

Demonstrating Managed Aquifer Recharge as a Solution to Water Scarcity and Drought

'The main objective of MARSOL is to demonstrate that MAR is a sound, safe, and sustainable strategy that can be applied with great confidence. With this, MARSOL aims to stimulate the use of reclaimed water and other alternative water sources in MAR and to optimize WRM through storage of excess water to be recovered in times of shortage or by influencing gradients'

Dec 1st 2013- Dec. 2016

Coordinator: TU Darmstadt (Germany)

<http://www.marsol.eu>

MARSOL: Demonstrating Managed Aquifer Recharge as a Solution to Water Scarcity and Drought

The Mediterranean region is suffering from increasing water scarcity, which is further exacerbated by climate change, high population density, and high water consumption by agricultural, industrial, and urban uses. Not only quantity but also quality is of increasing importance, e.g. due to intensive use of fertilizers and wastewater intrusion. Meanwhile, large water quantities are lost to the Mediterranean Sea 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 be used in principle for the controlled (re-)filling of exploited aquifers by artificial infiltration, referred to as Managed Aquifer Recharge (MAR).

1. Laverton Technological & Cultural Park, Greece - Development and implementation of advanced reuse - Treated wastewater effluents - Infiltration basins - Replenishment of exploited aquifer - Combating seawater intrusion - Soil Aquifer Treatment	Demonstration Sites For the project eight demonstration sites have been selected to represent different MAR purposes and hydrological settings. MARSOL follows an holistic approach, which considers different: • Recharge water sources • Recharge techniques • MAR objectives	8. South Malta Coastal Aquifer, Malta - Create a dedicated infiltration basin at a coastal wastewater treatment plant • Treated municipal sewage effluents • High quality groundwater • Combating seawater intrusion
2. Algarve and Alentejo, Portugal - River water infiltration of effluents • Surface water • Infiltration basins • WRM • Improving the ecological and physical status of the aquifer	4. Llobregat River, Catalonia, Spain • Surface water • Infiltration basins • Replenishment of exploited aquifer • Improving the ecological and physical status of the aquifer	7. Menashe Infiltration Basin, Hadera, Israel - Aquifer storage of surplus water from the National Desalination plant • Desalinated water • Infiltration basin • Seasonal storage and aquifer storage recovery of surplus desalinated water
3. Arenales, Castile and Leon, Spain - River water infiltration in two catchments • Treated wastewater effluents • Infiltration areas, artificial wetlands, drainage ditches • Replenishment of exploited aquifer • Soil Aquifer Treatment	5. River Brenta Catchment, Vicenza, Italy - Agricultural area with a network of ditches • Surface water • Infiltration basins • Replenishment of exploited aquifer • Improving the ecological and physical status of the aquifer	6. Senchia River Well Field, Tuscany, Italy - River bank infiltration with an advanced monitoring network • Surface water • Induced river bank infiltration • Replenishment of exploited aquifer • Quantity and quality • Continuous monitoring and automated operations

The Project

- 23 Partners
- 18 months, starting 12/2013
- Total budget = 8.0 million EUR
- EU contribution = 2.2 million EUR

MARSOL Project—Main Objectives

- Demonstrate at 8 field sites that MAR is a sound, safe, and sustainable strategy to increase the availability of freshwater under conditions of water scarcity.
- Improve the value of MAR applications to enable broader, 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 the Mediterranean region of southern Europe and other regions of the world.

Tools to Reach the Objectives

- Data collection
- Modelling (management of sources, new services)
- Improvement of MAR devices (planning, design, and maintenance)
- Modelling (to simulate the impact of MAR on aquifer hydrology and hydrogeology)
- Scenario analysis
- Development of a Decision Support System
- Definition of guidelines and policies
- Increase of public participation within Public Private Partnership (PPP) schemes
- Market analysis on the potential market exploitation solutions

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MARSOL

An Environment 2013 Cooperation Project funded by the European Commission

How can the increasingly scarce resource called water be exploited and used intelligently? The joint project MARSOL is aiming to demonstrate that Managed Aquifer Recharge techniques are able to secure 'excess' water and store it in the soil. The EU is funding the MARSOL project with 5.2 million Euros over 3 years under the WATER-INNO-DEMO scheme.

