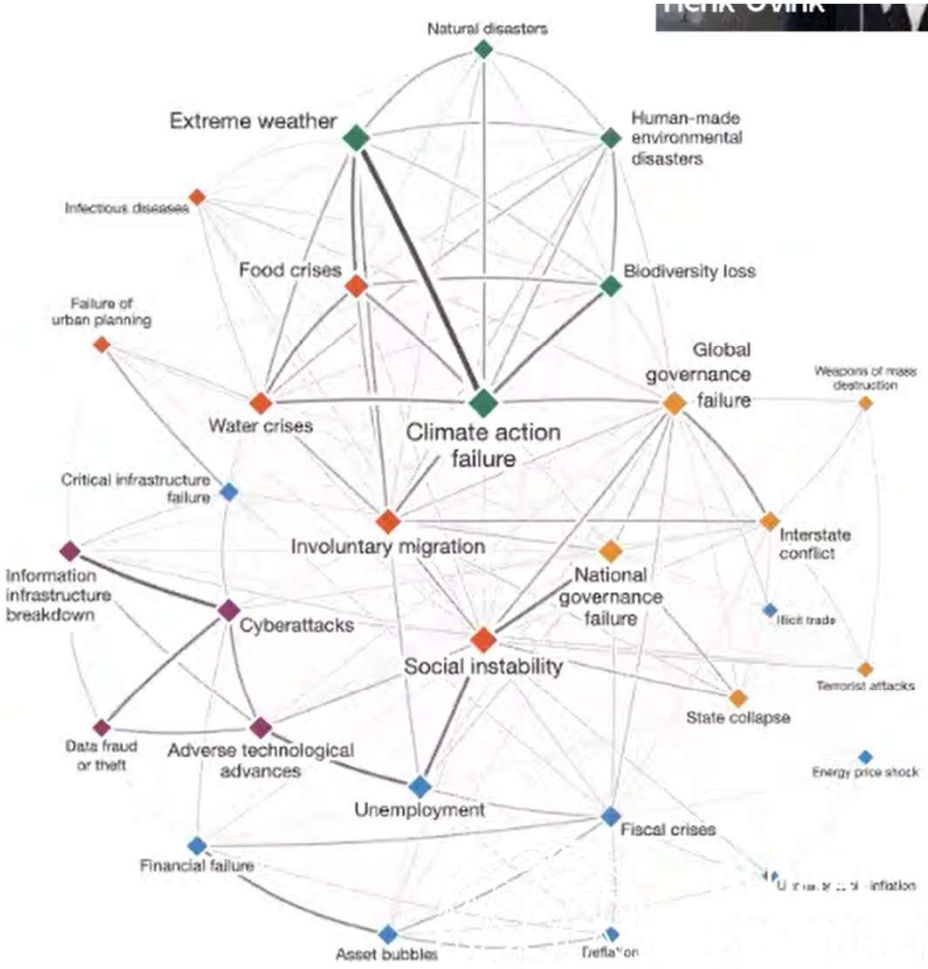
FOUNDATIONS FOR ACTION

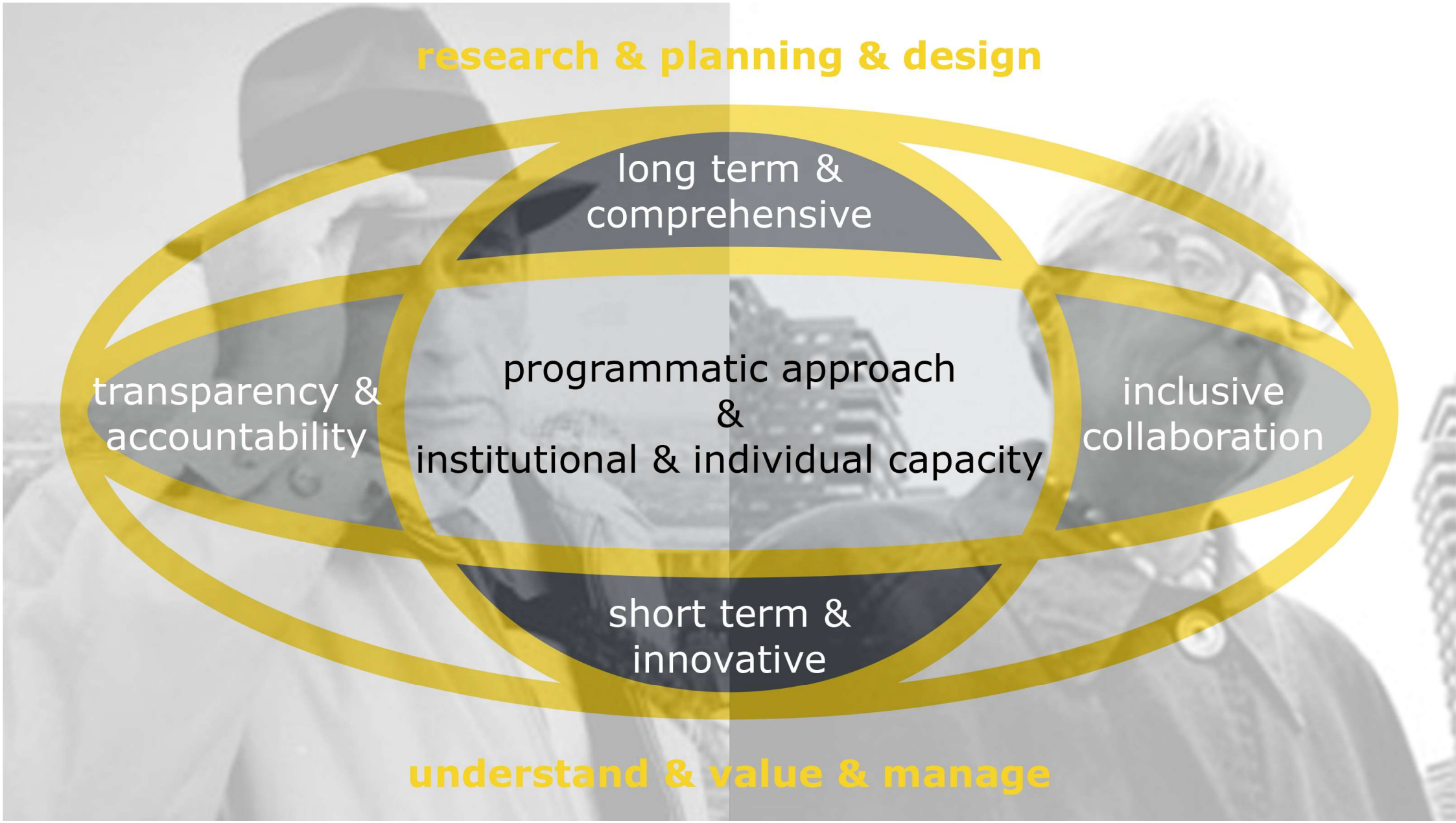
UNDERSTAND WATER
Commit to making evidence-based decisions about water, and cooperate to strengthen water data, such as through the HLPW World Water Data Initiative.

VALUE WATER
Use the HLPW Principles on Valuing Water to sustainably, efficiently, and inclusively allocate and manage water resources and deliver and price water services accordingly.

