

DEEPWATER-CE

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SLOVAKIA

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Slovak Partner Institution	Water Research Institute
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About DEEPWATER-CE project

Seven partners from 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 developed a joint strategy for the management of water resources which based on the implementation of managed aquifer recharge systems in Central European countries.

Managed Aquifer Recharge (MAR) refers to the intentional recharge of aquifers for subsequent water recovery or environmental benefit. These methods apply processes by which excess surface water is intentionally directed into the subsurface. MAR techniques offer promising solutions for water management, also with regard to tackling future climate change impacts.

In the first phase of the project the partners built a transnational knowledge base on MAR and its benefits. Subsequently, a transnational toolbox of decision-support for the designation of potentially suitable MAR sites in Central Europe was developed. Based on this toolbox, pilot sites with suitable MAR types were identified in Hungary, Slovakia, Croatia and Poland. A pilot feasibility study of MAR schemes with integrated environmental approach has been investigated in each country covering a different type of MAR system, **in Slovakia the study investigated Recharge Dam.**

This press release provides a key summary of the results obtained during the feasibility study of MAR in the Žitný ostrov pilot area.



Results from pilot feasibility study of Managed Aquifer Recharge (MAR) schemes with integrated environmental approach in Slovakia

Pilot site: Žitný ostrov, MAR type - recharge dam in porous conditions for agriculture

A. Pilot site characterization

The pilot site is located in porous conditions in the agricultural area in Podunajská Lowland, Žitný ostrov area. It is characterised by dense network of irrigation channels with technical tools (sluices, barriers) for regulation of water flow in channels. Possibility to regulate the flow in channels is a crucial point to create recharge dam MAR type and to investigate interaction between surface water and groundwater.

The field measurements aimed at investigation of the quantification of infiltrated surface water from recharge dam MAR scheme in order to replenish the groundwater sources. Field measurements involved the flow measurements in channels, geometry of channels, groundwater table measurements, the soil sampling and measurements of soils/rocks hydraulic properties by Auger hole method in the field and measurement and evaluation of retention curves in laboratory. The soils samples were evaluated in the laboratory in order to get input data to calibrate the mathematical models (MODFLOW and HYDRUS). The investigations were done by Water Research Institute in cooperation with the Slovak University of Technology in Bratislava.

B. Risk management related to MAR implementation or operation

For risk assessment analysis we combined two methods; i.e. quantitative risks were identified according to the methodology developed by MARSOL project and qualitative risk assessment was done in accordance with Australian guidelines. According to Marsol methodology, there were evaluated risks from technical and non-technical (social, economic, governance & legislation) viewpoints during design and construction phase and also during operational phase.

As non-technical risk during design and construction phase, the lack of private /public funding was identified as very high risk. Possible treatment is to disseminate and publicize the MAR schemes benefits to attract as many investors as possible. As high risks were evaluated - low price of water and high installation cost. These risks can be overcome by additional support for the use of MAR facilities (state support, private financial sources) in order to promote its financial viability. Evaluation of technical risks revealed several high probabilities of risk occurrence during design and construction phase: construction difficulties, risk of low water storage, hydrogeological setting. The risks can be treated by preparation of specific technical project, and proper and detailed geological and hydrogeological investigation. During operational phase, high risks are represented by swelling clays, nutrients, droughts and rainfall event periodicity, changes in water demand and supply. To be informed about risks in time the thorough monitoring of risks should be applied.



C. Cost-benefit analysis of the MAR

In order to have a complex assessment of the MAR scheme, it is essential to evaluate its economic feasibility along with its hydrological, geological, and institutional considerations. Cost-Benefit Analysis (CBA) allows us to assess the profitability of the MAR scheme by comparing costs of its construction and maintenance with the scheme's economic value, which is the sum of use benefits and non-use values. In our study, we developed a Willingness-to-Pay (WTP) survey, which provided useful insights for policy-makers regarding the agricultural production in the pilot area, but also farmers' knowledge regarding groundwater issues.

We can conclude the presence of economic feasibility of the MAR scheme in the pilot site, based on direct costs and benefits comparison. To incorporate uncertainty in analysis, scenarios with plausible variations of core parameters, such as expected irrigation water demand and levels of revenue per drop, were developed. Under all of them, the MAR scheme in the pilot site is expected to be economically feasible over the project's horizon (30 years). However, since analysis relies substantially on the data for the reference area, obtained CBA results should be treated as indicative.

Join our project actively!

To find out more about our activities please visit the project homepage:

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

We also invite you to our discussion group, where we share the results of the project's work and information about potential MAR-related training.

National Virtual Square

SLOVAKIA

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