



THE POWER OF A DROP ...

IN TIMES OF CLIMATE ADAPTATION AND SEARCH FOR LIVEABILITY

Prof. Herbert Dreiseitl, Liveable Cities Lab

www.ramboll.com/LCL

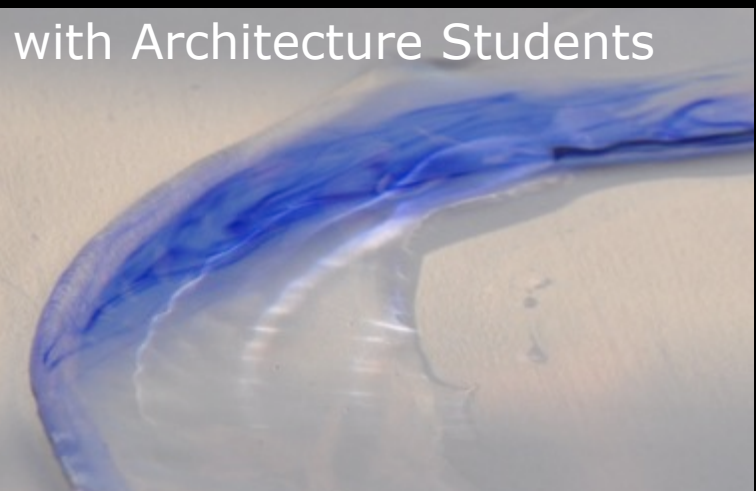
Mar. 26th 2018

RAMBOLL

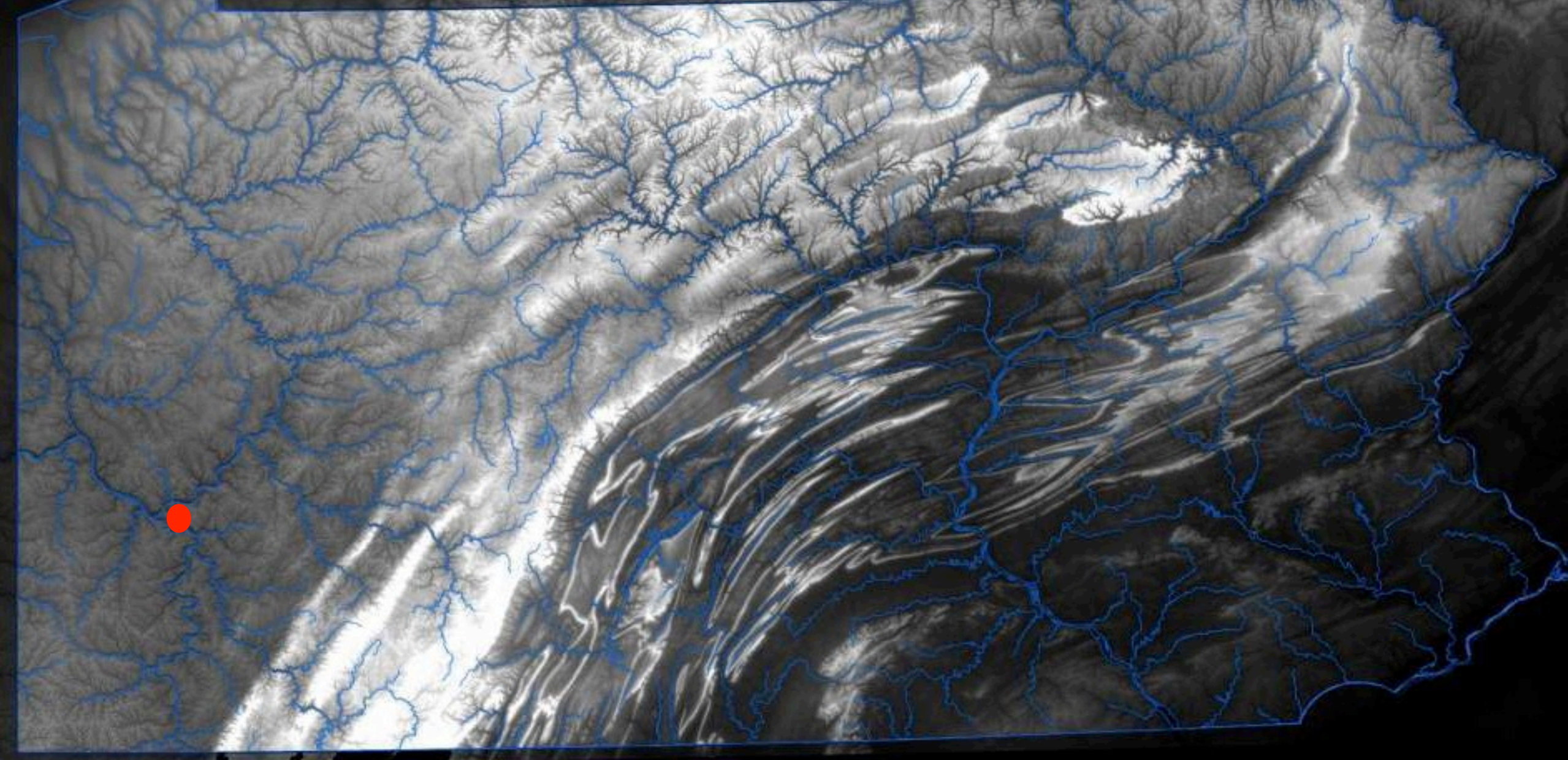


Testing Water Flow Dynamics

Herbert Dreiseitl with Architecture Students at Harvard GSD

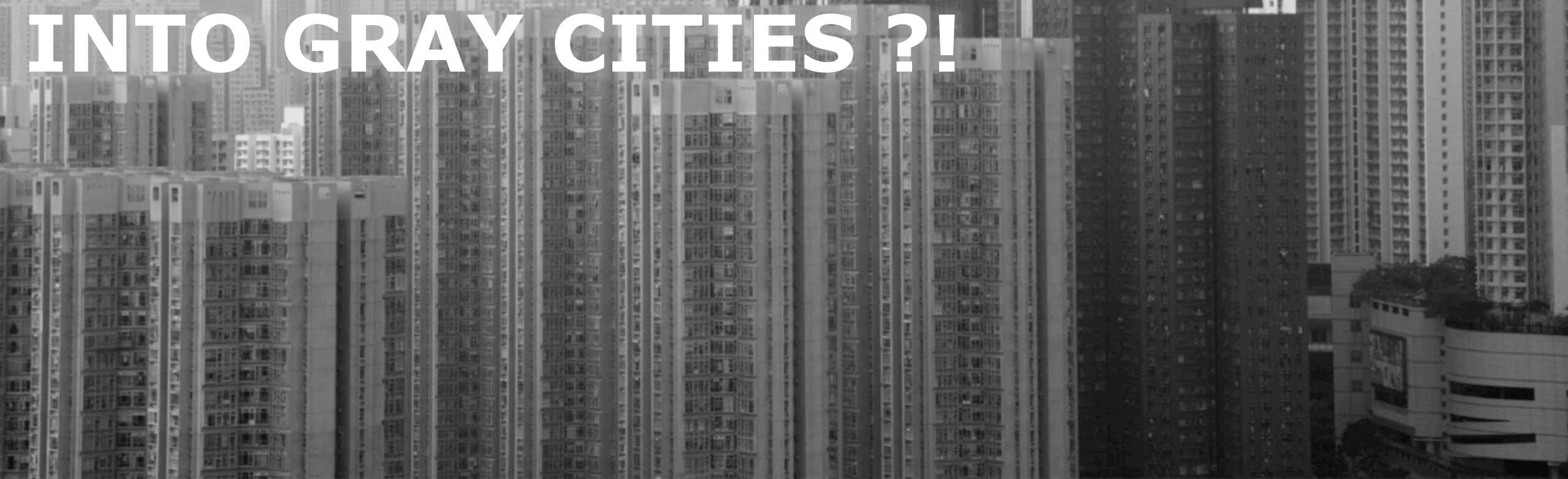


**Sometimes we have forgotten?
... Water is everywhere before it is somewhere ...**

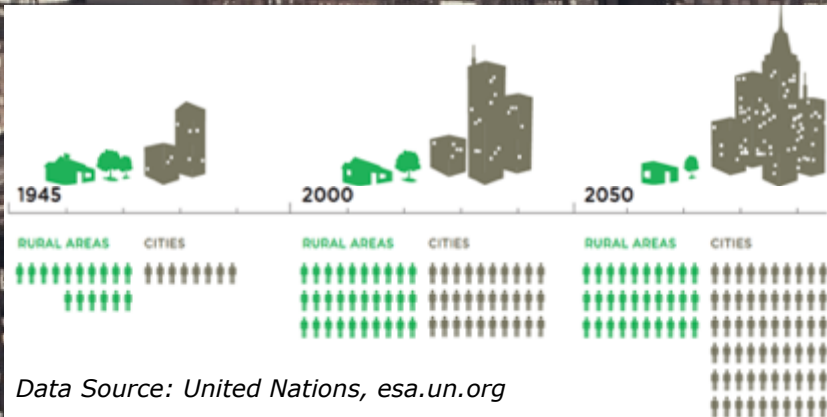




**HOW CAN WE BRING BLUE-GREEN
INTO GRAY CITIES ?!**

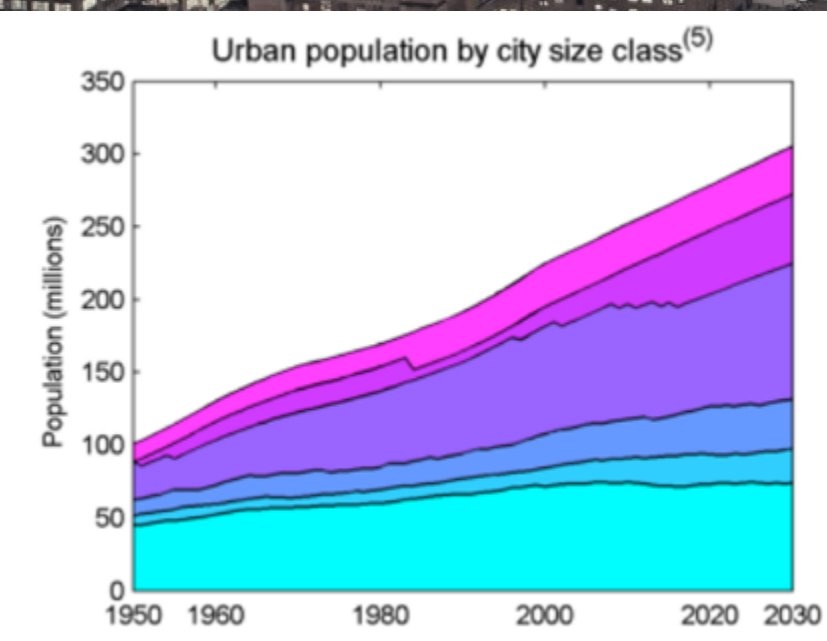


URBANISATION IS A MEGATREND



**Soon 2/3 of mankind will live in cities
Density creates high pressure on
Humans and Nature:**

- High percentage of sealed structures
- Temperature rise
- Green spaces disappear
- Blue is displaced in the underground
- Polluted air
- Noise
- Car-dependent culture

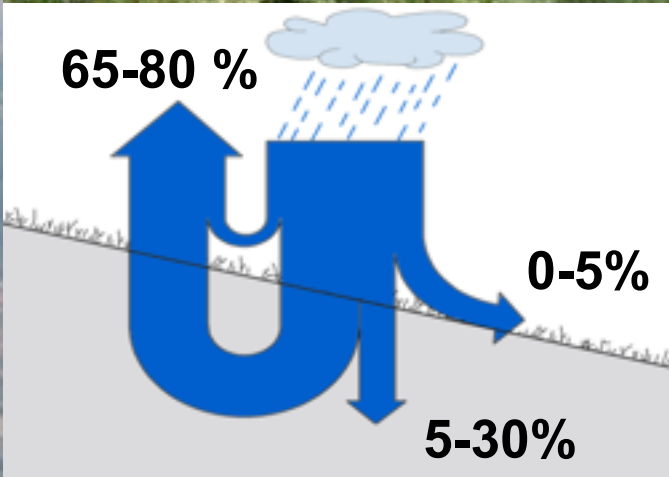


... often we still turn the city's backside to water

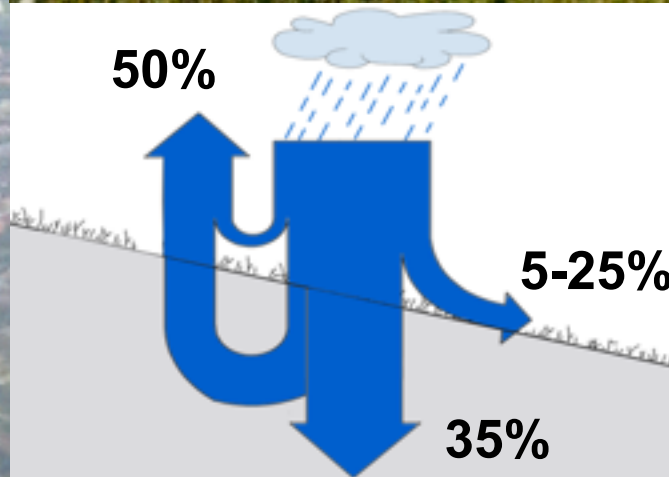


REPAIRING THE URBAN WATERBALANCE

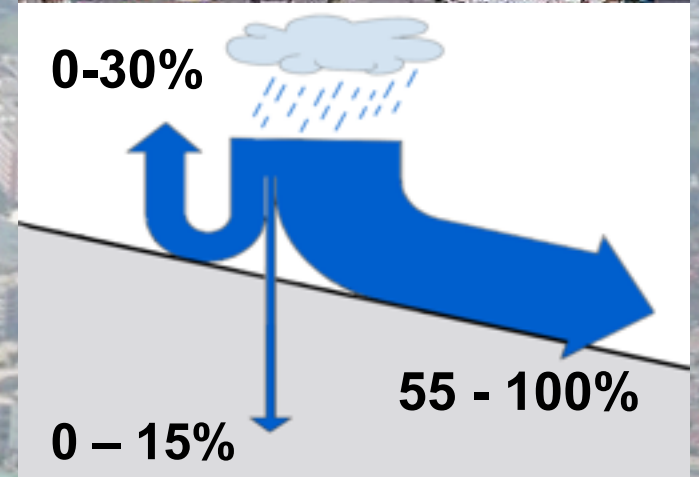
Nature



Agriculture



Urban Area



**Partial cloudbursts are more and more common,
but neighborhoods sometimes get no drop of rain.**



The heat island effect causes heavy local downpours in cities



FALLING INTO EXTREMES

TOO MUCH

Flooding, Erosion

2013: Damage of 173 MIO
Euro in German agriculture

TOO LITTLE

Heatwaves, Drought, Dust Pollution ...