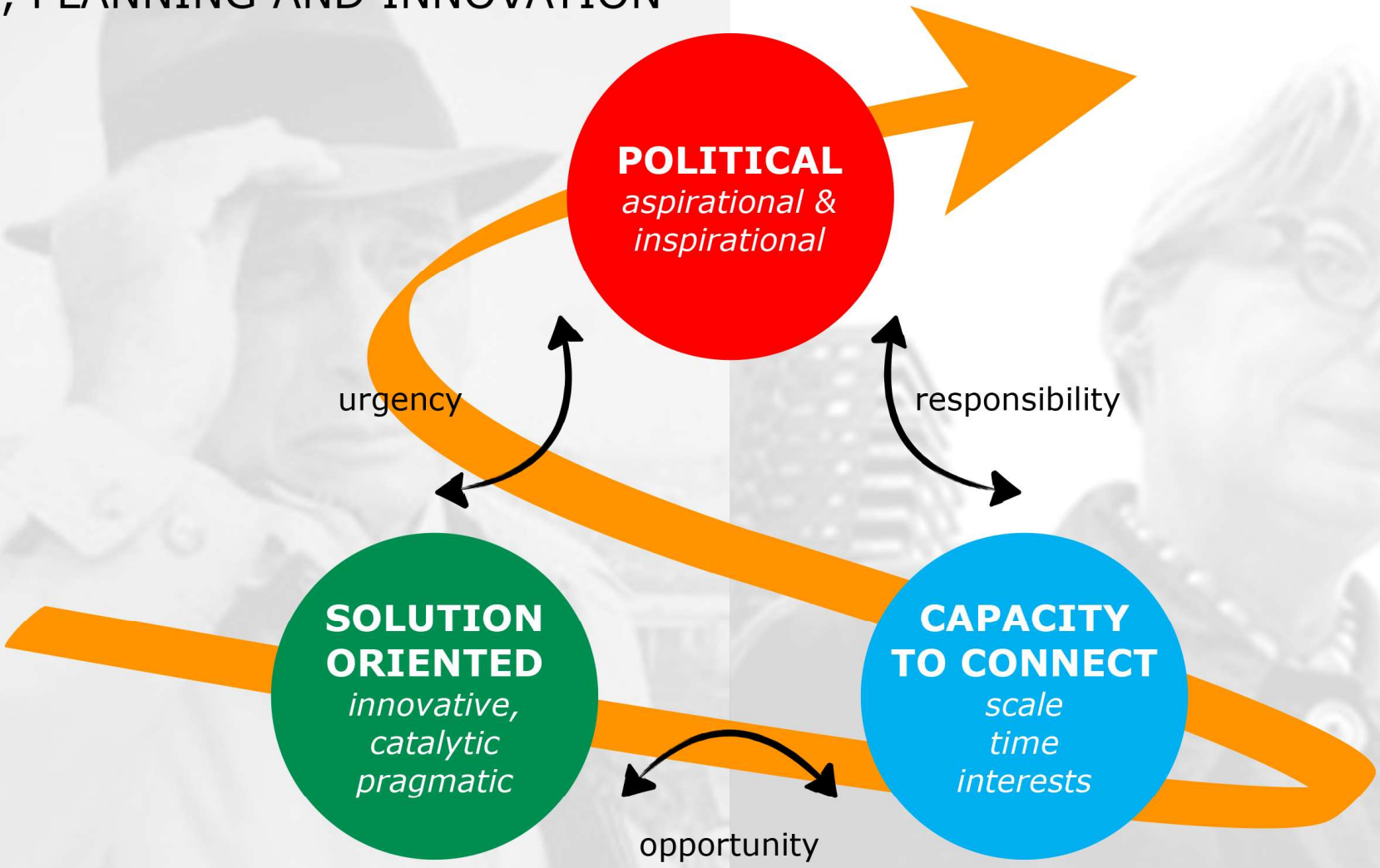
MANAGE WATER
Implement integrated approaches to water management at local, national, and transboundary levels, strengthen water governance, and ensure gender equality and social inclusion.






research & planning & design
long term &
comprehensive
transparency &
accountability
programmatic approach
&
institutional & individual capacity
inclusive
collaboration
short term &
innovative
understand & value & manage

