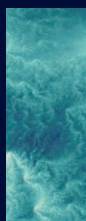


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foreword



Eloy García Calvo

Director, IMDEA water Institute

May 2012

Word

For us at IMDEA Water, 2011 has been a year of consolidation but also of austerity. Consolidation because the activity of the institute has grown significantly. Although we could not increase in our research staff appreciably, the collaboration with other research organizations has experienced an important growth, hence boosting our research production.

It has been a year of austerity as the resources necessary for the expansion of a young Institute like IMDEA Water have been reduced by the economic crisis. However, it would be unfair not to thank the Community of Madrid, which through the Regional Ministry of Education and Employment, has maintained its economic support to our Institute.

Despite the financial cuts that affected diverse research funding institutions during 2011, we secured the funding of our projects until the end of 2013. Six projects will be over in 2013 and three at the end of 2014.

Our scientific production does not only include scientific articles, which are published in the most relevant journals to each science category (14 of them in the top 10% high-ranking journals of their area), but also 5 books have been published (one, Springer). It is also worth mentioning the important contribution of the chapter on "Valuing Water" in the three-year report of UNESCO on water in the world "Managing Water Under Uncertainty and Risk".

Other relevant activities are 10 plenary and 36 oral presentations, participation in international expert panels, 7, scientific committees, 4, and activities of international scientific assessment, 6.

During 2011 the collaboration with institutions such as UN, FAO, UNESCO and World Bank, and with companies such as aqualia and Valoriza Agua, has also expanded.

Our formative activities continue throughout our very active collaboration in the inter-university postgraduate program "Hydrology and Water Resources Management" with 32 MSc and 17 PhD students.

Finally, I would like to express my gratitude to all those who have made possible the activity of our Institute growing in quality and quantity, because it is their results we display herein.

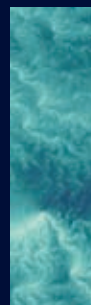


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overview

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1.1. Presentation

IMDEA Water Institute is a non-profit organisation promoted by the Madrid Regional Government, engaged in excellent research focused on contributing the innovative elements necessary in a strategic sector such as water, as well as providing highly competitive postgraduate lectures and courses. Training for scientists and professionals, primordial for IMDEA Water, is carried out through organising and collaborating in doctorate programmes, masters and other courses, thus helping to compensate society for the effort made in maintaining the Institute.

IMDEA Water's remit is to guide water problems along the path of research and education; to serve as a fundamental scientific resource and voice of authority on water issues in the region and the country; to prepare students to develop the next generation of leaders in water-related questions; to become a national model as a successful water research centre and provide recognition, visibility and resources to the Institute and the people and organisations involved with it.

1.2. Management structure

The main governing body of IMDEA Water is the Board of Trustees. The Board appoints the Director, who is assisted by the Deputy Director. Both the Director and Deputy Director are assisted by the manager who takes care of the legal, administrative and financial activities of the institute (Figure 1).

A Scientific Council assists the Board of Trustees and Directors in their functions. Council tasks include the selection of researchers and assessing the scientific activities of the researchers and the institute as a whole to ensure research excellence.

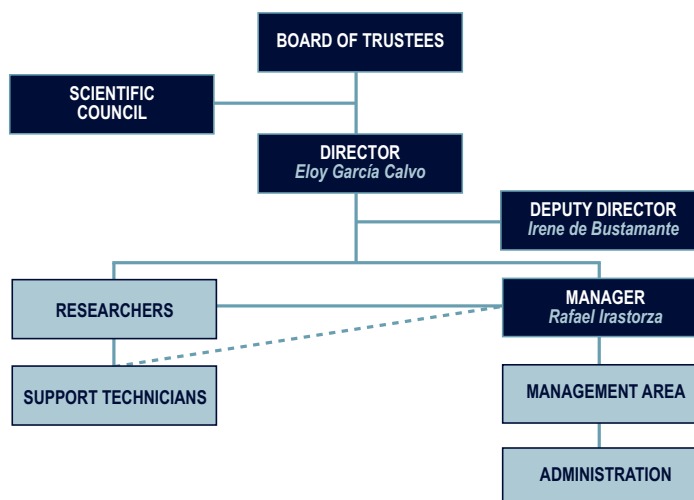


Figure 1. IMDEA Water management structure

1.3. Location

The institute is located in the Science and Technology Park at the University of Alcalá, one of the technology parks recently created by the universities and the Community of Madrid, so that IMDEA Water can benefit from the existing investigative framework and the alliances developed through the proximity to other research, development, and innovation centres. IMDEA Water accounts for an area of 950 m². The site dedicates 50% of its space to laboratories (Photo 1).



Photo 1. Temporary location

1.4. Governing bodies

1.4.1. Board of Trustees

The Foundation is governed and managed by a Board of Trustees comprising a President, a Vice-president, Trustees and a Secretary.

PRESIDENT

Mr. Rafael Fernández Rubio

Dr. in Mining Engineering

Professor Emeritus of Madrid Polytechnic University. Spain

Rey Jaime I Prize for Environmental Protection

Doctor Honoris Causa of University of

Lisbon. Portugal

EX OFFICIO TRUSTEES (GOVERNMENT OF MADRID)

Mrs. Alicia Delibes Liniers

*Regional Government Vice-Secretary for Education, Department of Education. Regional Government of Madrid, Spain
Vicepresident IMDEA-Water Foundation*

Mr. Jon Juaristi Linacero

Director General of Universities and Research, Department of Education. Regional Government of Madrid. Spain

Mr. Jorge Sainz González

Subdirector General of Research Directorate General of Universities and Research, Department of Education. Regional Government of Madrid, Spain

Mrs. Beatriz Presmanes Arizmendi

Chief of Research Programmes Sub Directorate of Research Directorate General of Universities and Research, Department of Education. Regional Government of Madrid, Spain

ELECTIVE TRUSTEES (INSTITUTIONAL MEMBERS)

Mr. Juan José Vaquero

Full Professor of Organic Chemistry University of Alcalá. Madrid. Spain

Mr. José Aguado Alonso

Full Professor of Chemical Engineering Rey Juan Carlos University. Madrid. Spain

Mr. José Luis Sotelo Sánchez

Full Professor of Chemical Engineering, Complutense University. Madrid. Spain

CIEMAT

Energy, Environment and Technology Research Centre CIEMAT. Madrid. Spain

ELECTIVE TRUSTEES (PRESTIGIOUS SCIENTISTS)

Mr. Avelino González González

Head of Environment Technologies and Pollution Prevention. Research Directorate General-European Commission. Brussels. Belgium

Mr. Marco Vighi

*Department of Environmental Sciences and Territory. Faculty of Mathematical, Physical and Natural Science. University of Milano Bicocca. Italy
Member of the Scientific Committee on Health and Environmental Risk (SCHER) of the European Commission*