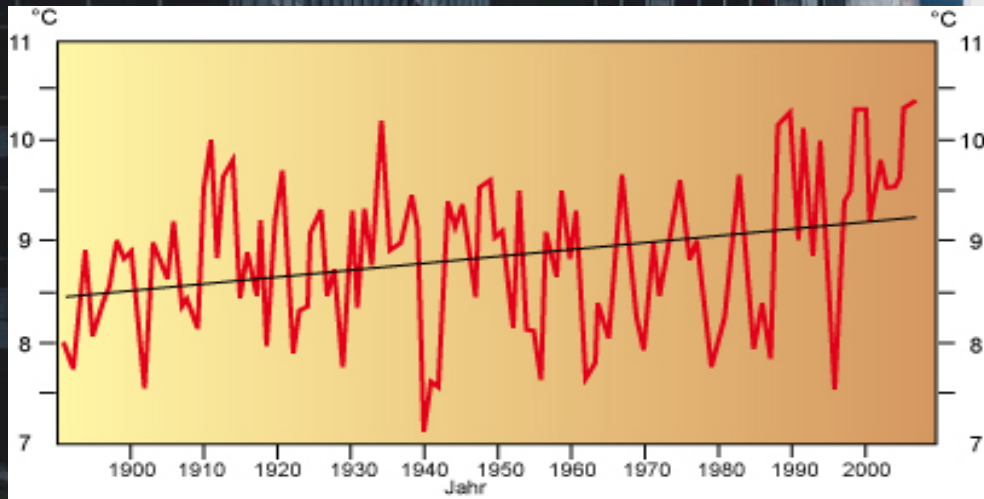
2003: 70,000 people died in
Europe

... HOW TO FIND THE BALANCE AGAIN ?

**HIGH TIDE IN BOSTON, JAN. 2018
... IN FRONT OF MY OFFICE!**



THE SEALED CITY



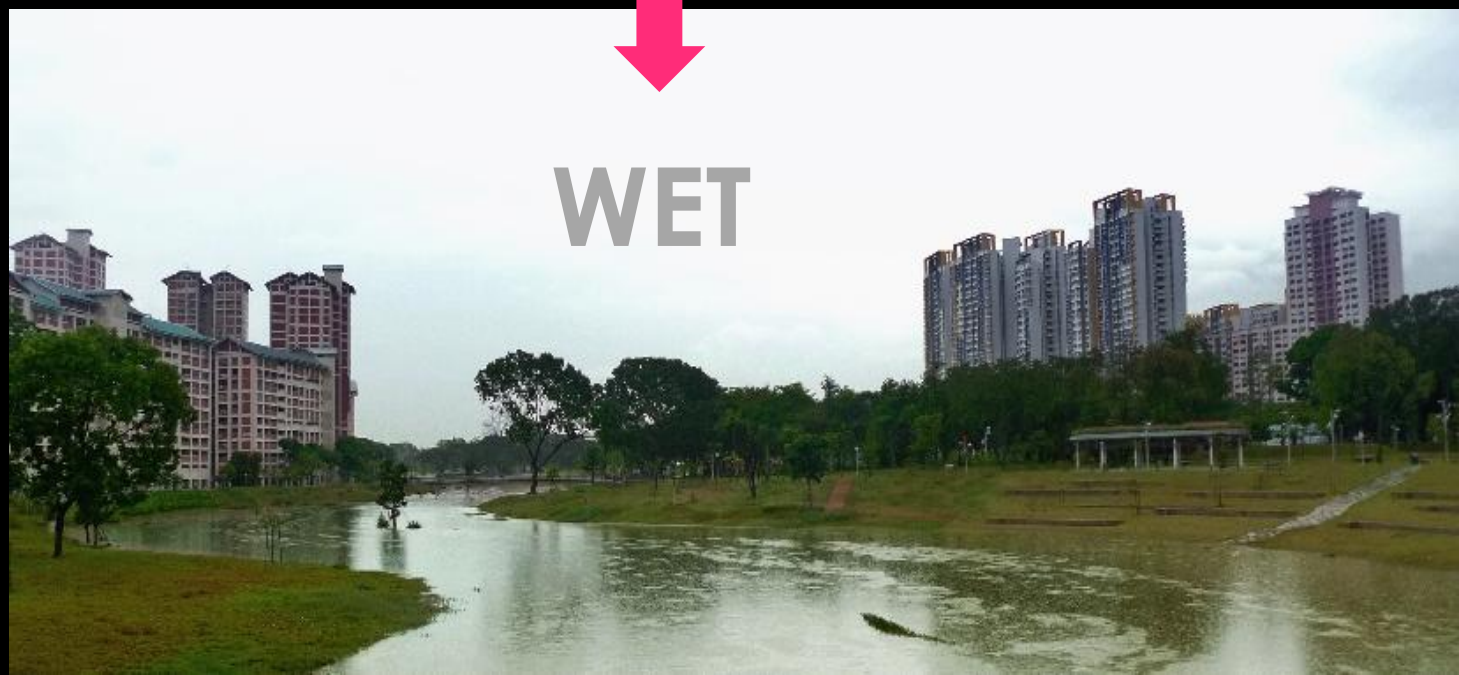
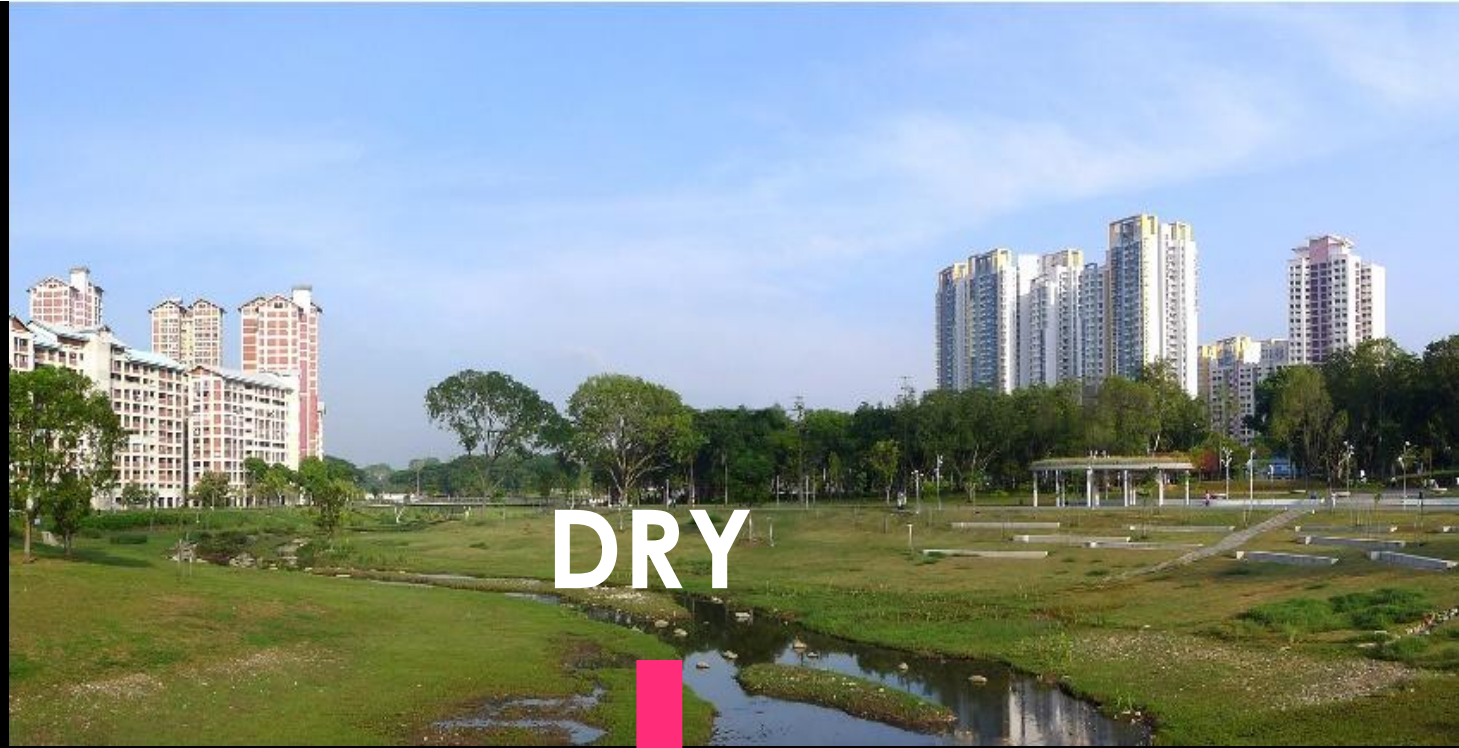
(http://wiki.bildungsserver.de/klimawandel/index.php/Datei:HH_temp1901-2007.jpg)

- Limited capacities of drainage
- Increase of heat islands
- Limited space for people and green

How to bring resilience and liveability into the Urban Fabric ?

Small Scale – Big Impact
Multi-functional Layers





How to get to a Water Sensitive City

INTEGRATION OF STORMWATER MANAGEMENT

EXAMPLE of HAMBURG, GERMANY | RISA Program

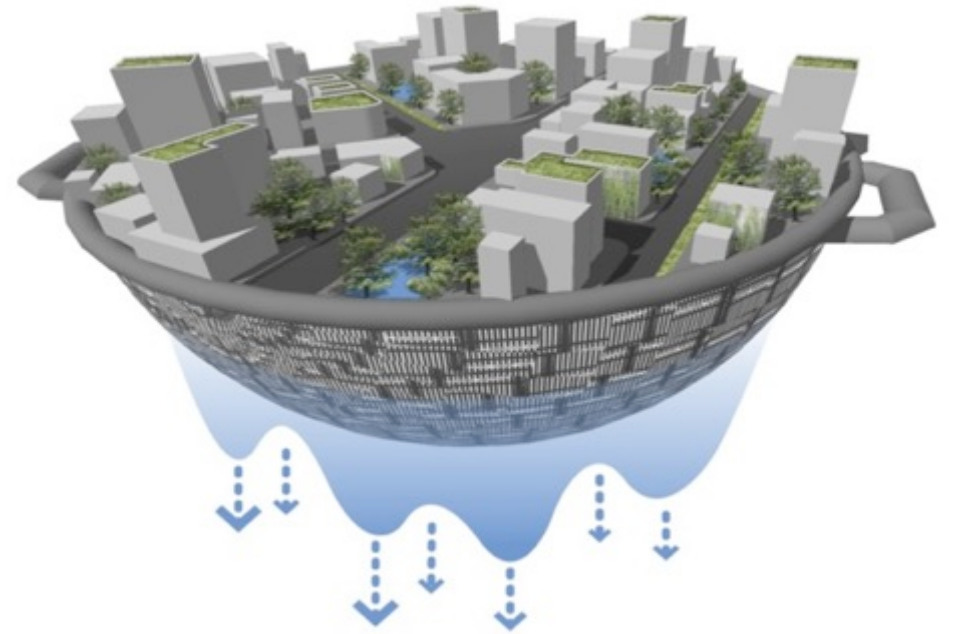
STATUS:



(Grafik: Atelier Dreiseitl)

END OF PIPE SOLUTION
ELIMINATION OF WATER

GOAL:

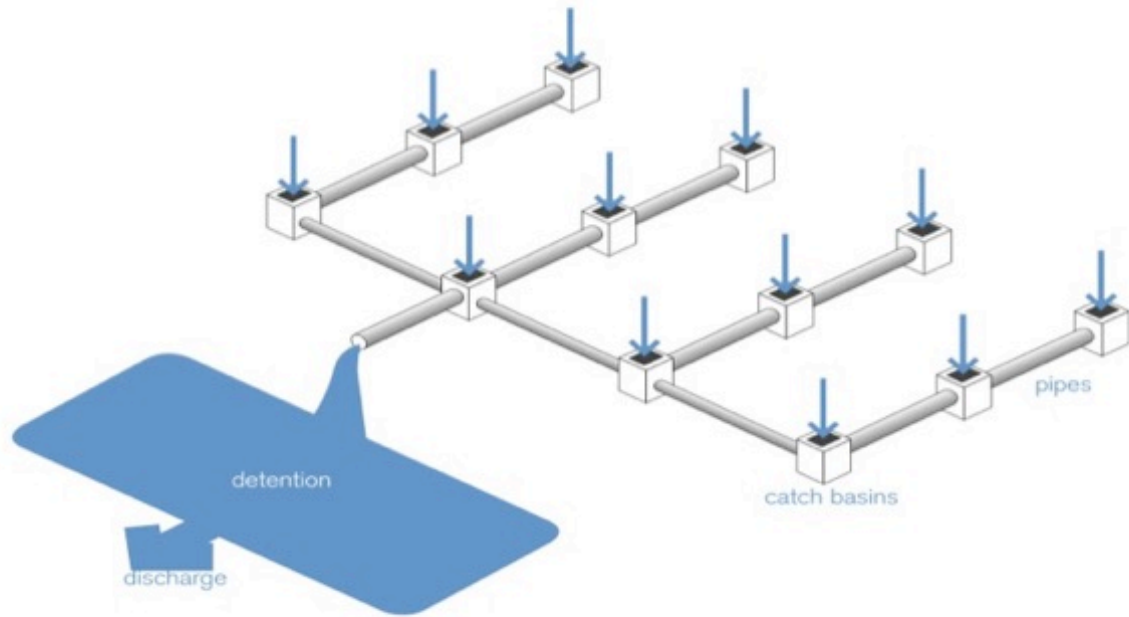


(Grafik: Atelier Dreiseitl)

