

PROPOSAL FOR A CREATION OF A NEW WORKING GROUP CALLED “MAR TO MARKET” WITHIN THE FRAMEWORK OF IAH-MAR COMMISSION

April 7th 2014



1 - Title of the Working Group (WG)

**MAR TO MARKET
STRATEGIES AND ACTIONS TO BRING MANAGED AQUIFER RECHARGE
TECHNIQUE TO THE INDUSTRY.**

2 - Background

At ISMAR 8 IAH MAR Commission’s plenary it was advanced by Enrique Fernández Escalante the intention of creating a future working group called MAR to MARKET. This group would be in close contact with the already existing WG “economics and MAR”, also including a branch dealing with MAR and “blue print” or (water footprint).

*After some months of maturing this idea, an Action Group was proposed to the European Community in the last European Innovation Partnership (EIP) call, named: **STRATEGIES AND ACTIONS TO BRING MANAGED AQUIFER RECHARGE TECHNIQUE TO THE INDUSTRY (MAR(solutions) to MARKET).***

Detailed info about these AG, the backdrop and the ones already operative, as well as the list of those recently approved is published at: <http://us6.campaign-archive2.com/?u=55b2cc2102daad86f327941d4&id=d16a34dbd7&e=374071f309> where is provided further info about the approved Action Groups, expected impact, institutions involved, countries of origin, etc.

The Action Group 14 has been proposed by a group of partners participating in the EU funded new project “MAR-SOL” (Managed Aquifer Recharge as a Solution to Water Scarcity and Drought) where about 15 out of the 35 current members participate.

In the very same memory it is described that this AG will be in close touch with IAH MAR Comm. and is intended to propose a Working Group dealing with these topics.

The detailed description of objectives is common for both, the Action Group (European scope with some international participants) and the Working Group (International scope).

The work to be done is guaranteed thanks to the AG activity and the commitment with the EU to achieve the expected results in three years time. Thus, it is perfectly compatible the existence of both groups as a guarantee of permanence and sustainability, taking advantage of its synergistic effects. Also the large amount of companies and institutions supporting the AG is expected to take part in the proposed WG.

3 - WG lead coordinators

The working group will be coordinated by two IAH members, who will act as contact people:

Full name	Dr. Enrique Fernández Escalante
Organization/company	TRAGSA (Empresa de Transformación Agraria). Madrid, Spain
Email address	efernan6@tragsa.es
Tel	+34 91 322 6106

Full name	Dr. Teresa E. Leitão
Organization/company	LNEC (National Laboratory for Civil Engineering). Lisbon, Portugal
Email address	tleitao@lnec.pt
Tel	+351 21 8443802

The coordinators CV is enclosed as annex 3.

4 - Executive summary of planned activities

Managed Aquifer Recharge technique, or simply MAR, has become, perhaps, the best technique within the Integrated Water Resources Management (IWRM) framework, to palliate Climate Change adverse effects. Due to the fact that some impacts are increasing rapidly, in scale and intensity, permanent "technological solutions" are required as a "water innovation in action" line.

R&D advances in water sector are "slow". It is required high doses of innovation, patience and a huge "hydro-imagination".

The innovative technical aspects of the planned activities include the development of novel MAR systems, or modification of existing ones, with sound technologies that can overcome the main drawbacks. MAR will increase aquifer water storage that can be used in meteorological drought periods, to supply water to human activities or to keep natural ecosystems. At the same time, will enable to solve flood problems by promoting aquifer recharge.

This strategic storage could also be used by some industrial branches and water cycle agents, for their future survival and development, as well as bringing new solutions for SMEs. "There is no business without sustainability and the opposite".

It is also worth to mention the important role developed by forest masses in major basin watersheds. According to studies in the Eastern part of Spain, the forests increase the seepage in the aquifers in comparison to close barren areas (www.dina-mar.es). It is also worth to mention the importance of vegetal masses on climate change.

The major questions to be addressed by the Working Group are based on this basis: "Industry must understand that much of their future is linked to groundwater by means of increasing their awareness across adapted dissemination techniques".

