VÚV TGM

ABOUT US


Taking care of water
for over 100 years

FOREWORD

Dear customers, readers, business partners,

Let me introduce you to our new booklet, presenting T.G.Masaryk Water Research Institute, p.r.i. (TGM WRI), the oldest water management institution in Czechia with more than a century of history. An institution where I have been working since 2002, became its director in February 2023, and which has grown close to my heart over the years. It gradually transformed my view of water and water management as values that need to be cared for in the long term and constantly developed; it is also the mission and role of TGM WRI.

Personally, I am most pleased that we are increasingly developing cooperation with foreign countries and submitting various projects funded through Horizon Europe, the World Bank, and other sources. Transnational activities allow us not only to increase our visibility and participate in interesting and significant research projects, but also to reduce our dependence on the state budget. And I am not the only one who greatly appreciates the fact that our research does not end on paper, but we verify its results in practice; for example, with the artificial water infiltration project in Meziboří, monitoring of Covid-19 markers in municipal wastewater, and the construction of an automatic water quality monitoring station on the Bečva River. I believe that it is these tangible results that move our institution and the entire Czech economy forward.

Ing. Tomáš Fojtík
Director

TGM WRI IN DATA[1]

102
media presentations on TV & radio

32
International & VaVal (Research, Development, Innovation) projects

8
independent branches

77
percentage of experts within our staff

198
employees

230
visitors to TGM WRI

1919
the year the Institute was established

2
new websites

36
research departments

88
professional outputs based on Goverment Council methodology

3
workplaces

10,2
budget in millions of EUR

33
publications in WoS & Scopus journals

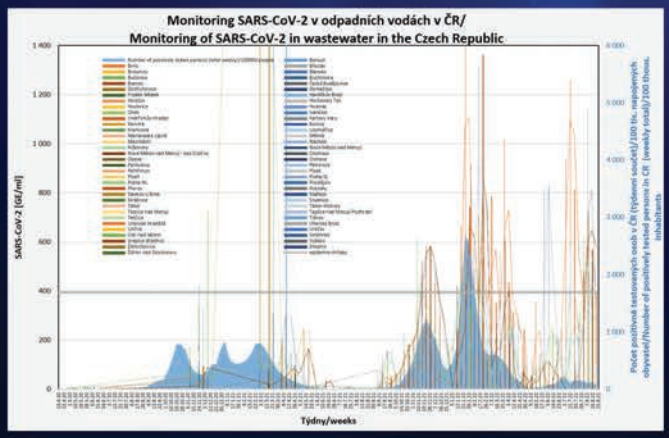
53
percent of women

[1]for 2024

WHAT DO WE DO?

SARS-CoV-2 virus in wastewater

TGM WRI, together with the Veterinary Research Institute and epidemiologists from the First Faculty of Medicine, Charles University, has implemented a wastewater monitoring system to monitor the covid-19 epidemiological situation and predict its development. The principle is the collection of untreated wastewater at selected WWTPs, viral RNA isolation, and quantitative detection of the number of the virus genomic units. Viral RNA is excreted into wastewater by people infected with the virus, and therefore its amount correlates with their numbers in areas connected to the monitored WWTPs. The results give us objective epidemiological information at much lower cost than using clinical tests.



"The coronavirus will stay, but we can catch the new wave in time and prepare for it."

The number of people testing positive compared to indicators of viral RNA presence in wastewater

HAMR and long-term hydrological drought

In recent years, the frequency of water shortage periods has increased in Czechia. Some regions have had issues with drinking water supply. The aim of this research has been to map the temporal and spatial variability of drought and propose adaptation measures to mitigate its potential impacts. Thanks to the proposed mechanisms for planning during the dry season and the introduced monitoring, it is hoped that the impact of water shortages on the population, energy industry, and industrial production will be eliminated.

