ADAPTING TO CLIMATE CHANGE IN RELATION TO WATER IN BUDAPEST

Barsi, Orsolya
Deputy Head of Department for Climate and Environment
Budapest City Hall

LIFE in Runoff
LIFE20CCA/HU/1774

Zöld Budapest

Content

BP drainage network

Climate change challenges

Catchment based modelling

Paradigm shift

BUDAPEST

Budapest, drainage network

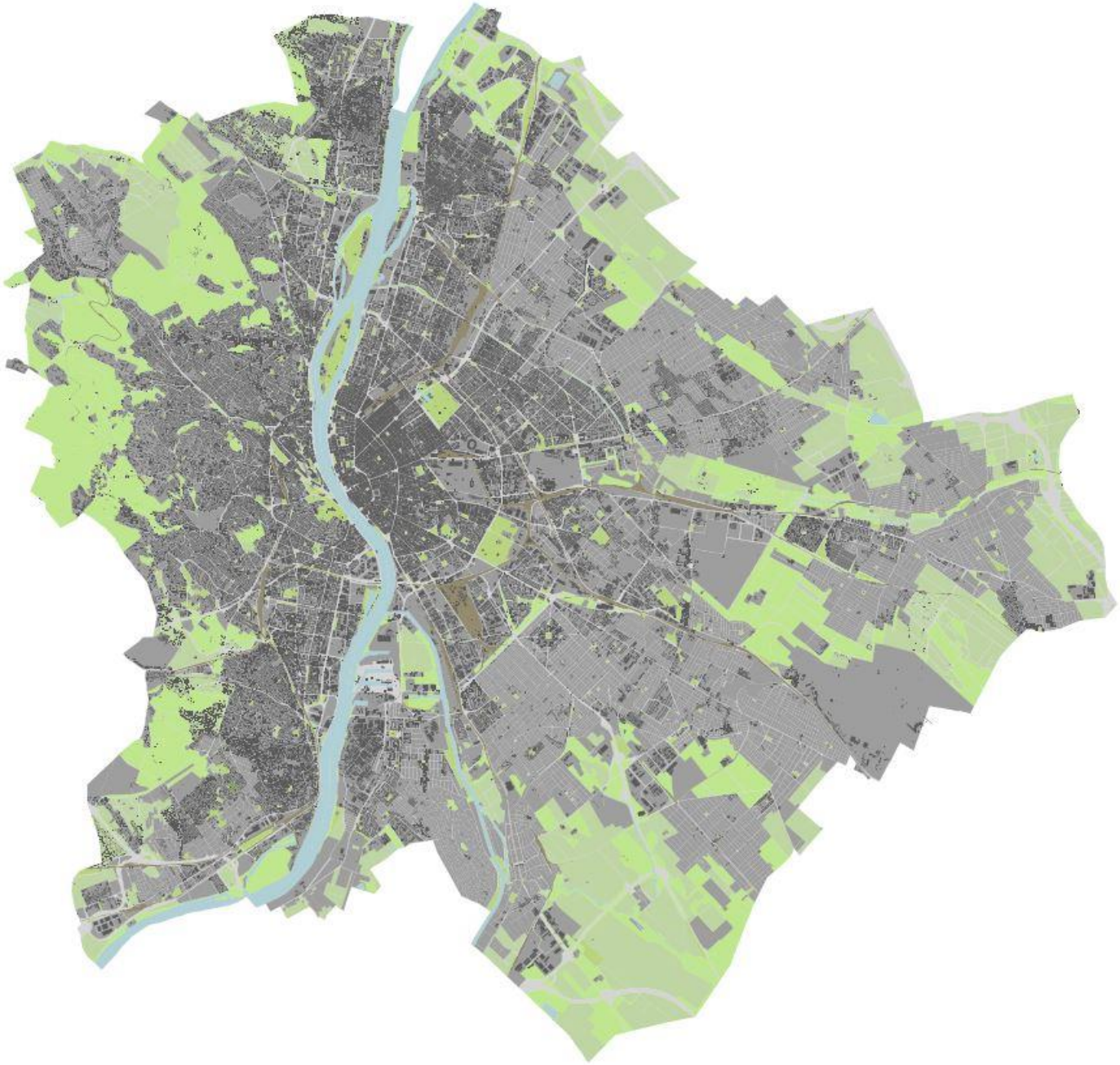
BUDAPEST


Niederschlag
Kondensation
Verdunstung
83%
