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DEEPWATER-CE

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Solutions to tackle climate change via Managed Aquifer Recharge DEEPWATER-CE project

Andrea Vranovská

Adapting to Climate Change in relation to Water, 28/11/2023, Budapest

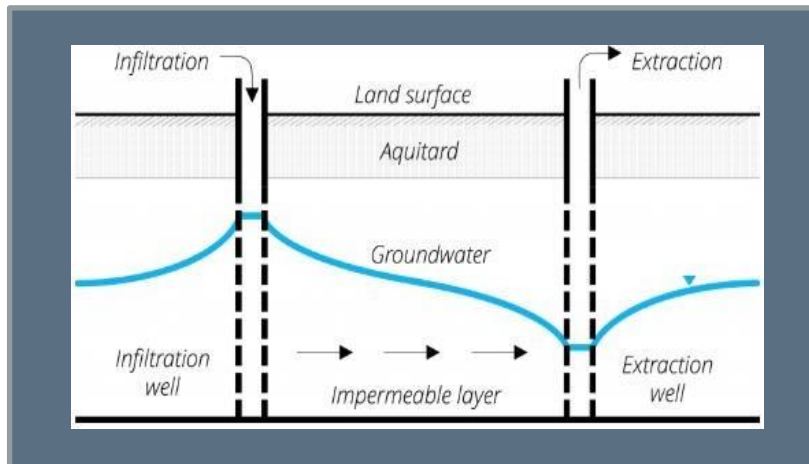
Managed Aquifer Recharge (MAR)

- **Endangered, decreased and unstable water sources due to climate change impacts**
- To prevent and address the arising user conflicts - necessity to innovate approaches and technologies in water management
- One of the solutions is **Managed Aquifer Recharge (MAR)**
- MAR is **an intentional process of directing/infiltrating excessive surface water into the ground** — either by spreading on the surface by using recharge wells, or by altering natural conditions **to increase infiltration in order to replenish an aquifer.**
- **To maintain, enhance and secure groundwater systems under stress**

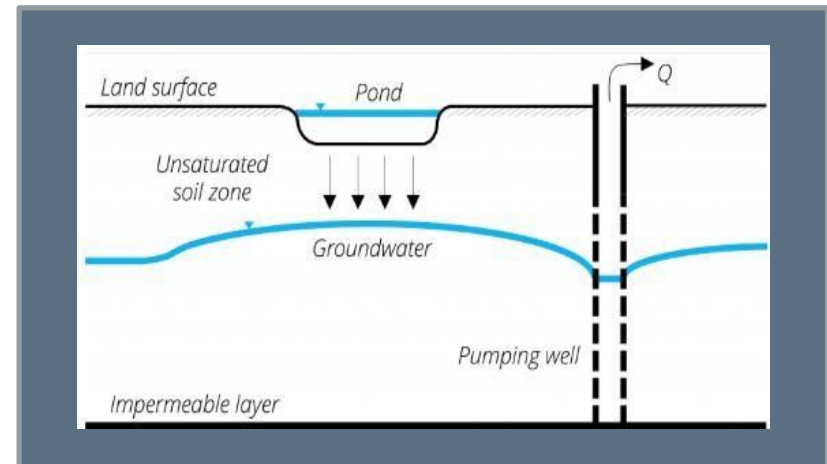


MAR principle

Aquifer storage, transfer and recovery (ASTR)



Infiltration pond



Possible water sources - surface water, rain water, storm water, reclaimed water, groundwater



6 selected MAR types

DEEPWATER-CE: Decision-support toolbox for identifying the suitability of MAR (English version) – [YouTube](#)

DEEPWATER-CE Promotional video_English version – [YouTube](#)



MAR sites selection criteria

1. **GENERAL SCREENING** – applied on the state or region
2. **SPECIFIC SCREENING** – applied on the areas considered as suitable after general screening

Criteria to be considered for screening:

- ✓ **Climatological selection criteria** - to find out where MAR schemes are needed or will be needed in the future
- ✓ **Geological and hydrogeological selection criteria** - to identify areas where MAR schemes are possible to be located
- ✓ **Analyze the sensitivity of MAR systems to climate extreme events** - to evaluate how MAR schemes can be applied when extreme climatic situations occur (i.e. dry or wet periods) and to identify related potential risk

Decision-Support Toolbox comprising the checklists in order **to choose suitable locations for MAR**