Mr. José C. Merchuk

Department of Chemical Engineering and Biotechnology Unit, Engineering Science Faculty. Ben-Gurion University of Negev. Beer Sheva. Israel

ELECTIVE TRUSTEES (EXPERT MEMBERS)

Mr. Manuel Ramón Llamas Madurga

*Director of M. Botín Foundation. Water Observatory. Professor Emeritus. Complutense University. Madrid. Spain
Permanent Member of the Royal Academy of Exact, Physical and Natural Sciences, Madrid. Spain*

Mr. Adriano García-Loygorri

*President of the Social Council. Polytechnic University of Madrid
Permanent Member of the Royal Academy of Exact, Physical and Natural Sciences, Madrid
Polytechnic University. Spain*

ELECTIVE TRUSTEES (COMPANIES)

CANAL DE ISABEL II

Mr. Fernando Arlandis Pérez. Subdirector of Studies, Programmes and Corporate Social Responsibility Spain

SACYR VALLEHERMOSO-VALORIZA AGUA

Mr. Domingo Zarzo Martínez. Technical Director, Murcia. Spain

ASOCIACIÓN DE EMPRESARIOS DEL HENARES (AEDHE)

Mr. Jesús Martín Sanz. President Alcalá de Henares. Madrid. Spain

AQUALIA. INTEGRAL WATER MANAGEMENT

Mr. Enrique Hernández Moreno. Director of Services Management. Madrid. Spain

ELECTIVE TRUSTEES (LOCAL ADMINISTRATION)

MUNICIPALITY OF ALCALÁ DE HENARES

Mr. Juan Jesús Domínguez Picazo. Councillor for Environment, Consumption and Waters, and Deputy Mayor of Alcalá de Henares City Council. Alcalá de Henares. Madrid. Spain

SECRETARY

Mr. Alejandro Blázquez Lidoy

1.4.2. Scientific council

The Scientific Council was constituted as follows:

Mr. Rafael Fernández Rubio

*Dr. in Mining Engineering
Professor Emeritus of Madrid Polytechnic
University. Spain
Rey Jaime I Prize for Environmental
Protection
Doctor Honoris Causa of University
of Lisbon. Portugal*

Mr. Avelino González González

*Head of Environment Technologies
and Pollution Prevention.
Research Directorate General-
European Commission. Brussels.
Belgium*

Mr. Marco Vighi

*Department of Environmental
Sciences and Territory. Faculty of
Mathematical, Physical and Natural
Science. University of Milano
Bicocca. Italy
Member of the Scientific Committee on
Health and Environmental Risk (SCHER)
of the European Commission*

Mr. José C. Merchuck

*Department of Chemical
Engineering and Biotechnology
Unit, Engineering Science Faculty.
Ben-Gurion University of Negev.
Beer Sheva. Israel*

Mr. M. Ramón Llamas Madurga

*Director of Foundation M. Botín.
Water Observatory
Professor Emeritus. Complutense
University. Madrid. Spain
Permanent Member of the Royal
Academy of Exact, Physical and
Natural Sciences, Madrid. Spain*

Mr. Félix Cristóbal Sánchez

*Highway, Canal and Port Engineer
Canal de Isabel II Administration
Committee. Spain*

Mr. Bo Jansson

Professor Emeritus. Stockholm University

Mr. Emilio Custodio Gimena

*Full Profesor. Polytechnic University of
Catalunya. Spain*

Mr. Paul L Younger

*C.Eng. C.Sci. C.Geol. FGS FIChemE
Pro-Vice-Chancellor (Engagement)
Newcastle University, UK*

Mr. J A Allan

*Department of Geography,
King's College London, The Strand
Centre of Near and Middle Eastern
Studies, School of Oriental and African
Studies, London, UK*

Mr. Domingo Zarzo Martínez

*Technical Director
Murcia. Spain
SACYR VALLEHERMOSO-VALORIZA
AGUA*

Mr. Frank Rogalla

*Director of Innovation and Technology.
Madrid. Spain
AQUALIA. INTEGRAL WATER
MANAGEMENT*





2 active research lines and projects

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2.1. Urban and Industrial Wastewater Treatment

2.1.1. Electricity and Hydrogen Production Bases on Residual Water Bacterial

The main goal of this research is to use *Geobacter* to convert the chemical energy stored in organic matter from wastewater into electricity and hydrogen. One of the most exciting features of this technology is the possibility of harvesting clean energy from waste during its treatment, so the classical methane-generating stage in wastewater treatment could be eliminated.



2.1.2. Wastewater Treatment by microbial bioelectrogenesis process (AQUAELECTRA)

<http://www.aquaelectra.es>



This collaboration project pursues three aims: to develop a natural wastewater purification system by means of bioelectrogenic wetlands; to establish an anaerobic bioelectrogenic treatment system for wastewaters and construct a bioelectrogenic removal system for nutrients (nitrogen). Bioelectrogenesis is a new process whereby determined bacteria can oxidise organic material and directly transfer the electrons generated to a conductive solid surface, such as graphite. This way, it is possible to generate and store clean energy. The use of aerobic microorganisms to remove organic matter from wastewaters is widespread, but entails two of the main problems currently associated with water treatments: the generation of biomass in the form of active sludge and the high energy cost of supplying oxygen to the biological system. The use of microbial anaerobic metabolism in water treatments is proposed as a viable alternative due to the lower biomass yield in these biological processes (less sludge produced) and the possibility of generating biogas (methane) that may be used as fuel for thermal and electrical energy generation. Methane presents the drawback that it is a greenhouse gas, even more toxic than CO₂. In this sense, bioelectrogenesis offers the alternative of replacing methane generation by the production of clean electrical energy in the treatment plan.

2.1.3. Bacterial wiring for energy conversion and bioremediation (BACWIRE)

The aim of the project is to develop a new paradigm for the simultaneous cogeneration of energy and bioremediation using electro-active bacteria. A new nano-structured transducer that efficiently connects to these bacteria will be developed, aimed at the production of devices with higher performance across a range of applications including microbial fuel cells, whole cell biosensors and bioreactors.





2.1.4. Madrid Advanced Wastewater Treatment Network with Non-Biodegradable Pollutants (REMTAVARES) <http://www.remtavares.es/>

REMTAVARES will be the reference point in terms of advanced technologies in wastewater management to ensure sustainable development for the Community of Madrid.

The lines of research that support these technologies are: adsorption, hydrodechlorination, advanced oxidation (Fenton, ozonation and photocatalysis), catalytic wet oxidation and catalytic oxidation in supercritical conditions.

2.1.5. Toxicological evaluation of herbicide contaminated soil under bioremediation treatment (DETOXSIL)

The aim of this project was to evaluate the efficiency of biostimulation processes of native microorganisms for remediation of two chlorinated herbicide (diuron and atrazine) in contaminated soil. Biodegradation of these priority pollutants was carried out applying conventional techniques of biostimulation like nutrient addition and using Sedimentary Microbial Fuel Cells (SMFCs). Assessment of the effectiveness of both bioremediation strategies was conducted by chemical analysis of extracted prepared from soil and by toxicological test batteries on aquatic and terrestrial organisms. Results indicated the possibility of improving the yield of contaminants elimination as well as the in situ rate of biodegradation using SMFCs.