Versickerung
16%
Abfluss
1%


Niederschlag
Kondensation
Verdunstung
42%
Versickerung
13%
Abfluss
45%

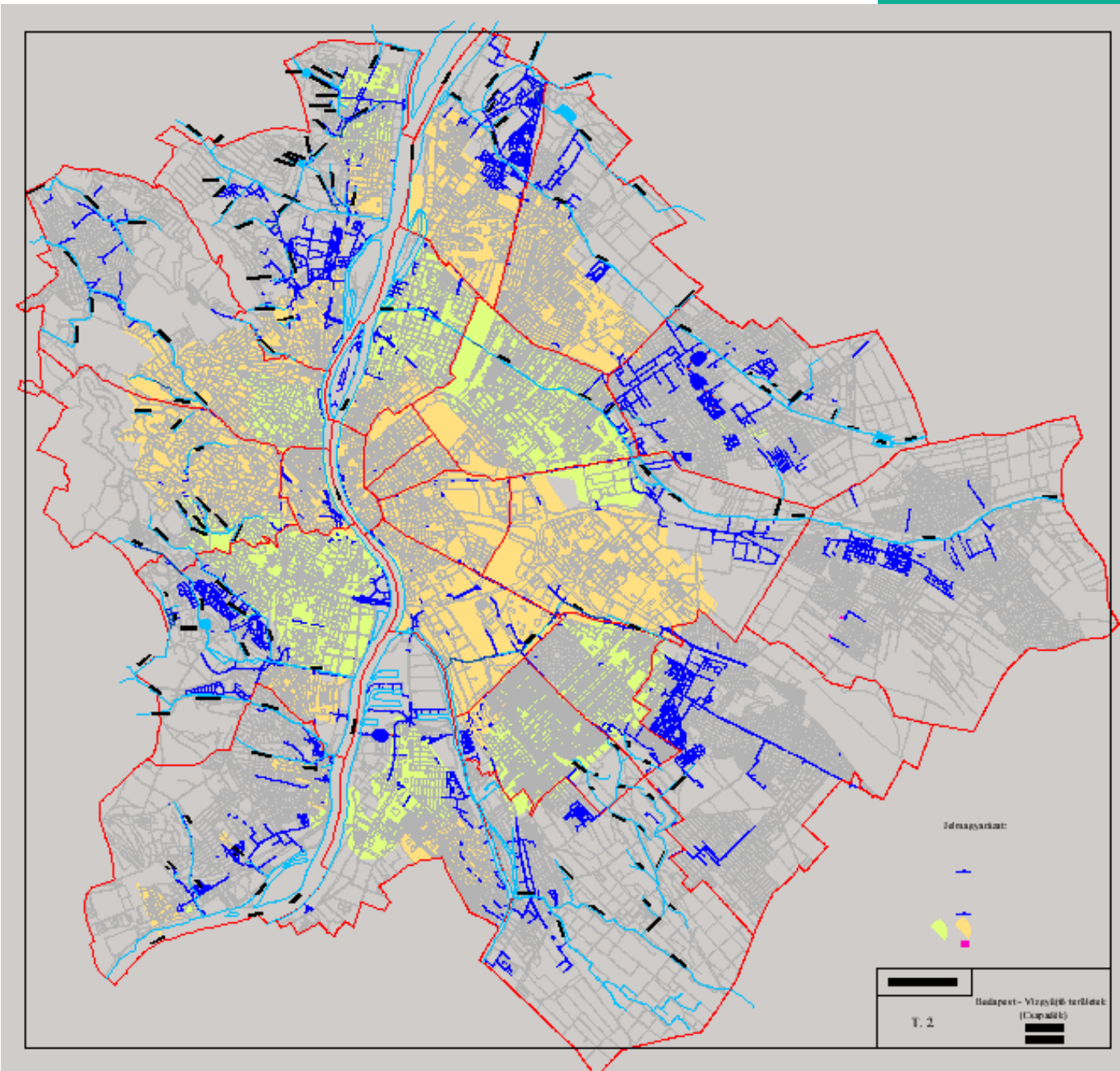
BUDAPEST

Surface coverage



Drainage network

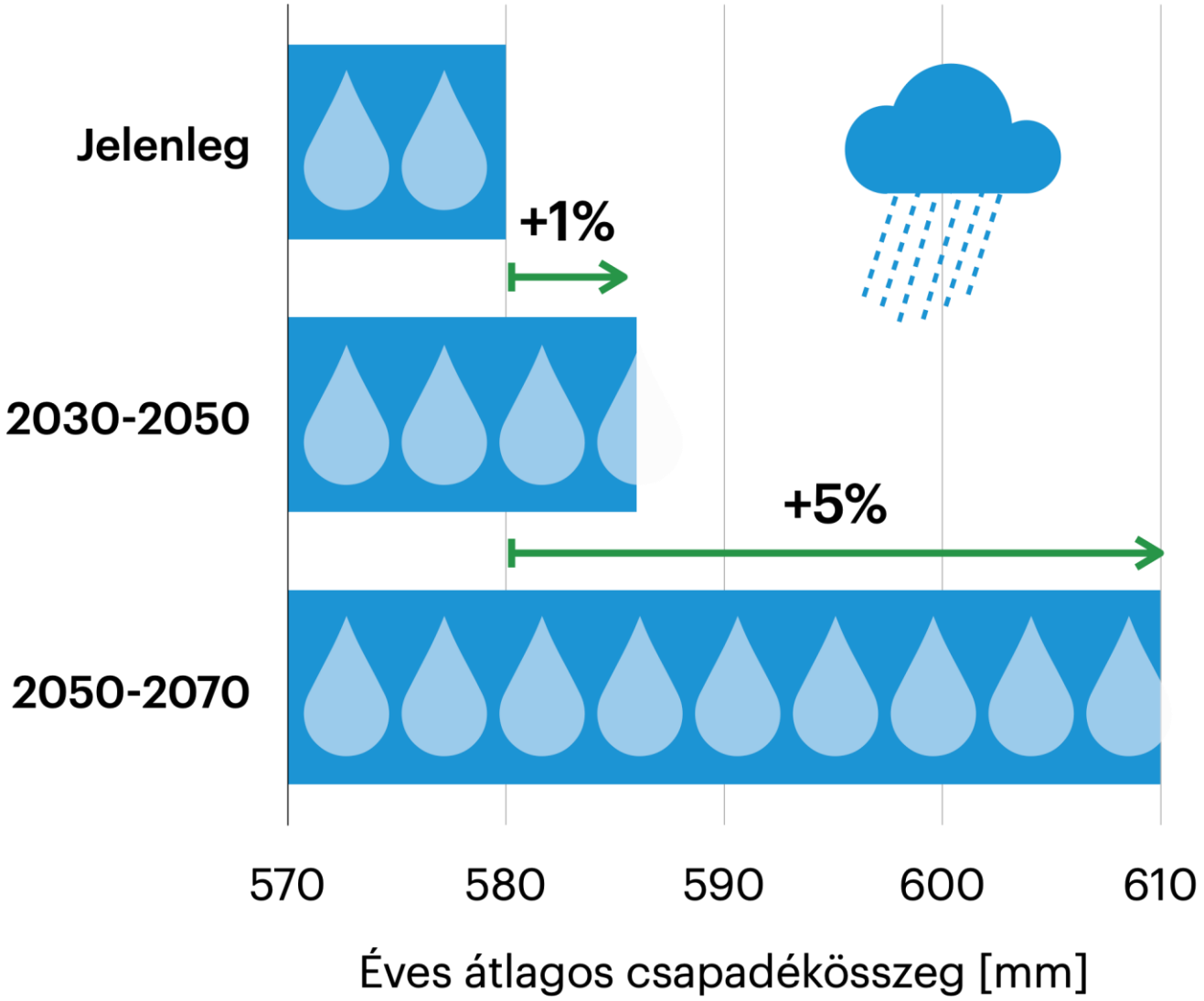
- Combined sewerage + drainage (grey)
- Organically developed since 18th century
- Blue: separated drainage system
  - no complete data,
  - more operators,
  - traditionally connected to combined system



