



# CONCEPT OF PILOT ACTIVITIES

Croatian partners (HZJZ-PP6; NZJZ OBŽ -PP9, City of Osijek- PP8)



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### Table of contents

1. Introduction2	-
2. Concept of pilot activities in Osijek3	5





## 1. Introduction

The UrbanBlueHealth aims to enhance the integration of urban water bodies into public health and wellbeing initiatives, promoting sustainable urban planning, ecosystem services, and community engagement. Osijek, located on the banks of the Drava River, is an ideal location to test pilot activities under the UrbanBlueHealth initiative.

The primary objective is to reduce risks for recreational users in the Drava River in the Osijek area, ensuring safe use and protecting aquatic ecosystems. Addressing sources of contamination such as agricultural runoff, wastewater discharge, and urban pollution will be crucial.

The primary goal of the pilot phase is to analyze the water quality of the Drava River during the bathing season by focusing on water quality monitoring, pollution control, and public engagement. The actions will aim to identify the sources of water pollution, understand seasonal variations in water quality, and establish effective measures to ensure safe water for recreational use.

In Croatia, bathing water quality is regulated by the Regulation on the Quality of Bathing Water, Official Gazette 51/2014. The Regulation is in line with the EU Directive 2006/7/EC. It applies to surface waters, including beaches, lakes, and rivers, where bathing is permitted. The Regulation stipulates monitoring and classification of bathing waters, and management of water quality for bathing. It also requires informing the public about the quality of bathing waters. The management measures for bathing waters are carried out by local self-government units, while processing of monitoring results and classification of bathing water quality are carried out by the Croatian Waters (Hrvatske vode).

The Regulation sets standards for microbiological properties of water at bathing areas, with a minimum of 5 samples per bathing season, which include testing for the presence of Enterococcus and *E. coli*. The results of the conducted analyses are published at national level on the webpage: <u>https://vrtlac.izor.hr/kakvoca/</u>. At the Osijek-Baranja County level, the results are published on the homepage of NZJZ-OBŽ (<u>https://www.zzjzosijek.hr</u>), where an interactive map with bathing locations and monitoring results is made available during the bathing season.





# 2. Concept of pilot activities in Osijek

#### Initial information about the pilot action

Area executing pilot action	Osijek, Osijek-Baranja County, Croatia
Partners	Croatian Institute of Public Health (HZJZ - PP6), City of Osijek (PP8), and Public Health Institute of Osijek-Baranja County (NZJZ OBŽ - PP9)

#### The importance of pilot action

The justification for the selection of the pilot action	The Drava River in Osijek is a vital urban water body used for recreation, especially during summer. However, the current system for monitoring and managing bathing water quality is limited. While Croatia has a regulation aligned with the EU Bathing Water Directive (2006/7/EC), it only requires monitoring for two microbiological parameters ( <i>E.</i> <i>coli</i> and <i>Enterococcus</i> ), and it is applied exclusively to regulated bathing areas. Yet, many citizens use unregulated river beaches where water quality is not systematically monitored. During internal partner discussion, it was recognized that there is a need to broaden the scope of monitoring parameters to protect public health, particularly in a time of climate change. The Drava River's urban beaches - Copacabana, Pampas and Željeznički most, provide an ideal opportunity to test a more comprehensive approach to water monitoring.
The justification for the choice of the selected methods	The concept proposes an extended water monitoring methodology. The idea of supplementing legal monitoring with additional chemical and microbiological parameters was identified as a priority by all Croatian partners.

#### Pilot action objective and components

Monitoring water quality throughout the bathing season	Since there are only two parameters defined by the Regulation ( <i>E. coli, Enterococcus</i> ), we will analyse the water for some other key parameters, including pH, conductivity, total P, total N, orto-phosphates, redox potential, dissolved oxygen, turbidity, ammonia, nitrates, nitrites, temperature, free chlorine, <i>Salmonella</i> , and somatic coliphages.
Establishing monitoring stations	Drava Pampas, Drava Copacabana, and Drava Željeznički most are chosen as the pilot locations.







	Multiparameter sondes will be placed at the Copacabana and Pampas beach, and a weather monitoring station will be placed at the Copacabana beach.
Regular testing for key water quality parameters	At least 8 samples will be taken throughout the bathing season, and the additional parameters, as well as the ones stipulated in the Regulation, will be measured.
	Additional samples will be taken over the course of three days from the end of heavy rainfall (water will only be tested for the presence of <i>E.coli</i> and <i>Enterococcus</i> ).
	Timeframe: June-September (throughout the bathing season).
Collecting and processing data on water quality parameters	Conducting a comparative analysis of water quality data, identifying trends, peak contamination periods, and correlations with rainfall. Producing a report summarizing the findings for further use.
	Timetrame: after the batning season.
Responsibilities	NZJZ-OBŽ is responsible for sampling and measurement of physical-chemical parameters of water, as well as the assessment of <i>E.coli</i> , <i>Enterococcus</i> and <i>Salmonella</i> spp.
	HZJZ is responsible for the assessment of somatic coliphages and pharmaceuticals.
	City of Osijek is responsible for co-financing the measuring equipment, as well as for installation.

