

„Water Centre“



The research project of the Technology Agency of the Czech Republic SS02030027 „Water systems and water management in the Czech Republic in conditions of climate change“, whose guarantor is the Ministry of the Environment, tries to answer the question of whether we will continue to have enough quality water. Climate change and the associated drought, as well as human behaviour and demands threaten water, and solutions must be sought for the immediate future.

WATER FOR PEOPLE (WP3 WORK PACKAGE)

The Department of Hydraulics, Hydrology, and Hydrogeology of the TGM WRI is the principal investigator of the work package called „Water for People“. In the research, it collaborates with the Czech Hydrometeorological Institute, the Global Change Research Institute of the Czech Academy of Sciences, the Faculty of Environmental Sciences of the Czech University of Life Sciences in Prague, and the Faculty of Civil Engineering of the Czech Technical University.

The objective is to find suitable measures for the conservation of water resources for drinking water supply in areas where there is already a shortage, or could be in the future. The following main measures are assessed:

Water transfers from places with its excess to places with its shortage

When dealing with this issue, water transfer refers to the technical infrastructure that ensures the supply of water from a place where there is enough of it to a place where there is not (during a hydrological drought), or diverting part of the flood runoff into a watercourse or water reservoir where it does not cause harm.

Artificial infiltration – controlled seepage of surface water into the ground

The aim of the project is methodological, technical, and professional preparation of specific areas for artificial infiltration technologies. The first stage in 2021–2023 assesses the specific potential of controlled allocation methods. This assessment takes place on a platform of hydrological basins including deficit areas and their surroundings with respect to sites for the accumulation of surface water (lokalita pro akumulaci povrchových vod, LAPV) and other proposed adaptation measures in other sub-objectives. The result of the first stage will be the delineation of those areas where water conditions can improve due to the application of artificial infiltration methods. The second stage in 2024–2026 will focus on specific technical solutions in several of the most urgent and suitable pilot sites, which will be assessed by experts in order to design specific technologies.

Protection of valuable groundwater resources, e.g. by adjusting management in their protection zones and other protected areas

The objective is to establish modern principles of complex protection of water resources in the era of climatic and anthropogenic changes affecting water regime and water resources, proposals and recommendations for the necessary changes in the content and functions of protected areas according to the Water Act.

Change in handling or increase in storage space at existing water reservoirs or flood release basins and modelling of water quality in water supply reservoirs

The objective is to assess possibilities for prospective changes to the handling regulations of existing water reservoirs with regard to the results of simulations of climate models with an outlook of 2100. One of the relevant tools for proposing changes in the use of multi-purpose water reservoirs and for modifying handling regulations or redistribution between storage and retention space in the reservoir will be outputs from mathematical modelling of water quality development in relation to handling methods in reservoirs. Another part of the objective is a proposal for changes in the use of the protective area of flood release basins, in particular by allocating sufficient space for permanent water storage or storage space so that these reservoirs fulfil multi-purpose functions while their primary purpose is not limited. Such functions can include, for example, the requirement to ensure minimum residual flows and also the ecological or microclimatic effect.

Construction and restoration of small water reservoirs

The objective is a methodological assessment of the suitability of construction of small water reservoirs (SWR) with regard to their function under current and prospective hydrological extremes (drought, floods). As part of the project, SWR retention abilities will be assessed, as well as the possibility of complying with the minimum residual flows. SWR will also be assessed from the point of view of the overall hydrological balance, microclimate improvement, and infiltration potential.

Support for natural water retention in the landscape by introducing technical and semi-natural adaptation measures

The objective is to choose a suitable methodological procedure for designing adaptation measures supporting natural infiltration through water retention in the landscape. Proposals for retention methods should contribute to extending the duration of increased and mean flows, reducing immediate flood conditions, ensuring higher infiltration into groundwater, reducing soil erosion and chemical runoff, improving water quality, improving the security of surface water and groundwater sources, and contributing to the protection of aquatic and water-related ecosystems.

Possibilities of building new water reservoirs for the accumulation of surface water (LAPV)

The sites listed in *Generel LAPV* will be assessed (especially those in deficit areas), as well as adjacent sites that can favourably influence deficit areas. The project will take into account the importance of individual LAPV with regard to the expected abstractions and flow improvements, and the degree of security, resistance and vulnerability of the planned reservoirs will be assessed. Calculations will be made for existing conditions as well as conditions based on climate change scenarios. The potential impact of the reservoir on the quantity and quality of groundwater, on local ecosystems, and also on changes in the socio-economic aspects of sites will be generally assessed.

For deficit areas in terms of water availability in the Czech Republic, such combinations of the above-mentioned measures will be proposed, which will return water to the landscape as efficiently as possible while minimizing negative impacts on the surroundings.

The main results of the entire WP3 package are aimed at the end of 2026. Now, in the course of the project, it is possible to introduce new elements in the

sub-goals of the WP3 package. On the subject of artificial infiltration, the most significant ones are the complex application of surface water and rainwater infiltration methods (bank, artificial and surface infiltration) for a variety of purposes. Induced sources are able to contribute to the overall improvement of the water regime of the landscape, including flood flows, maintaining minimum flows in watercourses during drought, or supporting individual and public water supply systems. Last but not least, they can support protected areas related to water (wetlands, springs, etc.).

Regarding the issue of changing the handling or increasing the storage space of existing water reservoirs or flood release basins, the project suggests an innovative approach within the methods of controlled handling and allocating parts of the storage space in water reservoir. Modelling of quality with full reservoir hydrodynamics will also allow better capture of predicted changes due to expected climate change. Furthermore, it is the application of a comprehensive approach to solving the issue of existing or planned SWR in deficit areas, or in the entire Czech Republic, under current and future climate conditions. Functioning under both minimum and flood flows will also be assessed.

Ongoing research to support natural infiltration is expanding knowledge in the topics mentioned below:

Assessment of semi-natural measures in the catchment area and their effectiveness – Amálie site (small surface retention, change of land use, changes in soil properties, drainage measures).

Rainwater management, assessment of risks and the potential of an integrated solution to rainfall-runoff conditions and retention support in agricultural landscape and urban areas – Vrchlice site.

Modelling the choice of appropriate adaptation measures in agricultural areas (forest land) for specific soil and physical characteristics, assessment of impacts on water resources – use of a simulation tool from the project in the Dyje basin.

Modelling runoff in small basins taking into account changes in land use (CN curve method).

Modelling hydrological balance, water balance in the basin with changed conditions due to the introduction of adaptation measures on watercourses and floodplains – use of semi-natural monitoring measures („Drought“ project).

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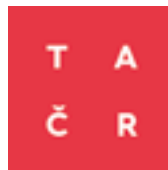
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