2.2. Reclaimed Water Reuse

2.2.1. Treatment and Reuse of wastewater for sustainable Management (CONSOLIDER-TRAGUA) <http://www.consolider-tragua.com/>

The main objective is to harness the expertise of 24 research groups in different areas to address the reuse of purified wastewater in an integrated manner. To this end, a strong multidisciplinary team with proven research experience was formed. The team carried out a study of the application of water treatments from WWTPs based on advanced technologies. This set the criteria for chemical and biological water quality and for determining their impact on the environment. As with any other sustainability-oriented activities, there are also economic benefits, so the proposals have relevant socio-economic value.

IWA 1st prize: "IWA prize for innovation in the practical realisation of sustainable urban water management" (in the frame of the "2010 Prizes for Excellence in Sustainable Urban Water Management").



2.2.2. Reuse of Treated Water for Environmental Applications: groundwater recharge using permeable reactive barriers and for energy forestry purposes (REAGUAM)

From the physical environment point of view, this project deals with the study of two different technologies for the reuse of urban waste water for environmental applications under RD 1620/2007: first re-use agricultural techniques (Green Filters species and irrigation for biomass and biofuels) and reuse of surface recharge systems through regeneration by horizontal reactive beds.

The main aim is to develop the applicability of these technologies in environmental applications for small communities. Within this overall goal are the following objectives: a) restoring the treated water, reducing the mobility and bioavailability of unwanted substances present in purified water, and b) achieving an added environmental benefit through reuse in irrigation for generation of biomass crops for energy purposes.



2.2.3. Technological development for self-sustainability of the urban cycle (SOSTAQUA)

<http://www.sostaqua.com/>

The ultimate goal of the project is to ensure that self-sustainability of the urban water cycle will be more likely the lower the requirement for natural resources (water and energy) and the lower the volume of waste generated.

The project plans to contribute to this objective through the exploitation of nonconventional water sources, the recovery of waste collected, minimising energy demand outside the cycle and assessing environmental health-risk behaviour.



2.2.4. Installation of the first laboratory attached to the National System of Protected Areas (SNAP), managed by the Research and Environmental Service Center (ECOVIDA)

Cooperation project for the installation of a basic waters laboratory. This laboratory will give service to the Natural Protected Areas, which are managed by the Research and Environmental Service Center (ECOVIDA) in Pinar del Río, Cuba. The laboratory will back the environmental services offered by ECOVIDA up and conform the analytical support for future research projects on environmental quality and improvement of the cleaning up and purification of the population centers belonging to these protected areas. It will also boost the knowledge and education of researchers involved in the use and management of the water laboratory.





2.3. Microcontaminants

2.3.1. Development of a continuous nitrate measuring probe in groundwater (NITROMED)

The main objective is to develop an industrial and commercial submersible probe for nitrate concentration measure in water.

The probe mechanism will enable remote and continuous measurement of nitrate in fresh-water, seawater and wastewater.

2.3.2. Nanoparticles and water quality (NANOQUAL)

The environmental and health risks of nanotechnology and nanomaterials are still not well known, and even less in water than in the air. The reason is the lack of data on the evaluation, behaviour and transformation of these materials. It is necessary, now that there is still time, to carry out extensive research work to determine the risks of nanomaterials and the use of nanotechnology. Knowledge of the environmental behaviour of these substances will allow ways to reduce these risks to be found.

The overall aim of this project is to gain knowledge, for materials representing different families, on their behaviour in water, mobility and final destination, as well as the appropriate techniques for their neutralisation and/or removal. Therefore, we will be able to tackle the problems that will be generated when, in a not too distant future, production and massive use of nanomaterials lead to concentrations of these products in water that could cause concern.



2.3.3. An integrated assessment of anthropogenic pollutant levels and their ecological impact on river basins. A study of the Henares River Basin. (INTEGRATOR)

As a result of the participation in the TRAGUA project it was found that the effectiveness of the WWTPs is limited because of the large number of pollutants such as pharmaceuticals, personal care products, additives, etc. Therefore, reasonable doubts surface at various points concerning the threats to water safety levels and the actual eco-impact achieved: (I) seasonal drought scenarios (II) local impacts (III) the presence of specific compounds at high concentrations. These points are of especial relevance considering the Directive 91/271 and the Directive 2000/60 (WFD), because its full implementation is to ensure that all waters in the EU achieve good ecological status by 2015.

This project seeks an integrated understanding of these concerns using the study of the Henares River as a model. This project covers: (a) a space-time water-monitoring pro-

gram in connection with Points I-III. The program includes the evaluation of aprox. 150 anthropogenic pollutants selected as being relevant, as well as an ecological status evaluation of water bodies based on studies with macroinvertebrate communities, (b) an assessment of the predicted river flow by evapotranspiration studies, both short and medium term, considering climate change models and (c) the selection and evaluation of one advanced tertiary treatment, determining its potential application and need for implementation.

2.3.4. A reference centre to manage information on Persistent Organic Pollutants (CNR-COPs)

<http://www.cnrcop.es/>

COPs are chemicals that have certain toxic properties and, unlike other pollutants, are resistant to degradation, making them especially harmful to human health and environment. COPs bioaccumulate, are transported by air, water and migratory species and build up in terrestrial and aquatic ecosystems. As this is a cross-border issue, it is therefore essential to take measures on an international level.

The actions of the National Implementation plan within this context focus on improving awareness, information and training of society in general and the sectors most directly involved.

2.3.5. Reactive Transport Modeling

The objective of Imdea –Agua is to obtain a better comprehension of the processes affecting contaminants in groundwater. Reactive transport modeling is an useful tool for the understanding and description of the movement and fate of contaminants as solutes in groundwater. The application of numerical models to field site and laboratory experiments allow the investigation of the contaminant transport under the influence of a variety of interacting processes, including advection, dispersion and chemical reactions.

2.4. Economic and Institutional Analysis

2.4.1. IWRM (Integrated Water Resource Management) – Economic and Legal Dimensions

- Modernisation of water management, regarding economic, legal and institutional aspects; specifically, use and water use rights markets, within a context of water economic scarcity and regulation of drinking water and sanitation services.
- Water conflict Management





2.4.2. Analysis of Economic Instruments for Water Management

Evaluation of effectiveness of economic instruments in integrated water policy (EPI-Water)

<http://www.feem-project.net/epiwater/index.html>

Economic policy instruments (EPI) have received widespread attention over the last three decades, and have increasingly been implemented to achieve environmental policy objectives. However, whereas EPI have been successfully applied in some policy domains (such as climate, energy and air quality), their application to tackle water management issues (drought/water scarcity, floods, water quality control) is beset by many practical difficulties.