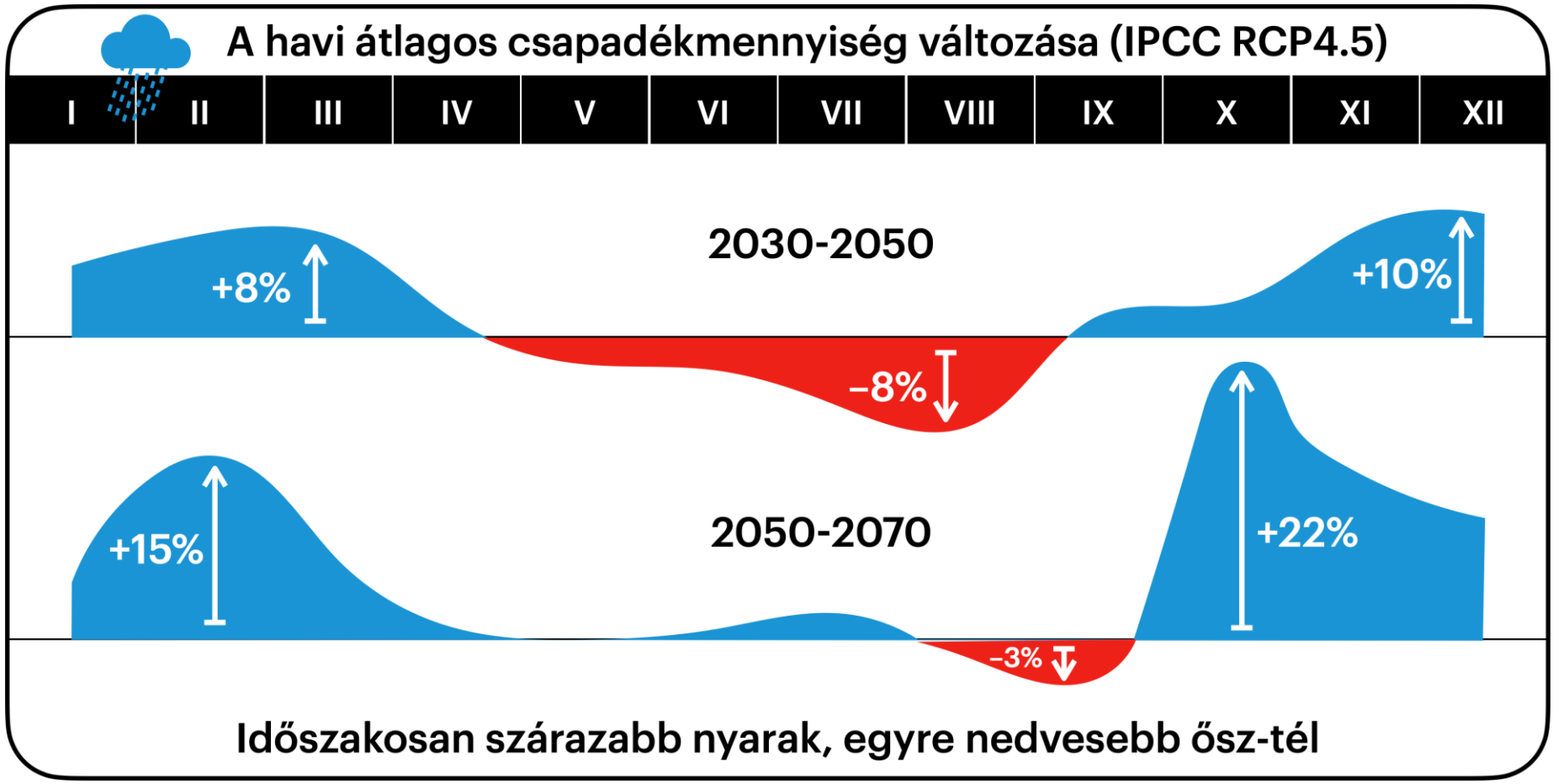
Climate change challenges

BUDAPEST

Local impact of climate change – machine learning downscaling for Budapest



Local impact of climate change – machine learning downscaling for Budapest



Source: origo.hu; index.hu; napi.hu

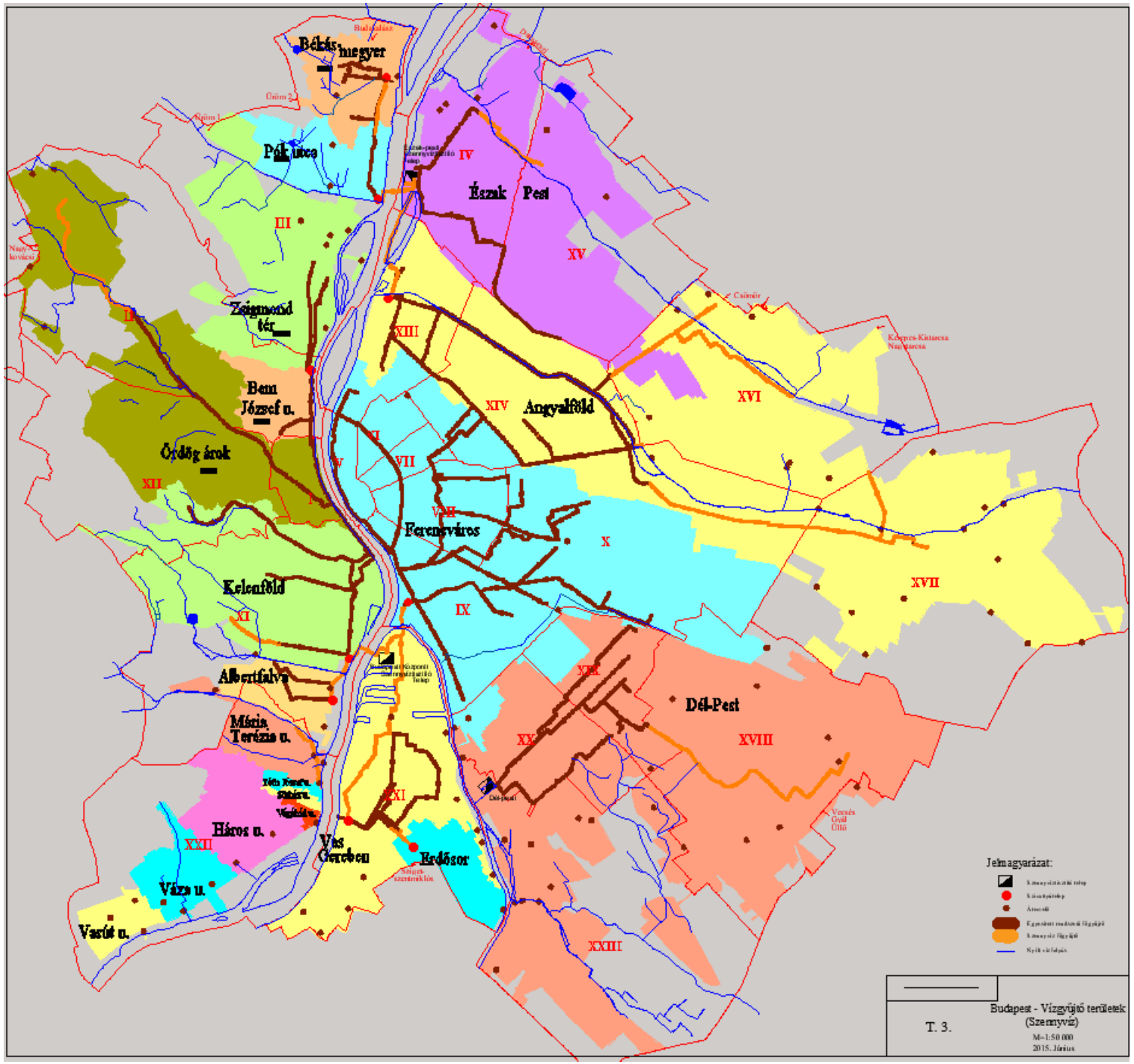
BUDAPEST

Catchment based modelling

BUDAPEST

Catchments

- Combined catchment based surface runoff and hydraulic modelling to
- Define intervention points: surface (preferably NBS), network (smart water governance) on the strategic level