Some challenging lines of the action are:

- *Water efficiency linked to a bigger productivity and savings in water supply and energy costs (the demand for water is increasing currently).*
- *Guarantee for sustainability and permanence even at water scarcity situations.*
- *Water quality improvement through Soil Aquifer Treatment (SAT) technologies.*
- *MAR technique as a "Market opportunity" for market drivers and applications.*
- *Lower "Blue print" or "water foot-print" and smaller impacts in the aquifers which content is going to other places as virtual water.*
- *Huge potential to convert MAR into job opportunity creation.*
- *Strengthen cooperation with international organisms, as UNESCO, World Bank, FAO, Red Cross...*
- *Demo sites to show the suitability of MAR technique. Sequential actions involving, firstly, related industrial sectors of high visibility at an international level.*
- *Hydro-economic modelling (combines factors hydro (geo) logical, structural, institutional and economic to simulate the evolution of the value of water in space and time).*

Annex 1 provides the list of proposed industry branches to work for and their main characteristics from the WG point of view.

5 - Partner base for this WG

The list of organizations/companies in the nucleus of the mentioned AG willing to participate in the proposed WG are:

1. *Laboratório Nacional de Engenharia Civil (PT)*
2. *Grupo Tragsa (Tragsa and Tragsatec) (SP)*
3. *Technische Universität Darmstadt (GE)*
4. *IWW Rheinisch-Westfälisches Institut für Wasserforschung gemeinnützige GMBH (GE)*
5. *National Technical University of Athens (GR)*
6. *Lavrion Technological & Cultural Park (GR)*
7. *Universitat Politècnica de Catalunya-BarcelonaTech (SP)*
8. *Helmholtz-Zentrum für Umweltforschung GmbH (GE)*
9. *Universidade do Algarve (PT)*
10. *Malta Resources Authority (MA)*
11. *Agência Portuguesa do Ambiente (PT)*
12. *Institute of Communications and Computer Systems (IT)*
13. *Athens Water Supply and Sewerage Company (GR)*
14. *Santiuste Basin Irrigation community (SP)*
15. *IGRAC (HL)*
16. *Comunidad de Usuarios de Aguas del Valle Bajo y Delta del río Llobregat (SP)*
17. *Terra, Ambiente e Recursos Hídricos (PT)*
18. *Aguas do Algarve, S.A. (PT)*
19. *Studio Galli Ingegneria (IT)*
20. *Alto Adriatico River Basin Authority (AAWA) (Public body) (IT)*
21. *Scuola Superiore Sant'Anna, SSSA (RTD) (IT)*
22. *GEAL (IT)*
23. *IngegnerieToscane, (IT)*
24. *Mekorot Water Company Israel (IS)*
25. *Agricultural Research Organization - the Volcani Center (IS)*
26. *Water Services Corporation (GR)*
27. *Spanish Water Technology Platform (SP)*
28. *Amphos 21 (SP)*
29. *Aquifer Storage And Recovery (USA)*
30. *Etc.*

Annex 2 contains useful info common with the AG proposal submitted to the European Commission, recently approved, and also the following topics:

- 6 - Description of planned activities
 - 6.1 - Description of the specific innovation barriers that will be addressed in the work of this AG
 - 6.2 - Action plan description, with deliverables and milestones
- 7 - Innovative concepts
 - 7.1 - How the envisioned results compare to existing solutions that may be similar or adjacent
 - 7.2 - Reference to available work-to-date (e.g. used policy studies, feasibility studies, market research, draft business plans)
- 8 - Relevance and urgency
 - 8.1 - Demand or market potential
 - 8.2 - Replication potential for roll-out in (other (sub-) sectors, other regions and countries)
 - 8.3 - Partner(s) in this AG will be directly involved with the dissemination and marketing of the results
 - 8.4 - Reference to likely 3rd parties that could help in the dissemination and marketing of the results
- 9 - Governance

ANNEX 1. INTENDED LINES OF ACTIVITY FOR THE PROPOSED WORKING GROUP “MAR TO MARKET” OPENED TO NEW CONTRIBUTIONS

According to EC Environment Commissioner, Janez Potočnik's words in the first annual conference of the European Innovation Partnership (EIP) on Water: *.../... We need to ensure that what already works well becomes available to a growing number of people, inside and outside Europe.* This should also bring new market opportunities, he predicted.

MAR-SOLutions' sequential actions in related industries counts on an international scope and established mechanisms for the dissemination and technology transfer of results. The main channels adopted are the Forum for the International Hydrogeologist Association; MAR AG; as well as the MAR-SOL inner channel. It is also worth including the different social networking from all partners involved in *MAR to MARKET AG*.

From the beginning there are two different phases well distinguished:

- As a starting point eight different industry branches have been identified to be involved in the application of MAR technique in their development and future business plans.
- It is expected in the future (after the third year) to involve new industrial branches (second stage) and, preferable, as a project.

