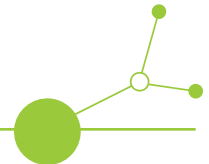


CONCEPT OF ACTION PLAN- PILOT ACTIVITIES

Austrian partner (MUW- PP7)



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1. Introduction

The primary objective of the UrbanBlueHealth project is to assess health impacts and create new solutions for improving the quality of urban bathing waters.

According to a decision of the consortium the Austrian partner agreed to conduct an additional pilot study in the city of Vienna.

The Danube River, Europe's second largest traverses the urban area of Vienna, Austria. Given its enormous catchment area, the river's water quality is influenced by a complex array of environmental factors, making Vienna an ideal pilot study site. While Vienna currently maintains several official bathing sites along the main river, there is a growing public demand to expand recreational access in the city center. The Vienna Danube Canal runs through the city center. While its banks are used for leisure and sport activities the Danube Canal itself serves also as a route for ship traffic for tourism. Moreover, the Danube Canal receives inflow from the Vienna River (*Wienfluss*), a tributary periodically subject to combined sewage overflows. Inspired by the global "Swimmable Cities" movement, the recently established "Schwimmverein Donaukanal" (Danube Canal Swimming Club) aims to transform this central waterway into a viable urban bathing area. Therefore, a growing community of people is using the Vienna Danube-Canal for swimming.

The primary objective of the pilot action is to better understand the dynamics of the water quality and to find an easy-to-assess proxy for predicting the water quality and an early warning system for this water body from a hygiene perspective for human health protection. For this data from precipitation and water levels will also be considered.

The primary goal of the pilot phase is to assess the water quality of the Vienna Danube Canal during the bathing season by focusing on water quality monitoring.

In Austria, bathing water quality is regulated by the Austrian surface bathing water regulation (Badegewässerverordnung - BGewV, BGBl. II Nr. 349/2009) which is in line with the EU Directive 2006/7/EC. It applies to all bathing waters except swimming pools, separated and treated waterbodies or waterbodies used for therapeutic purposes, and artificial water bodies that are separated from surface waters and ground water. 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. Monitoring of the bathing waters is required throughout the bathing season (June 15 - August 31) and is carried out on order of the Austrian ministry of health.



2. Concept of pilot activities in Vienna

Initial information about the pilot action

Area executing pilot action	Danube Canal, Vienna, Austria
Partners	Medical University Vienna (MUV - PP7)

The importance of pilot action

The justification for the selection of the pilot action	The Vienna Danube Canal is an urban water body connected to the River Danube. Despite not being an official bathing site, it is utilized for swimming by the Schwimmverein Donaukanal (Danube Canal Swimming Club). Consequently, the water quality of the Danube Canal is not systematically monitored with respect to established bathing water quality standards. This pilot action will assess the water quality of the Danube Canal throughout the bathing season. A primary objective is to identify proxies that can predict water quality conditions and serve as an early warning system.
The justification for the choice of the selected methods	The methods applied involve standard methods for assessing water quality. Additionally, the feasibility of the ISO 9308-4 (<i>E.coli</i> in water samples with high levels of background bacteria), currently under development will be proven. A modified method ISO 10705-2 for the analysis of somatic coliphages will be developed. The aims are better visibility of the plaques during the cultivation and reducing the interfering background bacteria. Moreover, high frequency monitoring of <i>E. coli</i> specific β-glucuronidase activity by an automated system will be applied to allow for dense monitoring intervals and to detect short-term contamination.

Pilot action objective and components

Monitoring water quality throughout the bathing season	Additionally, to the parameters defined in the regulation (<i>E. coli</i> , intestinal Enterococci) monitoring will be extended to <i>Pseudomonas aeruginosa</i> , <i>Clostridium perfringens</i> , and somatic Coliphages.
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	<i>E. coli</i> specific β-glucuronidase activity will be measured in addition. Moreover, physical-chemical parameters like pH, turbidity, conductivity, and UV-Transmission will be assessed. Weather related data (precipitation, Danube-Canal and Danube river water levels) will be retrieved from national databases.
Establishing monitoring sites and stations	Monitoring will be performed alongside two separate swimming routes used by the swimming club. Each of the two routes will be separated in three sections (beginning, middle, end) from which samples will be drawn. Additionally, an automated high frequency monitoring of <i>E. coli</i> specific β-glucuronidase activity will be installed at an appropriate site.
Regular testing for key water quality parameters	A full series of samples from both swimming routes, i.e. 6 samples, will be drawn once a month throughout the bathing season for measuring all parameters. Additional samples, e.g. for periodic comparison of results to the automated high frequency monitoring or in the case of rainfall events, will be taken and analyzed with a limited panel of parameters. Timeframe: May-September
Collecting and processing data on water quality parameters	Conducting a comparative analysis of water quality data, identifying trends, peak contamination, rainfall, water levels, and correlations between all parameters. Producing a report summarizing the findings for further use. Timeframe: after the bathing season.
Responsibilities	MUV is responsible for sampling and measurement of physical-chemical parameters of water, as well as the assessment microbiological parameters

Key issues addressed in the pilot phase

Unregulated bathing site	The Vienna Danube Canal is not an official bathing site and consequently lacks monitoring according to Austrian bathing water regulation. Yet the Danube Canal is used for bathing, e.g. by members of the Danube Canal swimming club whose members are
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	increasing. The Danube Canal is subject to discharge of wastewater by combined sewer overflows. Thus, swimming in the Danube Canal may pose a public health risk.
Raising awareness among local communities	Limited public and local community awareness persists regarding the health and environmental risks of water pollution, particularly its impact on recreational water quality. The Vienna Danube Canal, receiving combined sewage overflow via the Wienfluss (Vienna River), is susceptible to microbiological and chemical contamination, especially following heavy rainfall. Results from the Pilot Activity will be utilized to inform stakeholders and local communities about the critical link between water quality and public health through targeted communication and information campaigns.
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 Vienna Danube Canal's water quality in multiple ways, by increasing sediment runoff from surrounding areas, and intensifying the release of pollutants. Moreover, increasing temperatures will likely lead to an increased demand for bathing sites in urban areas. Therefore, it is to be expected that the number of bathers in the Vienna Danube Canal will also increase in the future.
Early warning system for water quality	To better prepare for and respond to sudden changes in water quality, an early warning system is projected to be developed. This system could involve continuous monitoring of water quality parameters and the use of predictive models to identify potential risks before they affect the bathers. In the event of pollution spikes, such as after heavy rains resulting in higher frequencies of combined sewer overflows the system could alert bathers. The implementation of an early warning system should help prevent waterborne diseases,



	especially in the face of increasing climate variability.
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Summary of the pilot action

Summary and future steps	The UrbanBlueHealth pilot in Vienna will focus on implementing water quality monitoring during the 2025 bathing season at the Vienna Danube Canal. Monitoring will take place at Vienna Danube Canal, along two separate swimming routes used by the Danube Canal Swimming club. For each of the two routes three samples (begin, middle, and end) will be collected monthly during the bathing season. Samples will be analysed for microbiological and chemical-physical parameters. Additionally, high frequency monitoring of <i>E. coli</i> specific β-glucuronidase activity will be applied. Results will be correlated with weather data (rainfall events, water levels). The collected data will be crucial for developing a comprehensive water quality monitoring 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 be used to assess planned improvements of the urban drainage system by the city of Vienna in terms of reducing combined sewer overflows. Ultimately, addressing the challenges of non-official bathing sites raising awareness within the local community, will contribute to successful implementation of the UrbanBlueHealth initiative, promoting safer and more sustainable urban water practices for the long term.
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