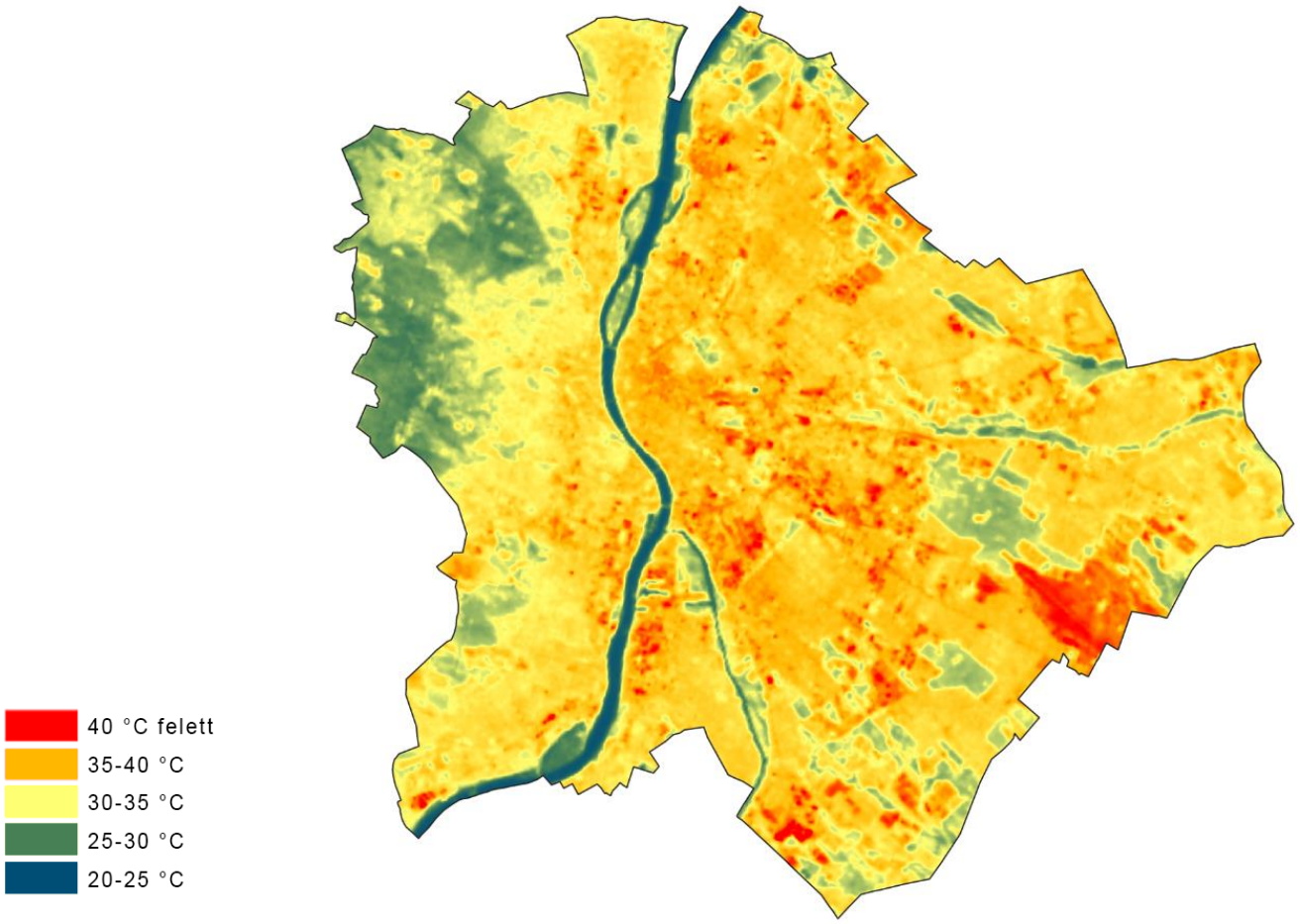
BUDAPEST

Paradigm shift

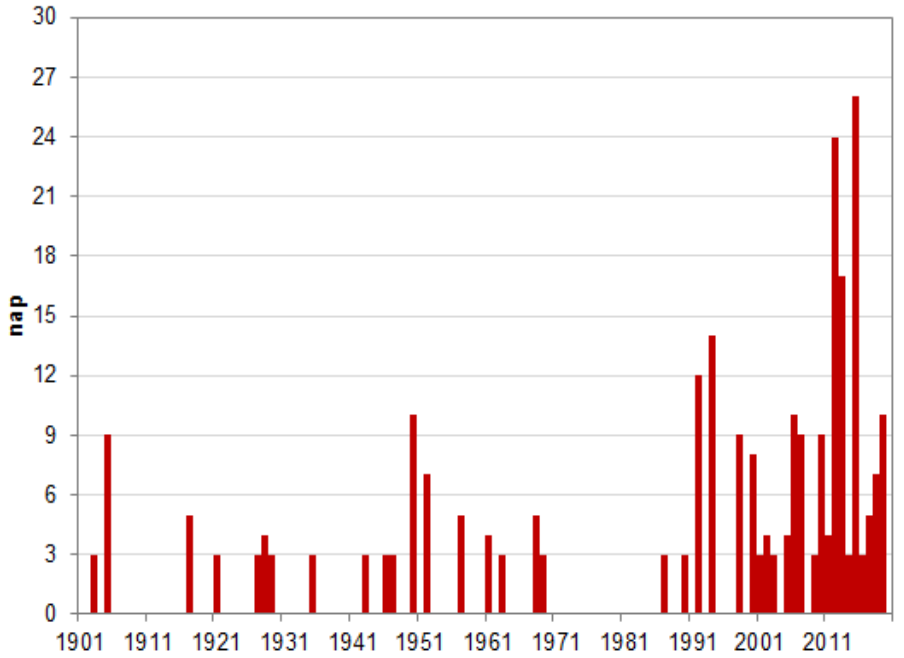
BUDAPEST

Temperature extremes

Budapest surface temperature during 3rd level Heat Alert 19th June 2022 (Source: Sentinel Hub EO Browser)