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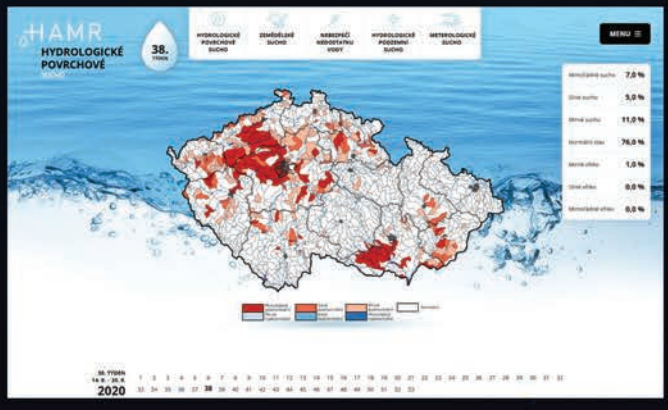
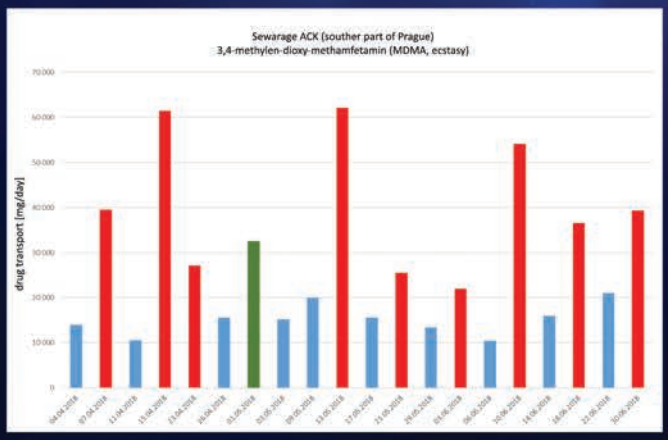


HAMR system graphical interface indicating the intensity of drought in catchments with the possibility of forecasting up to eight weeks in advance

WHAT DO WE DO?

Drugs in wastewater

The foundation of wastewater-based epidemiology (WBE) was laid at the turn of 1999 and 2000 with the hypothesis that municipal wastewater could be treated as a diluted urine sample. Municipal wastewater contains a complex mixture of chemicals including human metabolites – biomarkers. Quantitative measurement of these specific substances in 24-hour pooled samples can provide information on, for example, dietary habits, health of the population, incidence of diseases, consumption of alcohol, cigarettes (nicotine), medicines, and exposure of the monitored population to environmental contaminants, such as pesticides.



Wednesday (blue) and Sunday (red) concentrations of ecstasy metabolite in Prague as a typical example of a "party" drug, green – Witch Burning Day

Artificial infiltration to boost groundwater supplies

Groundwater reserves have been declining for a long time; a rise in temperatures increases losses caused by evapotranspiration and so the volume of water infiltrated into the ground decreases. During floods, water drains away quickly and without being used and, in the summer, more of it evaporates. One of the effective adaptation measures is artificial infiltration, which has a long tradition in Czechia but has been practically forgotten in recent decades. It is a unique technological process that is capable to address both hydrological extremes – drought and floods.

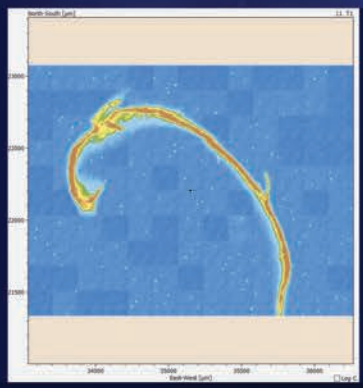
"There is more than one drought, and most types of drought can be prepared for and adapted to."

In the section of the Morava River below Kojetín, a multi-well aquifer test and a mathematical model demonstrated the possibility of bank infiltration with abstraction of up to 80 l/s

WHAT DO WE DO?

Microplastics in surface waters

Microplastics are particles of various polymers smaller than 5 mm in size, of exclusively anthropogenic origin, and are among the most researched and discussed pollutants. They are now practically ubiquitous and their numbers are constantly increasing. They occur to varying degrees in surface water and in sediments of watercourses, entering the bodies of water organisms and subsequently entering the food chain. However, their quantification and identification is methodologically very challenging due to their small size and diverse chemical composition. The TGM WRI laboratory processes microplastic samples from various environmental matrices using FTIR-FPA microscopy, which is one of the most promising contemporary particle analysis methods.