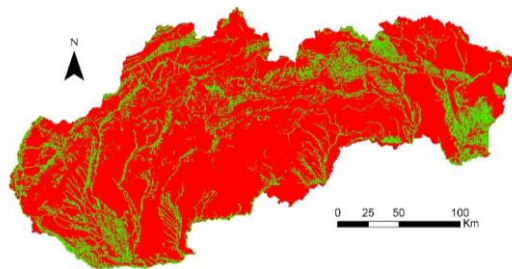


Maps for 6 selected MAR types

Maps for general and specific criteria applied in Hungary, Croatia, Poland and Slovakia:

<https://ggis.un-igrac.org/maps/2171/embed>

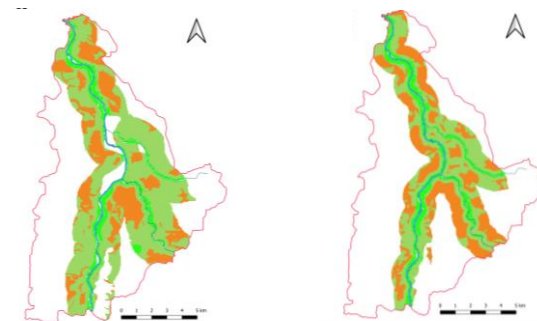
General mapping – Slovakia
Recharge dam



Specific mapping – Dunajec Catchment (Poland)

Ditches

Induced bank filtration



LEGEND

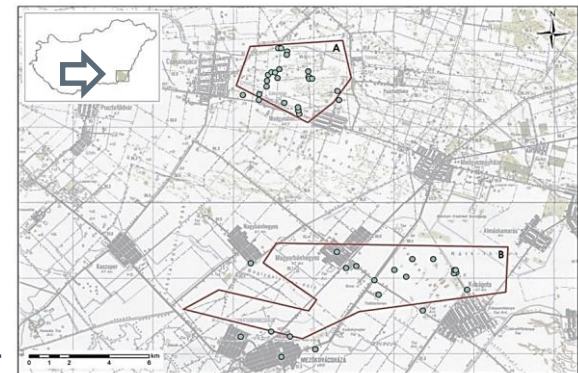


Pilot site

Hungary - Maros alluvial fan



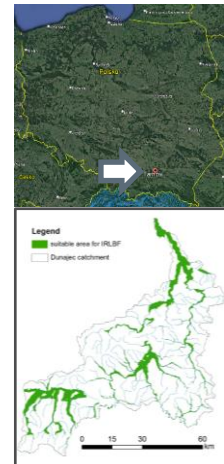
- ✓ Alluvium - paleo-channels of the Maros River (SE part of Hungary between two rivers: Körös and Maros)
- ✓ **underground dam MAR scheme** (i.e. construct a subsurface wall to interrupt groundwater flow resulting in an accumulation of groundwater)
- ✓ Detailed investigation of the pilot site aquifer - **field measurements** (geophysical measurements, groundwater sampling, pumping tests), and consequently **conceptual and numerical groundwater flow models**
- ✓ **Agricultural purposes**



Poland - Tarnów Waterworks



- ✓ **Porous aquifers located near industrial sites** - serious threat for the quality of water in shallow aquifers
- ✓ **Tarnów Waterworks** - 200 000 inhabitants supplied by **drinking water**
- ✓ **Świerczków pilot site** - groundwater is extracted from the **unconfined Quaternary porous aquifer** (*average thickness of 4-6 m, average hydraulic conductivity is 3×10^{-4} m/s, static water level is approximately 3,5–5 m below surface, wells yield about 86,7 L/s*)
- ✓ Aim of MAR systems – **to improve groundwater quality by reducing the inflow of water from the industrial zone**
- ✓ Field works - geophysical, hydrological and hydrogeological measurements, water and soil sampling for laboratory tests.