Heat waves in Budapest



Source: OMSZ

BUDAPEST

1. Resource

Human health aspects

Green field degradation

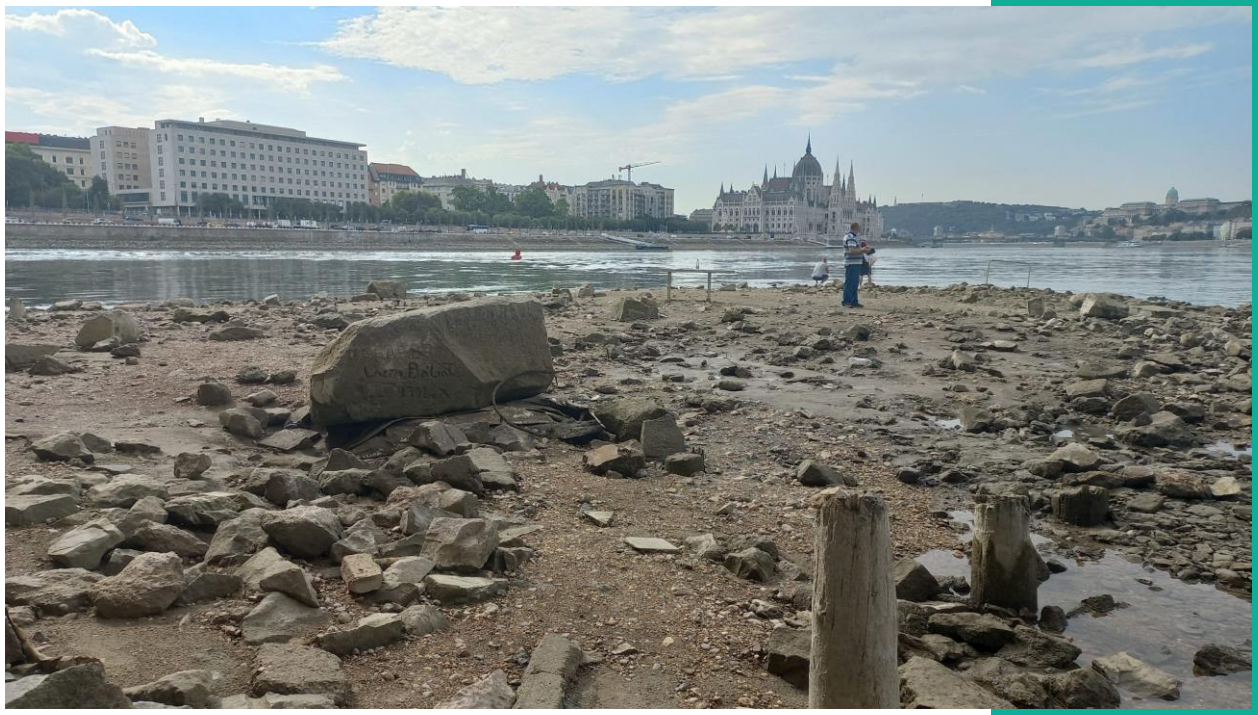
Faster material deterioration

+30% drinking water usage

+30% more energy

01
SOLUTION
Rainwater retainment

02
SOLUTION
Rainwater harvest



Source: telex.hu; index.hu

BUDAPEST

2. Urban flood

Capacity of network is not enough

- Risk of accidents: overpressure (sewer gaps), traffic
- Water damage to the wastewater system (pumps)
- Private damage events
- Danube pollution (overflows)

Source: origo.hu; index.hu

03 SOLUTION

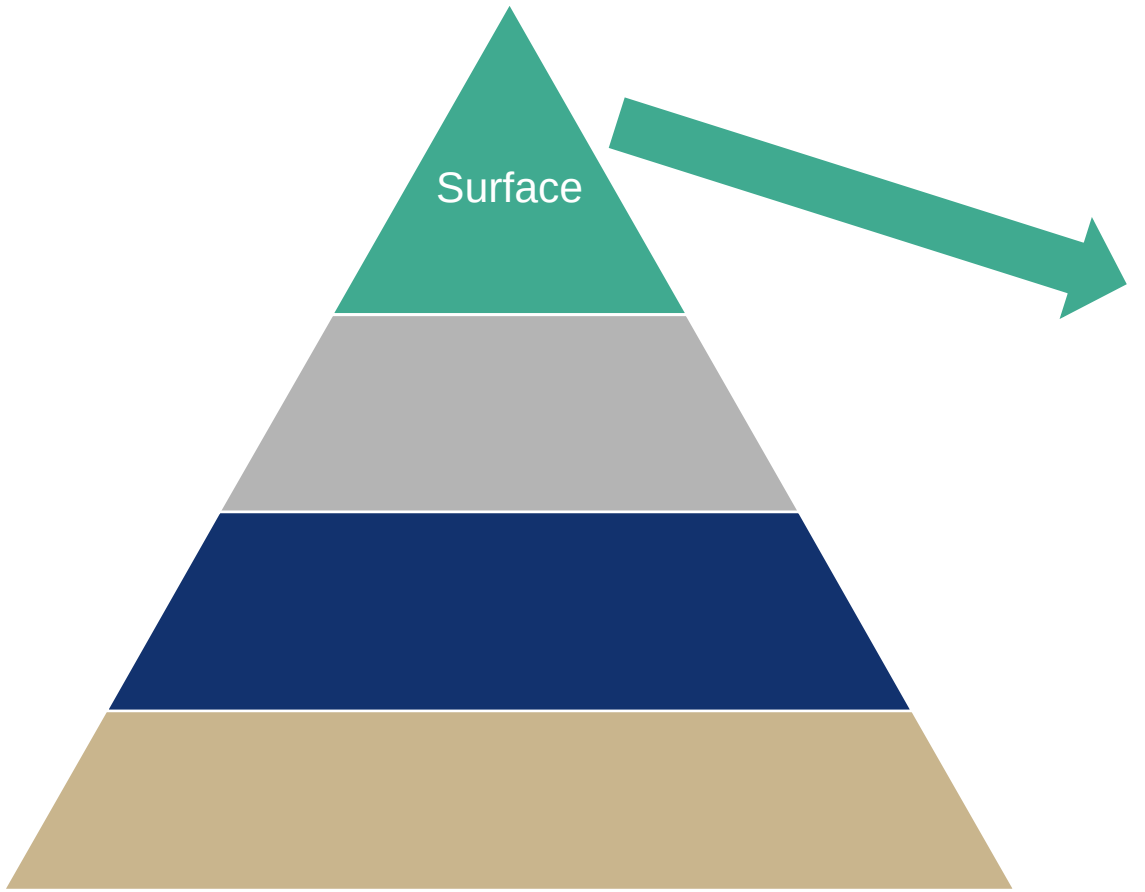
Delayed run-off in the upper part of the catchment