INTEGRATIVE SOLUTION
WATER AS A TREASURE

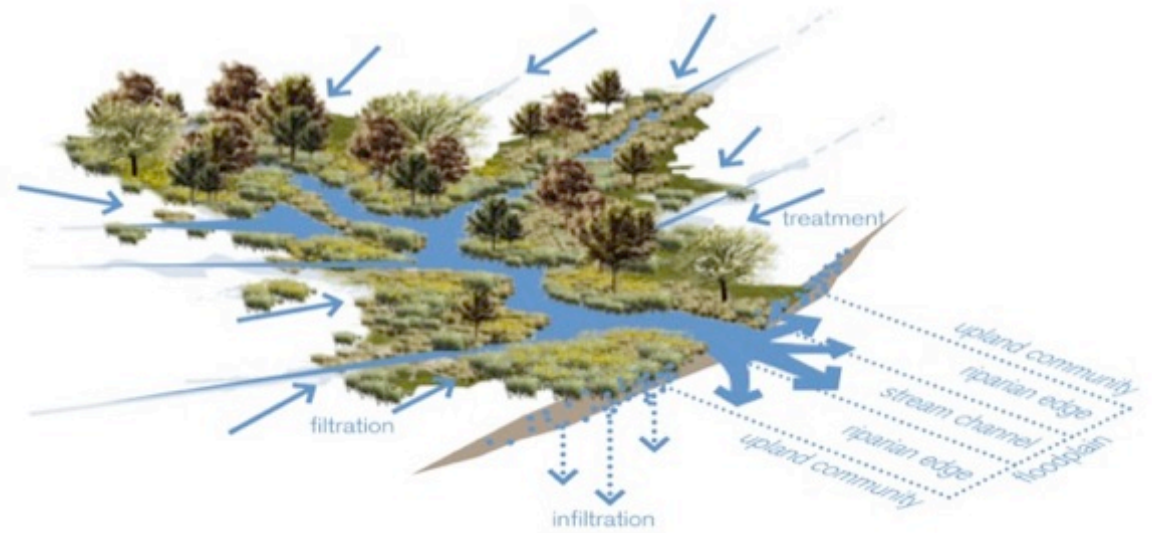
LID (Low Impact Development) Guidelines

hard engineering
...just transfers pollution
to another site



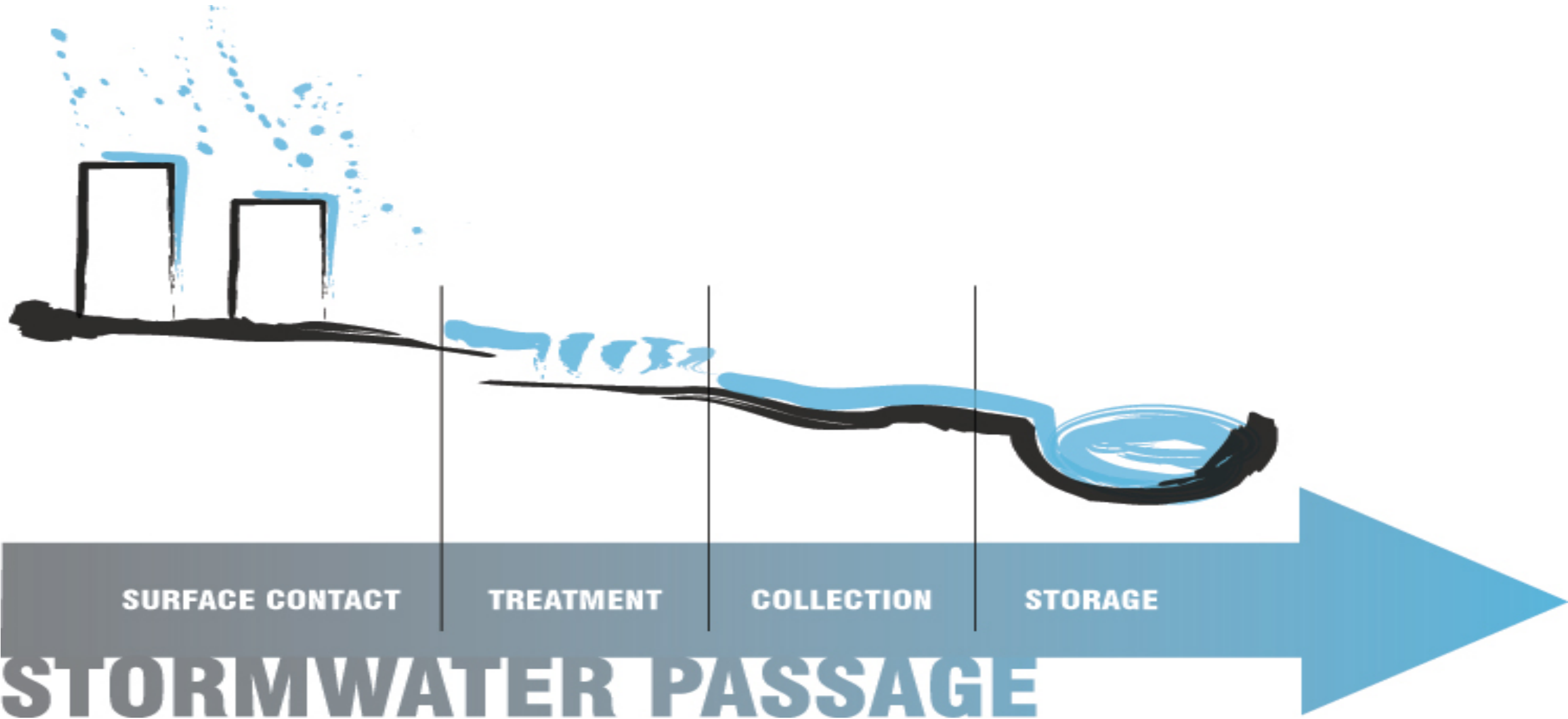
conventional management: "pipe-and-pond" infrastructure
drain, direct, dispatch

soft engineering
...metabolizes pollutants
on site — parks, not pipes!



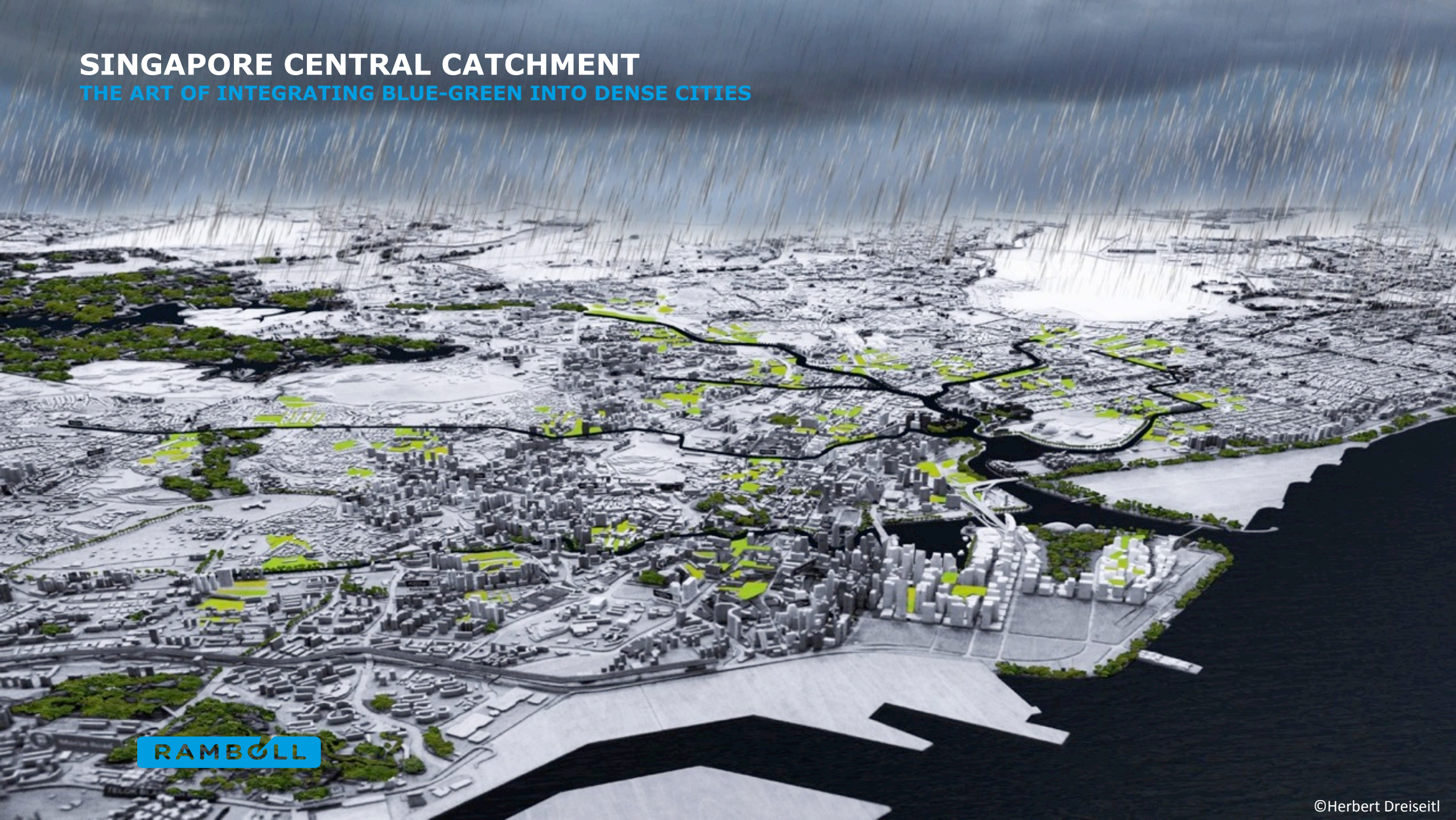
low impact management: watershed approach
slow, spread, soak