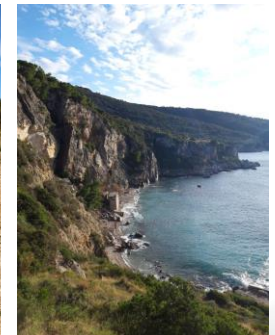


Pilot site

Croatia – Vis Island



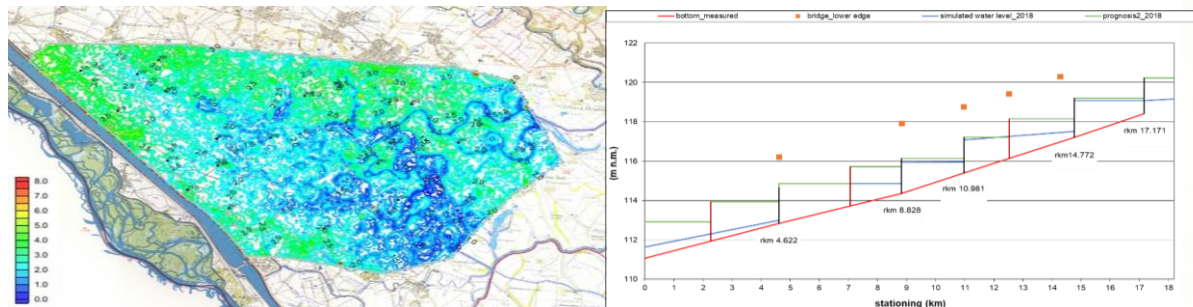
- ✓ **Karst semiarid hydrogeological conditions** of Dinaric karst region
- ✓ **Public water supply** - drilled wells in location Korita (40 L/s) and coastal spring Pizdica (3.3 L/s)
- ✓ **Main problem - high possibility of seawater intrusion** (*karst poljes serve as a barrier to seawater intrusion from southern direction and volcanic-sedimentary-evaporite rocks form western barrier*)
- ✓ **MAR - well/basin infiltration into karst aquifer**
- ✓ **Further research of aquifer** - geophysical research, structural measurements, determination of hydraulic parameters of the karst aquifer, hydrochemistry, monitoring of salinity and water levels
- ✓ **3D conceptual model**



Slovakia – Žitný ostrov

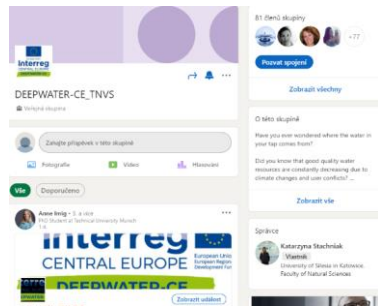


- ✓ Podunajska Lowland - **fluvial Quaternary sediments** (prevailing sandy gravels)
- ✓ **Gabčíkovo Water Structure (HPP) –Hrušov Reservoir** with left-hand seepage channel (supplies the channel network of Žitný Ostrov)
- ✓ pilot site area - **3 channels** Gabčíkovo-Topoľníky (S7), Vojka-Kračany (A7) and Šulany-Jurová (B7) – **MAR scheme - recharge dam**
- ✓ Field/laboratory measurements - input data to **HYDRUS 2D and MODFLOW** models
- ✓ **Agricultural use**



- ✓ **Feasibility assessment** of establishing MAR schemes in CE
- ✓ **Development of policy recommendations** and **national action plans** for adopting MAR solutions in national water resource management schemes
- ✓ **Dissemination of project outputs** – trainings for target groups, web, Transnational/National Virtual Squares, social media





Supporting activities




<p>14.09.2021 NEWS</p> <p>TRAINING</p> <p>The time is approaching for our autumn training events organised in partner countries. The first training will be held online on 29th September 2021 by our colleagues from Germany, who will be hosting meeting in ENGLISH!</p> <p>We warmly invite all interested participants to take part in the online training.</p> <ul style="list-style-type: none"> • More information about the objectives of the event can be found HERE • Meeting agenda HERE 	<p>02-03.06.2021 NEWS</p> <p>MEETING</p> <p>At the beginning of June the 4th online Project Coordination Meeting took place.</p> <p>Two years of the DEEPWATER-CE project have already passed. During the meeting, we summarized the activities to this day and discussed plans for the next six months.</p> <p>Read more</p> 	<p>26.04.2021 NEWS</p> <p>THE CLIMATE EXPOSURE MAPS</p> <p>We are pleased to present the climate exposure maps created by the Lead Partner (Hungary), uploaded on the IGRAC's GIS platform.</p> <p>As part of the work on WP T3, a set of maps for the four partner countries (HU, HR, SK, PL) was created.</p> <p>All 8 scenarios for 4 partner countries can be viewed and analyzed in the DEEPWATER-CE project Map Viewer available at: https://ggis.uni-igrac.org/maps/2171/embed</p>	<p>PAST NEWS ARCHIVE</p> <p>FIND HERE EVERYTHING YOU MISSED</p> <p>Click here to see all the past news!</p>
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<https://www.interreg-central.eu/Content.Node/DEEPWATER-CE.html>

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Thank you for your kind attention

andrea.vranovska@vuvh.sk