Some hints regarding these branches are:

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)

Brief description for each industrial branch:

AGRO-INDUSTRY

- Sector with abundant examples of implementation as is classically related with the exploitation of groundwater ("Early MAR" branch)
- Water and energy efficiency improvements by means of MAR
- Success linked to the supply guarantee without climate dependence
- High quality production in the "*Demo site*"
- Scales variety: From individuals to big industries (associationism)
- High blue print (operational and in the distribution chain to be lowered by MAR. Eco-innovation label)
Demo Sites: Arenales (Spain) - Direct linkage between MAR water and high quality products.

WATER SUPPLY COMPANIES

- Sector with abundant examples of implementation
- Water and energy efficiency improvements by means of MAR
- Success linked to the supply guarantee without climate dependence
Demo Sites: Athens. Greece, Labrion (Greece) and Algarve (Portugal)

WASTE WATER TREATMENT PLANTS

- Independence of environmental circumstances

- Technological solution of first order(Reengineering)
- Highly subject to technological advances
- Specific but not exclusive in arid climates
- Impacts of difficult evaluation by silting, synergies, emerging compounds...
- Low psico-social perception
- Many widely distributed examples
- Few well tested examples

Demo Sites: Delta del Llobregat, Barcelona, Spain, where are accomplished activities, as Waste water reuse by tertiary treatment plus osmotization, Saline intrusion barrier, Overexploited aquifers recovery, modelling and Test with self-depuration bed filters.

Other Demo Sites: Labrion (Greece) and Malta South

DESALINATIONS COMPANIES

- Activity "of opportunity" (surpluses)
- Often insular context
- High energy costs
- Industry in general related to the public administration
- Subject to technological advances (increased energy efficiency)
- Currently difficult but not unacceptable alternative

Demo Sites: Menashe (Israel) where seasonal storage and recharge of treated and "untreated" surplus, Public-private cooperation schemes, (Build-Operate-Transfer (BOT)), Unsaturated zone studies, chlorination, DBPs..., "Reengineering" studies...

Other Demo Sites: Malta South.

BOTTLED WATER COMPANIES

- Industry classically related with the exploitation of groundwater. "Early MAR"
- High level of dependence on supply security
- Associationism gives strength and very high visibility
- Vast number of studies undertaken and projects financed by bottled companies
- Market analysis on the potential exploitation of the achieved technological solutions

Demo Sites: Working on currently on the food industry. some aspects especially referred are: Cooperative schemes with stakeholders, safety drinking water, standard certification, high blue and grey water footprints descending in the operational and in the distribution chain. Examples already proposed will be provided by members in the IAH MAR Commission.

GOLF COURSES

- High level of dependence on groundwater
- Good examples (Phoenix, Tucson...)
- Important advances in the State-of-the-art (safe yield...)
- Solvent industry for technological improvements (reengineering) and R&D results exploitation
- Industry mobilizing € Millions
- Drinkable reuse:
 - Direct as part of the water resources available for a community
 - Indirect, "aquifers recharge is a practice which provides the increase of available resources" [USA National Water Research Institute White book (Schroeder et al., 2012)]

Demo Sites: Provided by experts from the USA taking part in MAR-SOL project expert advisory panel. Other members in the IAH MAR Commission.

PUBLIC ADMINISTRATION BRANCHES

- Presence of more cells for storage in topological schemes of water management in river basin plans

- Promotion of “Water markets” (Cap & trade management)
- Increase the supply security
- Promotion of alternative resources
- International visibility
- Innovative prestige

Demo Sites: All

SPAS AND BALNEARIES

- Future guarantee
- Promoters of projects and studies
- High risk before any qualitative variations
- Precautionary principle
- Emerging cases

Demo Sites: Working on currently

HOTELS AND TOURIST FACILITIES (MARKET UPTAKES)

- Increase the supply security
- Promotion of alternative resources
- International visibility
- Innovative prestige

Demo Sites: Working on currently. Probably Majorca Island within the frame of EARSAC project.

ANNEX 2. ACTION GROUP PROPOSAL

See enclosed document.

ANNEX 3. PROPOSERS´ CV



A. Enrique Fernández Escalante

EDUCATION

- Geological Sc. Degree, Universidad Complutense de Madrid, 1990.
- Hydrogeology specialist, UCM, 1990.
- Master in environment Sc. Universidad Politécnica de Madrid, 1993.
- Ph. D. medium degree (DEA). UCM, 2002.
- Pedagogic adaptation course (CAP), Instituto de Ciencias de la Educación UCM, 2003.
- PhD by Complutense University, *cum laude* & highest qualification. 2005.

