

## AQUABIO: MINIMIZE HEALTH RISKS TO BATHERS IN THE RIVER SPREE (BERLIN)

### CHALLENGE

Berlin is one of the largest capital cities in Europe. It has approximately 3.8 million inhabitants and is served by two main rivers: the Spree and the Havel.

The two rivers are interconnected by canals that facilitate river traffic and contribute to the city's waterway network.

The Spree is the main river and runs east to west through Berlin, passing through the historic centre and forming part of the city's urban landscape.

Around it you can visit many of the city's major sights, such as the Cathedral and the UNESCO World Heritage Site of Museum Island.

The **1.8-km-long Spree Canal is located in the central Mitte district**, which has been off-limits since 1925, the last time Berliners were allowed to use it as a river pool.

The reason for this ban is recurrent pollution **episodes caused by the use of the canal** as an end point for sewage discharges.

Berlin has 10,000 km of sewers, of which **2,000 km are combined systems, i.e. stormwater and untreated or urban wastewater** (which may also include water from industrial sources) are collected in the same pipe network.

The consequence is that overflows **can occur at 180 locations and Berliners see combined sewers overflow** multiple times a year during periods of heavy rainfall.

The result is a river Spree that **takes many days to recover after a massive pollution event** caused by the impact of raw sewage pumped through the sewer system.

However, inland bathing waters are also **threatened by uncontrolled or accidental discharges** from upstream sewage treatment plants.

It is this problem that led to the launch of the citizens' initiative Flussbad Berlin in 2012.

The main objective is to **recover the river channel for different citizen uses** such as bathing, to facilitate access to the water through public accesses and to monitor pollution episodes.



aquaBio B503

In 2014, Flussbad Berlin received support from the German Federal Ministry for the Environment as part of its 'National Urban Development Projects' programme and from the Berlin Senate's Department for Urban Development and the Environment.

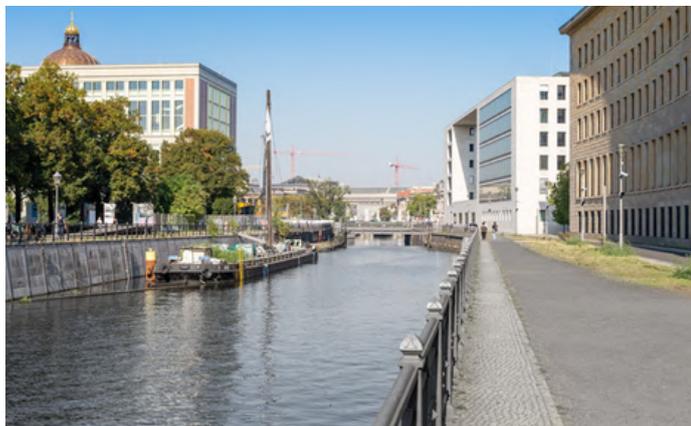
One of the measures being worked on since then is ecological water filtration.

## ADASA'S SOLUTION

Adasa has intervened in the river Spree as part of the iBathWater project by providing the **aquaBio microbiological monitoring device, specially designed for the automatic and continuous online identification and measurement** of faecal contamination indicators such as *E. coli* (*Escherichia coli*) and *Enterococci*.

**aquaBio**, which Adasa has deployed inside a ship, **acts as an additional monitoring solution that complements** standard laboratory analysis.

It provides **alarms in case of unsafe bathing due to discharges of DSU (Discharges from Unitary Systems)** into the river, while monitoring the purifying effect of the different nature-based solutions driven by the Flussbad Berlin project in the canal.



Canal of the river Spree subject of the microbiological aquaBio measurement.

As an added value, **aquaBio's** episode mode, **which is activated during rainfall events, allows continuous measurements** to be taken and to know the exact moment when the bathing water regains the right quality.

The aim of iBathWater has been to **demonstrate the effectiveness of integrated urban sewerage system management** in minimising untreated wastewater discharges, reducing pollution and environmental impact on receiving water bodies, and minimising health risks to bathing areas during short-term pollution episodes.

The project provides an **open platform capable of combining operational and management information** with innovative online microbial measurements to ensure bathing water quality during rainfall events.

Furthermore, it has demonstrated in large-scale and full-scale scenarios the usefulness of holistic management in a standard and interoperable framework (open data exchange).

Existing systems **have been coordinated with online water quality monitoring** and control tools, sewerage treatment technologies, knowledge-based decision support systems (KDSS) and external systems (e.g. coastal and tidal models).

