



AQUAREHAB

Development of rehabilitation technologies and approaches for multipressured degraded waters and the integration of their impact in river basin management

REHAB

NEWSLETTER JUNE 2013



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Announcement:

Final AQUAREHAB Symposium, 20-21 November, 2013, Leuven, Belgium – call for abstracts is open. Check www.vito.be/events to submit your abstract.

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AQUAREHAB

<http://aquarehab.vito.be>

Introduction

AQUAREHAB has now been running for four years, and aims to finish by the end of 2013. The main work in the last year has been finalising the technological and modelling work packages, hosting the 1st AQUAREHAB Symposium at the Institute for Catalan Studies (Institut d'Estudis Catalans) in Barcelona (25th and 26th September 2012) and starting the extrapolation of the AQUAREHAB developments to other areas (Work Package 8).

In this Newsletter we focus primarily on the outcomes of the **1st AQUAREHAB Symposium in Barcelona**, which included a policy (implementation) session to discuss the **policy issues relevant to AQUAREHAB**.

Intermediate AQUAREHAB conference: 1st European Symposium on Remediation Technologies and their Integration in Water Management

To improve the interaction between different disciplines as well as between people involved in different aspects of water management, AQUAREHAB helped to organise the “**1st European Symposium on Remediation Technologies and their Integration in Water Management**” at the Institute for Catalan Studies in Barcelona on September 25-26th, 2012. The aim of this event was to bring together scientists, policy makers, consultants, site owners, water managers and remediation companies who are working on or involved in water quality issues. In this Symposium, the barriers and potential approaches to integrate groundwater and surface water issues



Figure 1. Participants at the 1st European Symposium on Remediation Technologies and their Integration in Water Management in Barcelona enjoying discussions with fellow participants in the courtyard of the Institute for Catalan Studies

into one water management system was selected as the special topic. Furthermore, research results and demonstrations of different technologies were presented that have been developed as viable alternatives for standard dig & dump and pump & treat approaches. The Symposium on Remediation Technologies and their Integration in Water Management was therefore a platform for different thematic symposia and different projects to disseminate their results. The event organised in Barcelona was a joint effort

between the 5th European Conference on Permeable Reactive Barriers & Reactive Zones (PRB/RZ-2012), and the external dissemination activities of the two FP7



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research projects **AQUAREHAB** (aquarehab.vito.be) and **UPSOIL** (upsoil.eu).

About 100 abstracts were received, which were organized as 44 platform presentations in two parallel sessions, and more than 50 poster presentations. There were in total 11 oral and poster sessions held over two days:

1. Reactive Iron Particles - Chair: Jürgen Braun (VEGAS, Germany);
2. Wetlands & Riparian zones - Chair: Jaroslav Slobodnik (Environmental Institute, Slovak Republic);
3. Impact of chemical treatments on biological processes & soil matrix - Chair: Pauline Van Gaans (Deltares, NL);
4. Numerical models to estimate impact of remediation technologies - Chair: Gerrit Schoups (TUDelft, NL);
5. Transport of injectable particles - Chair: Rajandrea Sethi (POLITO, Italy);
6. Remediation technologies: Lessons learned from the field - Chair: Johan Gemoets (VITO, Belgium);
7. Rehabilitation technologies for metals - Chair: Tim Grotenhuis (Wageningen University, NL);
8. Water management: fate models - Chair: Pieter-Jan Haest (VITO, Belgium);
9. Water Management: Decision support systems - Chair: Piet Seuntjens, VITO, Belgium;

10. New developments - Chair: Marco Petrangeli Papini (Sapienza Univ. of Rome, Italy);
11. In-situ bioremediation: progress in basic research - Chair: Jens Aamands (GEUS, Denmark).

The 100 participants from 16 different countries enjoyed the symposium organised in an historical place under the Spanish sun.

The proceedings of the conference are now available on the AQUAREHAB website.

In addition to the 11 sessions listed above there were two general sessions: AQUAREHAB plenary session and the UPSOIL session. In the **AQUAREHAB plenary session** the project outcomes that are particularly relevant to the non-scientific community were presented. This included a discussion on remediation technologies and their impact (products related to remediation technologies, technology numerical models, generic guidelines) and river basin management tools (fate models, data bases & prototype REACHER DSS, generic guidelines/approaches/manuals).

