The MARSOL Project

Managed Aquifer Recharge

Many regions in the world suffer from water scarcity, which is further exacerbated by climate change, increasing 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, or due to seawater intrusion. Meanwhile, large water quantities are lost to the 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 for the controlled (re-)filling of exploited aquifers by artificial infiltration, referred to as Managed Aquifer Recharge (MAR).

The Partnership

The EU-funded MARSOL project has 22 partners and operates eight demonstration sites in Greece, Portugal, Spain, Malta, Italy, and Israel. Waters coming from different sources with different qualities (such as precipitation, river water, treated wastewater, and desalinated seawater) are infiltrated into the subsurface at these sites using various techniques and monitoring schemes.

The MARSOL project has received funding from the European Union's 7th Framework Programme for Research, Technological Development and Demonstration under grant agreement no 619120.

Course Information

Target Audience

Graduate and post-graduate students, PhD students, postdocs in the fields of geosciences, water research, environmental research, or related areas; professionals aiming at improving or broadening their qualification. A certificate of participation will be issued at the end of the course.

Costs

Participation in the Advanced Study Course is free of charge. All travel and accommodation costs must be covered by the participants. Barcelona offers a wide range of budget accommodations, and low cost carriers fly to Barcelona from many places in Europe.

Registration

Participation is limited to 25 participants. For application, please send a brief CV and a motivation letter to the email address given below. Deadline for the registration is 15 October 2016.

Contact

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MANAGED AQUIFER RECHARGE SOLUTIONS

Managed Aquifer Recharge: Water Quality and Reactive Modeling

Advanced Study Course

7 - 9 November 2016
Barcelona, Spain

MARSOL FP7 EU Project
www.marsol.de
marsol@geo.tu-darmstadt.de

Course Programme

Monday, 7 November 2016

Morning session

Fundamentals of Managed Aquifer Recharge (MAR): The concept of MAR is presented and requirements for its implementation considering different water sources and different objectives are discussed.

Technical solutions for MAR systems: State of the art technical solutions for implementing various MAR systems are presented. Performances of the different designs are discussed and the experiences made during long-term operation of such systems are presented, providing new advices on design, operation and management, at international level.

Photo: MAR experiment in South Portugal

Afternoon session

Water quality aspects of MAR: An overview on water quality aspects that have to be considered in MAR installations will be given with special focus on organic micropollutants. Entry pathways and fate of these contaminants are discussed based on hydrochemical boundary conditions.

Course Programme

Tuesday, 8 November 2016

Morning session

Principles of water quality modelling during MAR: Fundamentals of solute transport and biogeochemical processes in the subsurface are presented. An introduction to geochemical and reactive transport modelling with special emphasis on MAR is given. Different MAR case studies and their modelling approaches are presented, such as deep-well injection, AR with highly treated wastewater, and ASR of reclaimed wastewater. The fate of pharmaceuticals and arsenic mobilization are discussed as examples of reactive transport modelling of redox sensitive species.

Photo: MAR scheme in Israel

Afternoon session

Hands-on modelling exercises: Participants will setup, parameterize, and calibrate a conceptual reactive transport model for the modelling of redox zonation at MAR sites, and for the modelling of the fate of micropollutants and metalloids.

Course Programme

Wednesday, 9 November 2016

Morning session

MAR in the Barcelona region: Existing MAR installations in the Barcelona region will be presented, their monitoring and modelling concepts explained, and their performance discussed.

Field visit of MAR installations in the Barcelona region: The MAR site, located in Sant Vicenç dels Horts, 15 km south of Barcelona, consists of a settlement pond and a recharge pond. Water source is the local Llobregat River. A reactive layer has been installed at the bottom of the recharge pond in 2011 to enhance biodegradation of contaminants.

Photo: MAR infiltration basin near Barcelona

Closure of the course early afternoon

Wrap-up meeting to summarise the course's contents and discuss open questions; collection of evaluation questionnaire; handing out of participation certificates.

Further program details (venue, lecturers, course schedule):

www.marsol.eu/41-0-MARSOL-Events.html