



D.T3.1.5

COMPREHENSIVE FUA-LEVEL STATUS QUO STUDIES

Budapest FUA

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1. Status Quo analysis

Analysing the FUA level self-assessment on background conditions related to circular water use (D.T3.1.3) and the local public perception assessments (D.T3.1.4) done in the **Budapest** FUA, we highlight the following main results.

1.1. Self-assessment on background conditions related to circular water use

For each of the main topics of the FUA-Level status Quo assessment:

1. Climate, Environment and population
2. Water resources
3. Water infrastructures
4. Water consumption
5. Climate change
6. Rules, laws and good practices

we summarise the results highlighting challenges and strengths.

1. Climate, Environment and population

- Challenges:
 - Decreasing green spaces, increasing sealed soil
 - Difficulties of rainwater drainage and heat island effect due to high amount of sealed soil
 - Growing population in the agglomeration
- Strengths:
 - Population of Budapest doesn't increase rapidly (decrease and increase were less than 4% in a 20-year period)
 - Green spaces and forests in suburb
 - More public parks in good condition
 - Increasing area of nature reserves

2. Water resources

- Challenges:
 - Upstream sensitivity
 - Poor chemical and ecological status on the creeks of Budapest
 - Surface and infrastructural influence on groundwater level
 - Polluted groundwater on Pest side, no responsible of former polluting (e.g. former industrial area)
 - Reduced ability of infiltration in downtown and densely built area
 - Lack of municipal incentives for rainwater harvesting and reuse
 - Rainwater is drained through combined sewer network instead of held in place
 - Low rate of rainwater reuse among the population



- Strengths:
 - Danube as water supply: good quality from radial collector wells, enough capacity due to fast rechargeability from the river
 - Revitalization plans for creeks
 - Potable thermal and medicinal water

3. Water infrastructures

- Challenges:
 - Water loss is more than 15%
 - Partly separated system for rainwater and sewage, no separation in central districts
 - Aged pipe network
 - The exfiltration from sewage network pollutes soil and groundwater
 - Few or too much rainwater also cause problem in wastewater treatment (rainwater management should be solved together with sewage problems)
 - Wastewater treatment plants have enough hydraulic capacity but no biological capacity in case of heavy storms
 - Frequent changes in the load of sewage system and wastewater treatment plant
 - No infrastructural background for greywater usage
 - Optimisation of chlorine intake
 - Changes in settlement structure cause increasing the water consumption in uptown region and decreasing in downtown region
 - Stagnant water due to lower water consumption
 - In buildings built before 1970s lead containing pipes are common, and the replacement is the task of the owners
- Strengths:
 - Every member of the population has access to the water supply network
 - Water supply needs few treatments to reach high quality
 - Nearly every household is connected to wastewater collection system
 - All of the collected wastewater is transferred to wastewater treatment plants (except in case of severe thunderstorms)
 - Good practice in maintenance of sewer network and treatment plants
 - No need to restrict water usage
 - 3rd grade treatment is used on every WWTP
 - Treated effluent is driven back to the Danube
 - High amount of households with water meter
 - Almost all of lead containing pipes in water distribution network has been replaced



- Generally, well dimensioned and structured water supply, and sewage network.

4. Water consumption

- Challenges:
 - Relatively high freshwater usage by the population
 - Increasing the bottled water consumption
 - Tap water used for irrigation, fire water or public area cleaning
 - Increase consumer's consciousness (build knowledge in connection with water consumption, wastewater treatment, rainwater management, campaigns for use tap water for drinking purpose)
 - Increasing water consumption on heat days in summer
- Strengths:
 - No water stresses
 - High rate of water metering
 - The water metering, and growth of the environmental awareness, increase the consumer's consciousness on water consumption
 - Good tap water quality

5. Climate change

- Challenges:
 - Heat island effects - need of lowering temperature in urban spaces
 - Heavy storms, overloading rainwater systems
 - Effective flood protection of built environment with special attention on protecting the natural areas and values of Danube bank Droughts and extreme low water levels on Danube
 - In technical design and in the design parameters the climate change is not taken into consideration
- Strengths:
 - Average annual rainfall does not change
 - Increasing environmental awareness
 - Civil movements for environment
 - SECAP-s (Sustainable Energy- and Climate Action Plan), Climate strategies for Budapest and districts

6. Rules, laws and good practices

- Challenges:
 - Difficult to enforce the maintaining and management of rainwater within the property
 - Legislation of greywater usage is missing
 - Rainwater management, drainage legally is not a public utility, there is no owner, no professional operator, no price, hard to find legal responsible



- No appropriate data for design, low level cooperation between professions (architects, civil engineers, landscape architects)
- Lack of capacity of building authorities to monitor illegal practices (buildings, overbuilt ground)
- Strengths:
 - Pilot projects for rainwater management
 - Developing cooperation between city and districts
 - Circular Water Management Strategy of Budapest in preparation phase

1.2. Water efficiency and reuse related public perception assessments

Analysing of the FUA level water efficiency and reuse related public perception assessments (D.T3.1.4), we summarise the results highlighting challenges and strengths.

7. Public perception assessment

- Challenges:
 - Reach elder part of the population with educating campaigns
 - Collecting and reuse rainwater is not widespread
 - Lack of knowledge about water needs of products
- Strengths:
 - Significant part of population uses water saving techniques
 - Sensitivity of the population to climate changes and willing to change habits to reduce impact on water footprint is high
 - Prevalent part of population shows supportive attitude to circular water management solutions (rainwater harvest, green roofs, greywater reuse)

1.3. Conclusions

The effect of climate change such as extremes in rainfall or increasing heat island effect challenges the city leadership, operators, and designers. The amount of sealed soil increased. To make more green surfaces in downtown green walls and green roofs can be an alternative solution, and the revitalisation of creeks should be continued. In order to ensure the long-term safety of water supply, the protection of water bases especially important.

In connection with water infrastructures, it can be told that the present pipe systems are aged, and the yearly reconstructions go slowly. The utilisation of sewage system ranges between extremities. The total separation of rainwater drainage would make the operation of present sewage system impossible. So that the two problems (separation, and operative aspects) could be solved only together by higher volume investments.



To decrease the effect of the urban area on natural water cycles, and protect the population from damages caused by water, the utilization with rainwater, holding it in place, use it for irrigation, the deceleration of runoff is also important way.

Though the environmental awareness increased in the past years, further improvement is needed to achieve a sustainable urban environment.