

Monday, May 20th 2019

Short Course nº 4

Theme: Technical solutions for IWRM by means of MAR schemes

Title: Technical solutions to increase Managed Aquifer Recharge effectiveness. MARSOL project findings and Tragsa Group experience regarding design and construction criteria, operation and management

By:

Dr. Enrique Fernández Escalante (Tragsa Group)

Dr. Jon San Sebastián Sauto (Tragsa Group)

Themes

This half day **interactive workshop** intends to show several sets of “technical solutions” based on the current state-of-the-art. It also entails a repository including all types of activities applied and/or deployed in the different demo site scenarios of the MARSOL project (eight demo sites in five Mediterranean countries) and real implementations conducted by Tragsa Group. The different techniques have been aggregated into a data base, offering different problem-solution binomials after 4 years of tests. Some of the technical solutions are willing to be applied in similar scenarios all around the world. Examples from five continents have been gathered.

It is important to state, since the beginning, that “technical solutions” are not related to Managed Aquifer Recharge (MAR) technique as if it was the problem to solve, but rather the group of activities to increase MAR effectiveness, being MAR the solution to many related water management dysfunctions.

Objectives

One of the main issues that have arisen in most of the MAR facilities is how to get an actual effective and rapid infiltration rate. The difficulty presents a technical character: *How to increase the infiltration speed of water flow into the aquifer?* A possible solution to this issue is the adoption of soil and aquifer treatment and other complementary techniques. Within that context, this overview relates the integrated actions and available techniques to be adopted from specific MAR sites around the world, technological improvements willing to:

- ✓ Increase the rate of infiltration in MAR operating areas,
- ✓ Increase the effectiveness of the already existing facilities,
- ✓ Check design criteria to be applied in future MAR devices.

After the international overview of existing tech-Sols, some experiences are presented regarding diverse groups of actions, which might be clustered in three different classes:

- ✓ Design and construction,
- ✓ Operation,
- ✓ Management, Decision Support Systems and benchmarking.

PROGRAM. Afternoon time. The workshop program includes:

SESSION I (Before coffee break)

1. Building work designs for Managed Aquifer Recharge facilities
2. Introduction. All attendees
Instructor: Dr. Enrique Fernández Escalante
3. Context. Technical solutions' corollary. International State-of-the-art overview.
4. MAR-SOLutions obtained from the experience in eight MARSOL demo sites from six Mediterranean countries (Portugal, Spain, Italy, Greece, Malta and Israel).
Instructor: Dr. Jon San Sebastián Sauto. Full round-table to share specific experiences from attendants.

Break- Networking

SESSION II (After coffee break)

5. *Tech-Sols* database and problem-solutions binomials and benchmarking applied to MAR guidelines.
 6. Discussion – All attendees. Full round-table to Exchange experiences
 7. Questions and discussion. Collective summary
- Farewell & photo. All attendees*

Description

The workshop has been divided in two sessions and seven chapters: After the summary and the introductory paragraph, chapter 2 will provide the state-of-the-art context: a hydrogeological literature synopsis on past technical solutions applied to improve the efficiency of worldwide Managed Aquifer Recharge activities.

Chapter 3 details the activities and results performed in the different MARSOL demo sites and Tragsa Group's experience deploying MAR facilities in several countries. Afterwards the structure of the MARSOL database will be exposed, defined in terms of problem-solutions models. So that, the interrelation among the users, the *smart solution*, the demo-sites infrastructure and the repository of experiences will be guaranteed.

The database structure is deliberately open and flexible to integrate additional future inputs from the conventioners' experience and related agents.

The final corollary distinguishes **four main sorts of operations**:

- ✓ Applied to water from its original source (in both quantity and quality),

- ✓ To the receiving medium (in both soil and aquifer),
- ✓ Management parameters,
- ✓ Cleaning and maintenance operations plus combinations.

Note: It is expected all attendees will share their experiences on each topic. A new complementary checklist of worldwide experiences is expected to be a probable product as a result of the course attendants' experiences interchange.

Optionally and depending on the time, an appendix will be included showing a 12 min film on technical solutions in Los Arenales Aquifer (Spain), with comments on the described elements.

Proposers:

- Dr. Enrique Fernández Escalante, practitioner, lecturer and researcher with 29 years experience in hydrogeology, the last 20 dedicating most of his time to MAR projects and activities. Member of MAR-SOL project <http://www.marsol.eu> and coordinator of DINA-MAR. <http://www.dina-mar.es> and RECACUIF projects...
- Dr. Jon San Sebastián Sauto, practitioner, lecturer and researcher with 25 years experience in environmental aspects of constructions. Researcher of the aforementioned projects. www.marsol.eu.

Note: 100% of the course incomes will be donated by proposers to ISMAR 10 organization in order to reduce the registration fees as much as possible.