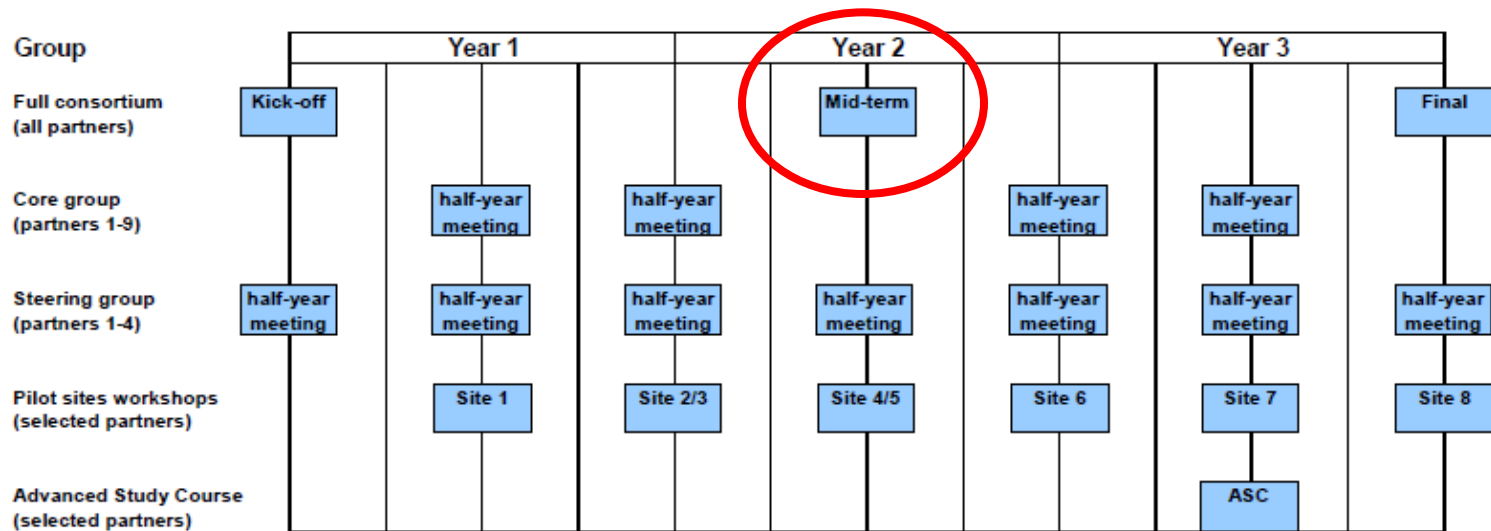
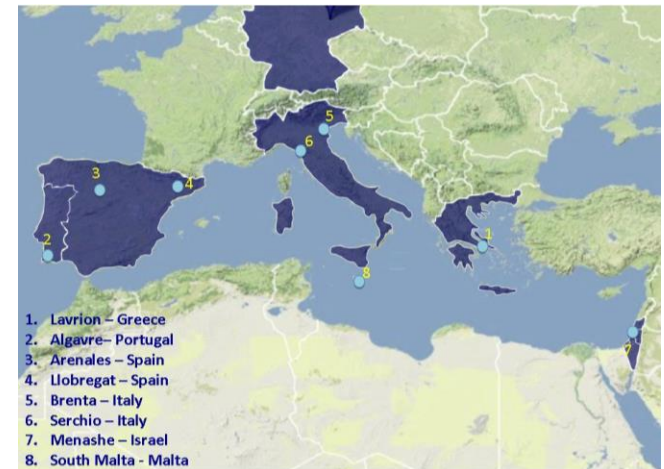
It is estimated that due to climatic changes only about 50 percent of today's amount of water will be available in the Mediterranean region by 2100 – while the population continues to grow. The lack of water will result in drought and crop losses.

MARSOL
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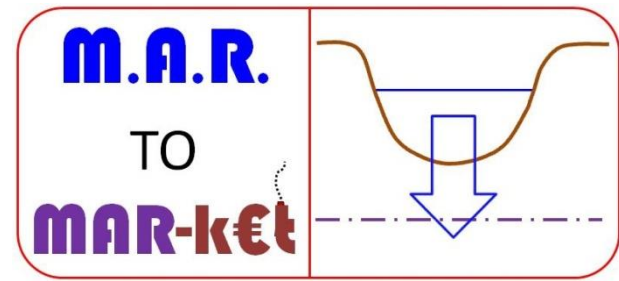
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2014 advances:

- Characterization of the economic backdrop for each demo site (8)
- Legal frame regarding MAR in the seven participating countries
- Workshop on MAR and modelling. Lisbon, Portugal (July 2014)
- Participation in Workshop on MAR Piacenza, Italy (Oct. 2014)
- Arenales workshop MAR4FARM. Segovia Spain (Oct. 2014)
- Israel Workshop (Nov-Dec 2014)
- 9 planned workshops in three years: mid-term workshop Ξ European Symposium scope opened to non participants (**"ESMAR"**) by mid2015
- Outcomes to be shared soon




New Action Group / Working Group MAR(solutions) to MARK€t



- Implementation possibilities of MAR technique into nine different branches of industry and blue print studies related to MAR.
- Managed Aquifer Recharge strategies & actions, AG128 of the European Innovation Partnership (EIP)
- Directly related to MARSOL project
- Leaders: LNEC (PT) –Tragsa (SP)
- 35 partners
- Involving Water Technology Platforms and IGRAC for Dissemination and Technology Transfer (D&TT) activities
- IAH MAR Comm. WG linked to the AG activities, with similar objectives, a broader international scope and longer in time





Eight different industry branches have been identified to be involved in the application of MAR technique

1. Agro-industry
2. Water supply companies
3. Waste water treatment plants
4. Desalinations companies
5. Bottled companies
6. Golf courses
7. Public Administration branches
8. SPAs and balnearies
9. Hotels and tourist facilities (Market uptakes)



Involved industry in MARSOL demo-sites & apart

1. Agro-industry. Arenales (SP): Direct linkage between MAR water and high quality products.
2. Water supply companies: Athens. Greece, Labrion (Greece) and Algarve (Portugal)
3. Waste water treatment plants: Llobregat, Barcelona, Spain, Labrion (Greece) and Malta South
4. Desalinations companies: Menashe (Israel) and Malta South.
5. Bottled companies. Working on currently on the food industry
6. Golf courses. Relation with MAR not clear within Europe yet
7. Public Administration branches. All demo-sites
8. SPAs and balnearies. Working on currently
9. Hotels and tourist facilities (Market uptakes). Connection with demowarte and Demeaumed projects. Posible pilots in Catalonia and Balearic islands

To participate in the Mar to MARK€t Working Group (IAH MAR Com), please contact: efernan6@tragsa.es; leitao@lnec.pt

