

DEEPWATER-CE WORKPACKAGE WPC , ACTIVITY D.C.2.1

PRESS RELEASE

FINALL

HUNGARY, CROATIA, POLAND AND SLOVAKIA

(summary from all PPs)

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Lead Institution	PP4, University of Silesia in Katowice
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The Shortage or surplus of water? Drought or flood?

INTRODUCTION

Seven partners representing five countries (Croatia, Germany, Hungary, Poland and Slovakia) have joined their efforts as part of the **DEEPWATER-CE** Interreg Central Europe Project to minimize adverse consequences of the climate change in order to provide good quality water for people and for the economy, including agriculture. They develop a joint strategy for the management of water resources which includes implementation of managed aquifer recharge systems in Central European countries.

The natural frequent phenomenon of interlacement of dry periods and heavy rainfalls causes droughts and floods, both of which harm the economy and have a general adverse effect on the quality of living.

Unless we have systems in place to manage sudden raises of water, we will inevitably lose it as a consequence of the superficial run-off to rivers and, finally, the sea. This process is rapid and, after a while, we have a water deficit again. The Project focuses on the potential storage of surplus water from heavy rainfalls and from the snow melt and for retention of river water to store it for dry periods. Briefly speaking, the idea consists of balancing water resources and flows, to benefit from them.

The partners to the Project propose a solution to tackle the climate change: the Managed Aquifer Recharge (MAR) technologies. These are designed to replenish natural groundwater resources by man-made means from short-lasting surface water surpluses for long-term retention and use them in drier or heavier demand periods.

The main goals of the Project are to develop a set of tools to promote and support the use of the MAR technologies in Central Europe, to develop criteria for identification of regions likely to be effected by water shortage and to verify meteorological, geological and hydrological conditions for the optimal choice of technologies. The Project-driven sharing of know-how and the mutual exchange of new ideas on how to adapt the technologies will make it possible to increase quantity and improve quality of water in problematic regions. This is how the Project will benefit local water management policies for alleviation of water shortage, uses and access disputes.

The testing of ideas in the following four countries representing the current study areas - taken as reference for verification and review of effectiveness of 6 types of MAR technologies - is an important part of the Project:

- Croatia - for the testing of the managed recharge of karstic aquifers;
- Hungary - for the testing of the managed recharge of groundwater in alluvial formations underlying inundation areas of a river valley;

- Poland - for the testing of the managed recharge of groundwater in proximity to industrial facilities;
- Slovakia - for the testing of the managed recharge of aquifers underlying agricultural areas.

DEEPWATER-CE PILOT ACTIONS

In four pilot areas, different hydrological, hydrogeological and geophysical measurements will be carried out to designate the best locations for MAR establishment and prepare feasibility studies based on a commonly developed methodology.

Field measurements will be carried out throughout the year in order to collect hydrological, hydrogeological and geophysical data.

Within pilot field work, 6 different types of MAR schemes will be tested (Fig. 1).



Fig. 1. MAR types verified in the framework of the ongoing research of the DEEPWATER-CE project (Author: Andrew Berry).



HUNGARY MAR SOLUTIONS IN FLOODPLAIN ALLUVIAL SYSTEMS

The Hungarian pilot area of the DEEPWATER-CE project is located in the South-Eastern part of the country, on the Maros alluvial fan between two major rivers, Körös and Maros.

The location was selected based on the results of climate models, as well as geological and hydrogeological factors. The region is uniquely suited for agricultural purposes both at a national and international level. The area has a low relief with a limited river network, plus the region is one of the warmest within Hungary in the summer period. The summer heat is expected to further intensify because of the climate change. For this reason, water demand for irrigation is increasing and cannot be provided from current sources. If water abstraction for irrigation purposes takes place in an uncontrolled way or in an excessive manner, it can endanger the drinking water supplies.

The main source of water for irrigation is generally surface water, supplemented by groundwater. When groundwater has to be used, it should be taken from locally stored rainwater and shallow aquifers, rather than deeper aquifers used for drinking water supplies. In this way, sustainable water use can be achieved, especially with regard to agricultural water withdrawal during periods of water scarcity, and the vulnerability of aquifers storing drinking water can be decreased.

In the framework of this project our team will explore and select paleo-channels (remnants of former river or stream channels filled or buried by younger sediment) of the ancient -Maros river which are suitable for groundwater storage. We will determine whether the conditions for installation of an underground dam (a subsurface wall constructed to restrict groundwater flow, resulting in retaining the water in the aquifer) are suitable. A detailed investigation of the aquifer showing the potential for underground damming will be carried out through field measurements (geophysical measurements, groundwater sampling, pumping tests) and developing conceptual and numerical groundwater flow models.

The end result of the pilot study will be incorporated in a preliminary feasibility study examining the viability of the selected managed aquifer recharge system. It will provide recommendations for the future implementation of the underground dam, which can help ensure a larger amount of irrigation water for local farming communities. Our purpose is not only to contribute to improving water supply in the Maros alluvial fan region, but also to provide information supporting subsurface water retention methods, which can give a kick-start to other water deficit alleviating projects in Hungary.