DESIGN, PLANNING AND INNOVATION



Water for as Resilient Cities Leverage Asia

Water as Leverage

AIIB ASIAN INFRASTRUCTURE INVESTMENT BANK

FMO Finance for Development

GLOBAL CENTER ON ADAPTATION

UN HABITAT FOR A BETTER URBAN FUTURE

WWF

PEGASYS CHANGING LIVES CHANGING WORLDS

PARTNERS FOR RESILIENCE Working together on disasters, climate, ecosystems

IsDB البنك الإسلامي للتنمية Islamic Development Bank

ADB

GREEN CLIMATE FUND

THE WORLD BANK

Kingdom of The Netherlands Water Envoy

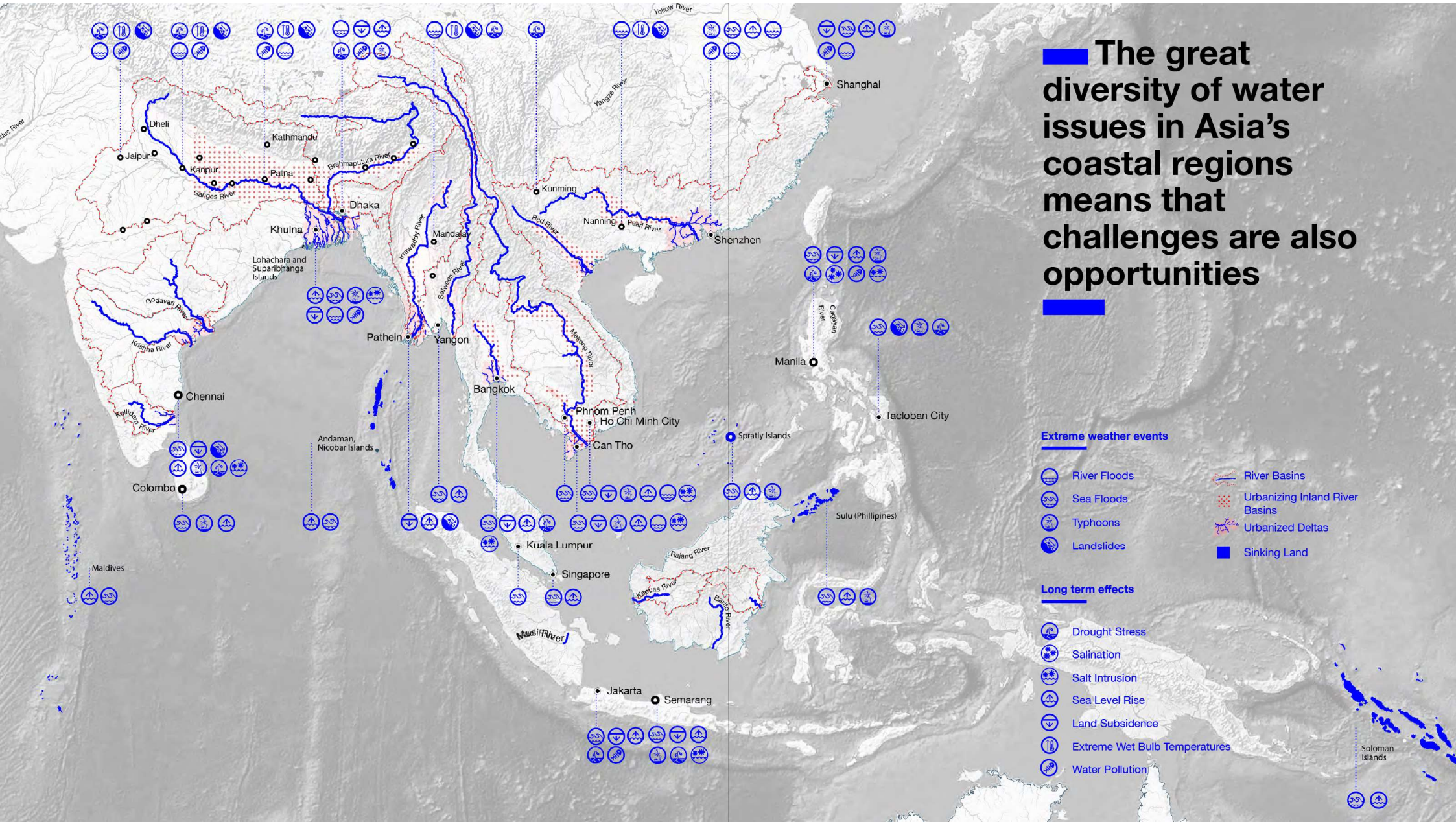
Netherlands Enterprise Agency

PIONEERED BY THE ROCKEFELLER FOUNDATION 100 RESILIENT CITIES

IABR–

OECD

awb


The great diversity of water issues in Asia's coastal regions means that challenges are also opportunities
Extreme weather events
River Floods
Sea Floods
Typhoons
Landslides
River Basins
Urbanizing Inland River Basins
Urbanized Deltas
Sinking Land
Long term effects
Drought Stress
Salination
Salt Intrusion
Sea Level Rise
Land Subsidence
Extreme Wet Bulb Temperatures
Water Pollution
Yellow River
Yangze River
Shanghai
Dheli
Jaipur
Kathmandu
Kanpur
Patna
Ganges River
Brahmaputura River
Dhaka
Khulna
Kunming
Red River
Nanning
Pearl River
Shenzhen
Irrawaddy River
Mandalay
Salween River
Lohachara and Supariibhanga Islands
Godavari River
Krishna River
Pathein
Yangon
Mekong River
Bangkok
Chennai
Kelliadan River
Phnom Penh
Ho Chi Minh City
Can Tho
Andaman, Nicobar Islands
Spratly Islands
Cagayan River
Manila
Tacloban City
Colombo
Maldives
Sulu (Phillipines)
Kuala Lumpur
Singapore
Rajang River
Kapuas River
Barito River
Musi River
Jakarta
Semarang
Soloman Islands

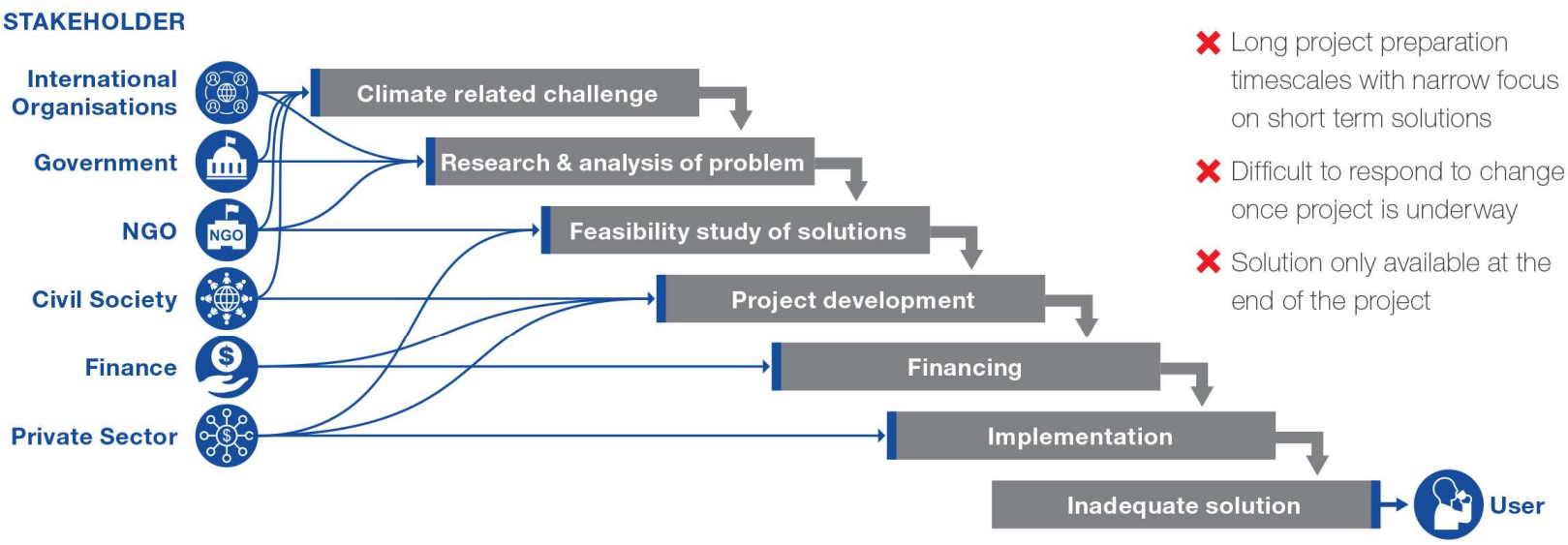
Water as Leverage

Rethinking the approach for urban climate resilience

WATER AS LEVERAGE

The World Economic Forum ranked water crises number one in its 2015 assessment of global risks. Traditional project management cannot keep pace with the impact of climate change on global water supplies. A new approach is needed.