Using a common multi-dimensional assessment framework, to compare the performance of single economic instruments with alternative policy instruments and baseline scenarios. In particular:

- Analysing the extent to which economic instruments contribute to achieving water policy goals (e.g. good ecological status of water bodies, flood protection, reducing risk and uncertainty in water availability), either directly (via changing use/consumption behaviour) or indirectly (via raising financial resources for implementing water policy protection measures);
- Analysing the efficiency implications of economic instruments, or to what extent they contribute to an optimum allocation and use of water resources (or goods and services provided by aquatic ecosystems), also in situations in which not all use- and non-use values are known or fully accounted for.
- Pinpointing the preconditions for economic instruments (or group of instruments) to be workable, effective and/or efficient in given socio-economic, hydrological, cultural and institutional conditions in Europe, whether in isolation or in combination with command and control mechanisms.
- Identifying remaining research and methodological issues that need to be addressed, in particular with regard to the further development and use of national accounting to support the design, implementation and evaluation of EPI in the field of water management.

2.4.3. Economic and Legal Analysis of drinking water and sanitation service regulation

- Analysis of international agreements on international trade and legal protection of foreign investment in water resources, rights and uses of local population and drinking water and sanitation supply.
- Analysis of factors driving the industrial structure of drinking water and sanitation (W&S) services.



2.4.4. The transnationalization of local water battles: Water accumulation by agribusinesses in Peru and Ecuador and the politics of corporate social responsibility

This NWO-WOTRO programme investigates transnational processes of water resource accumulation and contamination by agri-business companies in arid areas in Ecuador and Peru, and explores the societal responses to such processes at diverse scales. Analysing the case of high-water-consuming crops (flowers, vegetables, fruits, and biofuels) the programme examines how globalizing water extraction and virtual water exports change existing labour- and property relations. It also investigates the strategies that local collectives devise to cope with this re-patterning of livelihoods. Given the fact that international consumers are steadily increasing the pressure to include 'the water issue' in fair and sustainable production trademarks, the programme also explores opportunities and perspectives for articulating the demands of local trade unions and water user collectives with international producer-consumer networks, fair trade and corporate social responsibility initiatives at diverse scales.

The programme's main research question is which strategies do local collectives in Peru and Ecuador devise to cope with the re-patterning of their livelihoods by globalizing water extraction and virtual water export, and what are their perspectives for articulating with consumer, fair trade and CSR initiatives, at diverse network scales.

2.4.5. "Cascade Flushing Flow Programme based on the analysis, integration and modelling of both physical processes and economic parameters of the river basins draining into the Ribarroja Reservoir (River Ebro) SICMEC"

The main goal of the project is to develop a Cascade Flushing Flow Programme ('SICMEC') based on the analysis, integration and modelling of both physical processes and economic parameters of the river basins draining into the Ribarroja Reservoir (River Ebro). The SICMEC represents the starting point for restoration of the hydrosedimentary dynamics of the highly regulated rivers Segre and Cinca and, consequently, optimise the flushing flow programme of the Lower River Ebro that has been operational since 2002. We propose: (i) to design experimental releases from the main reservoirs in these two catchments, (ii) to continue the experimental flushing flow releases in the lower Ebro, and (iii) to examine natural floods that occur during the course of the project. We propose to use economic evaluation methodologies and cost-efficiency analysis, integrated within River Basin Management Plans. Finally, we will develop a decision support tool based on the integration of physical and economic elements. As it will be built around environmental effectiveness and cost-benefit criteria, this tool will allow the evaluation and comparison of different flushing flow options in the rivers Segre, Cinca and lower Ebro. We intend that SICMEC will serve as a tool to transfer methodologies and results to other drainage basins in the Iberian Peninsula and also to other Mediterranean catchments.





2.5. Membrane Technology

The IMDEA Water membrane research group is working on the synthesis of thin film composite (TFC) membranes with sulphonated polymer, doped with nanoparticles and hybrid nanoparticles. Membranes are tested with reverse osmosis (RO) and forward osmosis (FO) processes to treat seawater. The group is also working on assessing fouling and the effectiveness of different cleaning treatments as well as surface modification of commercial membranes.

2.6. Geothermal

IMDEA Water collaborates in the Spanish Geothermal Technology Platform (GEOPLAT), participating actively in different working groups: shallow geothermal, deep geothermal, geothermal resources research, regulatory framework and training. IMDEA Water is also part of the AENOR working group, which is currently developing a regulation applicable in shallow geothermal energy. In addition, IMDEA Water is taking part in the Renewable Heating & Cooling European Technology Platform (RHC).

The Aim of IMDEA Water is to investigate geothermal energy from the point of view of water, because in all the different exploitation techniques for deep geothermal (flash plants, binary cycle plants, GS, etc.) and shallow geothermal (open loop, closed loop with heat exchanges etc.), water plays an essential role as vehicle for energy transport, with groundwater as the principal heat storage agent.

2.7. Water and Mining

2.7.1. Water and Mining Industry

Water resources are especially sensitive to mining activity, due to the intense environmental impact it causes, which in many cases includes generation of acid waters, pollution by heavy metals, modification of the hydrogeological conditions of auriferous, etc. These effects are compounded by the demand for water, especially in areas with scant resources, which often gives rise to competition with the demand from other productive sectors such as agriculture.

IMDEA Water has initiated two lines of work in the field of water and the mining industry: one in relation with the characterisation of the direct environmental impacts provoked by the mining industry, and another concerning water reuse and recycling for mining purposes.

2.7.2. Concentrate (Salt) management from inland desalination

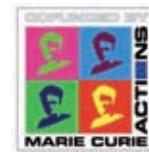
IMDEA Water works to find solutions for the management of the concentrate obtained as a by-product in inland desalination and water treatment plants. It was observed that all usual processes for concentrate disposal (discharging on the surface, evaporation lagoons, and so on) lead to a loss of water and an extra economical burden, in addition to the negative aspects associated with each of them. This research line is therefore mainly focused on the only viable option to manage this kind of concentration nowadays, which is deep well injection, but only where the geology and hydrogeology of the area meets certain conditions to be able to carry out deep injection in isolated deposits. Similarly, IMDEA Water is examining different methods currently under research and development to achieve a sustainable and viable management of concentrate by-product from large interior desalination plants. All of these emerging methods tend to achieve virtually zero liquid discharge, which means a higher use of the water (as a resource) and, occasionally, the possibility to use the solid waste depending on its composition.