ACCREDITATIONS

- Accredited to sign environmental impacts Studies, JCL nº 1999101966AFE.
- External teacher & Assistant teacher.
- 40 courses related to my education.
- 50 workshops and seminars.
- Around 500 hours imparted at the University as Associated teacher.
- Researcher participant at 23 R&D+i projects. Three as coordinator.
- Director of six research Works plus a PhD and Master.
- Certificate of appreciation. IAH MAR Commission, 2013 October.
- Co-coordinator of IAH MAR Commission since 2014 February 27th.

PROFFESIONAL EXPERIENCE

- **DAMES & MOORE**, from 1990 to 1992. Collaboration in 10 projects.
- **INGIOPSA**, 1993- 1994. Collaboration in 2 projects.
- **Investigaciones Geológicas y Mineras (INGEMISA)**. 1994-1995 Hydrogeology Dpt. AFA project.
- **TRAGSATEC. 1995-2007**. Rural Engineering and hydric planification & Management. Technician. Coordination and participation in 90 accredited projects and Studies.
- From 2007: **Empresa de Transformación Agraria (TRAGSA)**, R&D Subdirectorate. Specialist. Participation in 23 R+D+i projects.
- Work as **FREELANCE** hydrogeologist. About 15 projects.
- Associated teacher at **COMPLUTENSE UNIVERSITY OF MADRID** from 2009. Estratigraphy Dpt.

OTHER MÉRITS

- Author, coauthor or editor of 19 books and eight chapters.
- Published 34 articles in research magazines.
- Published 45 articles in congresses, Workshops, etc.
- Published 38 minor communications (abstracts y posters).
- Redacted and distributed materials for 15 courses.
- Author of five websites / one Blog
- Participant in a Project which obtained an invention patent, another one is expecting for resolution.
- Climber and diver.

Teresa E. Leitão



Academic degrees

- Habilitation degree with the work "Integrated and Sustainable Management of Groundwater Quality in Portugal. Contribution for a Good Status in 2015", Laboratório Nacional de Engenharia Civil, 2010
- Ph.D. in Hydrogeology with the work "Methodologies for the Rehabilitation of Polluted Aquifers", Faculty of Science, University of Lisbon, 1997

Career and Employment

- Degree in Geology, Scientific and Technical University of Coimbra, 1988
- Ph.D. in Hydrogeology, Senior Research Officer with Habilitation Degree at National Laboratory for Civil Engineering (LNEC), since May 2009
- Since 1989 she has participated in about 27 national and European research projects and 28 consultancy projects on these topics and was responsible for several of them, including the supervision of trainees, master and PhD degrees

Current and previous posts (both scientific and professional)

- Trainee at the Sondagens e Fundações A.CAVACO, Lda. Firm, between December 1988 and February 1989
- Research Trainee at the Laboratório Nacional de Engenharia Civil (LNEC), Lisbon, Portugal, from September 1989 to May 1993
- Member of the Groundwater Specialised Commission (CEAS) of the Portuguese Water Association (APRH). May 1992 - May 1996
- Research Assistant at the Laboratório Nacional de Engenharia Civil (LNEC), Lisbon, Portugal, from May 1993 to January 1997
- Director of the Bulletin of the APRH. January 1996-September 1999
- Research Officer at LNEC from January 1997 to September 2003
- Vice-President of the Directive Board of the Portuguese Water Association. March 2002 - March 2004
- Vice-President of LNEC's Scientific Council. July 2002-May 2004
- Senior Research Officer at LNEC. September 2003- May 2009
- President of the Directive Board of the Portuguese Water Association March 2004 - March 2006
- Member of the Water National Council. March 2004-March 2006
- Senior Research Officer with Habilitation degree since May 2009

Award

- In the framework of APRH prizes for the biennium 1996/1997, with the Ph.D. thesis "Methodologies for the rehabilitation of polluted aquifers"

Expertise and research interests

- Integrated management of water quality, specially groundwater
- Hydrogeological and hydrogeochemical studies, including MAR
- Groundwater monitoring and numerical and physical modelling (laboratory scale and prototype scale)
- Pollution prevention, control and rehabilitation (soil, vadose zone and groundwater) of diffuse pollution (agriculture, road and traffic sources, forest fires, golf) and point pollution (airports, landfills, industry types)

Published material

More than 290 different articles were published including:

- 1 Habilitation thesis & 1 PhD thesis
- 113 LNEC Reports
- 16 books and book chapters
- 1 LNEC Memoir
- 62 papers presented at national and international scientific meetings
- 28 articles in national and international journals
- 14 posters presented in international meetings
- 57 Other Technical Reports