THE TRADITIONAL APPROACH



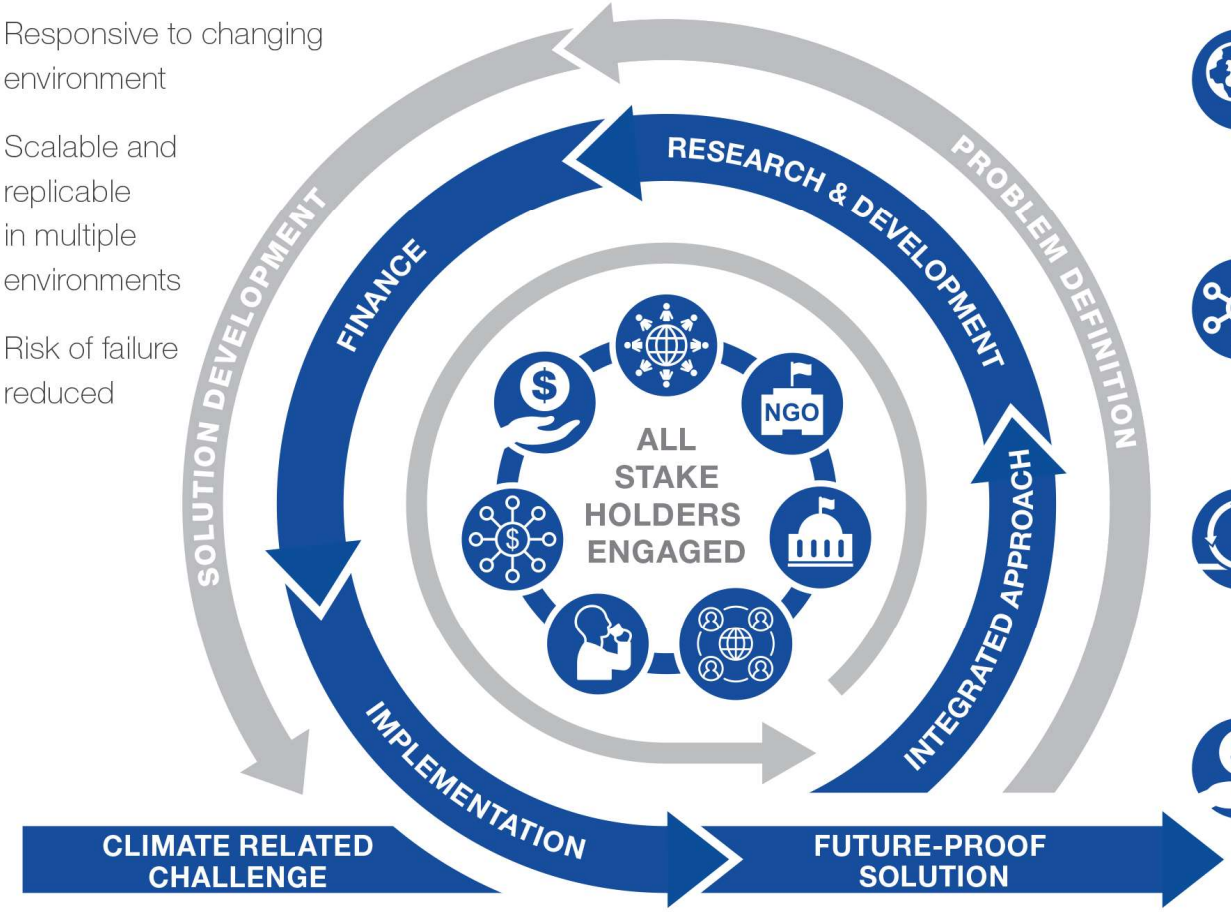
- ✖ Multiple stakeholders involved at different times
- ✖ Long project preparation timescales with narrow focus on short term solutions
- ✖ Difficult to respond to change once project is underway
- ✖ Solution only available at the end of the project

> Confidence is very high that the window of opportunity – the period when significant change can be made, for limiting climate change within tolerable boundaries – is rapidly narrowing."

IPCC report August 2019

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



People
Combine the world's best expertise with local talent.

R&D
Catalyze innovative processes to understand vulnerabilities to future risks and uncertainties.

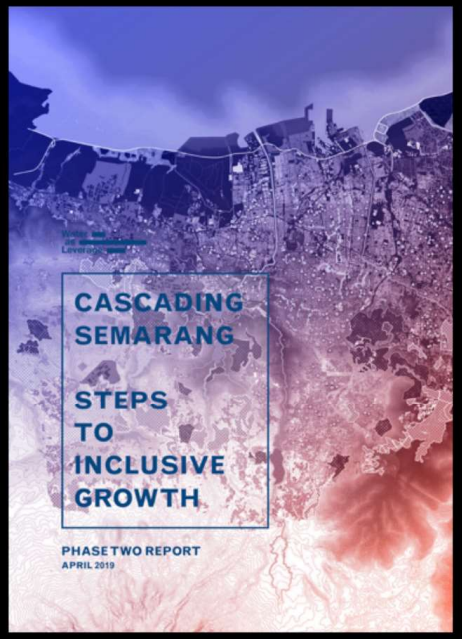
Integration
Co-ordinate closely with local communities and governments in an agile working environment.

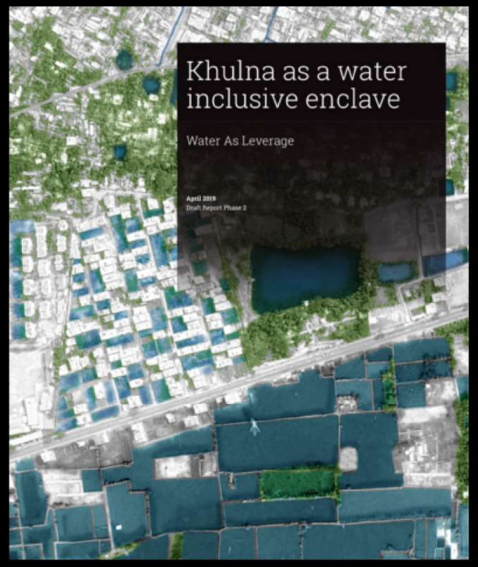
Process
Ensure Government and community stakeholders work closely with experts from day one.

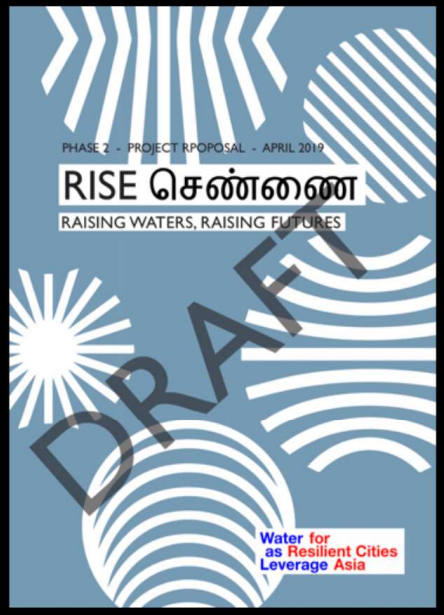
Finance
Source innovative project funding through public private partnerships, blended and private finance initiatives.

Water as Leverage is an initiative of the Government of the Netherlands

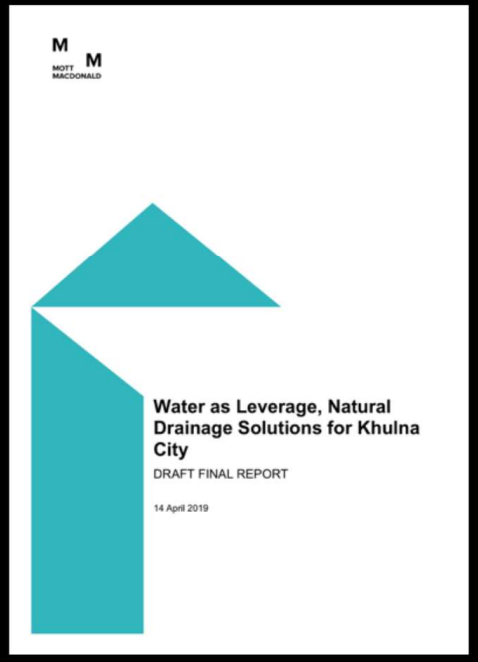

DRAFT
CITY OF 1,000 TANKS
"ஆயிரம் ஏரிகள் கொண்ட அபூர்வ சென்னை"
WATER AS LEVERAGE REPORT - PHASE 2- APRIL 2019