"Just because we don't really know something yet doesn't mean it can't have a negative impact."

Polyethylene terephthalate (PET) fibre in wastewater sample identified using FTIR-FPA microscopy

Desiccation of watercourses and biodiversity

Climate change is causing extreme flow rates; in addition, the partial or complete desiccation of watercourses is becoming more frequent. The disappearance of surface flow carries a number of negative consequences, such as deterioration of ecological status, death of aquatic organisms, and zero dilution of wastewater. When studying the issue, the emphasis is placed primarily on monitoring the influence of drought on ecological links and environmental impacts. The development of bioindication methods for assessing the extent of

arch topics.

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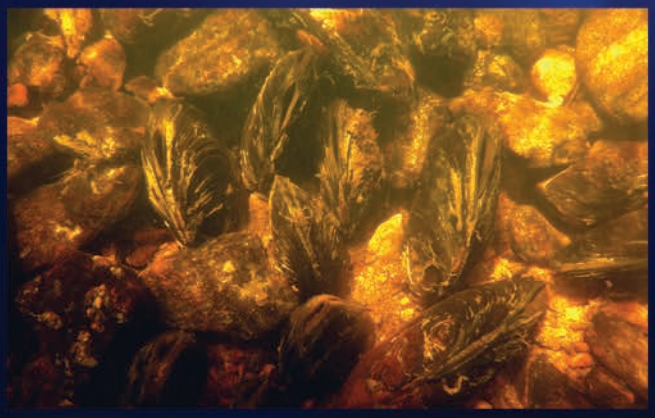
Dried-up bed of the Radějovka stream in the White Carpathians

WHAT DO WE DO?

Saving freshwater pearl mussel

The freshwater pearl mussel, a specially protected species of large aquatic mollusc, is found in a few remaining sites in central Europe. Although a single pearl mussel can live up to a hundred years, its populations are declining rapidly. By protecting this "umbrella species" we indirectly protect the entire community of organisms in the habitat. Filter-feeding molluscs remove fine organic material from the water and utilize the nutrients contained therein. One pearl mussel is capable of filtering up to 50 litres of water per day, so the entire pearl mussel population can significantly influence the oligotrophic character of the streams in which it occurs. We have been cooperating with the Nature Conservation Agency on the conservation and research of this species and its unique ecosystem.



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Freshwater pearl mussels in the Teplá Vltava River inhale water through their slightly open siphons which they then filter out

Crayfish species

In Czechia, we can encounter six species of crayfish in the wild. However, only the stone crayfish and the noble crayfish are native, and both are critically endangered. Our native crayfish are threatened by the introduction of aggressive crayfish from North America, which are carriers of the crayfish plague, as well as poor water quality caused by municipal pollution and the desiccation of streams. Crayfish are seen by the public as one of the icons of nature conservation and are often released in good faith, without any regard to their actual species. Awareness-raising is therefore critical in protecting our native crayfish species.

"Rare and critically endangered species help to create the Czech countryside, which is why we help them."

In Czechia, thirteen sites of community importance with the occurrence of stone crayfish have been declared within NATURA 2000

WHAT DO WE DO?

Online water quality monitoring

After the Bečva River environmental disaster, TGM WRI, in agreement with the Ministry of the Environment, began pilot control monitoring of selected water quality parameters on a selected river section at the end of January 2021. The goal was to identify the possible negative impact of pollution sources in a given section of the stream and then automate the entire process. This was achieved on 3rd June 2022, when automatic monitoring was officially launched using the Daph Tox II device with live water fleas. The NAVAROSO expert information system is then used to detect possible causes and estimate the spread of pollution in the event of a significant decrease in surface water quality.

"We cannot prevent another environmental disaster, but we can learn about it in time and respond promptly."

Start of test operation of the Bečva River monitoring station in the presence of Czech Television

The impact of artificial snowmaking on water resources

If there is no long-term frost and colder periods alternate with thaw, watercourses will have enough water, even in winter. However, in the case of prolonged frost, flows could be low. If there is enough water flowing in the streams, water abstraction for artificial snowmaking does not pose a problem. Natural variability of flow fluctuations caused by water level fluctuations due to a natural increase and decrease in the water level is more significant than changes caused by abstraction for technical snowmaking. In contrast, during periods of low flow, the impact can be significant.

