Demonstration Sites

1. Lavrion Technological & Cultural Park, Greece
   - Development and implementation of advanced sensors
2. Algarve and Alentejo, Portugal
   - River water infiltration at three sites
3. Arenales, Castilla & Leon, Spain
   - River water infiltration, soil aquifer treatment (SAT)
4. Llobregat River, Catalonia, Spain
   - River water infiltration basin
5. River Brenta Catchment, Vicenza, Italy
   - Forested infiltration area for aquifer storage and recovery (ASR)
6. Serchio River well field, Tuscany, Italy
   - River bank infiltration with an advanced monitoring network
7. Menashe Infiltration Basin, Hadera, Israel
   - Aquifer storage of surplus water from the Hadera desalination plant
8. South Malta Coastal Aquifer, Malta
   - Create a seawater intrusion barrier at a coastal wastewater treatment plant

Participants

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Institute of Communications and Computer Systems (ICCS)

Laboratorio Nacional de Engenharia Civil (LNEC)

Tragsa

Empresa de Transformación Agraria S.A. (Traasa)

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Terras, Ambiente e Recursos Hídricos (TARH)

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**MARSOL Objectives**

Large water quantities of water are often lost as surface runoff, river discharge, discharge of treated and untreated wastewater, and as discharge of excess water from various sources during periods of low demand. This water can, in principle, be used for the controlled re-filling of exploited aquifers by artificial infiltration, referred to as Managed Aquifer Recharge (MAR).

The objectives of the EU demonstration project MARSOL are:

- **Demonstrate** at eight field sites that MAR is a sound, safe and sustainable strategy to increase the availability of freshwater under conditions of water scarcity.
- **Improve** the state of the art of MAR application to enable low-cost, high-efficiency MAR solutions that will create market opportunities for European Industry and SMEs (MAR to market).
- **Promote** the advantages of MAR by tailored training and dissemination programs to enable and accelerate market penetration.
- **Deliver** a key technology to face the challenge of increasing water scarcity in southern Europe, the Mediterranean and other regions of the world.

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**MAR Demonstration**

**Different MAR purposes:**

- Replenishment of depleted aquifers (Lavrion, Arenales, Llobregat, Brenta)
- Combating sea-water intrusion (Lavrion, Malta)
- Improving the ecological and chemical status of aquifers (Algarve and Alentejo, Llobregat, Brenta)
- Soil aquifer treatment (Lavrion, Arenales)
- Seasonal aquifer storage & recovery of surplus fresh waters (Menashe)

**Different recharge techniques:**

- Infiltration basins (Lavrion, Algarve and Alentejo, Arenales, Llobregat, Menashe)
- Forested infiltration area (Brenta)
- River bank filtration (Serchio)
- Injection wells (Algarve and Alentejo, Malta)
- Others (artificial wetlands, ditches, drainage pipes) (Arenales)

**Different recharge water sources:**

- Surface waters (Algarve and Alentejo, Arenales, Brenta, Serchio)
- Treated effluents (Lavrion, Arenales, Malta)
- Desalinated water (Menashe)

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**MARSOL Approach**

**Tools to reach the objectives:**

- Data collection
- Monitoring (improvement of sensors, development of new sensors)
- Improvement of MAR devices planning, design and maintenance
- Modelling to simulate the impact of MAR on aquifer hydrogeology and hydrochemistry
- Scenario development
- Decision Support Systems
- Development of guidelines and policies
- Analysis of the potential role of Public Private Partnership schemes
- Analysis of potential market access solutions

MAR clogging and infiltration experiments in the Rio Seco river bed basin (Campina de Faro, Algarve, PT).

MAR is a partner of the European EIP Water Action Group “MAR Solutions - Managed Aquifer Recharge Strategies and Actions (AG128)” - [www.eip-water.eu](http://www.eip-water.eu)