04 SOLUTION

Urban flood protection measures

BUDAPEST

Levels of interventions

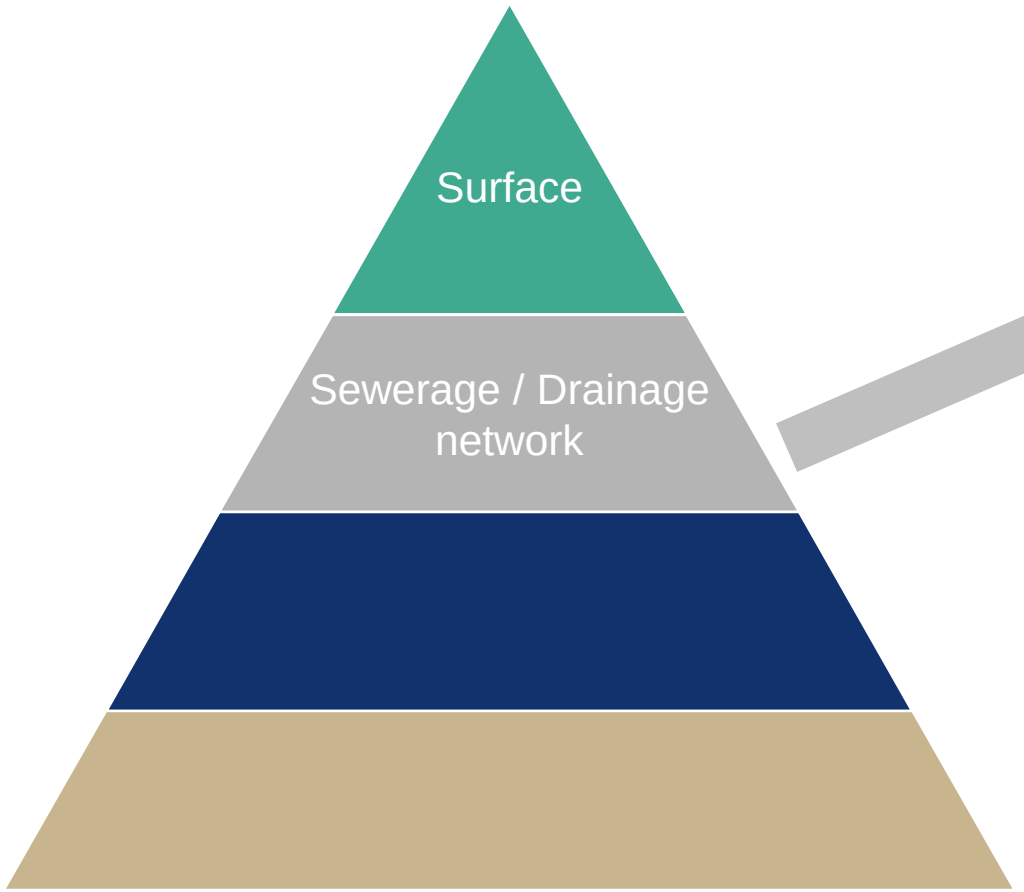


Impact

- Relieving the load on network
- Irrigating Green Infrastructure
- Utilization in building services (grey water)
- Cooling
- Relieving the load on reciepient
- Emergency response

BUDAPEST

Levels of interventions

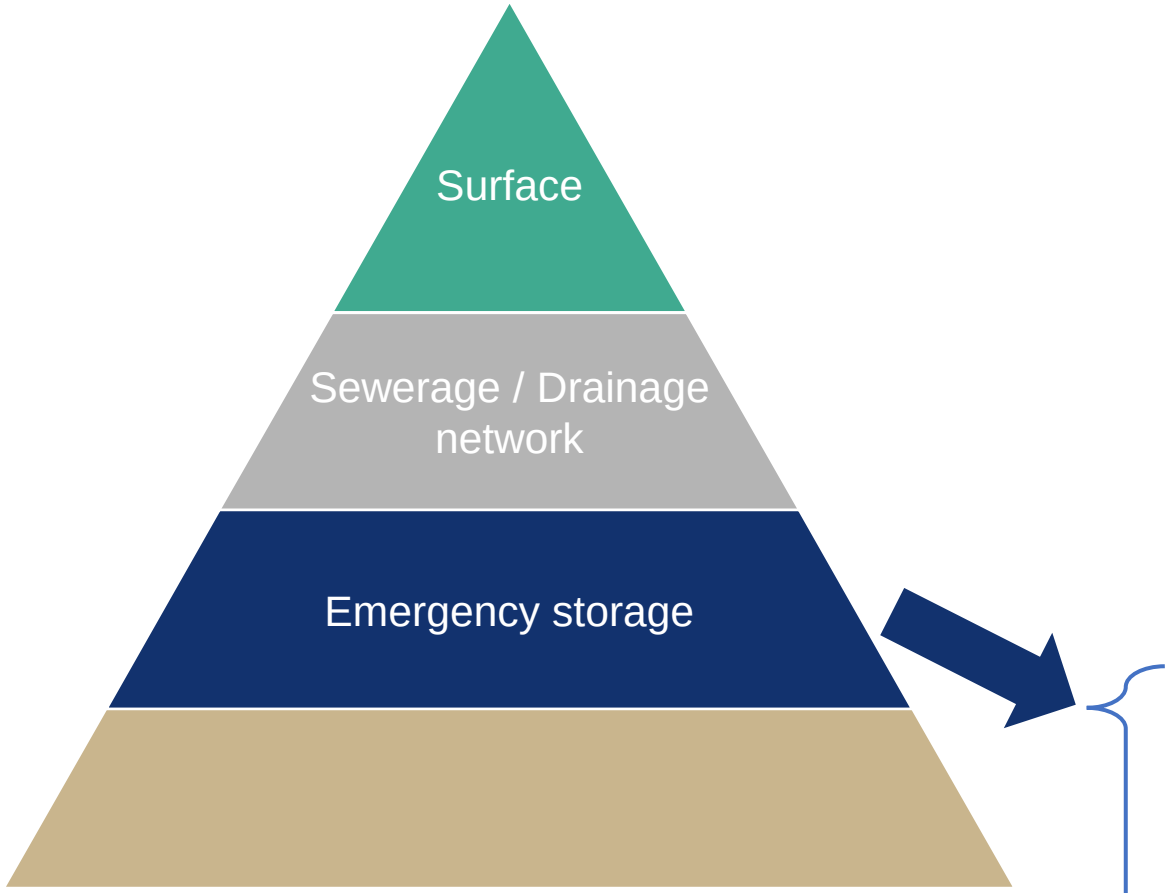


Impact

- Relieving the load on network
- Irrigating Green Infrastructure
- Utilization in building services (grey water)
- Cooling
- Relieving the load on reciepient
- Emergency response