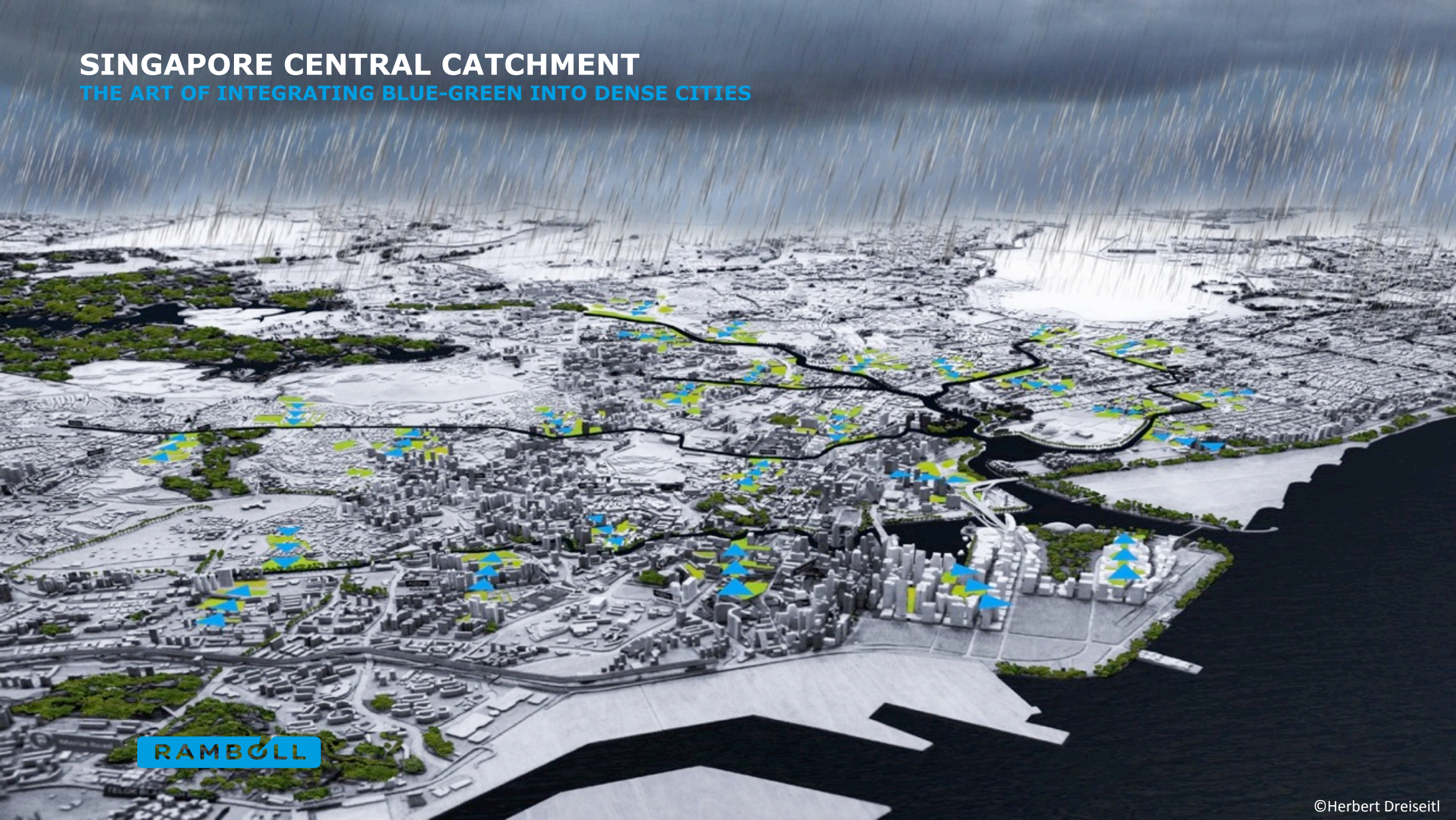
SINGAPORE CENTRAL CATCHMENT

THE ART OF INTEGRATING BLUE-GREEN INTO DENSE CITIES



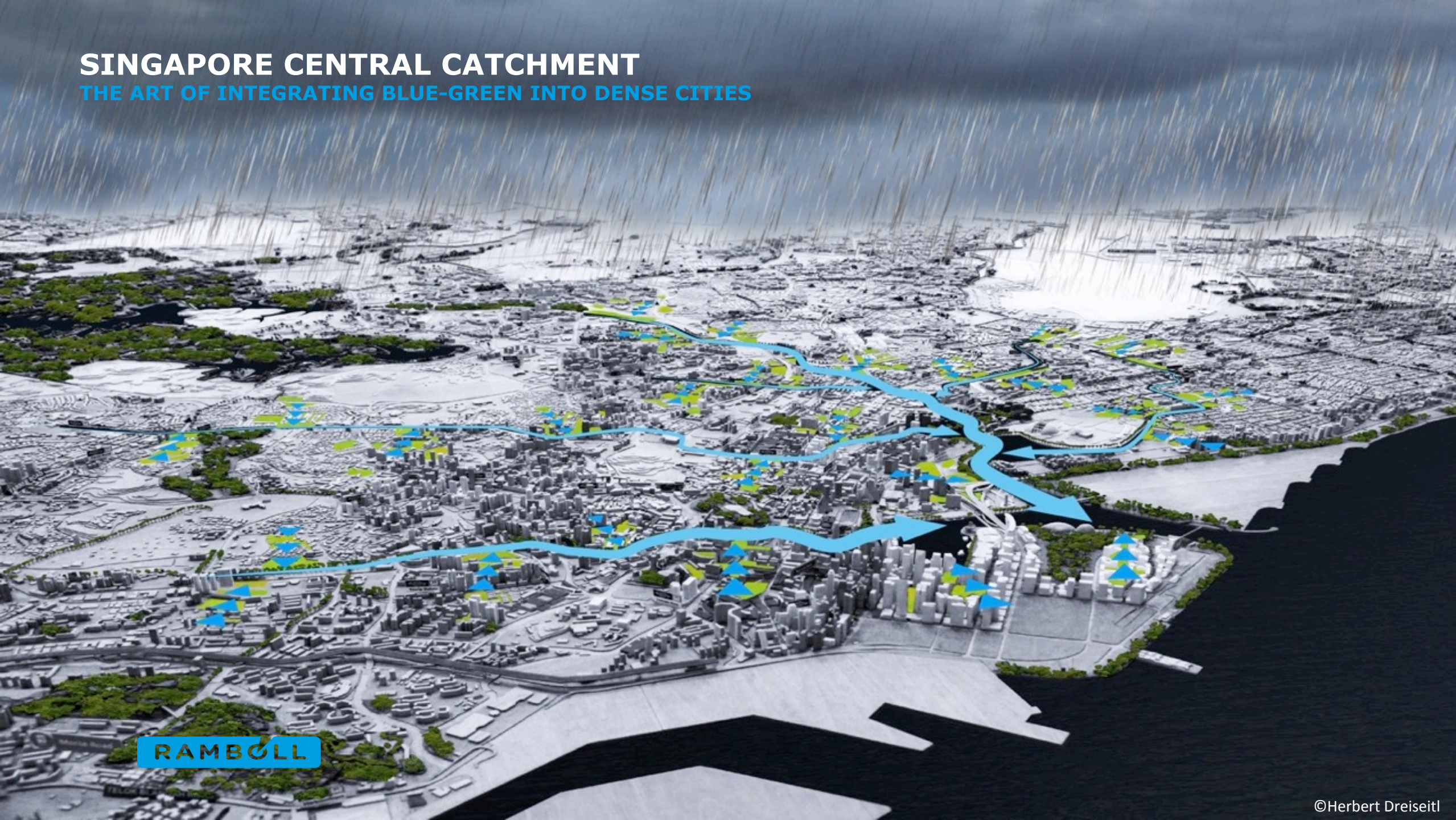
SINGAPORE CENTRAL CATCHMENT

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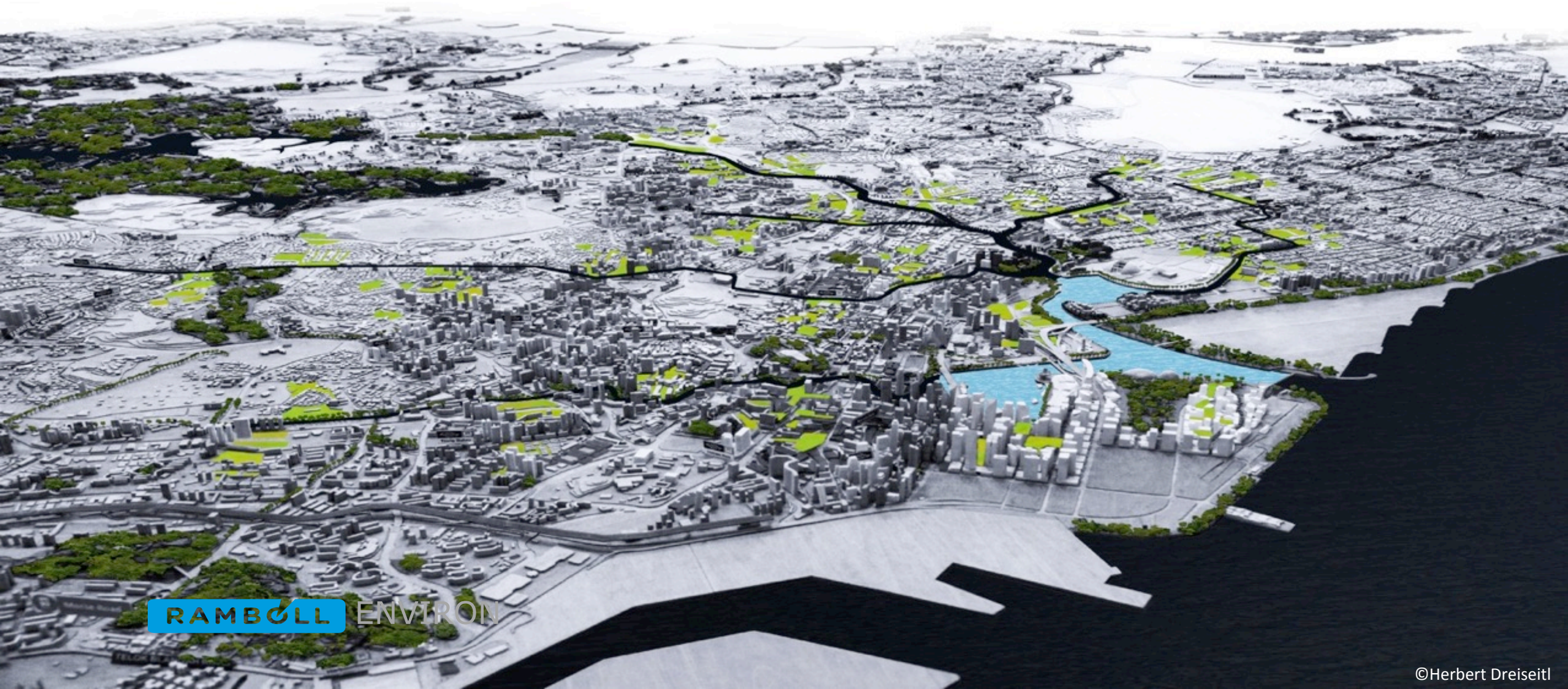
SINGAPORE CENTRAL CATCHMENT

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SINGAPORE CENTRAL CATCHMENT

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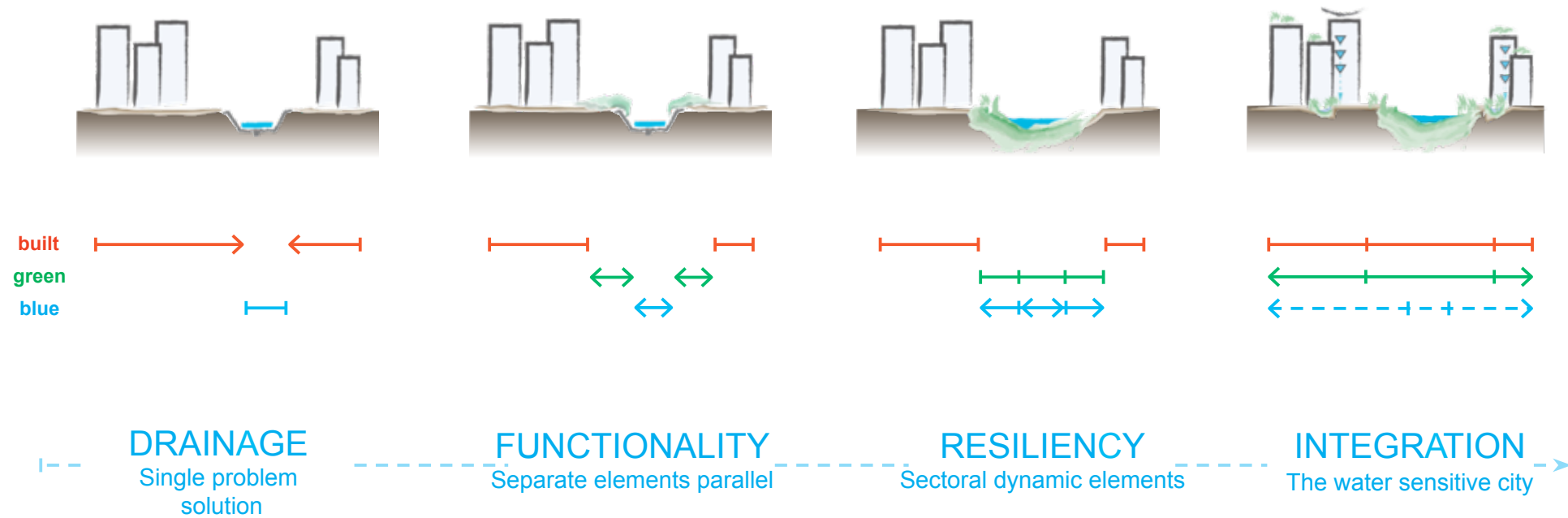
A monsun drain once at Bishan Park in SINGAPORE



Kalang River, Singapore, before 2010

BLUE-GREEN INFRASTRUCTURE (BGI)

BLUE\GREEN\RED FROM SEGMENTED TO SEAMLESS INTEGRATION









PILOT STUDY - CONSTRUCTION



Construction



Bioengineering Workshop, 8. Jan 2009



2008
Before



2013
After (View from bridge 5)





KALLANG RIVER



BRINGING NATURE TO DOWNTOWN SINGAPORE



Image: Dreiseitl

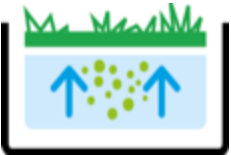


MAKING CITIES RESILIENT AND LIVEABLE

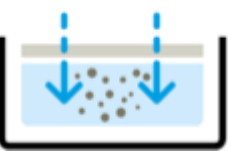


BLUE-GREEN INFRASTRUCTURE TOOLKIT

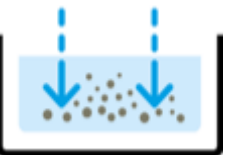
QUALITY CONTROL



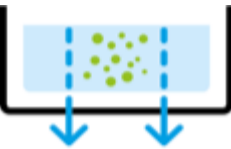
Biological Absorption



Filtration



Sedimentation



Infiltration



Recycle



QUANTITY CONTROL

Evaporation



Conveyance



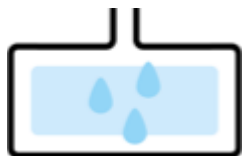
Detention



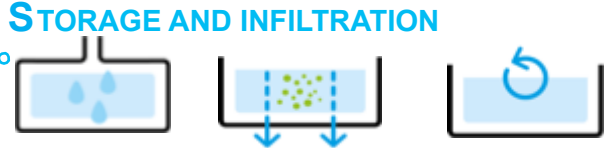
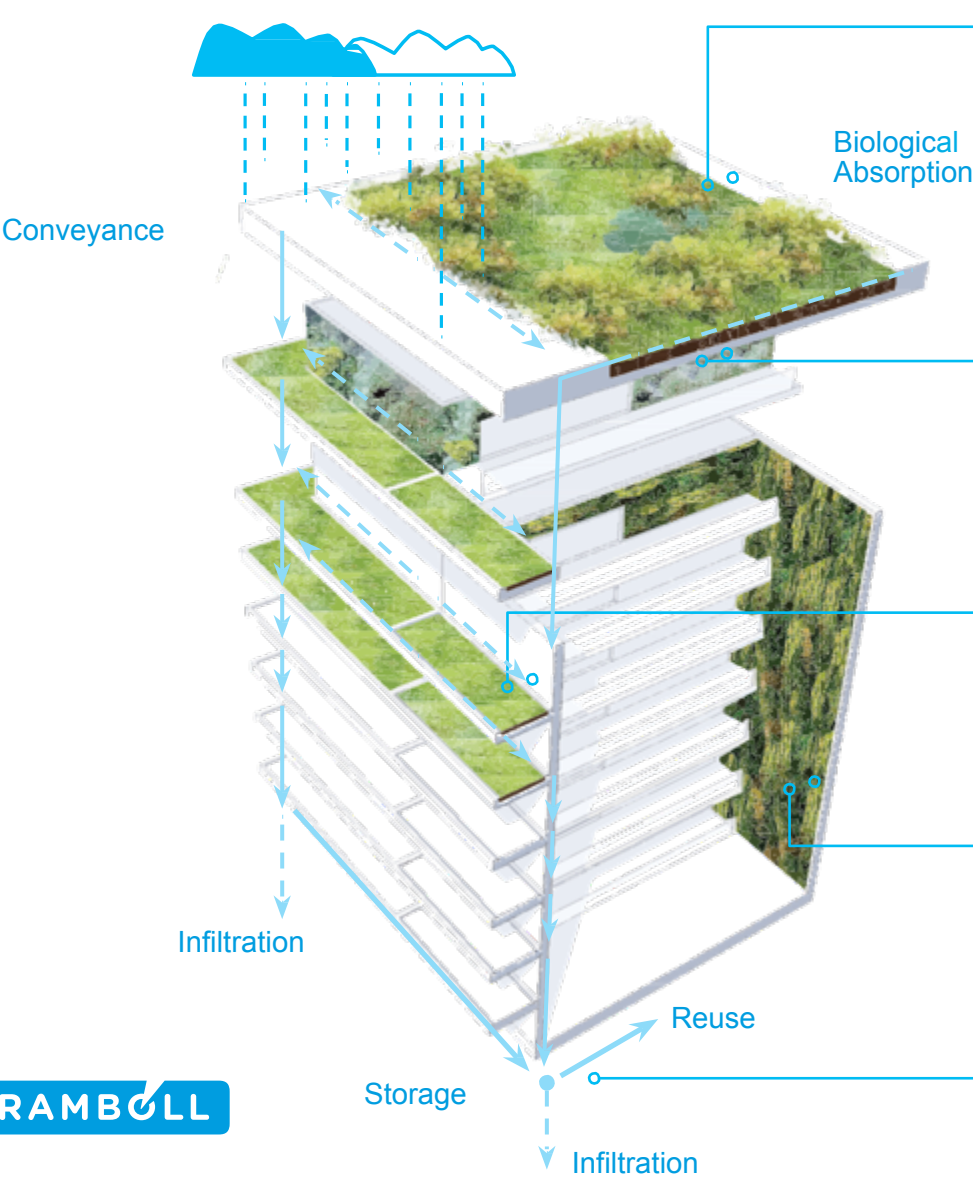
Retention