POLAND MAR IN AQUIFERS NEAR INDUSTRIAL SITES

The Polish study area consists of a ground water intake located in Tarnów, supplying a population of approx. 100 thousand. The research work, led by the Silesian University of Katowice, focuses on optimization of existing MAR solutions based on river bank infiltration and infiltration ditch recharge. The team is studying the geophysics and spatial layout of the aquifer, mineralogy and chemistry of soils and ground waters, occurrence of new pollutants in water drawn from wells, and the content of radioisotopes. Further, the team will build hydrological and hydrogeological models of the area to identify the rates and paths of water flows and exchange and of transportation of chemicals. They will attempt to pinpoint sources of likely pollution and improve quantity and quality of well water by minimizing infiltration from industrial sites to surrounding areas and their ground waters. The research can not only contribute to improving water quality in Tarnów but give a kick-start to other water deficit alleviating and water Q&Q betterment projects in Poland. Even if today we cannot see any major problem with availability of potable water around us, this can change in the future, so we should act now to work out an action plan.

The end result of the Project will consist of recommendations for a strategy for the implementation, and of national action plans for the adoption, of the most promising MAR technologies. These can be addressed by water management regulators in Poland and in other CE countries.



SLOVAKIA MAR IN POROUS AQUIFERS IN AREAS USED FOR AGRICULTURAL PURPOSES

The Žitný Ostrov area is located in the SW part of Slovakia. From geological viewpoint it is characterized by fluvial Quaternary sediments determining the hydrogeological conditions. The current hydrological conditions are strongly affected by construction of the Gabčíkovo Water Structure.

The location of pilot site was selected based on climatic models outcomes and geological and hydrogeological conditions. Moreover, taking into consideration the current land use for agriculture, we expect the increased water demand in the future. From this reason the application of MAR schemes using the existing network of irrigation canals seems to be the proper solution for the future development of the region.

The pilot site area is delineated by Gabčíkovo-Topoľníky (S VII), Vojka-Kračany (A VII) and Šuľany-Jurová (B VII) canals with technical possibilities for water flow control, i.e. creating Recharge Dam MAR type. The main purpose of the pilot site measurements is to investigate the relationship between water level in surface canals and groundwater level, and the lateral range of this influence. Based on the field work investigation and data evaluation by mathematical modelling, the feasibility study will be prepared. Pilot study will provide the basic data for proposing the measures aiming at water retention in the landscape and therefore ensuring sufficient amount of water for local communities.

CROATIA MAR IN AQUIFERS LOCATED IN SEMIARID KARST AREAS

The Croatian study area is located on the island of Vis, a remote karst island in the Adriatic Sea, located 43 km from the mainland. The climate on the island of Vis is a semiarid variety of the Mediterranean climate, often referred to as the “olive” climate (Csa). Furthermore, the whole Mediterranean region is regarded as one of the hotspots of climate change. The island’s population is 3617, however, during the peak of the touristic season in the summer, the number of people increases by ten times, resulting in high demand for fresh water during the dry season. Vis has a water supply from its karst aquifer due to favorable geological and hydrogeological conditions. The water supply system comprises wells in Korita, costal spring Pizdica, and K1 well above Komiža. Groundwater resources in karst aquifers are irregularly distributed and highly vulnerable to seawater intrusions.

The project team is investigating the feasibility of applying two types of managed aquifer recharge (MAR) in karst island aquifer: aquifer storage and recovery (ASR) and infiltration pond. Field, desk, and laboratory investigations include small-scale geological and hydrogeological mapping, structural mapping, water balance calculation, 3D flow models, periodical monthly monitoring of hydrochemical parameters, and surface geophysical investigations (electrical resistivity tomography, magnetotelluric method, and seismic methods).

Furthermore, an important segment of the research is the involvement of the local community and experts (e.g. water supply company) through various workshops, training, and personal meetings throughout the project DEEPWATER-CE.



Join our project actively!

The Project has established a number of discussion groups on the LinkedIn platform, joined under the “Virtual Square” heading, to spread knowledge about the MAR technologies and to share results with all concerned. The Virtual Square is a space for any person interested in hydrology or hydrogeology who wishes to learn more about the MAR and to share their knowledge and opinions with us. Both these discussion groups and other social media used by the Project communicate current information on availability of training courses and webinars and on Project results.

Join the LinkedIn groups of the Project:

- **Transnational Virtual Square**

<https://www.linkedin.com/groups/13760882>

- **National Virtual Squares**

HUNGARY

<https://www.linkedin.com/groups/8913723/>

GERMANY

<https://www.linkedin.com/groups/8914391/>

POLAND

<https://www.linkedin.com/groups/13847309/>

SLOVAKIA

<https://www.linkedin.com/groups/13837018/>

CROATIA

<https://www.linkedin.com/groups/12438067/>

If you want to learn more about the progress of the project please visit our official webpage you can find more information about the aims of the project, the partners involved, project news and events, and our outputs

<https://www.interreg-central.eu/Content.Node/DEEPWATER-CE.html>



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