CASCADING SEMARANG
STEPS TO INCLUSIVE GROWTH
PHASE TWO REPORT
APRIL 2019

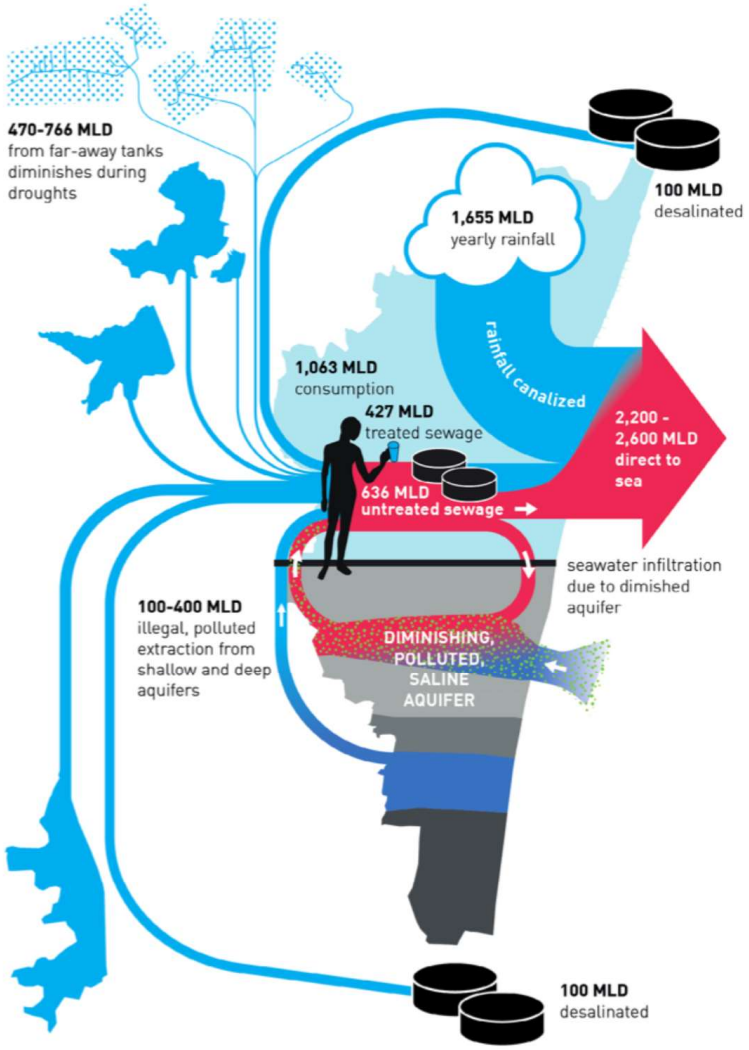

Khulna as a water inclusive enclave
Water As Leverage
April 2019
Draft Report Phase 2


PHASE 2 - PROJECT RPOPOSAL - APRIL 2019
RISE சென்னை
RAISING WATERS, RAISING FUTURES
DRAFT
Water for as Resilient Cities Leverage Asia

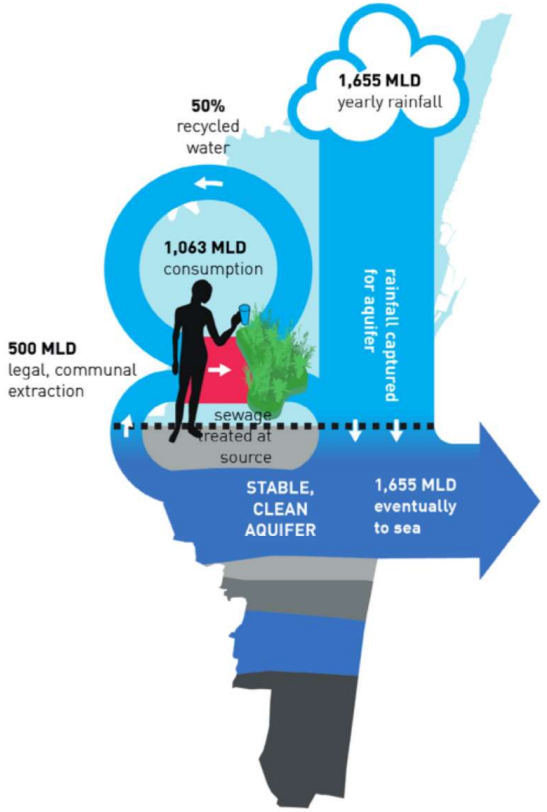

95% DRAFT
Water for as Resilient Cities Leverage Asia
one resilient semarang
VOLUME II
CONCEPT DESIGN PROPOSALS
CONCEPT DESIGN PROPOSALS
APRIL 2019
FINAL REPORT
FINAL REPORT


MOTT MACDONALD
Water as Leverage, Natural Drainage Solutions for Khulna City
DRAFT FINAL REPORT
14 April 2019

CURRENT SYSTEM
SCARCITY



PROPOSED SYSTEM
CLOSED LOOP

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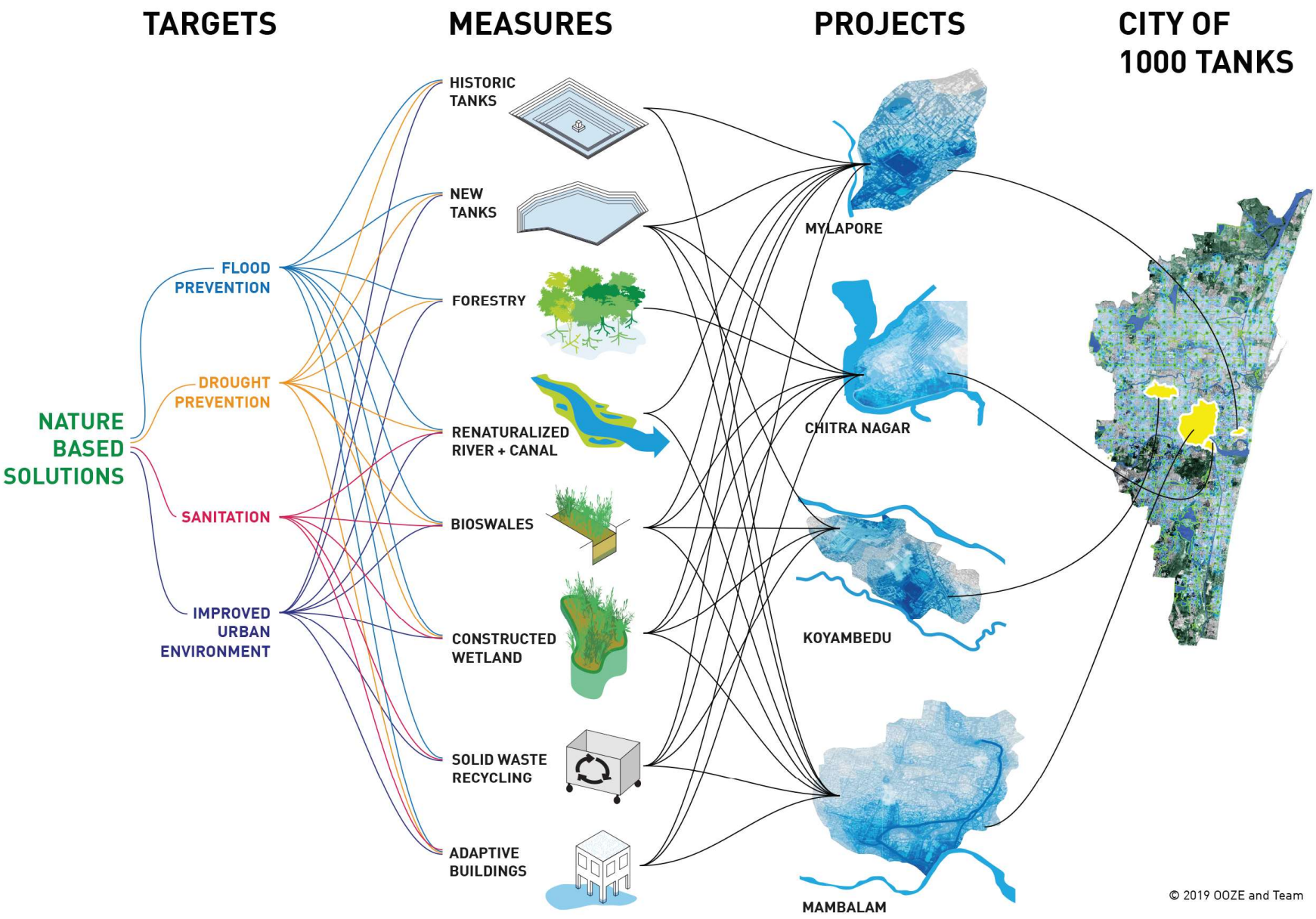
TARGETS
MEASURES
PROJECTS
CITY OF 1000 TANKS
NATURE BASED SOLUTIONS
FLOOD PREVENTION
DROUGHT PREVENTION
SANITATION
IMPROVED URBAN ENVIRONMENT
HISTORIC TANKS
NEW TANKS
FORESTRY
RENATURALIZED RIVER + CANAL
BIOSWALES
CONSTRUCTED WETLAND
SOLID WASTE RECYCLING
ADAPTIVE BUILDINGS
MYLAPORE
CHITRA NAGAR
KOYAMBEDU
MAMBALAM
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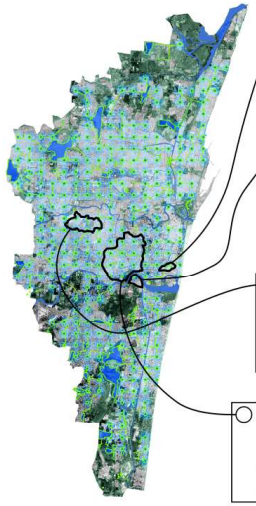
$221M
FOUR FLAGSHIP PROJECTS