Storage

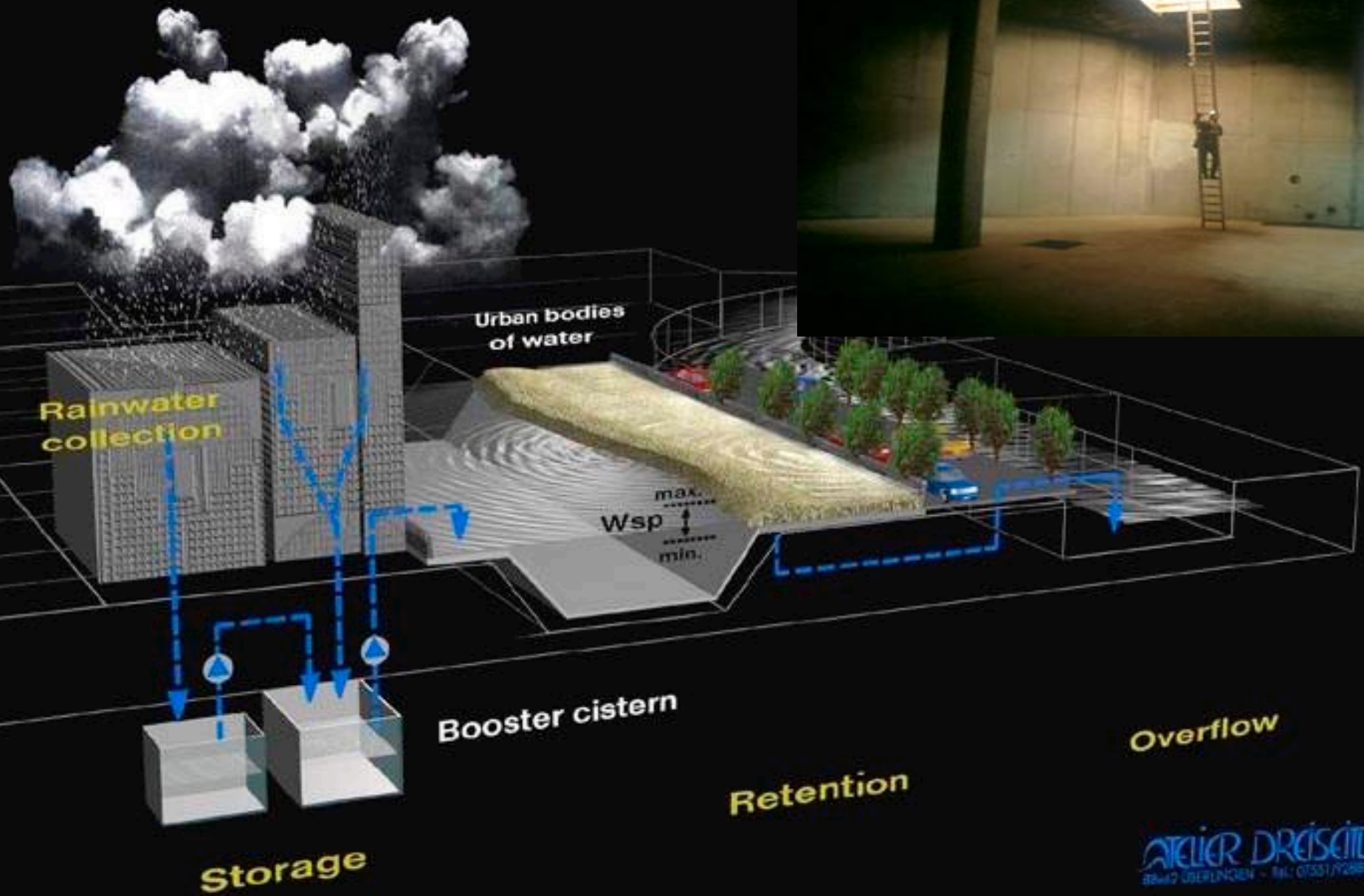


BGI – BUILDING SCALE





Berlin Potsdamer Platz Rainwater management

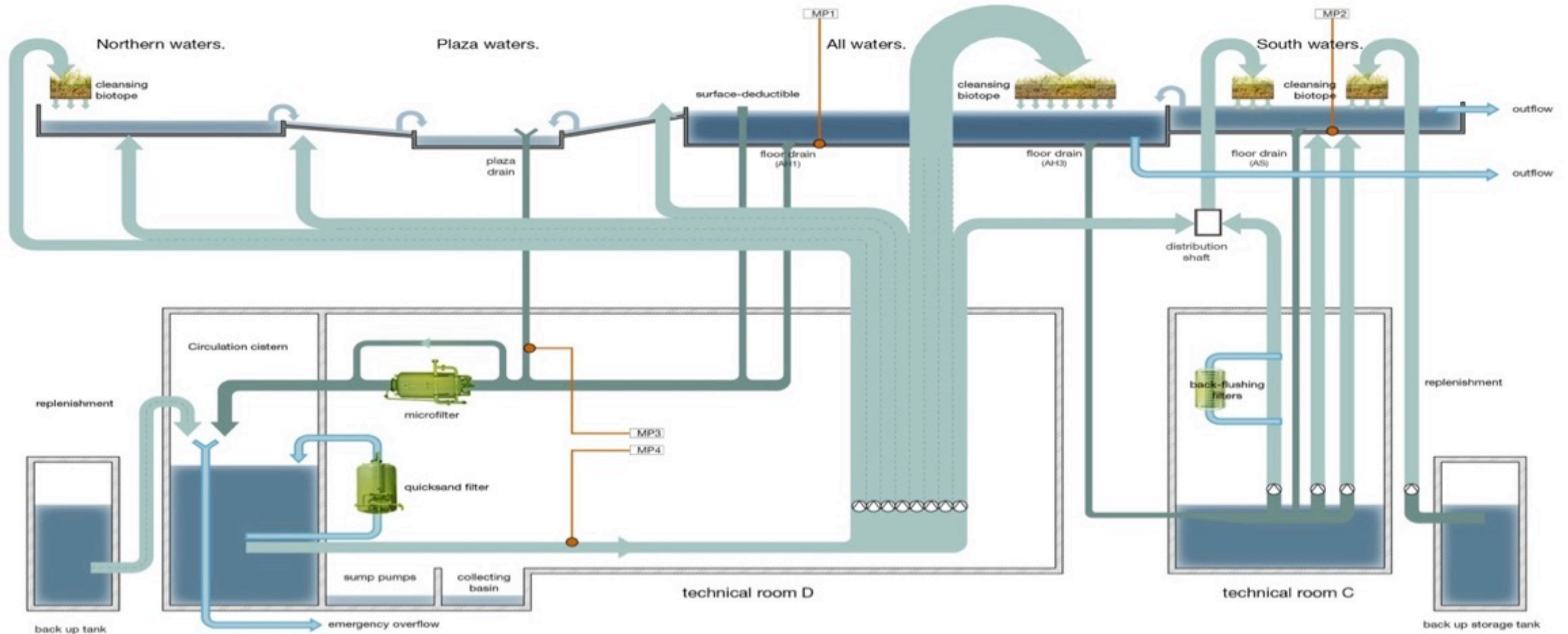




Potsdamer Platz Berlin - Freianlagen mit Urbanem Gewässer

CIRCULATION SYSTEM

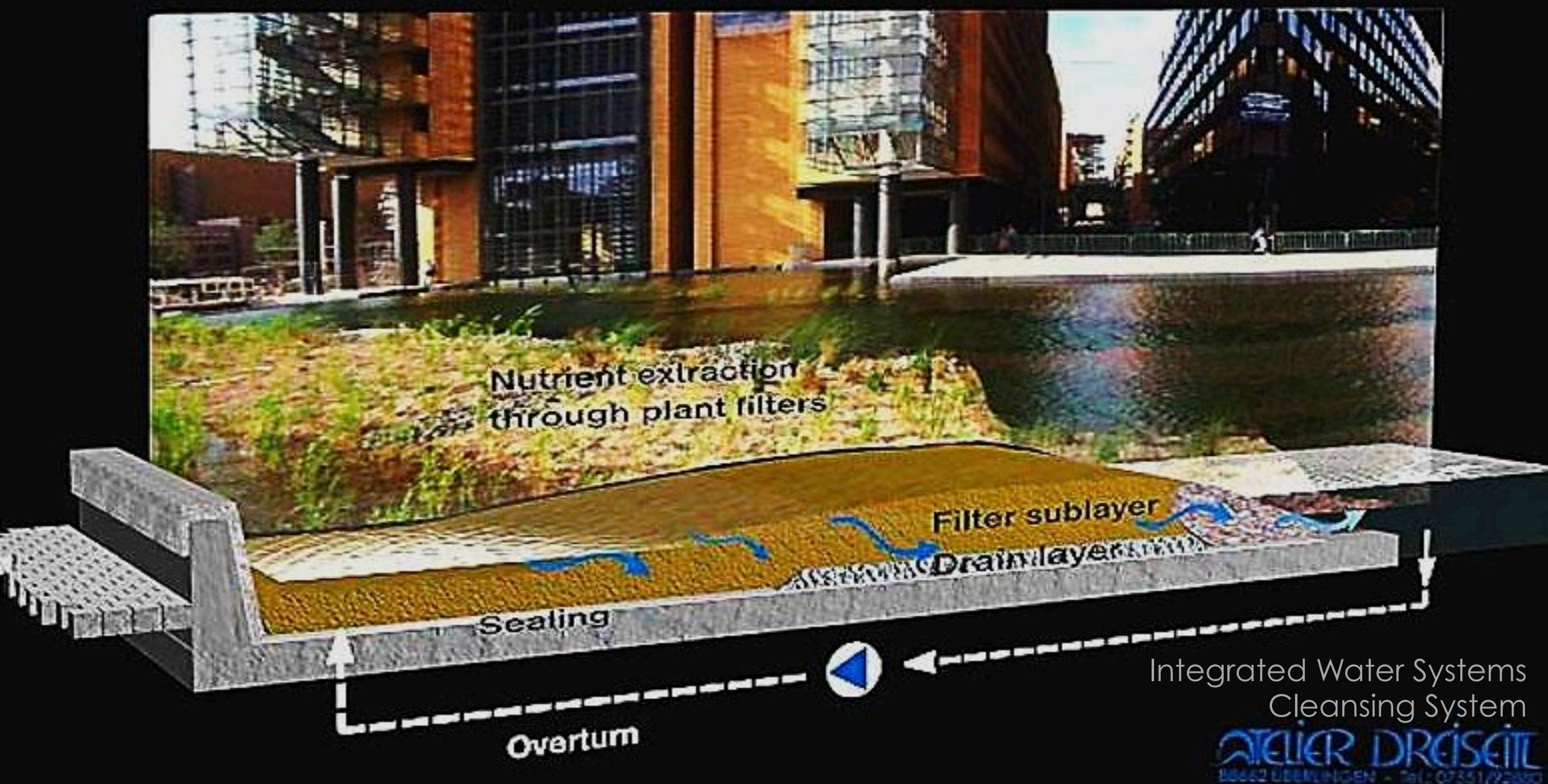
Postdamer Platz



LEGEND

- █ running waters
- █ inflowing waters
- █ internal circulation | Emergency overflow
- █ inflow of purification biotope

- MP1 measuring point major watercourse
- MP2 measuring point south waters
- MP3 measuring point North drain line in piazza
- MP4 measuring point at all running circulation



Nutrient extraction
through plant filters

Filter sublayer

Drainlayer

Sealing

Overtum

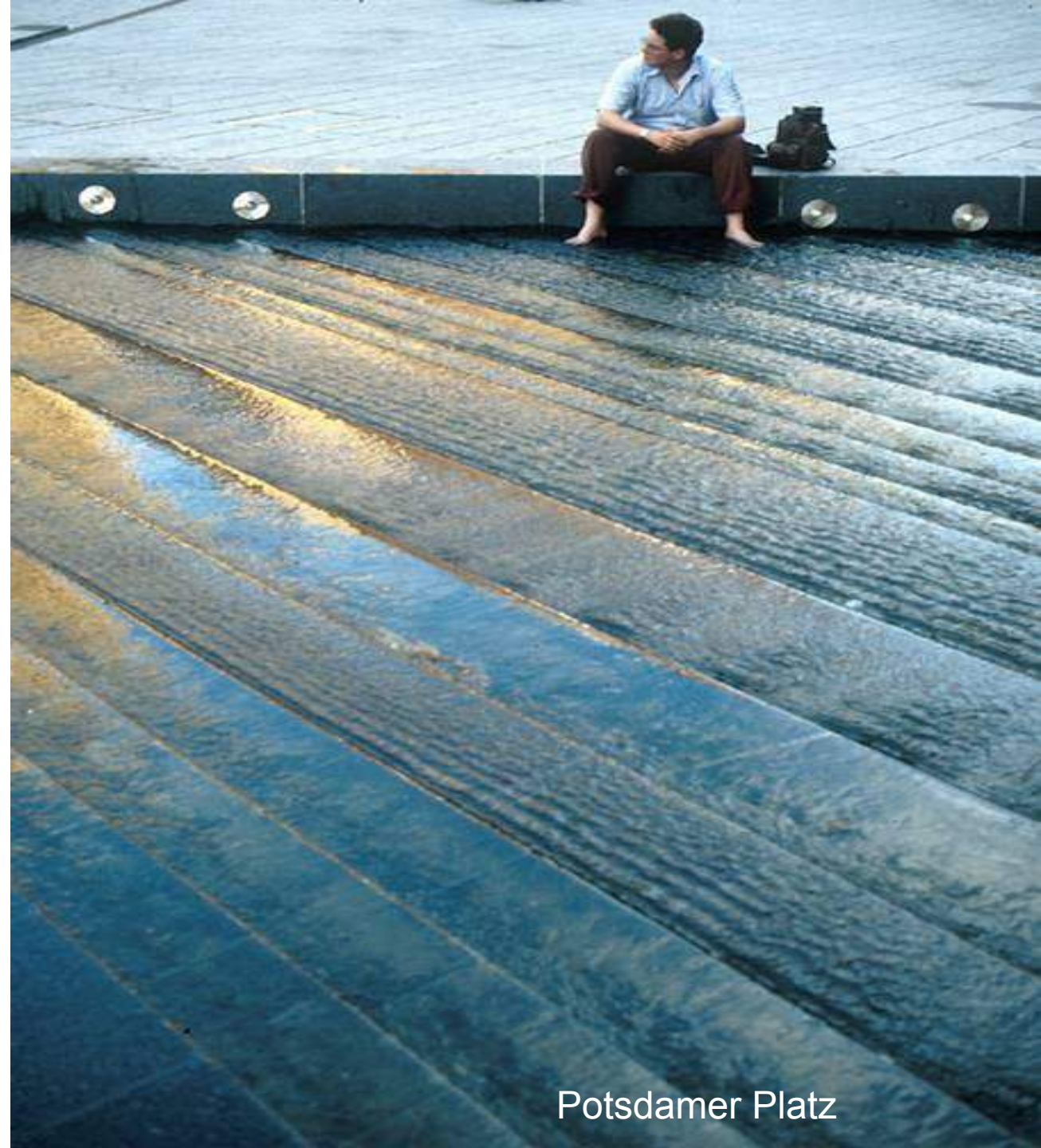
Integrated Water Systems
Cleansing System

ATELIER DREISEITE
10662 BERLIN - Tel.: 07351/92880

URBAN WATERS AT POTSDAMER PLATZ; BERLIN, GERMANY



View over Water surface and Cleansing Biotope



Potsdamer Platz



SUSTAINABLE DESIGN ACHIEVEMENTS

POTSDAMER PLATZ

Berlin, Germany

70%

carbon emission
reduction

20,000

cubic meters of
potable water
saved

13,500

cubic meters
combined
stormwater
storage

50%

primary energy
saved compared to
air-conditioned
systems



TANNER SPRINGS PARK PORTLAND

Challenge

Previous attempts to renovate park met with vandalism

What we did

300 citizens participated in workshop to shape design

Effect

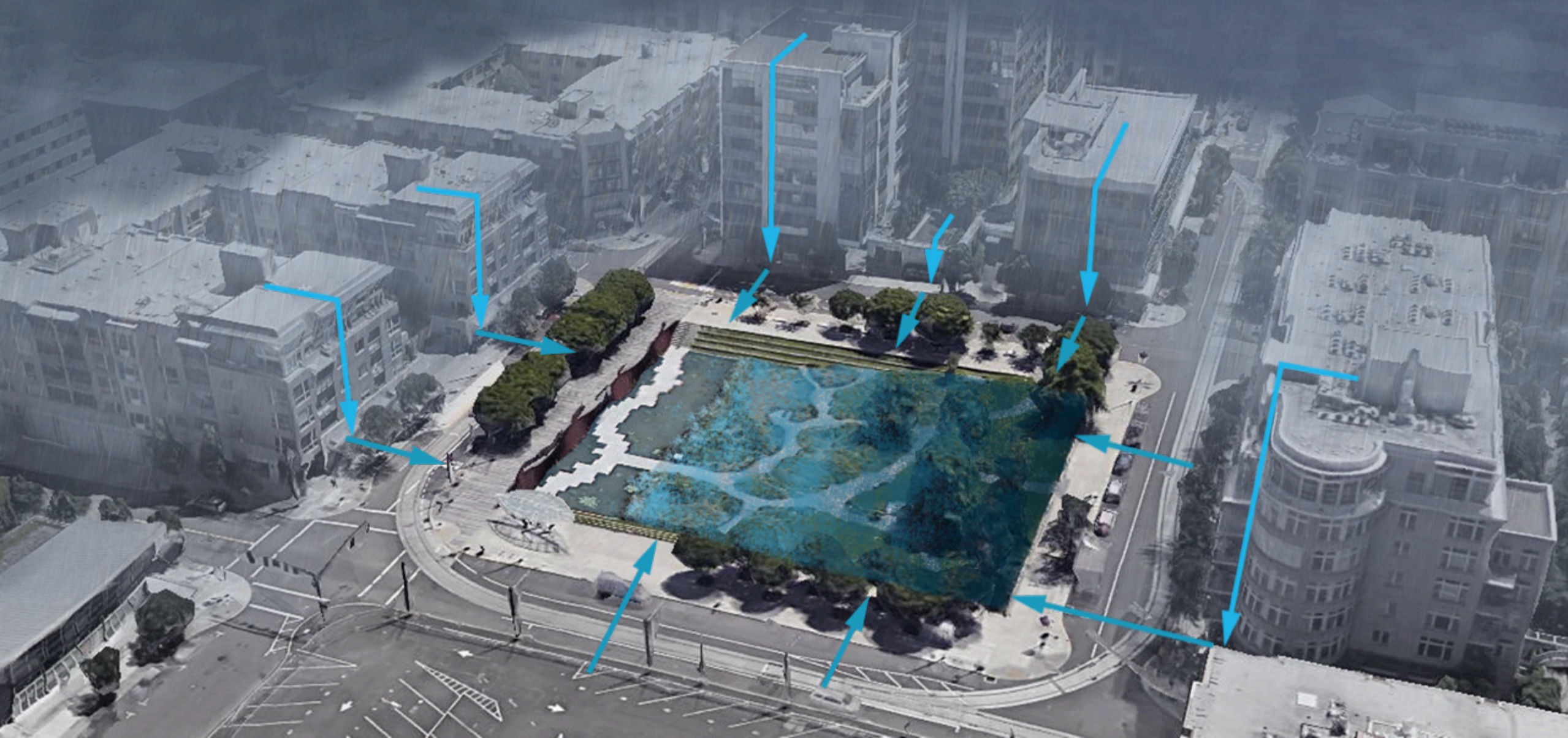
Local ownership – Friends of Tanner Spring community group
Decline in vandalism