#### Key issues addressed in the pilot phase

Unregulated beaches	Some beaches along the Drava River lack formal regulation, leading to inconsistencies in water quality management and safety standards. These unregulated beaches pose risks to public health, especially during peak bathing season, as they may not be subject to regular water quality testing or pollution control. In Osijek-Baranja County there are a total of 4 regulated and 14 unregulated beaches. Nevertheless, most of the unregulated beaches are monitored throughout the bathing season. Upstream and downstream of the urban
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	beaches. Neverthetess, most of the unregulated
	beaches are monitored throughout the bathing
	season. Upstream and downstream of the urban
	regulated bathing areas on the Drava River, there
	are some popular, wild beaches where water
	quality is not monitored. Supervision and raising
	awareness within the local community will be
	requested for these areas. Establishing guidelines



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	and regulations for safe bathing conditions will help mitigate health risks from waterborne pathogens and pollutants.
Raising awareness among local communities	Public awareness of the health and environmental risks associated with water pollution is limited. Local communities may not be fully aware of the impact of pollution on water quality, nor the potential hazards posed by unsafe recreational water. On the Drava River, there is a possibility of contamination by the spillage of manure into bathing water or its immediate vicinity, or by the runoff of pesticides from nearby fields, as well as the possibility of pollution of the river bathing area from cruise ships or wastewater discharges. The pilot phase will include a public engagement strategy to raise awareness among stakeholders about the importance of water quality and its direct link to public health by organizing a workshop for municipalities in Osijek-Baranja County, with invited municipalities from two neighbouring counties. This could involve community outreach, informative campaigns, and possibly collaboration with local schools and organizations. By raising awareness, the initiative can empower the public to act in maintaining water quality, reporting pollution incidents, and participating in sustainable water practices.
Limited legal regulation of water quality parameters	Current legal regulations governing water quality testing cover only a limited number of parameters. However, the complexities of water pollution often involve multiple factors beyond those regulated, such as emerging contaminants, seasonal variations, and specific types of bacteria and parasites that may not be routinely monitored. The pilot activities will address this gap by testing a broader range of water quality indicators than those required by law, helping to provide a more comprehensive assessment of water safety. This data can be used to advocate for broader legal reforms and for the inclusion of additional parameters that reflect the full range of risks associated with waterborne diseases and pollutants.
The impact of climate change on water quality	Climate change is expected to intensify water quality issues by altering rainfall patterns, increasing temperatures, and changing the frequency and intensity of extreme weather events such as floods and droughts. These changes can affect the Drava River's water quality in multiple









	ways, by promoting harmful algal blooms, increasing sediment runoff from surrounding areas, and intensifying the release of pollutants. Additionally, rising water temperatures could foster the growth of waterborne pathogens and parasites that pose health risks to people using the river for recreational activities. The pilot phase should include monitoring of the potential impacts of climate change on water quality. There will be a weather monitoring station set at Drava Copacabana. Sampling will also be done after heavy precipitation. A similar threat to water quality could be low water levels, therefore the data on water level at the time of sampling should be included.
Early warning system for water quality	To better prepare for and respond to sudden changes in water quality, an early warning system could be developed. This system could involve continuous monitoring of water quality parameters, real-time data collection, and the use of predictive models to identify potential risks before they affect the public. In the event of pollution spikes, such as after heavy rains or industrial accidents, the system could alert local authorities and the public, enabling rapid response actions such as closing beaches or issuing health advisories. The implementation of an early warning system should improve public safety and help prevent waterborne diseases, especially in the face of increasing climate variability.

### Summary of the pilot action

Summary and future steps	The UrbanBlueHealth pilot in Osijek will focus on implementing extended water quality monitoring during the 2025 bathing season. Monitoring will take place at three key locations - Copacabana, Pampas and Željeznički most, using multiparameter sondes and a weather monitoring station.
	At least eight samples will be collected per site, along with additional samples after heavy rainfall.
	The pilot phase of the UrbanBlueHealth project in Osijek will focus on measuring, collecting, and analyzing water quality data throughout the bathing season. By monitoring key water quality indicators and assessing pollution levels, this phase aims to generate valuable insights into the health condition of the Drava River. The collected data





will be crucial for developing a comprehensive
water quality management strategy, which could
be used for future interventions and long-term
planning. The focus of this pilot will be on data-
driven decision making. The results will inform
future strategies aimed at improving water quality, ensuring safer recreational use, and promoting sustainable urban water management in Osijek and other urban locations in Croatia.
Ultimately, addressing the challenges of unregulated beaches, raising awareness within the local community, and expanding the range of water quality parameters will contribute to successful implementation of the UrbanBlueHealth initiative, promoting safer and more sustainable urban water practices for the long term.