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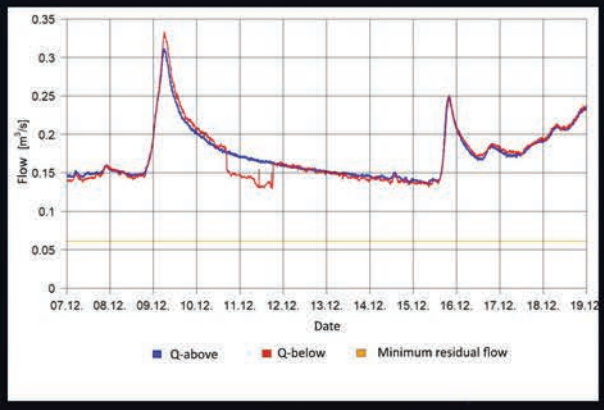

Impact of abstraction for artificial snowmaking on the Svatopetrský stream in Špindlerův Mlýn in 2019, with indication of the minimum residual flow

WHAT DO WE DO?

"Water Centre"

This project seeks to answer the question of whether we will continue to have enough quality water in Czechia. Climate change and the associated drought, as well as human behaviour and demands, threaten water and its sources; for the future, it is necessary to find solutions not only for potentially affected sectors of the economy, but also for our natural heritage. Seven other research and educational institutions are involved in the project under the leadership of TGM WRI; the expert guarantor of the research programme is the Ministry of the Environment. The research is divided into seven work packages; an eighth package is focused on project management and its promotion among the gene-

ted in the future of water in Czechia.

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How to meet the future demand for water in industry, energy, agriculture and households with respect for natural resources, the landscape and the possibilities of Czechia?

WHAT WE OFFER

Calibration of current meters

Using natural water from the Vltava River, our unique calibration station in Prague-Podbaba allows the calibration of water gauging devices, from standard propellers to ultrasonic and electromagnetic sensors.

Laboratory services

TGM WRI laboratories are focused on a wide range of environmental component analyses. We perform routine and special chemical, microbiological, hydrobiological, ecotoxicological, and radiological analyses, and sampling of various types of matrices.

Water treatment facilities testing and inspection

Our testing laboratory performs independent accredited and non-accredited tests of domestic WWTP cleaning efficiency, light liquid separators, and grease traps according to standard operating procedures.

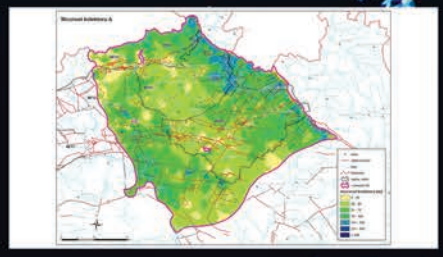
Laboratory competence assessment

The ASLAB Centre monitors compliance with the principles of good laboratory practice, organises competence tests in the field of the environment, and issues a Certificate of Laboratory Competence. We also offer professional services in the field of consultancy and appraisal activity in water management.

VTEI journal, library, and excursions

We publish the prestigious scientific and technical journal VTEI, focusing on water management issues (www.vtei.cz), as well as other professional publications. At our office in Prague-Podbaba we organize excursions for both the professional and general public.

Online information



TGM WRI manages a number of specialized servers with water management topics for online use by both experts and the public, as well as by local governments and water authorities. You can find everything on our new website: www.vuv.cz.

LIFE AT TGM WRI


VÚV
TGM


VÝZKUMNÝ ÚSTAV VODOHOSPODÁRSKY T.G. MASARY

OUR WORKPLACES

Prague – Podbabská 2582/30, 160 00 Prague 6
e-mail: info@vuv.cz, telephone: 220 197 211

Brno – Mojmírovo nám. 16, 612 00 Brno
e-mail: info.brno@vuv.cz, telephone: 541 126 311

Ostrava – Macharova 5, 702 00 Ostrava
e-mail: info.ostrava@vuv.cz, telephone: 595 134 800

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