2.8. Biological Indicators

2.8.1. Biological indicators of water body quality: macroinvertebrates

The Index of Trophic Completeness (ITC) method of aquatic ecosystem health integrity estimation was developed in 1998 as a result of many years of joint research by the Russian Institute of Water Management and Protection (RosNIIWH) and Dutch Institute RIZA. It is based on the ecosystem approach where pathways of energy and substances among biotic and abiotic components of ecosystem are of central importance. The Index of Trophic Completeness (ITC) is a new method for evaluating and monitoring the condition of aquatic ecosystems. The method focuses more on the study of functional connections (such as trophic links and nets) among organisms and their environment than on the species composition of communities, indicator species or species density. Results suggest that the new ITC method may be sensitive to a broad range of disturbances, such as agricultural activity, heavy metal and acid contamination, or river engineering.



2.8.2 Biological indicators in subsurface waters: microinvertebrates

Within this project the biological and chemical criteria will be applied to subsurface water to define the 'ecological status' of rivers from central Spain. The project will be focused on the transitional ecotone between the river and the adjacent aquifer, the hyporheic zone, which is also the most susceptible underground aquatic environment to surface pollution. We investigate the role of the hyporheic as an intermediary transfer area of



pollutants from the surface rivers down to the water table, and the effect on the hyporheic biota. This can be further use to diagnose the cause of an existing impact and to provide an early warning signal of subsurface ecosystems decline. The results of this research will allow a better understanding of the hyporheic structure and functionality, which is essential for the development of sustainable integrated river basin management strategies for Spanish rivers.



2.8.3 Toxic cyanobacteria in fresh water reservoirs

The aim of IMDEA-Water is to improve the understanding of the function and dynamics of cyanobacteria in fresh water bodies used for potable water. We combine traditional tools (such as cultivation and measurements of key physiological processes) together with modern molecular techniques (functional genomics, molecular detection and quantification) in a comprehensive approach to tackle the problem of eutrophication and cyanobacterial blooms.

Currently, we are focused on developing molecular tools for the detection of toxic cyanobacteria in Spanish water reservoirs, and the application of such tools as an early warning system.

2.9. Climate Change



2.9.1. Urban Hydraulic structures and climate change

This research line is focused on determining the possible changes in the design of hydraulic structures due to expected changes in precipitation extremes under a climate change perspective. A possible re-design should be considered either for new hydraulic schemes or for existing structures under new conditions. The first step consists of analysing the long-term trends of precipitation and its fluctuations from weather stations with sufficient observed data (100 years or more). The second step will provide -based on medium and long-term timescales- the new design for hydraulic structures with the support of the changes anticipated by the IPCC.

2.9.2. Methodologies for calculating evapotranspiration: scintillometry and remote sensing

Dealing with water scarcity is nowadays one of the most important issues worldwide. In arid and semi-arid regions, irrigation water consumption becomes especially critical. Accurate estimates of crop evapotranspiration can help to regulate this water consumption.



We are currently carrying out an investigation on the estimation of evapotranspiration in the Henares river basin (Madrid-Spain). The aim is to develop a methodology for accurately estimating evapotranspiration through remote sensing, by relating satellite imagery with scintillometer ground measurements. Using a scintillometer we can gauge the sensible heat flow over a surface, from which it is possible, at the same time, to calculate the current evapotranspiration through a surface energy balance and the other components also measured (net radiation and soil heat flow).

2.9.3 Assessment of heavy precipitation and droughts in central Spain

Climatic and hydrological extremes frequently cause high losses. Due to climate change, it is likely that climate extremes will have the greatest impact on human society in the future. This project investigates on the statistical modeling of extremes, such as heavy precipitation and droughts in central Spain. Here extreme value theory (EVT) is applied. The adequate description of the characteristics of extremes is a necessary prerequisite to assess their change. One main topic of the project is the joint modeling of extremes in a region. This reduces uncertainty and allows for the estimation of regional extremal dependence. Indices are derived from the statistical model in order to estimate the fragility of the region. Those indices serve to summarize information. According research questions are, for example: If one site experience losses due to heavy precipitation, how many other sites in the region are expected to suffer damage as well? The project results may serve for water management purposes.



2.10. Tool Development for Water Resource Management

There is a need to develop tools to support the management of water resources, through the correct assessment of the present state of the resource and its possible evolution in different scenarios.

IMDEA Water is working on the methodological development and application of different management support tools, including remote sensing, geodatabase construction and design, and geological and hydrological modelling. Remote sensing techniques enables the location and estimation with the required precision of some important terrain features such as crop evapotranspiration, land uses, vegetation index, etc. The geodatabase records and arranges all this information, giving as result a GIS able to analyse the topological and quantitative relations of different variables. The knowledge of those variables and their relations is materialised in the implementation of a Hydrological Information System. This will allow construction of the hydrological model and will be the basis for decision-making in managing the resources.

2.11. Hydraulic Heritage

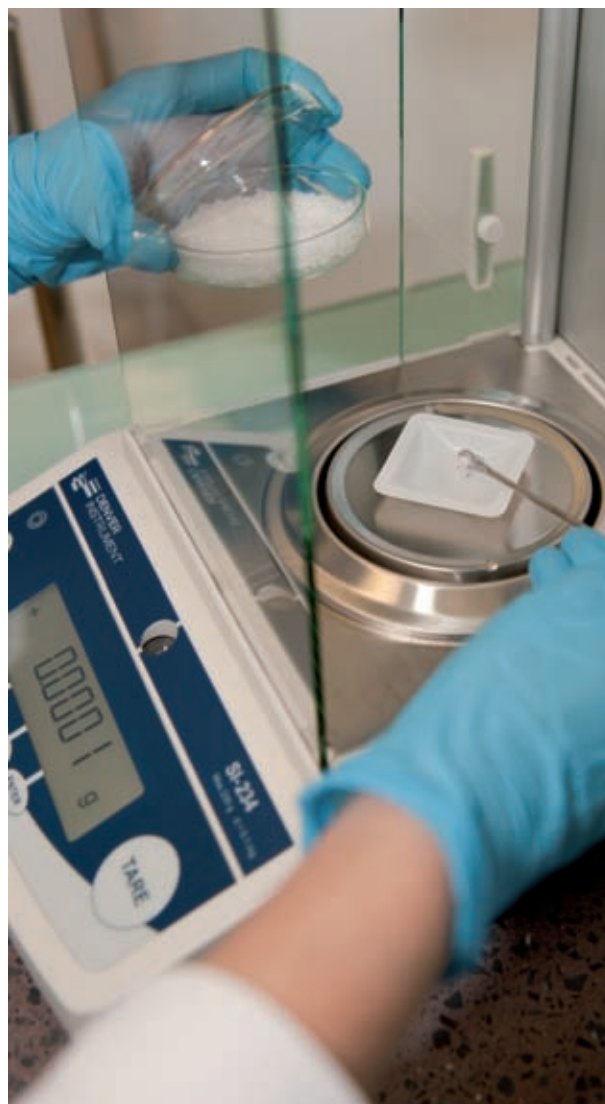
Research into water heritage aims to resolve conflicts between the existence of heritage structures and the current social need for development and growth. To this end, four main lines of action have been created:

1. Inventory and valuation of heritage systems using new technology as an integrator of different sources of data and information processing.
2. Development of valuation and territorial management support structures as useful tools for decision making.
3. Analysis of socio-economic values of water cultural heritage systems, from a sustainable strategy of traditional systems that allow their survival and constitute forms of support for endogenous economic development.
4. Assessment of heritage and traditional landscape impacts (positive and/or negative) to be integrated in a holistic manner in complex landscape systems, in which water flows are common elements.