$16M
MYLAPORE
HERITAGE
PROGRAMME

$10M
CHITRA NAGAR
DISASTER-RESILIENT
HOUSING PROGRAMME

$40M
KOYAMBEDU
GREEN INDUSTRIES
PROGRAMME

$155M
MAMBALAM
SMART WATERWAYS
PROGRAMME

KOYAMBEDU

MAMBALAM

CHITRA NAGAR

MYLAPORE

SUSTAINABLE DEVELOPMENT GOALS

IMPROVED WATER SUPPLY
1.4 5.4 6.1 6.4 6.6 6b

FLOOD RESILIENCE
1.5 2.1 2c 11.5 13.1

SANITATION
1.5 3.3 6.2 6.3 11.6 12.4 12.5 14.1

IMPROVED HEALTH
3.3 3.9

NATURE & BIODIVERSITY
4a 6.6 12.8 15.1 15.5

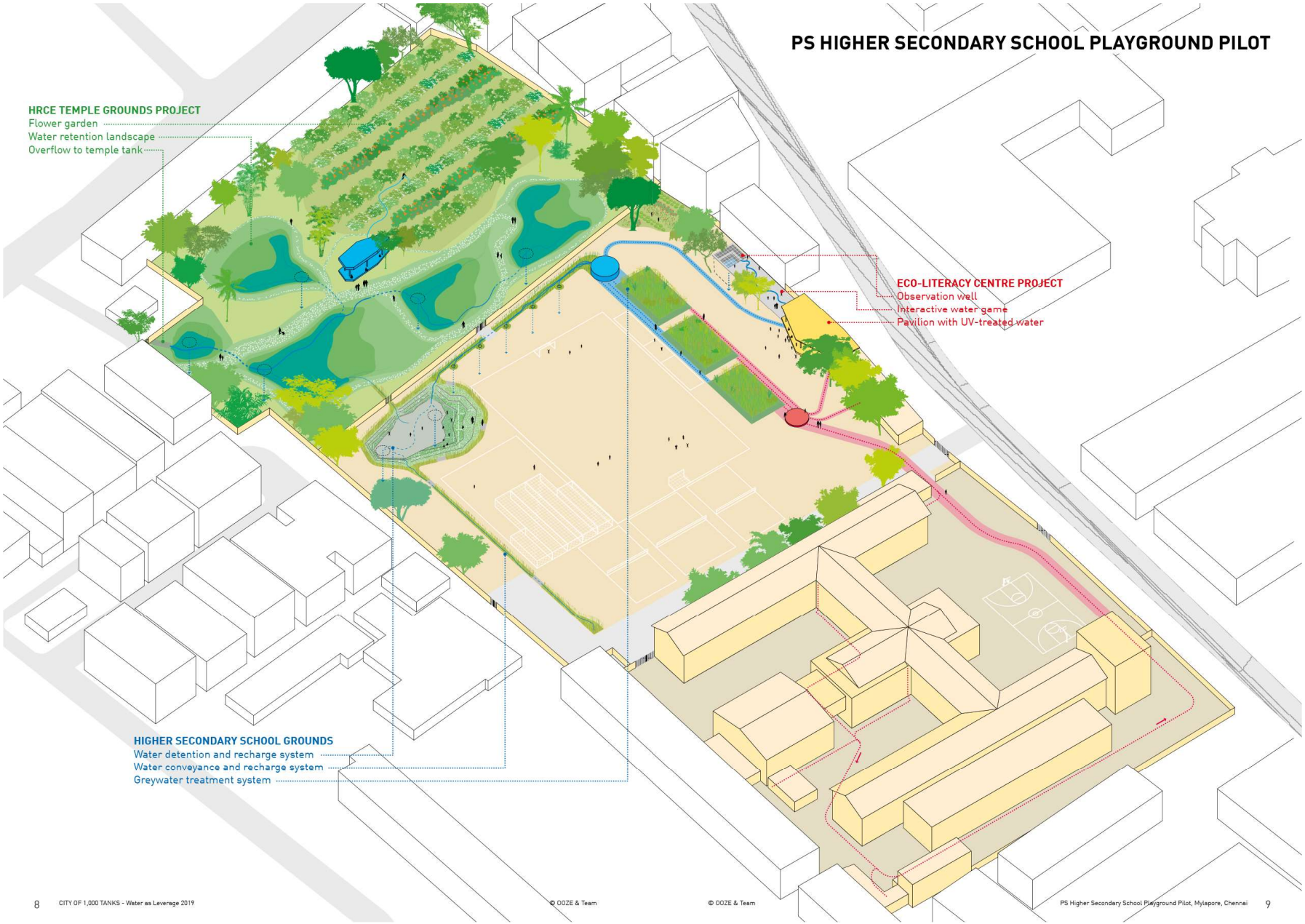
SUSTAINABLE LOCAL BUSINESSES
6.3 8.3 12.5 14.1