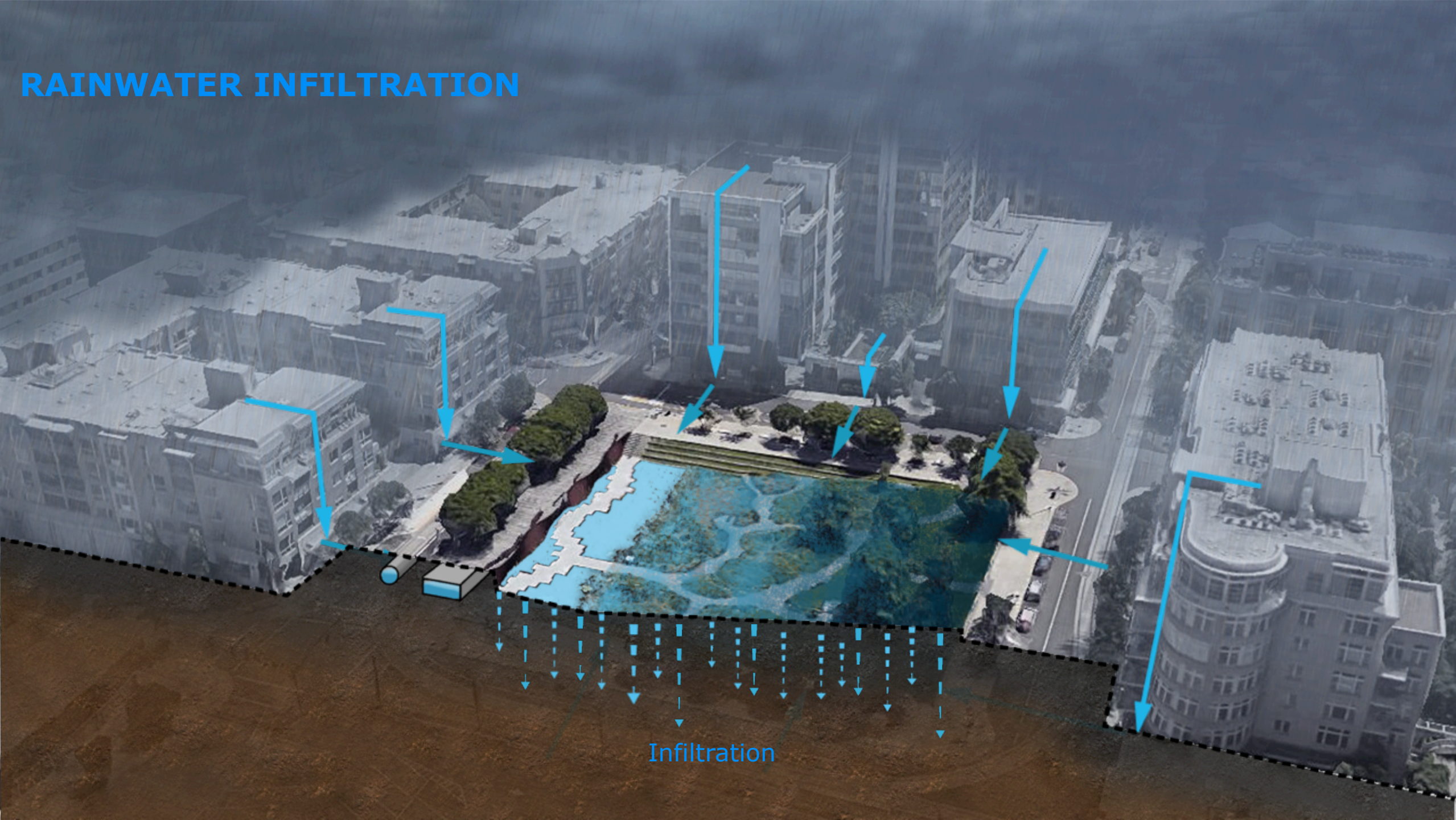


Pearl District in Portland OG

RAINWATER COLLECTION SYSTEM

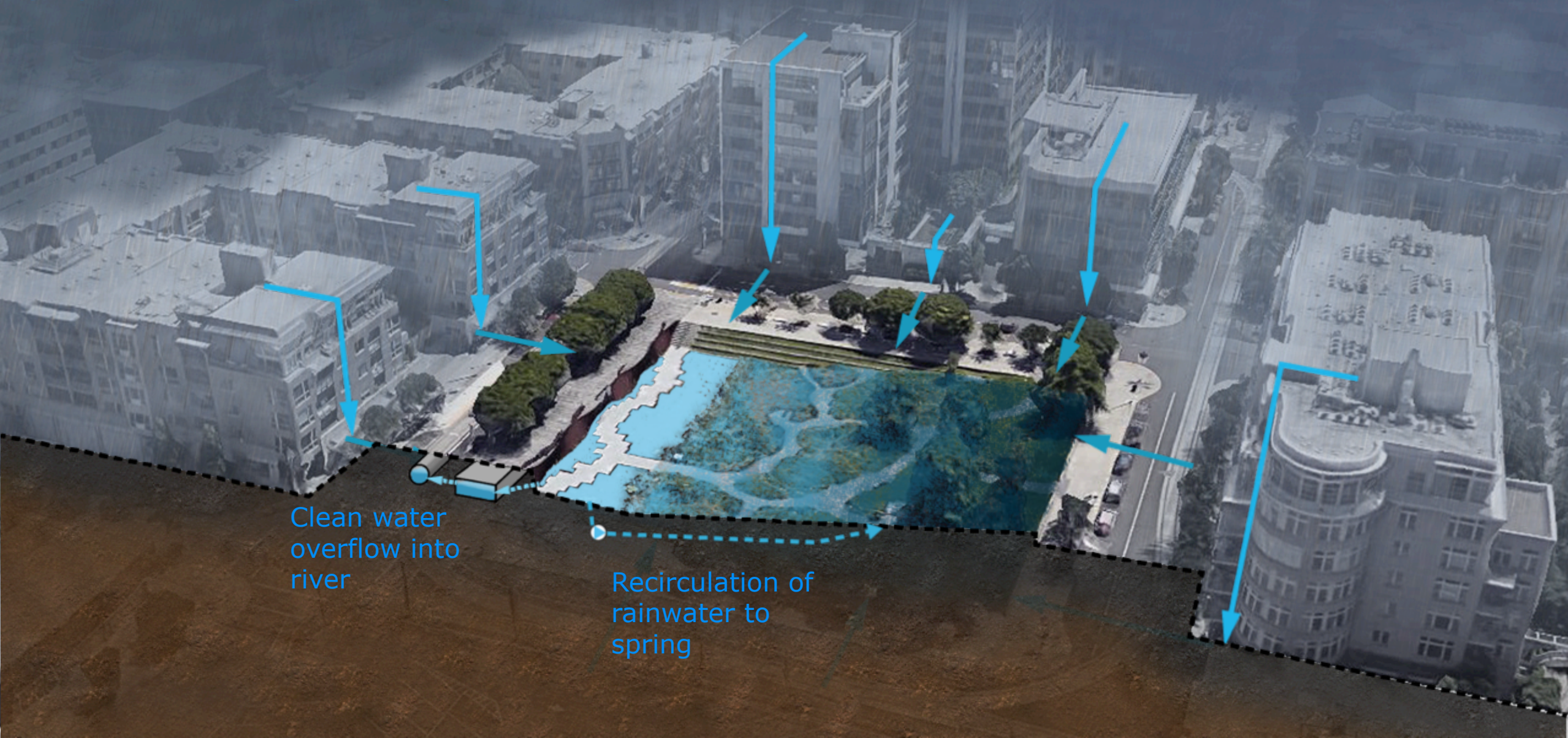


RAINWATER INFILTRATION



Infiltration

RAINWATER RECIRCULATION SYSTEM AND OVERFLOW



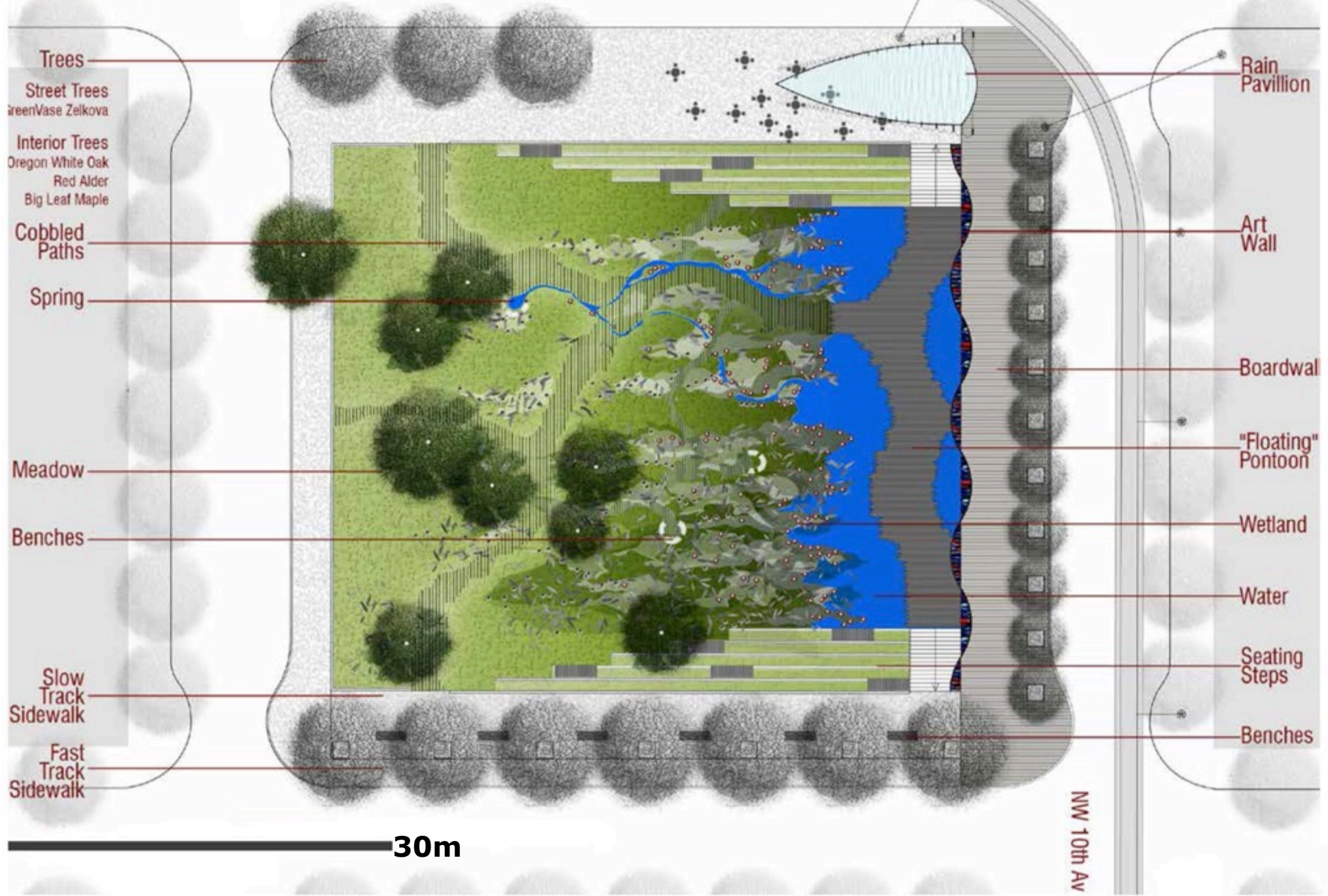
Clean water overflow into river

Recirculation of rainwater to spring



WORKSHOP WITH PUBLIC AND STAKEHOLDER INVOLVEMENT AT TANNER SPRINGS PARK UNDER LEADERSHIP OF HERBERT DREISEITL

W Northrup Street



- Trees
- Street Trees
GreenVase Zelkova
- Interior Trees
Oregon White Oak
Red Alder
Big Leaf Maple
- Cobbled Paths
- Spring
- Meadow
- Benches
- Slow Track Sidewalk
- Fast Track Sidewalk

- Rain Pavillion
- Art Wall
- Boardwalk
- "Floating" Pontoon
- Wetland
- Water
- Seating Steps
- Benches