Finally a water policy implementation session was organised by AQUAREHAB and the WaterDiss2.0 project (see below)



Figure 2. Participants at the 1st European Symposium on Remediation Technologies and their Integration in Water Management in Barcelona attending one of the oral presentations

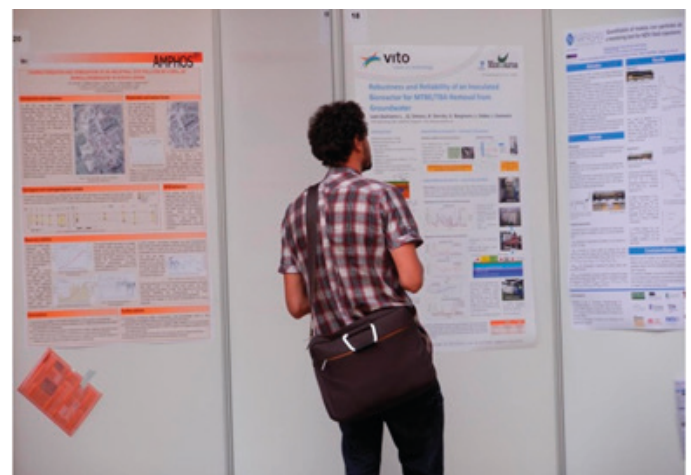


Figure 3. The poster session at the 1st European Symposium on Remediation Technologies and their Integration in Water Management

Policy (implementation) session: The challenges of integrating the impact of remediation technologies into water management

Water and environmental agencies and technology providers share a common interest in applying the best technologies to remediate water degraded areas. This policy (implementation) session aimed to match the needs of policy makers and practitioners to the new solutions provided by research projects in order to meet the objectives set out in the Water Framework Directive and related directives. It was organised by **AQUAREHAB** and the **WaterDiss2.0** project. The WaterDiss2.0 project (www.waterdiss.eu) is part of the SPI-Water Cluster, which consists of three EC FP7 projects dealing with science-policy interfacing in water management: **STREAM**, **WaterDiss2.0** and **STEP-WISE**. These projects are working to support the transfer of water research results to intended users, linking science, policy and practice. To support the preparation of the session a questionnaire was sent to a selected list of end-users before the event. The aim of the questionnaire was to collect opinions and concerns framing the basis for the discussions. The session was divided into three thematic discussion groups: Groundwater management; Diffuse (land) pollution; and, Remediation technologies.

Groundwater management

The central issue for the groundwater management discussion was that currently **the integration of groundwater management and remediation in 'water management'** does not seem to be fully accomplished by EU policy. During the session the group tried to address what are the bottlenecks for implementation and what is the key policy requirements related to the issue of groundwater/surface water protection? It was observed that Water Framework Directive (WFD) is mainly focussed on the long term and large scale management of surface water within water bodies – so that activities related to groundwater as part of remediation of contaminated sites are probably at a too local scale for the WFD and are mainly addressed by regional environmental authorities. This might be so but there could be more effort to harmonise standards and legislation concerning risk assessment and management of contaminated sites and pollution incidents. Since local groundwater contamination can often affect large groundwater bodies, it is still important to consider the effects of the parcel scale on the larger scale. Furthermore, groundwater is an important reserve for clean water in the future, and should be considered as a receptor and not just a path of pollutants to reach surface waters. Besides scale, the pollutant types listed in the WFD are mainly based on the needs of maintaining good surface water status, while other compounds are of more concern groundwater quality status. In addition, the limited dynamics of groundwater complicates the use of tools & legislation developed for highly dynamic surface waters. At the moment it seems that more public information is needed concerning the status of the groundwater to increase the awareness and understanding of its impacts and the best remediation approach. In addition, it is important to establish relations between the use of the groundwater and the quality in order to assess whether all groundwater reserves are adequate for all uses or whether there should be restrictions on use depending on the quality. This topic was discussed further in detail within the AQUAREHAB advisory board. AQUAREHAB decided to release by the end of 2013 a policy brief summarising its experiences in relation to the 'integration of groundwater management in water management' and propose recommendations for policy makers.

Diffuse land pollution

During the diffuse (land) pollution discussions it was observed that there is an **absence of clearly defined source areas for diffuse pollution**, posing specific requirements for monitoring. Tools are still needed to relate nutrient levels at the surface to concentrations in the groundwater and so identify the principle polluters. Diffuse pollution has the following key characteristics: prolonged effects over time, multiple polluters (from different sectors), unclear delineation, and multiple responsibilities in terms of tackling the issue. These characteristics pose major challenges for the design, implementation and management measures. Nutrients and pesticides are typical examples of diffuse pollution, but other compounds cannot be excluded – therefore there is a need to prioritize chemicals based on occurrence, hazard, and volumes.

Remediation technologies

The remediation technologies discussion group focussed on how policy makers deal with the time effects of groundwater remediation measures, because the effects of remediation may not be readily visible or may take years or even decades to become effective for improving the quality of surface waters. Obviously the lengthy time scale of some technological solutions has to be taken on board when designing and implementing a groundwater remediation and monitoring framework for a region. It is therefore important that the "generic guidelines on remediation technologies" provides sufficient information for policy makers and practitioners to make informed decisions on which technologies are suitable for a given situation. The required length and content of guidelines was discussed: it was concluded that different end-users may require different types and quantities of information and that as such different guidelines versions may be preferred (i.e. short and general versus long and detailed). AQUAREHAB has therefore taken great lengths that each technology developed during the project provides standardised information to support the practitioner to decide on the design and implementation of a certain technology and to assess its performance in a their field/river basin/groundwater body context.