HERITAGE & PARTICIPATION
11.3 11.4

REDUCED CARBON EMISSIONS
13.2

IMPROVED URBAN ENVIRONMENT
8.9 11.1 11.6 11.7 12.b

PS HIGHER SECONDARY SCHOOL PLAYGROUND PILOT



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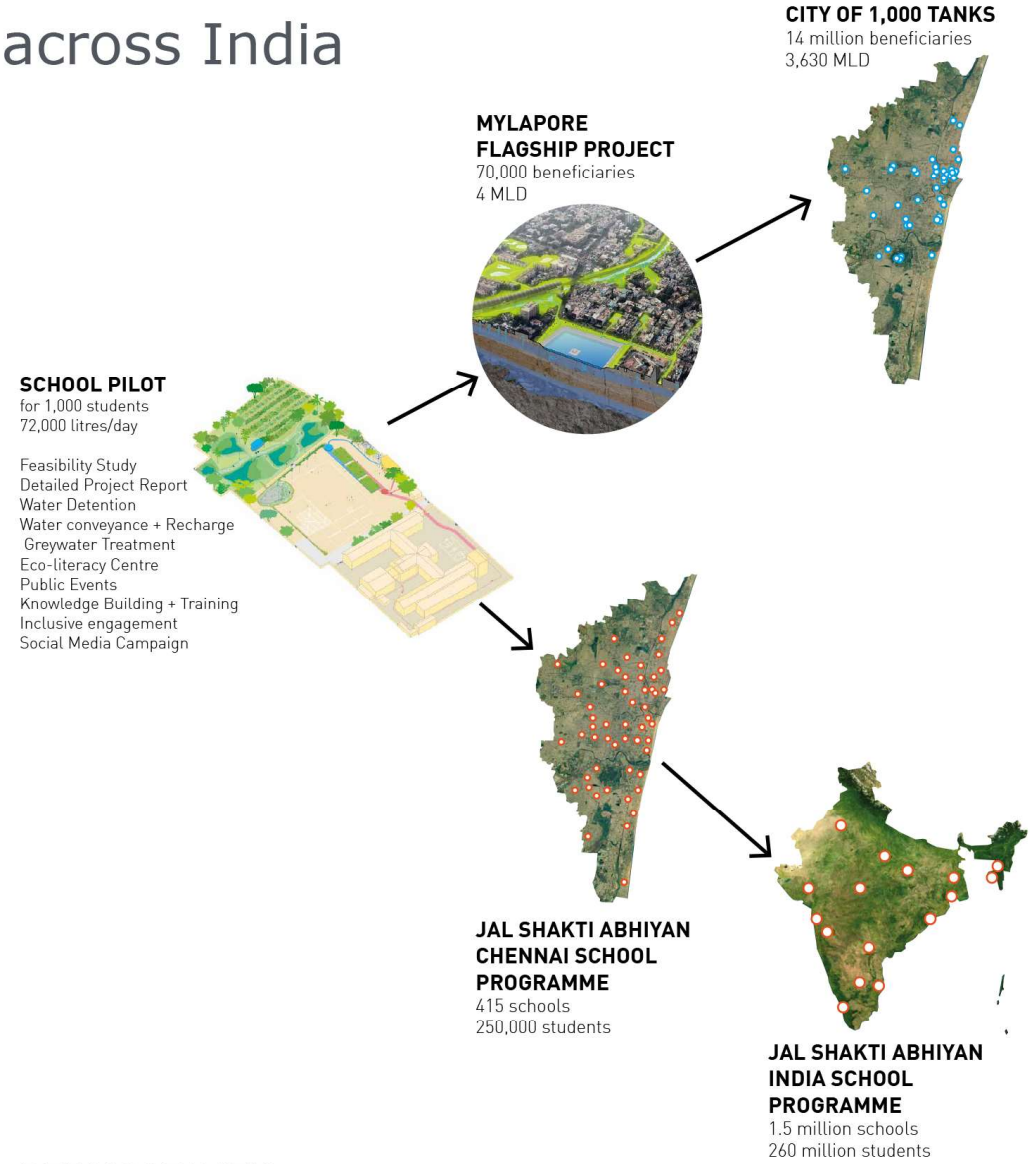
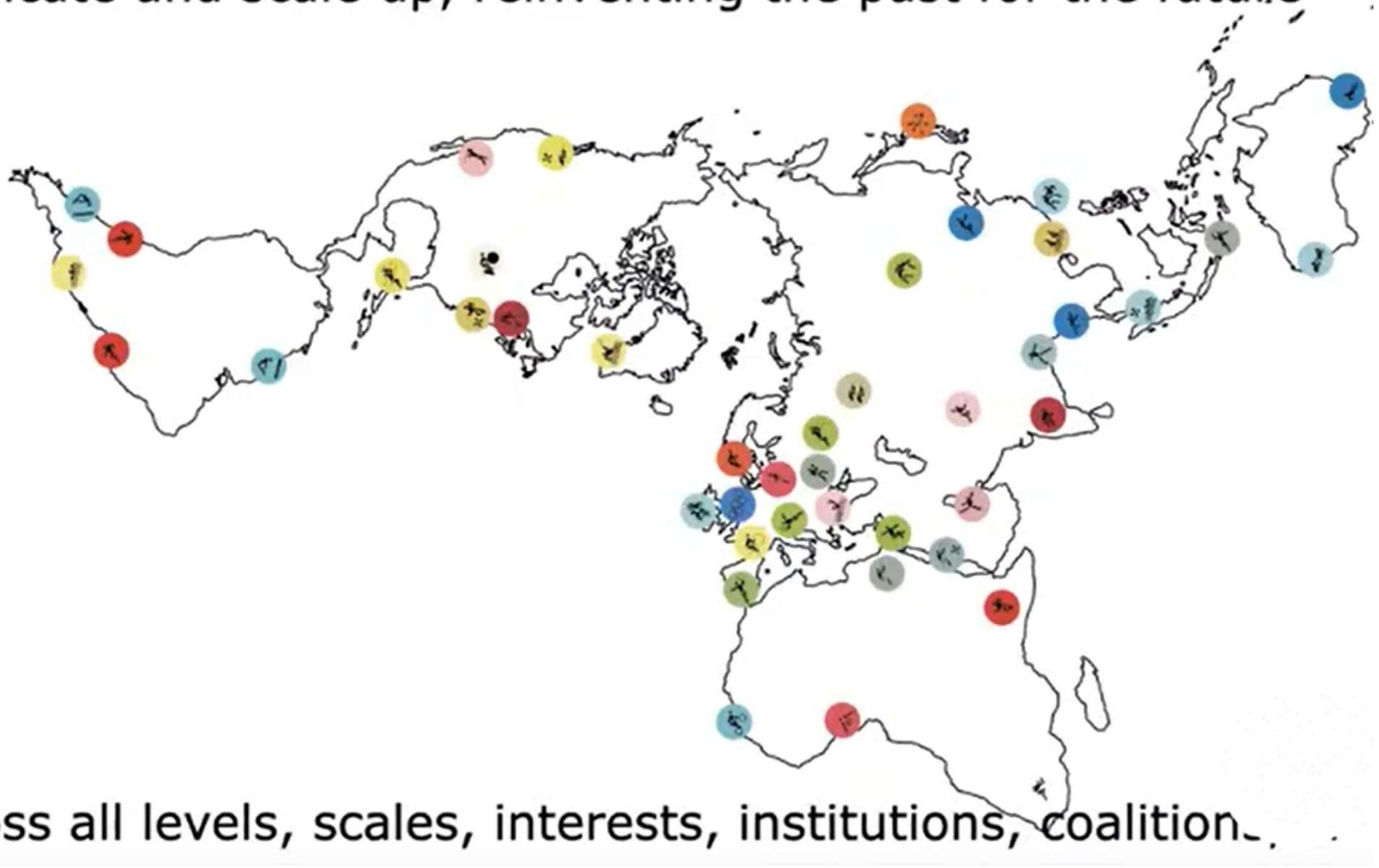
Scale and replicate across India