30m

NW 10th Av



THE ARTWALL CREATED WITH TRAIN TRACKS AND GLASS FROM PORTLAND





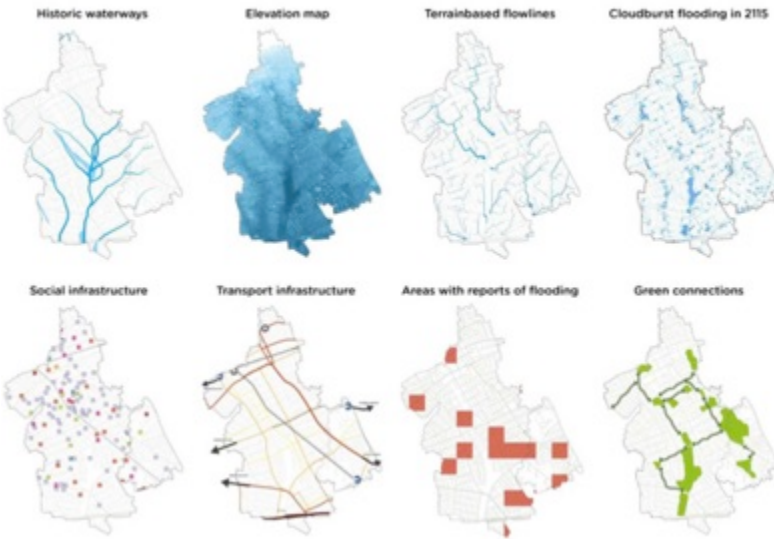
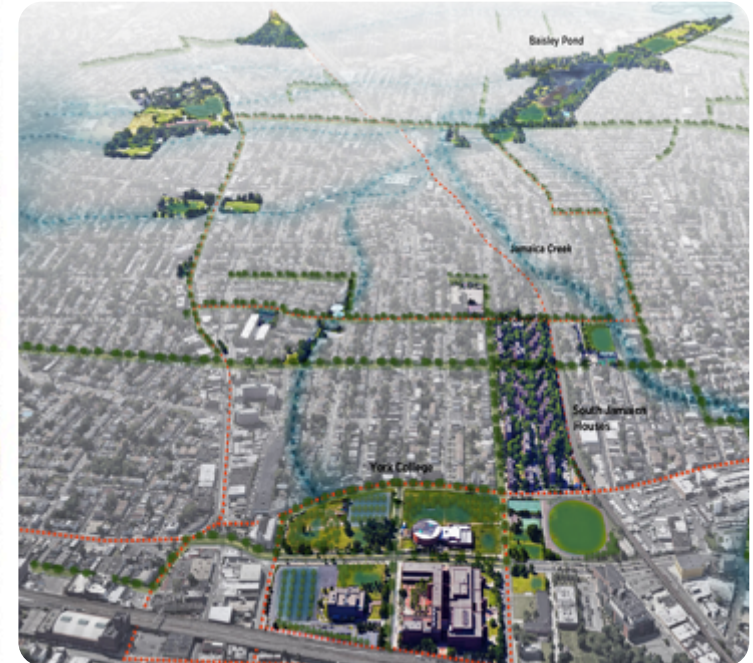
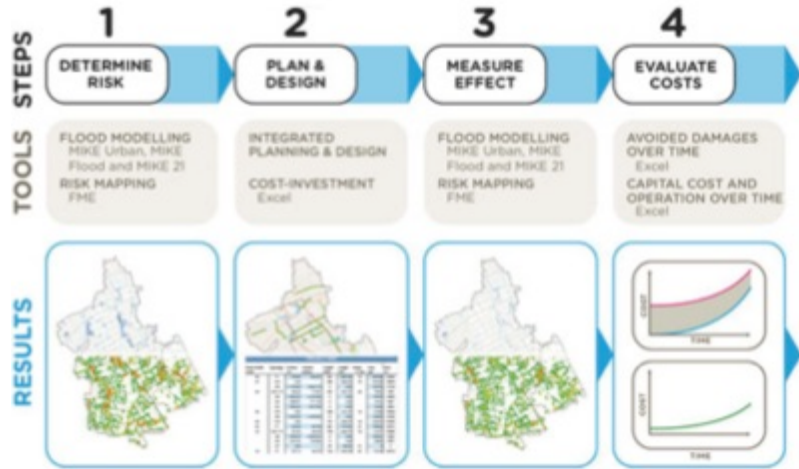


An Osprey catching a fish
at Tanner Springs Park
right in the City of Portland OG
in front of people



MULTIFUNCTIONAL USE

CLOUDBURST RESILIENCY PLANNING IN QUEENS NYC



Merrick Blvd

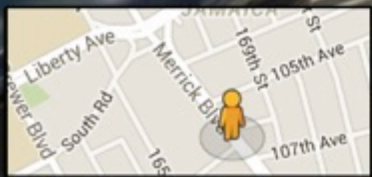
New York

Street View - sep. 2013

FIRST WORLD
AUTO REPAIR

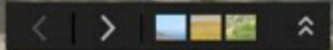
DELIC FOR RENT

Merrick Blvd



Google

RAMBOLL





CLIMATE READY FOR CLOUDBURST & COASTAL FLOODING

BUZZARD POINT WASHINGTON DC



Urban Landscape - Stairs



Urban Landscape - Combined

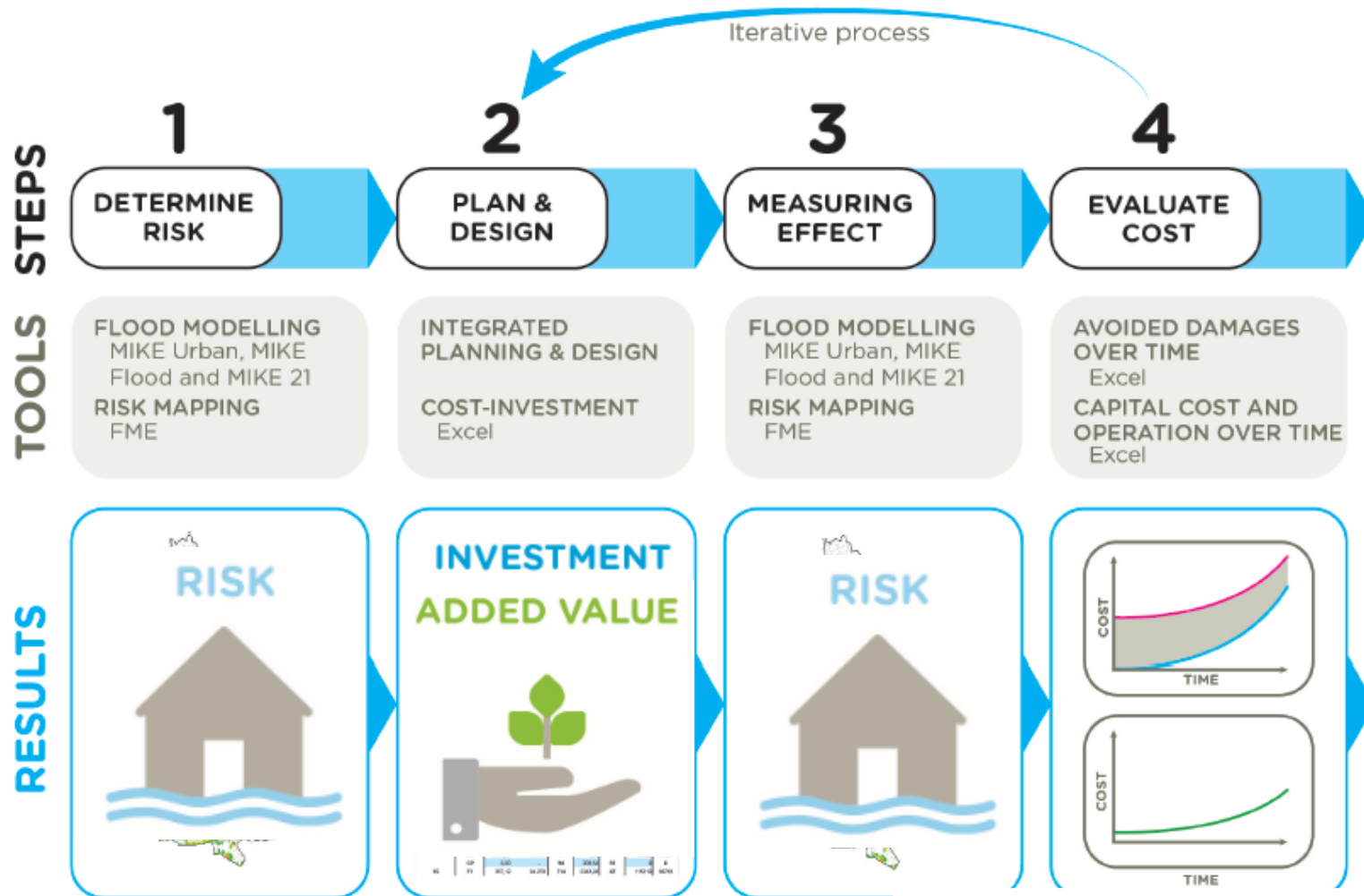


Urban Landscape - Green Areas

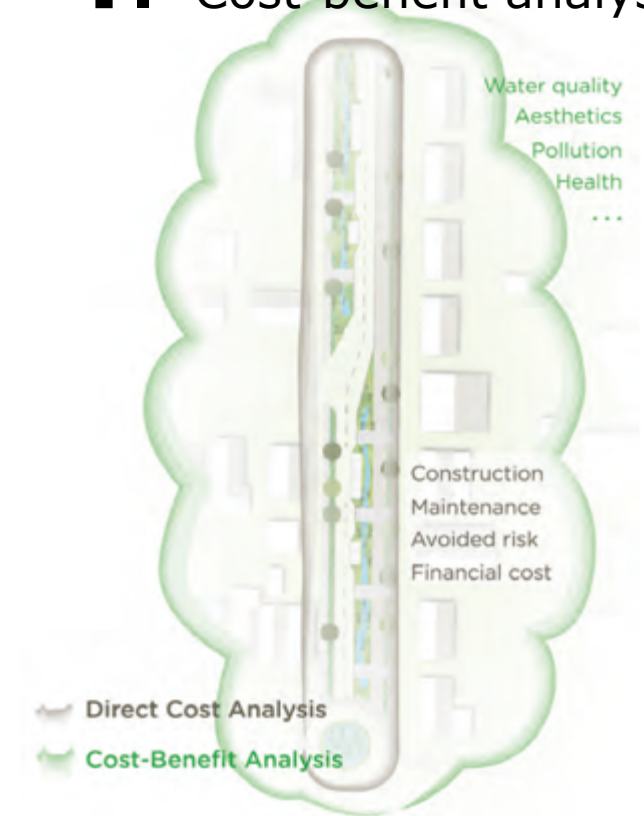


Sea Wall

THE RAMBOLL COST-BENEFIT ANALYSIS



4. Cost-benefit analysis



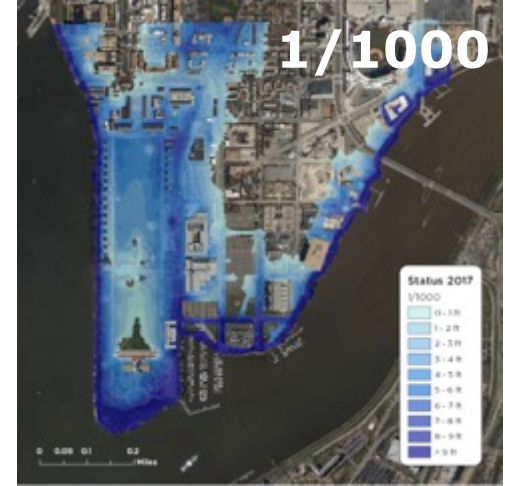
Integrated planning process



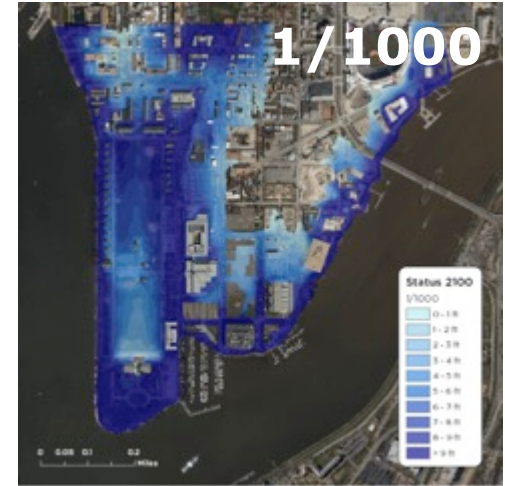
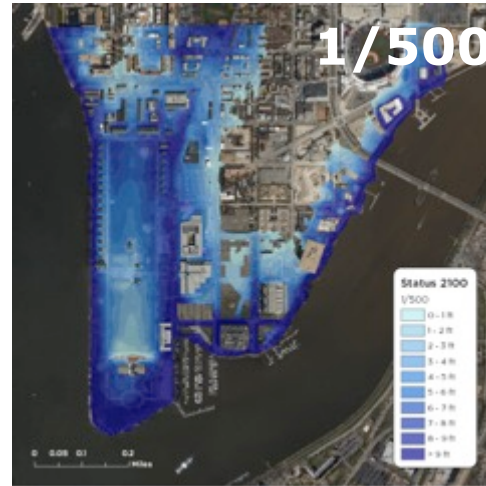
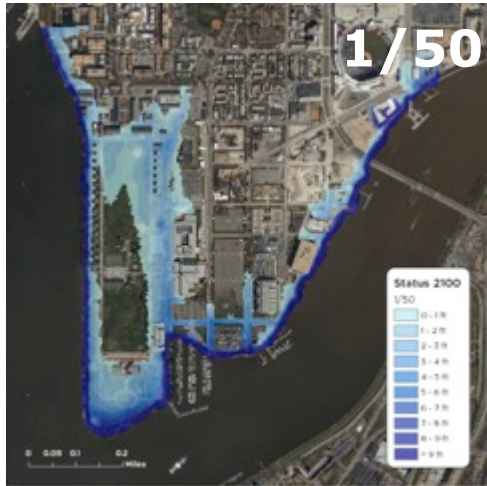
INITIAL ANALYSIS

BASELINE SCENARIO – “DO-NOTHING”