BUDAPEST

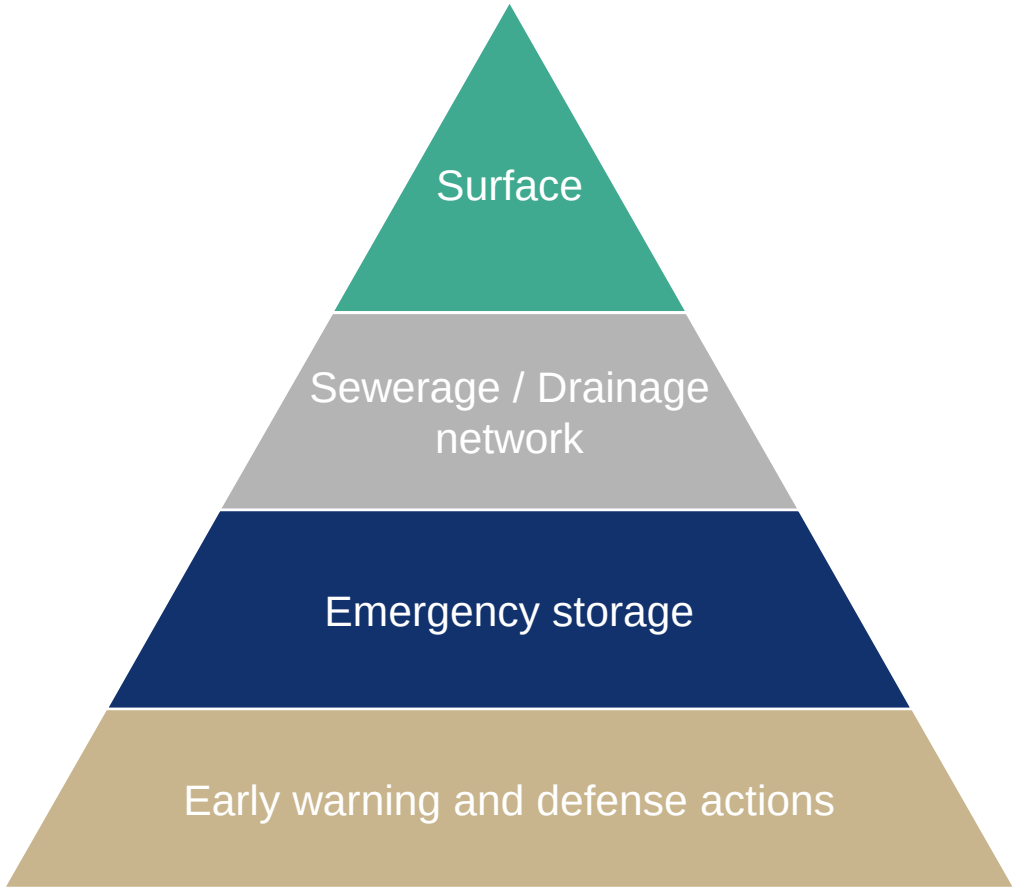
Levels of interventions



Impact
Relieving the load on network
Irrigating Green Infrastructure
Utilization in building services (grey water)
Cooling
Relieving the load on reciepient
Emergency response

BUDAPEST

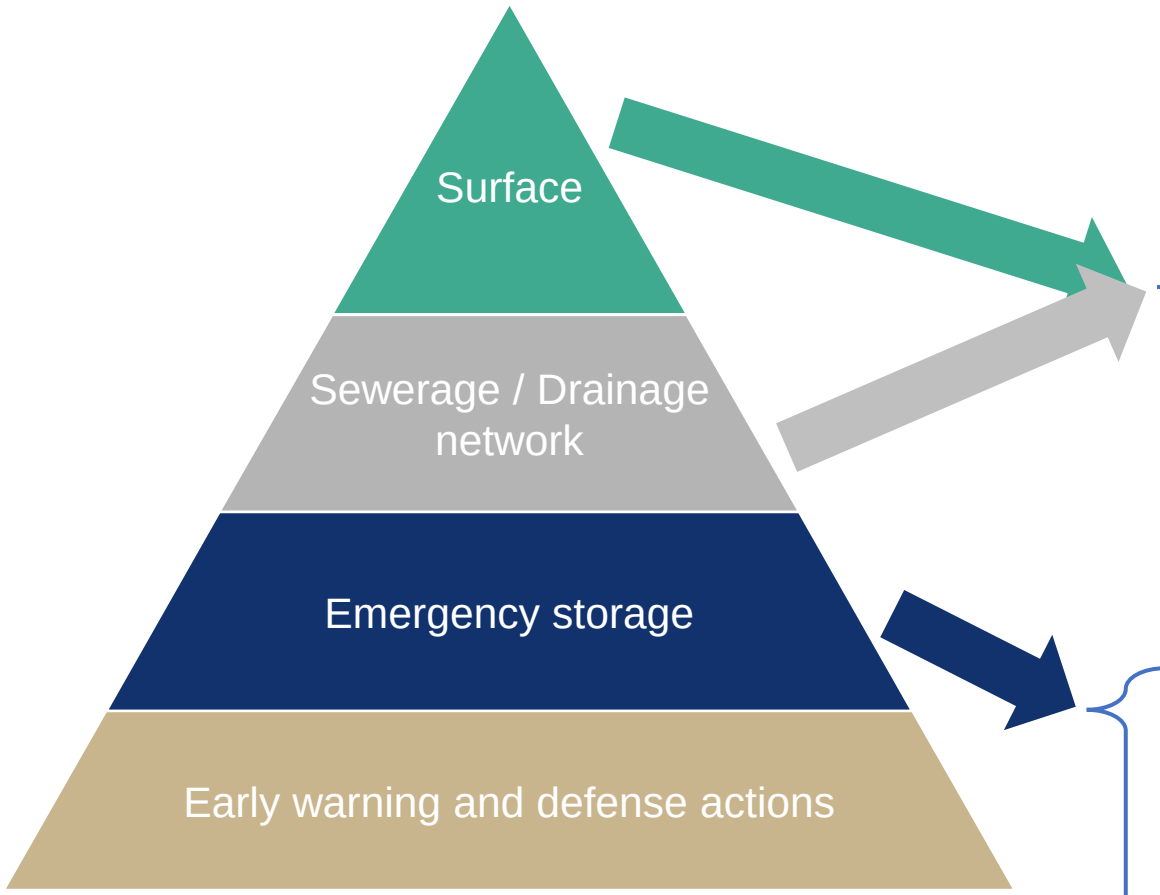
Levels of interventions



Impact
Relieving the load on network
Irrigating Green Infrastructure
Utilization in building services (grey water)
Cooling
Relieving the load on reciepient
Emergency response