REPLICABILITY

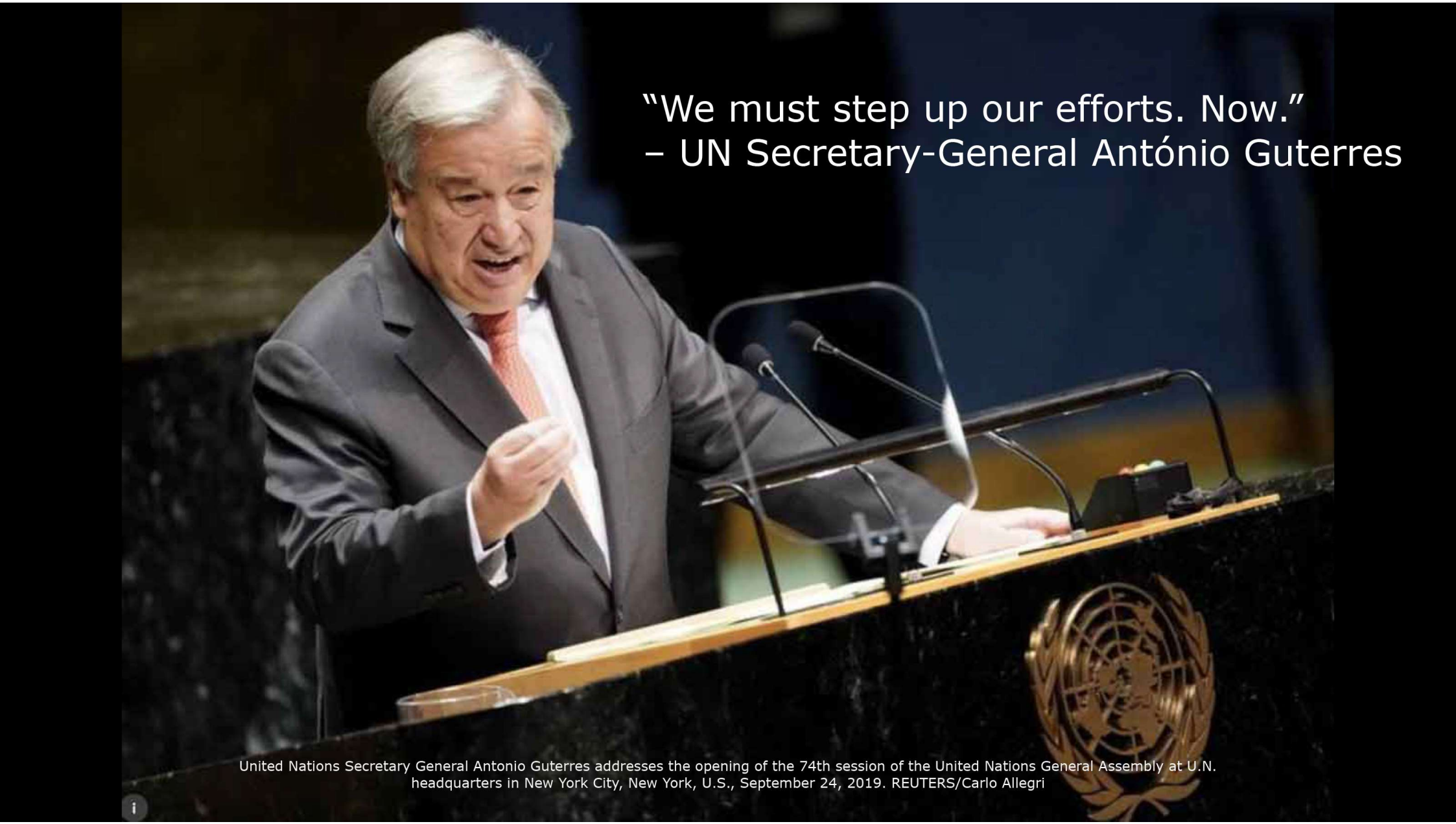
Replicate and scale up, reinventing the past for the future



across all levels, scales, interests, institutions, coalitions

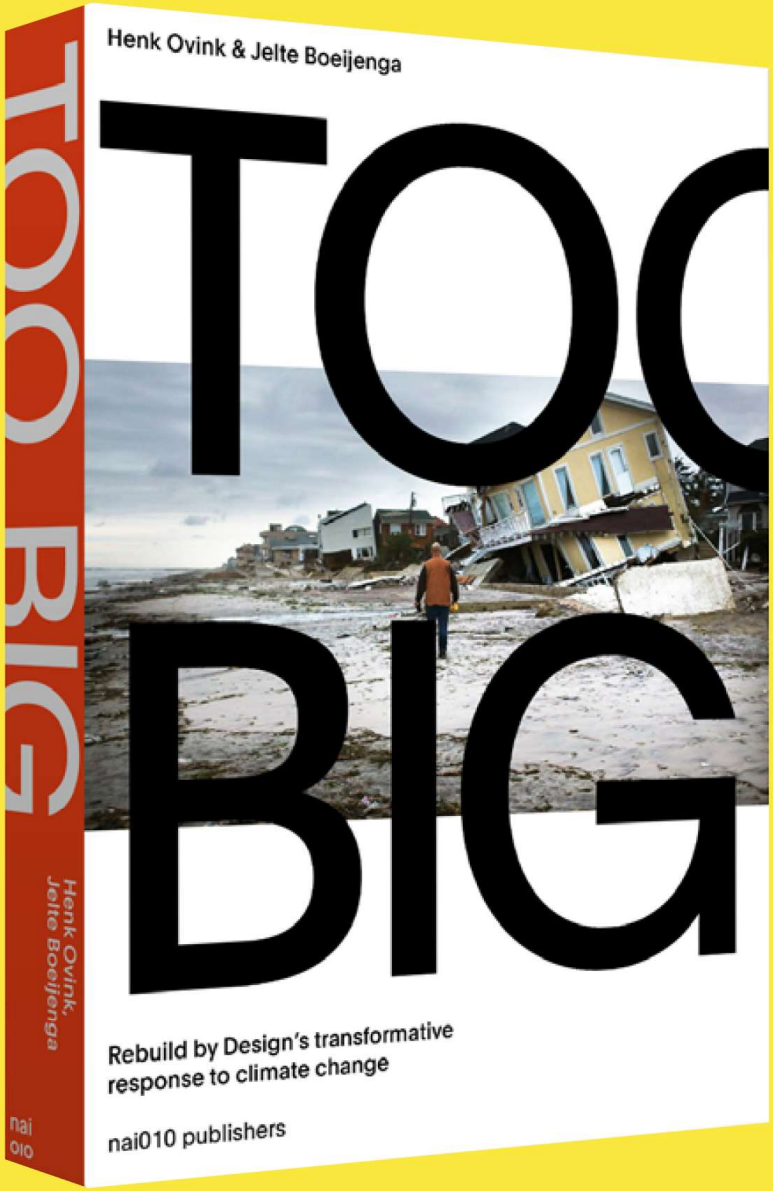
NO SILVER BULLET - NOT EASY

Necessity



United Nations Secretary General Antonio Guterres addresses the opening of the 74th session of the United Nations General Assembly at U.N. headquarters in New York City, New York, U.S., September 24, 2019. REUTERS/Carlo Allegri

Job Koelewijn, 'A Balancing Act' (1998)



TOO BIG to Ignore.
The Biggest Challenge Ever

TOO BIG to Simplify.
Embrace Complexity

TOO BIG for Our Systems.
Create a Free Place

TOO BIG to Go Alone.
Be Radically Inclusive

TOO BIG for Fragmentation.
The Power of Design

Act Now