2.12. Water Footprint

Water footprint is an index to estimate the impact of human goods and service on water bodies, whether at local, regional, national or global level. These impacts are important not only at the point of production or consumption, but also in the international context. Estimating the virtual water flows associated with the exchange of goods and services could be a useful tool for river basin water management.

To determine the virtual water flows inside the country, the Spanish Environment Ministry has approved a planning statement (Order ARM/ 2656/2008) to include a periodical water footprint analysis in river basin water management.





3

human resources

3.1. **Research Groups [26]**

- 3.3.1. Water and Chemistry [26]
- 3.3.2. Water Reuse [30]
- 3.3.3. Water Biology and Bioelectrogenesis [33]
- 3.3.4. Water and Climate Change [35]
- 3.3.5. Economic and Institutional Analysis [37]

3.2. **Laboratory Technicians [39]**

3.3. **Management Area and Administration [40]**

research groups

water and chemistry



Dr. Eloy García Calvo

Director

He received his Ph.D. in Industrial Chemistry from the Complutense University of Madrid in 1980. Since 1992 he is professor of Chemical Engineering at the University of Alcalá (UAH). He directs a project of the first call Consolider-Ingenio 2010, www.consolider-tragua.com, involving 180 researchers from 24 research groups in Spain. He also coordinates the CNR COP (National Reference Centre for Persistent Organic Pollutants) www.cnr-cop.es, MARM Ministry and collaboration between INIA and UAH. As a researcher in the areas of biotechnology and, especially, environment he has led 16 research projects at European, national and regional level. He has also been responsible of 10 projects in collaboration with companies and private funding. Other results include 7 patents, and about a hundred of scientific papers, mostly in the most relevant journals in the area, and 11 PhD directed.

He has been part of the evaluation panel of Environmental and Climate Programme in the 3FP and 4FP of the EU, the International Geosphere-Biosphere Programme (ICSU), Expert Panel on Technology and Technology Transfer at the UN and the Working Party on Biotechnology-Electronic Discussion Group of the OECD on the issue of safe drinking water. He has previously been Vice Chancellor for Research at the UAH, Manager of RTD Environmental programme within the National RTD, a member of the CNEAI (National Evaluation of Research

Activity) (board nº6 of architecture and engineering), Coordinator of Technology Programme for the Environment of the Madrid Region and evaluator of scientific projects in the European Union, Hungary, Argentina and Spain (Galicia, Aragon, Basque Country). He has also published opinion articles in environmental and science newspapers.

Among the awards, special mention of the UAH, 2007, in transfer of knowledge and the Prize of the IWA (International Water Association) in the category of "Sustainability: practical implementation" received during world congress of the association held in November 2010 in Montreal.

Dr. Amadeo Rodríguez Fernández-Alba

Researcher

Head of the Department of Management and Regulation of Point and Diffuse Pollution of IMDEA Water. He obtained his PhD on Chemical Sciences from the University of Granada and is Chair Professor at the Chemical Department of the University of Almería (UAL).

His most outstanding research lines are currently the development and application of effective new analytical methodologies in determining emerging contaminants in water by advanced analytical techniques (GC-MS/MS, GCxGC-TOF-MS, LC-QTRAP-MS/MS, LC-QTOF-MS...), the development of analytical methods for pesticides in food, etc..

He has participated in more than 36 research projects funded by both public and private entities and has negotiated more than 230 contracts and agreements for R&D. He has a large number of publications (182) and scientific-technical documents to his name.

He has been lecturing and participating in PhD courses at the University for 28 years. He has also been directed or assisted on summer courses and masters organised by the University of Almería, the Complutense University of Madrid and the University of Alcalá. He has guided 10 PhD theses and holds three patents.

He also has proven experience in organising scientific-technological conferences and seminars as well as in R&D management.





Dr. Pedro Letón García

Associated Researcher

Graduated in Chemistry in 1985 from University of Alcalá, with a Ph.D. in Chemistry from the Engineering Department of Alcalá University in 1992. Professor at the University of Alcalá, he is co-author of more than thirty papers in international peer-reviewed journals, and several technical reports for industry.

Nowadays he works on wastewater treatment focused on degradation of xenobiotic compounds by chemical (ozone) or biological (aerobic and anaerobic) processes. Xenobiotics of interest are pharmaceutical and personal care products detected in wastewater plant effluent which must be removed in order to reuse the water.

Toxicity aspects such as synergisms and antagonisms in mixtures between compounds and metabolites, as well as their evolution during treatment, are also of interest.

Dr. Roberto Rosal García

Associated Researcher

Master degrees with honours in Chemistry and in Business and a Ph.D. degree in Chemistry from the University of Oviedo with the distinguished dissertation Award. Professor of Chemical Engineering at the Department of Chemical and Environmental Engineering of the University of Oviedo from 1992 to 2003 and at the Department of Analytical Chemistry and Chemical Engineering of the University of Alcalá since 2003.

His scientific interests centre on chemical kinetics and catalytic processes with emphasis on the development of catalysts and the design and modelling of advanced oxidation processes.

He is also involved in the development of methods for assessing the ecotoxicology of emerging pollutants. He has participated in more than thirty financed research projects and R&D contracts and published over fifty scientific articles and book chapters.



Dr. Antonio Rodríguez Fernández-Alba

Associated Researcher

Graduate in Chemistry (1974) and Pharmacy (1989) from the Complutense University and Ph.D. in Chemistry (1998) from Alcalá University, he was assistant professor (2003) at the Chemical Engineering Department and Consultant (2006) for the Fine Chemistry Pilot Plant of Alcalá University (Alcalá de Henares-Spain).

His research is focused on the development of Biotechnological yeast-based processes for the manufacture of recombinant protein with therapeutic actions and AOP-based technologies to reclaim wastewater. He has participated in more than 40 research projects sponsored by the Spanish government and private enterprises.

He is co-author of 40 scientific papers as well as co-registrar of three patents for wastewater treatment processes.



Dr. Shivanand Teli

Researcher

Graduated with B.Sc in Chemistry (2001) and M.Sc in Polymer Chemistry (2003) from Shivaji University, Kolhapur (MH), INDIA. He joined as Doctorate Student in Jan 2004 in same department and university and received his doctorate degree in September 2007.