BUDAPEST

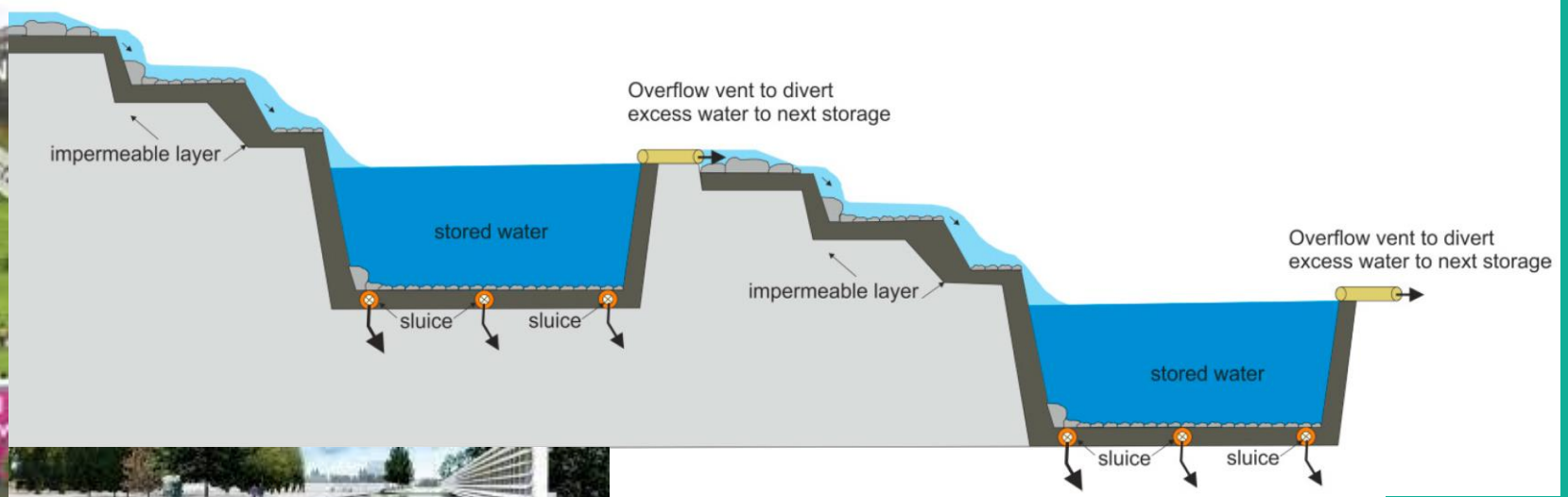
Levels of interventions



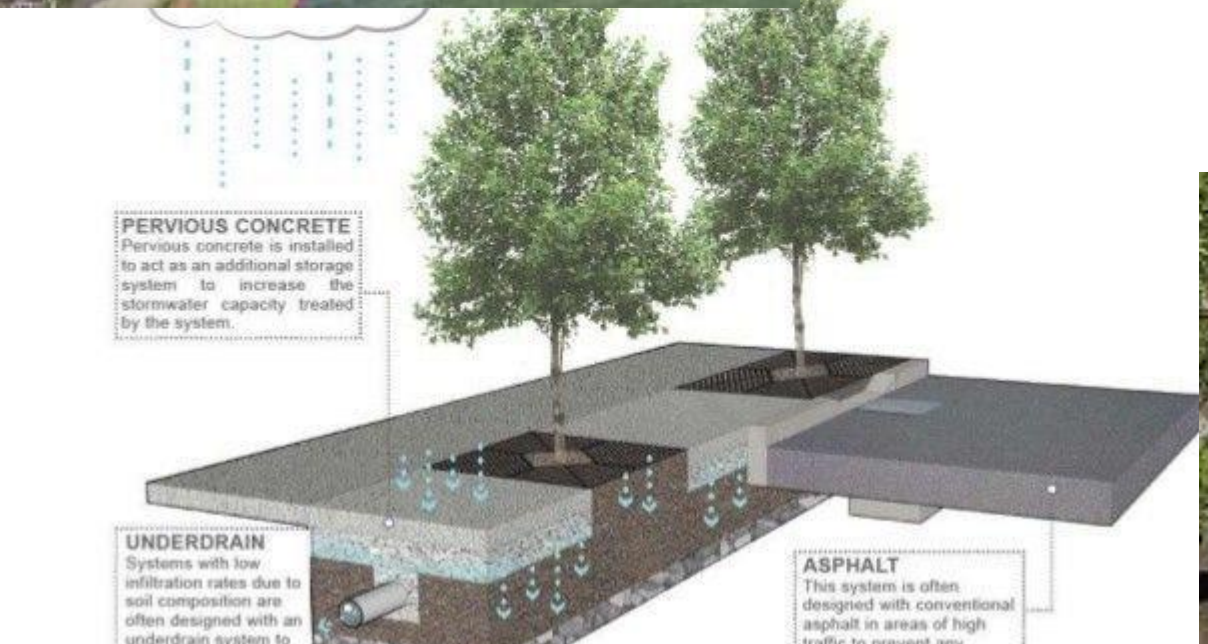
Impact	Tools
Relieving the load on network	
Irrigating Green Infrastructure	
Utilization in building services (grey water)	
Cooling	
Relieving the load on reciepient	
Emergency response	

BUDAPEST


SANKT JØRGEN


impermeable layer
stored water
sluice
sluice
Overflow vent to divert
excess water to next storage
impermeable layer
stored water
sluice
sluice
Overflow vent to divert
excess water to next storage


Flood
Outflow
Safety Zone
Flood Zone
Safety Zone
Flood Zone
7,000m³
retention
capacity
Flood


PERVIOUS CONCRETE
Pervious concrete is installed to act as an additional storage system to increase the stormwater capacity treated by the system.
UNDERDRAIN
Systems with low infiltration rates due to soil composition are often designed with an underdrain system to
ASPHALT
This system is often designed with conventional asphalt in areas of high


HarvestingRainwater.com

BUDAPEST

THANK YOU FOR YOUR ATTENTION!

Barsi, Orsolya

barsi.orsolya@budapest.hu

Zöld Budapest