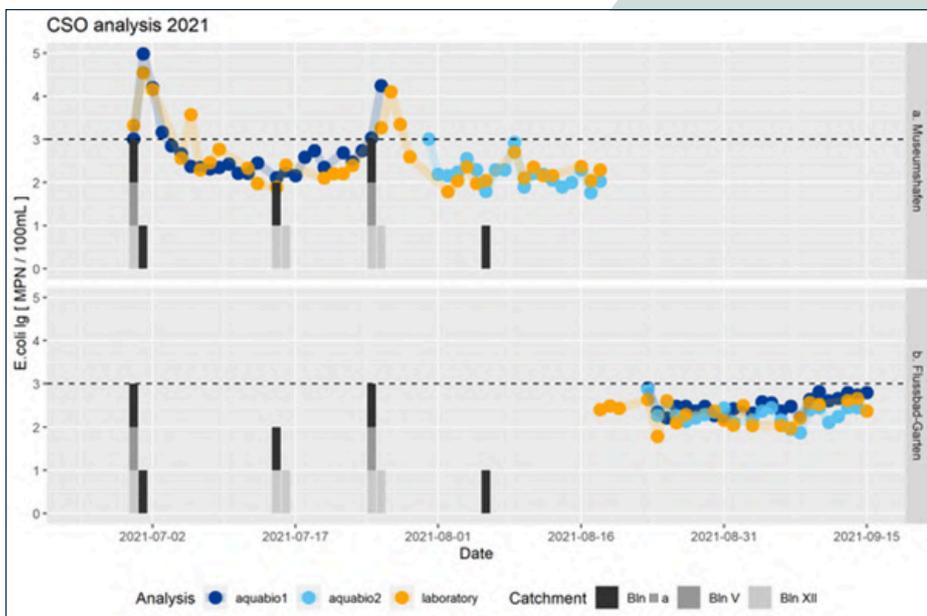
Website



The integration of information from aquaBio, the sewerage system and risk-based statistical prediction models into **the KDSS results in an advanced early warning system for Berlin.**

**iBathWater is an initiative funded by the European Union's LIFE programme** (LIFE17 ENV/ES/000396), is integrated by partners such as Adasa Sistemas, Fundació Eurecat, Barcelona City Council, Barcelona Cicle de l'Aigua, SA and Kompetenzzentrum Wasser Berlin GmbH and has developed a Knowledge Decision Support System (KDSS).

*Detection of contamination episodes and data validation.*



In addition, **aquaBio** allows **continuous and daily monitoring of the water quality status**, which provides up-to-date and reliable information, thus exceeding the analysis requirements of the European Bathing Water Directive (DIR 2006/7/EC).

This regulation only requires specific measurements to be carried out at least 4 times during the bathing season, with an interval of no more than one month between them.

In the case of short-term contamination, an additional sample must be obtained to confirm the end of the incident.

Finally, **aquaBio**'s services include:

- Thanks to **ETV verification (Environmental Technology Verification)**, the data provided by **aquaBio** are reliable and their credibility is accredited by an independent body. In this way, decisions derived from **aquaBio** monitoring can be made with confidence and ensure a safe bathing experience for users.
- It quantifies ***E. coli* and Enterococci in MPN/100 ml in only 3 hours in heavily contaminated water** and in 12 hours guarantees the absence of *E. coli*.



View of the Spree River.

## CLIENT

The total budget of the iBathWater project is €2,274,164. The EU LIFE program is financing part of this budget with 1,364,497 euros under Grant Agreement No. LIFE 17 ENV/ES/000396.

After completion of the iBathWater project, the **aquaBio** measurements continue to be used today by the current client, the Flussbad project.

## RESULT

Both the results of the **aquaBio** measuring device and the results of the prediction model are combined with real-time information on combined sewer overflows provided by the Berlin water utility.

This information is integrated into the KDSS decision support system.

The results obtained are shown in the following table.

	STATU QUO	STANDARD EARLY WARNING	iBathWater
<b>Risk of being exposed to an unannounced day: 1</b>	84%	34%	0,96%
<b>Annual risk of disease: 2</b>	34%	13%	3%
<i>1. With a total number of 123 days between May 15 and September 15 (bathing season in Berlin) considering 10 baths per year.</i>			
<i>Multiplying the above figures by the disease risk of 40% gives this annual risk of disease for a swimmer who swims 10 times a year.</i>			