MAR2PROTECT

Innovation Factsheet

REACH TOOL gRoundwatEr quAlity CHange

Problem Solved

Water resource managers and MAR operators lack accessible, validated tools to forecast how climate change (CC) and global change (GC) will affect groundwater quality and quantity over the coming decades. Aquifer vulnerability assessment is typically slow, expensive, and requires high specialist input. Without evidence-based predictions, long-term MAR investments and groundwater protection strategies cannot be optimally designed or justified to regulators and investors.

How It Works

The REACH Tool is made of three analytical modules: MOD-REACH, DATA-REACH and GIS- REACH integrating hydrogeological modelling with climate change scenario analysis to:

- → Predict piezometric levels and stored water volumes in aquifers under multiple CC scenarios.
- → Perform risk and vulnerability mapping for different types of aquifer contamination using GIS tools.
- → Identify areas most susceptible to groundwater pollution hazards (mapped outputs).
- → Provide decision-support for groundwater exploitation planning.

The tool has been proven capable of reproducing hydrogeological dynamics of aquifers with low uncertainty and high precision. It includes a model of the El Señorío Aquifer (Spain) and it has been tested in the Emilia-Romagna (Italy) and Frielas (Portugal) Demo Sites. The REACH tool is integrated into the broader M-AI-R DSS platform.

Unique Value Proposition

Forecasts climate & global-change impacts on groundwater quality and quantity. Predicts piezometric levels and maps vulnerability, exposure, hazard and risk. Includes aquifer models.

As climate change and rising demands threaten our vital underground water supplies, managers and policymakers face a critical challenge in securing these resources. The REACH Tool solves this by combining predictive AI, aquifer simulations, and GIS mapping to forecast future water levels and pinpoint pollution risks. This approach empowers decision-makers to run virtual “what-if” scenarios, optimise water management, and identify the absolute best locations for sustainable aquifer replenishment.

Result Identification

Technology Short Name

REACH TOOL.

Full Name

gRoundwatEr quAlity CHange.

Lead Partner

CETAQUA Andalucía, Spain.

Work Package / Task Related Deliverables

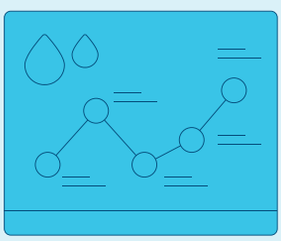
WP4. Linked to Task 4.2 and D4.3 contributing SO4 to predict the impacts of global and climate change on GW quality in a specific context.

Current TRL

TRL 6-7. Fully developed, validated on real aquifer and replicability study done.

KER Type

Tool → Software Platform integrated in the Decision Support System.



- **Efficiency:** integrated modeling and GIS tools streamline groundwater assessment processes.
- **Cost:** reduces expensive field monitoring through predictive modeling and risk mapping.
- **Safety:** identifies vulnerable zones for protection of water resources.
- **Sustainability:** supports long-term groundwater management under climate change scenarios.
- **Competitive advantage:** predicts the evolution of piezometric levels and electrical conductivity with high accuracy.

Target Markets & Users

Segment	Description	Role
Government and international organisations	Water authorities, basin managers and local, regional or national administrations responsible for groundwater protection and climate-adaptation planning	Primary user; policy maker
Water utilities, drinking water/water suppliers	Water utilities and MAR operators applying the tool to aquifer assessment, recharge planning and groundwater management	Primary user
Industrials (SMEs and large companies)	Environmental and hydrogeological consultancies integrating the tool into assessment and advisory services	Integrator; service provider
Academia and research community	Research institutions refining hydrological models and validating their transferability to other aquifers	Research and validation partner

Exploitation Route & Business Model Outline

Exploitation route	Open-source release with commercial consultancy services; integration into M-AI-R DSS as module
Revenue model	Consultancy for site-specific model setup and customization; training workshops; technical support contracts
IP strategy	Software copyright protection, trademark and contractual protection via SaaS terms under assessment
Next steps	Develop user manual; engagement with stakeholders

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