During his Ph.D, he was awarded departmental research scholarships (DRFs). Upon completion of his doctorate degree, he worked as a Research Associate (RA) in Chemical Engineering Department, Indian Institute of Technology (IIT), Kanpur INDIA. While working in IIT, he received a post-doctorate offer from Research Institute for Agriculture and Life Science, Seoul National University, South Korea in 2008. After completion of his one-year tenure, he was awarded a Brain Korea Fellowship sponsored by the South Korean government and joined the Department of Energy Engineering Science at Hanyang University Seoul, South Korea (2009). He currently works as a Marie Curie Research Fellow at IMDEA Water, University of Alcalá de Henares (Madrid), Spain.

His primary research was into sulphonated polymer synthesis for water desalination and for separation of liquid-liquid mixtures. He has worked on reverse osmosis (RO), UF, MF, PV and ED etc. and has published several articles in scientific journals, as well as conference proceedings covering some 15 sources.

Dr. N. Sridhara Chary

Researcher

Masters degree in Environmental Science and Technology with distinction in the year 2000 from Jawaharlal Nehru Technological University (JNTU), India. He pursued his doctoral studies on the fate, mobility, risk assessment, human exposure studies and remedial methods of heavy metal pollutants in industrially contaminated sites. His doctoral research was carried out at the Indian Institute of Chemical Technology (IICT) and he received his PhD in 2005 from JNTU, India. Soon after this, he was selected for the Research Associate position of CSIR and pursued the same at IICT. During this period he was offered a postdoctoral position by the French National Institute of Agricultural research (INRA), France. Later, he worked as postdoctoral associate at the National Taiwan University, Taiwan.

His general research interest lies in the area of Environmental monitoring and risk assessment studies with respect to anthropogenic pollution of both inorganic and organic pollutants, with emphasis on the determination of emerging contaminants in the environmental matrix. His research currently focuses on volatile organics in the environmental matrix with particular interest on development of new methods using advance mass spectrometry techniques.

He has 22 research papers 2 review articles in peer reviewed journals and a text book chapter to his credit, in addition to many conference contributions. He has also written popular science articles for the science and technology sections of leading newspapers.





Dr. María José Gómez Ramos
Researcher

Obtained her PhD on Chemistry from the University of Almería in 2008. Her research is mainly focused on the determination of organic pollutants in environmental water and wastewater by advanced analytical techniques (GC-MS/MS, GCxGC-TOF-MS, LC-QTRAP-MS/MS, LC-QTOF-MS, etc.), the evaluation of the removal efficiencies of these contaminants after applying advanced wastewater treatment technologies and the environmental impact assessment of wastewater effluents containing organic pollutants.

She has participated in 17 research projects. She has published more than 25 papers in international journals and participated in numerous national and international workshops.

She has made research stays at the Institute of Chemical and Environmental Research (National Research Council-CSIC) in Barcelona (Spain) and in the Laboratoire Environnement et Chimie Analytique at the École Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (ESPCI), Paris (France). She has collaborated in the organisation of two scientific meetings.



Dr. Maria Malgorzata Ulaszewska
Researcher

Obtained her PhD in 2010 in environmental chemistry from the Faculty of Agriculture of Università degli Studi di Milano in Milano (Italy) and Institute of Agricultural and Environmental Chemistry of Università Cattolica Del Sacro Cuore in Piacenza (Italy). Her PhD research was mainly focused on the determination of persistent organic pollutants in human breast milk and environmental samples, and on analysis of human exposure to these contaminants. For two years she joined the Dr. Zuccato's research group at the Department of Environmental Health Science in Mario Negri Institute Pharmacological Research in Milan (Italy). During her PhD she spent several months in Institut National de l'Environnement Industriel et des risques (INERIS), Unite Modeles pour l'Ecotoxicologie et la Toxicologie (METO), Verneuil en Halatte, (France) and Electricite de France (EDF R&D), Laboratoire National d'Hydraulique et Environnement, Paris (France) where her research was focused on environmental fate modeling and PBPK modeling. She has participated in numerous national and international conferences and workshops. She has collaborated in the organization of several national and international scientific meetings.



Julio José Lado Garrido
Predoctoral Researcher

Degree in Chemistry from Alcalá University. Spain.
MSc in Hydrology and Water Resources at Alcalá University and Rey Juan Carlos University, Madrid. Spain.
Research: Asymmetric Capacitive Deionisation for water treatment applications.

Raquel García Pacheco
Predoctoral Researcher

Degree in Chemical Engineering from Rey Juan Carlos University. Madrid. Spain.
MSc in Hydrology and Water Resources Management at Alcalá University, Madrid. Spain.
Research: Membrane Technology.



water reuse



**Dr. Irene de Bustamante
Gutiérrez**

Deputy Director

Ph.D. in Geological Sciences from the Complutense University of Madrid.

Since 1990 is Professor in the Department of Geology at the University of Alcalá. She is currently Director of the Master's Degree in Hydrology and Water Resource Management.

Since 2007 she is the Deputy Director of IMDEA Water Institute. Among her current research may include: hydrogeology, water quality and pollution, reuse of reclaimed water for irrigation and aquifers recharge and environmental cartography.

She has participated in 53 projects and research contracts, in 33 of them being the principal investigator. The results are reflected in 165 papers in journals, books and papers, two patents (one licensed) and a software.

She has also directed 3 doctoral theses, licentiate 4 PhD and 25 master's projects.

**Dr. Francisco Javier
Lillo Ramos**

Associated Researcher

He graduated in Geology in 1985 from the University Complutense of Madrid and received the Diploma in Geological Engineering from the same University in 1985. He obtained a Ph.D in Earth Sciences from the University of Leeds (Britain).

He subsequently spent ten years working in the industry, mainly as field geologist for exploration and nuclear waste repository projects and for the Geological Map of Spain. In 1999, he joined the academic staff of the Rey Juan Carlos University, where he lectures in Geology and Hydrology and has been Head of the Geology Group since then. He was granted academic tenure in 2003. Dr. Lillo is the co-director of the Master of Hydrology and Water Resources Management (University of Alcalá-URJC) since 2005.

He has published 32 papers in peer-reviewed international journals and has taken part in 13 research projects funded by public grants. Dr. Lillo has also collaborated in several projects with industry. His research is currently focused on environmental geochemistry, soil contamination by heavy metals, hydrochemistry and water quality, and reuse of treated waste waters in aquifer recharge.



Dr. Irene Ortiz

Associated Researcher

Graduated in Sciences (Geology) in 1996 from the University of Granada, Spain. She received her European Ph.D. degree in Geological Sciences in 2002 from the University of Granada, Spain, obtaining the Outstanding Doctorate Award in Geological Sciences. During her PhD, Dr. Ortiz-Bernad spent several months in Dr. Sposito's Environmental Geochemistry Group, at the University of Berkeley (USA), and in Dr. Stoops's lab at the Department of Geology and Soil Science of the University of Gent (Netherlands). In 2002, she joined Dr. Derek Lovley's lab as a Post-doctoral Research Associate in the University of Massachusetts (USA). Since the end of 2005, Dr. Ortiz-Bernad has worked as a Researcher with the Ramón y Cajal National Science Program at the Department of Geology of the University of Alcalá, Madrid. In addition, she is the Secretary General of the Spanish Society of Soil Science. Her current research activities are focused on bioremediation of soils contaminated by metals, the application of biological reduction for the removal of sulphate from wastewaters, and the study of sedimentary microbial fuel cells to harvest electricity from the biodegradation of organic pollutants in contaminated soils.