Figure 4. One of the break-out discussion groups at the Special Sessions to discuss the policy issues relevant to AQUAREHAB





AQUAREHAB meetings

AQUAREHAB's Fifth General Meeting

The Fifth General Meeting was held at in Barcelona, immediately after the Symposium (27 – 28 September, 2012). The two day meeting gave the participants the opportunity to discuss the progress of the Project in its fourth year, and present the results achieved so far in 2012. The key issues discussed for the next months was the finalisation of the technology and modelling deliverables and the extrapolation of the AQUAREHAB developments to other areas in Europe.

ANNOUNCEMENT: AQUAREHAB's Final Symposium in Leuven, Belgium

The AQUAREHAB's Final Symposium will take place in Leuven, Belgium 20th to 21st November, 2013. This Second European Symposium on Water Technology & Management Symposium aims at bringing together scientists, policy makers (local, country and European level), consultants, site owners, water managers and remediation companies who are working on or involved in water quality. The goal is to improve interaction between different disciplines as well as between people involved in different aspects of water management. It will be a platform for different thematic symposia and different projects to disseminate their results. The specific topics so far decided for the Symposium are: groundwater remediation & management; innovative wastewater treatment technologies; and drinking water.

More information can be found at the AQUAREHAB website: <http://aquarehab.vito.be> under the title 'Latest news'.

Papers on AQUAREHAB work

- » Yimer Ebrahim, G., Hamonts, K., Van Griensven, A., Jonoski, A., Dejonghe, W. 2012. Numerical simulation of groundwater-surface water exchanges using temperature, hydrological processes, accepted. Hydrol. Process DOI: 10.1002/hyp.9310.
- » Li, H., De Boer, C.V., Buchau, A., Klaas, N, Rucker, W.M., Hermes, H., 2012. Development of an inductive concentration measurement sensor of nano sized zero valent iron. 9th International Multi-Conference on Systems, Signals and Devices (SSD).
- » Xue, D., Sethi, R., 2012. Viscoelastic gels of guar and xanthan gum mixtures provide long-term stabilization of iron micro- and nanoparticles. J. Nanopart. Res. 14:1239-1253.
- » Velimerovic, M., Chen, H, Simons, Q., Bastiaens, L. 2012. Reactivity recovery of guar gum coupled mZVI by means of enzymatic breakdown and rinsing. J. Cont. Hydrol. 142-143: 1-10
- » Carniato, L., Schoups, G., Seuntjens, P., Van Nooten, T., Simons, Q. Bastiaens, L. 2012. Predicting longevity of iron permeable barriers using multiple iron deactivation models. J. Cont. Hydrol. 142-143: 93-108.
- » Bosch J., Meckenstock RU. 2012. Rates and potential mechanisms of anaerobic, nitrate-dependent microbial pyrite oxidation. Biochemical Society Transactions (40) 1280-1283.
- » Comba S., J. Braun, 2012. A new physical model based on cascading column experiments to reproduce the radial flow and transport of micro-iron particles Original Research Article. J. of Cont. Hydr., 140-141:1-11.
- » Tosco T., Marchisio D.L., Lince F., Sethi R. 2013. Extension of the Darcy-Forchheimer Law for Shear-Thinning Fluids and Validation via Pore-Scale Flow Simulations. Transport in Porous Media, 96:1-20.
- » Atashgahi S, Maphosa F, Doğan E, Smidt H, Springael D, Dejonghe W. 2013. Small-scale oxygen distribution determines the vinyl chloride biodegradation pathway in surficial sediments of riverbed hyporheic zones. FEMS Microbiol Ecol. 84(1):133-142.

AQUAREHAB in a nutshell

AQUAREHAB is an EU financed large scale research project (FP7) that started 1st May 2009 with 19 project partners. The AQUAREHAB consortium will work together on the project for 56 months (until 2013). Within this project, different innovative rehabilitation technologies for soil, groundwater and surface water will be developed to cope with a number of priority contaminants (nitrates, pesticides, chlorinated compounds, aromatic compounds, mixed pollutions...) within heavily degraded water systems. The expected outcome of the project is new or improved remediation technologies; guidelines to describe feasibility tests, applications and monitoring; technology specific numerical tools to improve designs and predict the long term effects of technologies; and, a generic river basin management tool that predicts the impacts of measures on surface and ground water bodies. AQUAREHAB therefore aims to be the basis for improving future river basin management tasks and site specific remediation management.