2017



2100



Fluvial and tidal
storm surge
events today

Fluvial and tidal
storm surge events
in the future

STRATEGY II FLOODING AFTER IMPLEMENTATION

2017



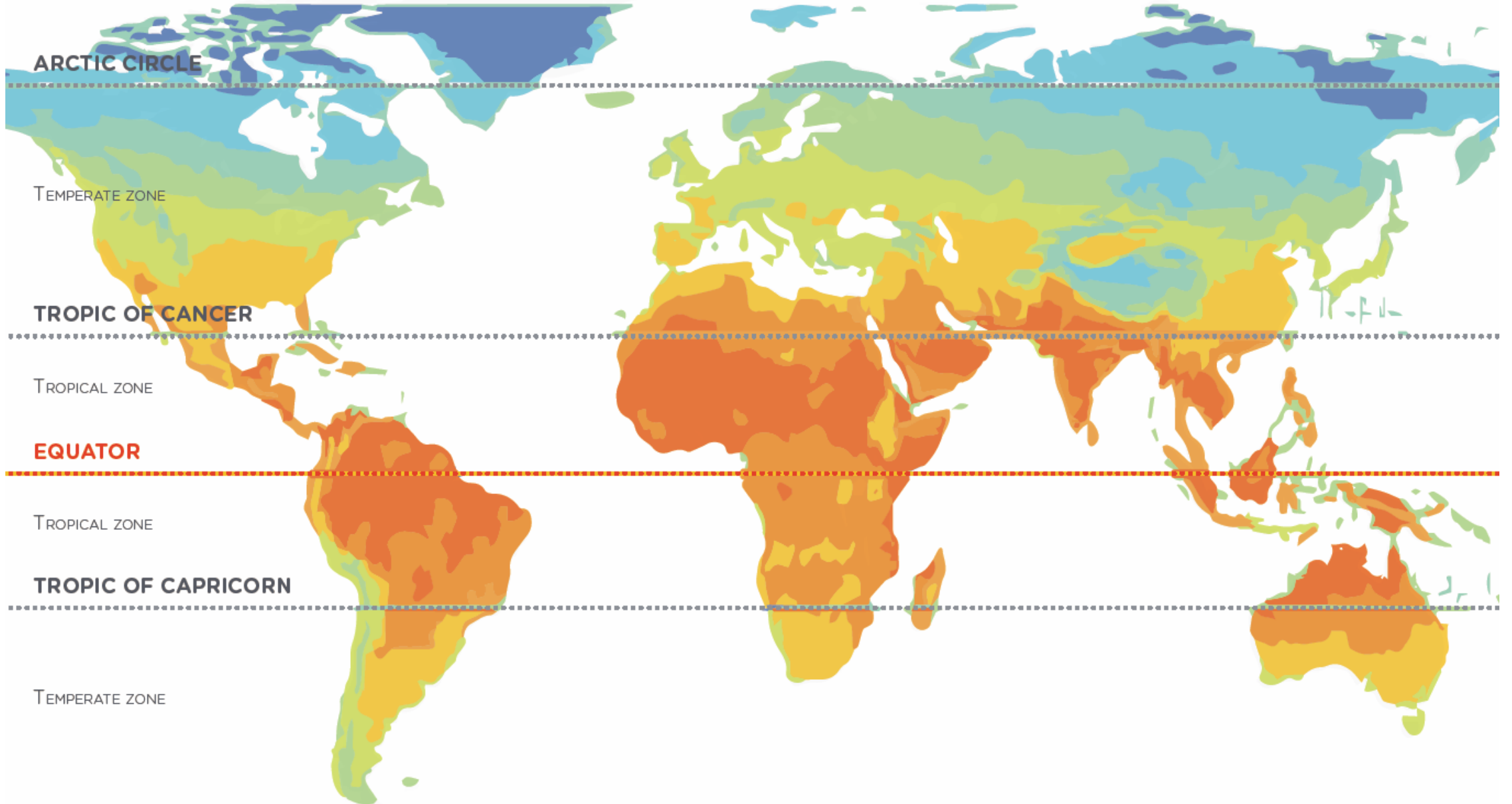
2100



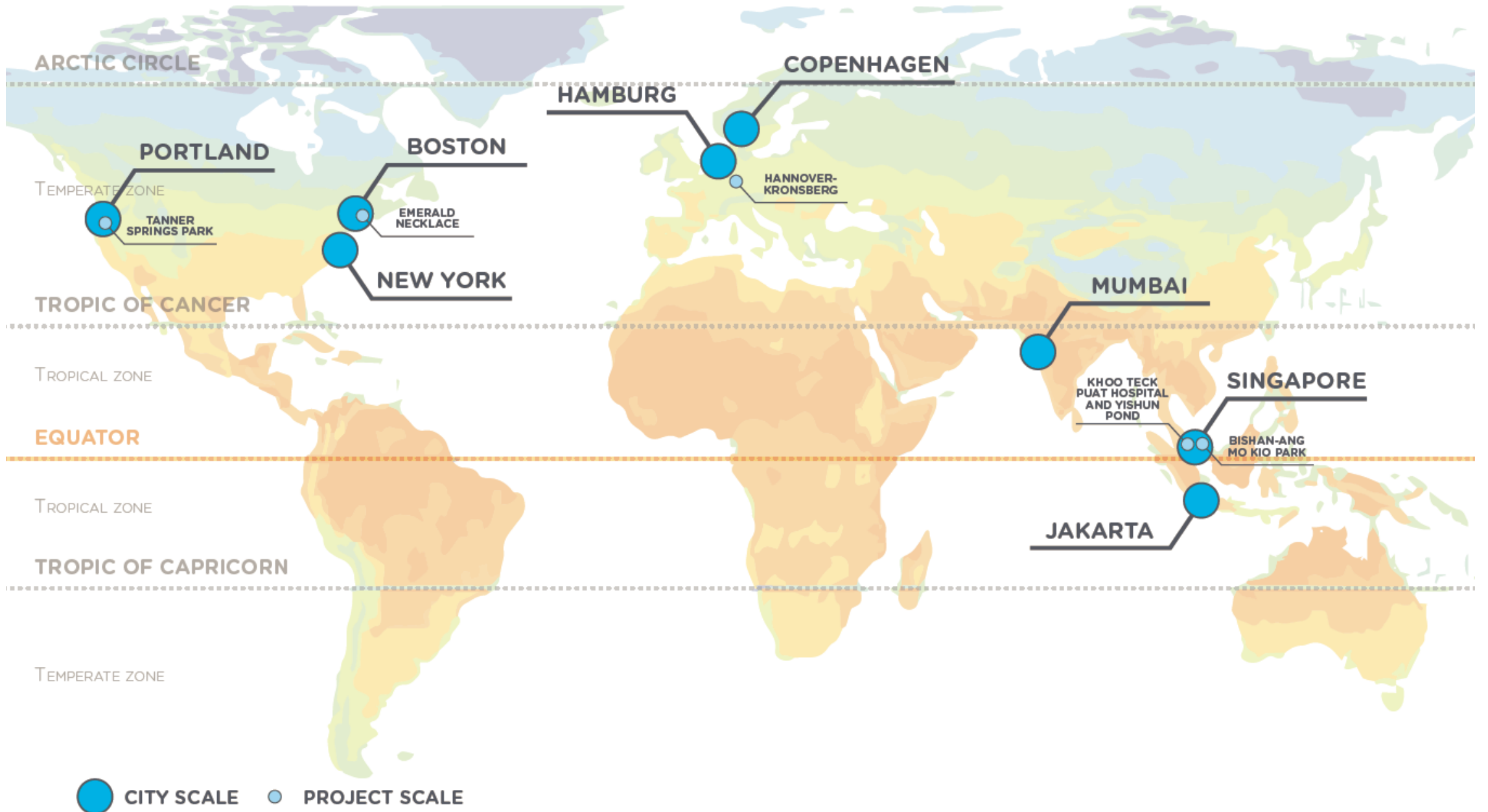
Fluvial and tidal
storm surge
events today

Fluvial and tidal
storm surge events
in the future

THE CASE STUDY APPROACH



THE CASE STUDY APPROACH



THE CASE STUDY APPROACH: THE EXPANDED PROCESS MODEL

INITIAL CONDITIONS



DRIVERS OF CHANGE



ENABLING CONDITIONS



CONSTRAINING CONDITIONS



PROBLEMS AND OPPORTUNITIES THAT GAVE RISE TO THE BGI INQUIRY (E.G., CRISIS, HAZARDS, POLLUTION) TO UNDERSTAND MOTIVES, TARGETS AND RESOURCES FOR BGI-IMPLEMENTATION



AGENTS WHO TAKE INITIATIVE FOR BGI-IMPLEMENTATION: PERSONS/LEADERS, INSTITUTIONS AND/OR SOCIAL MOVEMENTS



TECHNICAL TOOLS, LEGAL REGULATIONS, POLITICAL AND SOCIAL AWARENESS, FINANCIAL SUPPORT THAT HAD A SECONDARY EFFECT AS LEVER FOR BGI-IMPLEMENTATION



ANTI-BGI AGENTS/INSTITUTIONS, DESIGN STANDARDS OR POLICY PROGRAMS THAT WORK AGAINST BGI

RESEARCH FINDINGS ON CAPITAL AND VALUES



NATURAL CAPITAL

Natural capital is defined as an urban **Ecosystem Services provider** as it supports the reproduction of natural resources for human purposes such as energy, water, air, soil, biodiversity, etc.



BUILT CAPITAL

Built capital relates to the designed character of **material/physical features of BGI**. Built capital is used regularly in evaluation of infrastructure to report financial assets as well as designed functionalities.



HUMAN CAPITAL

Human capital refers to **personal competences and capabilities** taking different forms like physical and mental health, basic potentials and strengths of persons, knowledge (education, qualification, creativity, etc.).



SOCIAL CAPITAL

Social Capital is a power source based on affiliations (e.g. memberships), **personal or impersonal relations to other people** and exists in the form of **trust, commitment and cohesion**.



SYMBOLIC CAPITAL

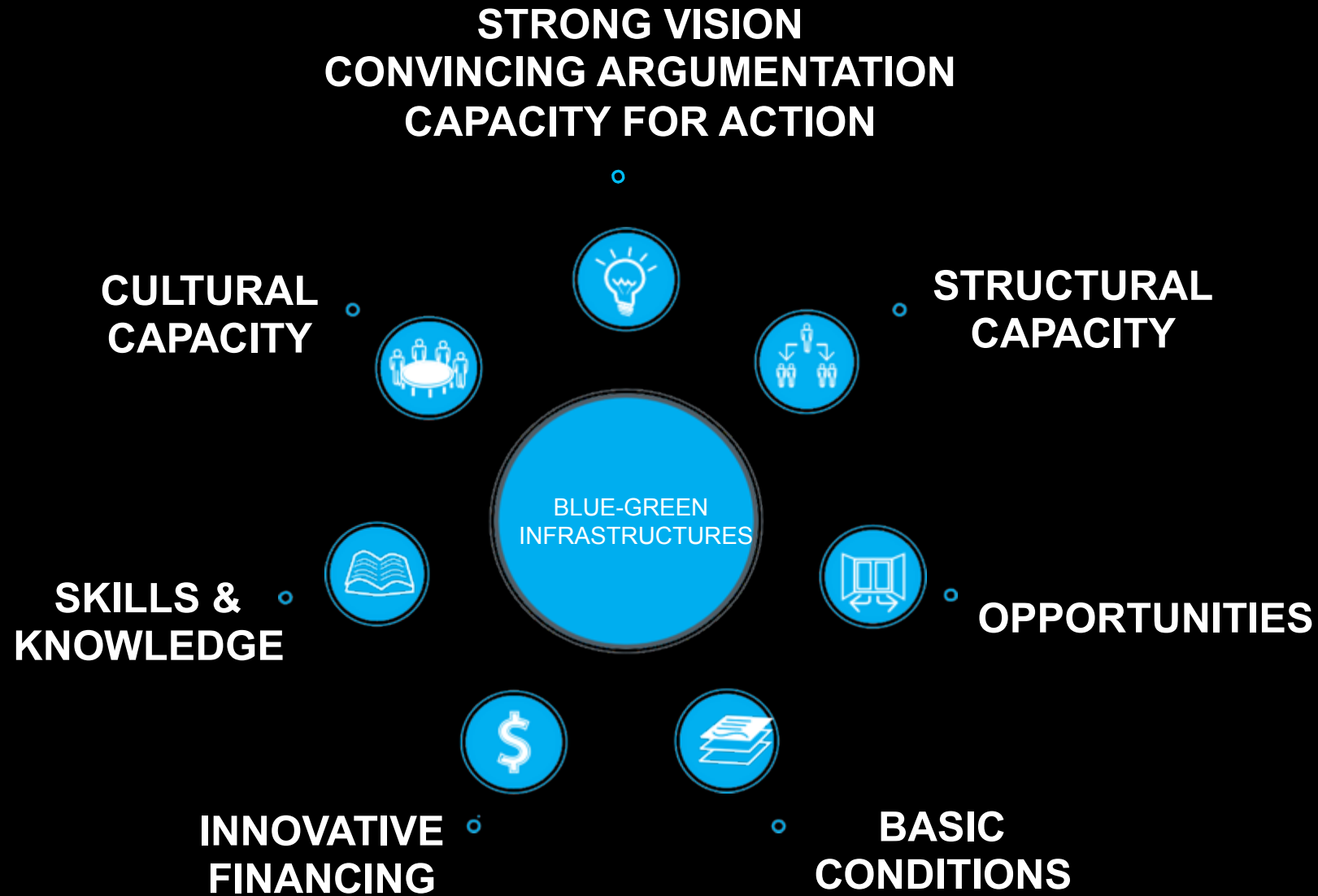
Symbolic capital is power derived from **attributions of positive value of others**, e.g. reputation or image. Symbolic capital can be based on individual attributes, or generalised, e.g. bound to nobility titles or educational titles.



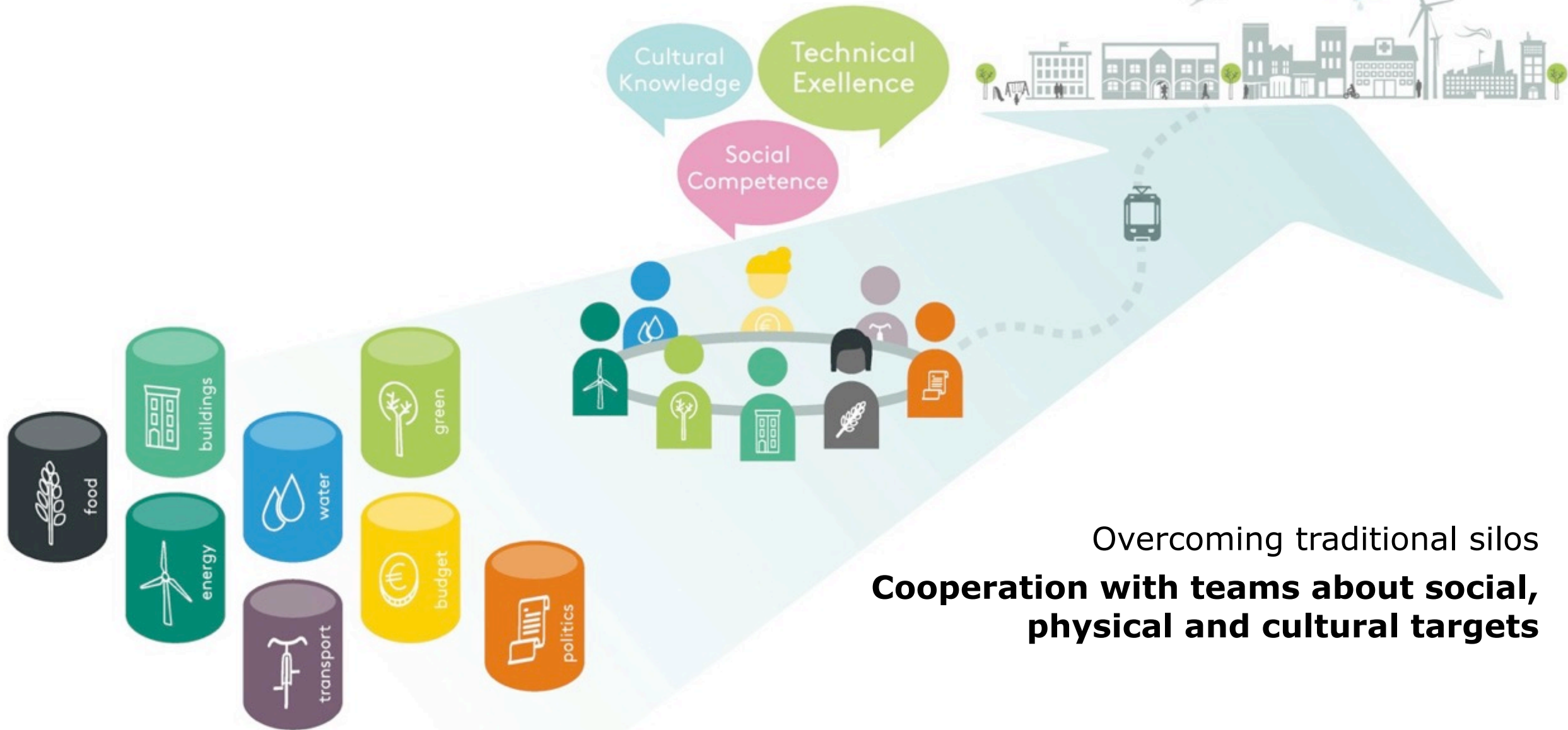
FINANCIAL CAPITAL

Financial capital includes **relevant direct as well as indirect costs and benefits** resulting from financial effects or from effects that are frictionlessly transferable in monetary terms.

RECOMMENDATIONS FOR IMPLEMENTATION



THE ART OF INTEGRATION



WORKING WITH THE PLANET – INTEGRATING THE BLUE AND GREEN

Leadership

Financing

Management

Aesthetics

Acceptance



>> Convincing Argumentation



THANK YOU



RAMBOLL

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