**Dr. Francisco
Carreño Conde**

Associated Researcher

Graduated in Geological Sciences from the Complutense University of Madrid and obtained a Ph.D. for the Rey Juan Carlos University. He worked for four years in a private sector environmental company and three years on a research grant in remote sensing (Complutense University of Madrid).

He has been Professor of Biology and Geology Department at Rey Juan Carlos University since 2002. He is a co-author of six papers in international peer-reviewed journals, one scientific book and four chapters of scientific books, and more than 40 marine geology and geomorphology maps. His research is currently focused on remote sensing and GIS techniques applied to prospecting, management and conservation of water, geology, detection of submarine groundwater discharges. He has also experience in 3D geological surfaces for groundwater modelling.



**Dr. Ana Berreteaga
Escudero**

Associated Researcher

Graduated in Geological Sciences at the University of the Basque Country and received her PhD in 2008 at the same University, specialising in issues related with vertebrate paleontology, phosphate geochemistry and especially stratigraphy, geological mapping and basin analysis.

In 2009 she joined the hydrogeology research team from the University of Alcalá de Henares under the guidance of Dr. Irene de Bustamante, studying desalination processes and management of the rejections resulting from different water purification processes (desalination, reuse, etc.). She also participates actively in research into Geothermal Energy at IMDEA Water.

Her current research focuses on variations in thermal conductivities of subsoil, depending on the lithology and the amount of water, with the ultimate aim of achieving greater development of geothermal energy. On the issue of managing rejections from various water purification techniques, her research focuses on studying the possibility of deep underground injection of the same.



Dr. Raffaella Meffe
Researcher

Graduated in Geological Science with specialization in hydrogeology at the University of Rome "La Sapienza" in 2007. During her master thesis, she carried out the characterization of a carbonatic aquifer to quantify the natural groundwater resource for a suitable drinking water management.

She obtained her PhD at the Free University of Berlin in 2011. The PhD research was mainly focused on organic contamination of groundwater used for drinking water production.

She published papers in international peer-reviewed journals and attended international conferences.



Dr. José Luis Corvea Porras
Researcher

PhD in Environmental Sciences by the University of Alcalá, (approved as PhD in Pedagogical Sciences by the Cuban Ministry of Higher Education). Professor and member of the Academic Committees of the Master in Environmental Management and the Master in Agroecology (University of Pinar del Rio, Cuba).

He has experience in the management of National Parks and he has participated in several research and international cooperation projects. He has published several papers and reports related to the educational management of water resources, the dissemination and the knowledge of the hydrogeological heritage and, it is worth pointing out its participation in several national and international congresses. He has been teaching and researching for 20 years and also organizing R+D activities.

His current research focuses on the management of wastewater treatment system and natural protected areas.





Ángel de Miguel García
Predoctoral Researcher

Degree in Environmental Sciences from Alcalá University. Madrid. Spain.
MSc in Hydrology and Water Resources at Alcalá University and Rey Juan Carlos University. Madrid. Spain.
Research: Water Footprint and water resource stress.



María de las Virtudes Martínez Hernández
Predoctoral Researcher

Degree in Environmental Sciences from Alcalá University. Madrid. Spain.
MSc in Hydrology and Water Resources at Alcalá University and Rey Juan Carlos University. Madrid. Spain.
Research: Emerging contaminants and groundwater.

María Leal Meca
Predoctoral Researcher

Degree in Environmental Sciences from Alcalá University. Madrid. Spain.
MSc in Hydrology and Water Resources at Alcalá University and Rey Juan Carlos University. Madrid. Spain.
Research: Horizontal Permeable Reactive Barriers for groundwater recharge with treated wastewater.

Víctor González Naranjo
Predoctoral Researcher

Degree in Chemical Engineering from University of Las Palmas de Gran Canarias, Canary Island. Spain.
MSc in Hydrology and Water Resources at Alcalá University and Rey Juan Carlos University. Madrid. Spain.
Research: Analysis of priority and emerging pollutants in soil samples and their impact on groundwater.



water biology and bioelectrogenesis



Dr. Abraham Esteve Núñez
Associated Researcher

Graduated in Biochemistry in 1995 from the University of Murcia, Spain. He carried out his doctoral research on biodegradation of explosives in the El Zaidin Experimental Station (CSIC) and received his Ph.D. degree in Biochemistry in 2000 from the University of Granada, Spain, obtaining the Outstanding Doctorate Award. He spent his first Postdoctoral period (4 years) in the Environmental Biotechnology Centre (Massachusetts, US) investigating different aspects of microbial iron reduction. Then, he joined the Astrobiology Centre (CSIC-INTA) in Madrid (3 years) to provide insights into the exocellular electron transfer in electricity-producing bacteria.

As of 2009 he is a Researcher with the Ramón y Cajal National Science Programme at the Department of Analytical Chemistry and Chemical Engineering of the University of Alcalá, Madrid.

He is currently leading a research group into the microbial production of electricity, a novel process that merges biotechnology with renewable energies, with applications in the field of wastewater treatment, in situ bioremediation and nanobiotechnology. He is also a member of the consortium responsible for the BACWIRE project (7FP) dedicated to improving the bacteria-electrode interaction by nanotechnology tools in order to make the waste-into-bioelectricity process a feasible application. At IMDEA Water, he is leading the research focused on the molecular and bioelectrochemical aspects of microbial fuel cell technology in wastewater treatment.

Dr. Rehab El-Shehawy
Researcher

PhD in Microbiology in 2001 from the University of Bayreuth, Germany. She carried out her doctoral research on nitrogen fixation and cell differentiation in cyanobacteria and got

In 2001, she moved to Stockholm University to work as a postdoctoral fellow and later on as an assistant professor and a group leader. As a postdoctoral fellow, her research focused on the filamentous bloom-forming *Trichodesmium* sp., which is a significant nitrogen fixer in tropical and subtropical oceans. Later as a group leader, she directed her research to focus on studying the bloom-forming toxic cyanobacterium *Nodularia spumigena* that dominates the annual summer blooms in the Baltic Sea.

She has authored and co-authored eighteen original research articles for international peer-reviewed journals, which also includes two review articles and one book chapter. She acted as a referee for several high impact journals and she has presented her research at several international conferences. As a main academic supervisor, she graduated one PhD thesis and two MSc theses. She has successfully collaborated on both the national (Swedish) and international levels.





Dr. Sanda Iepure

Researcher

Graduated in Biology from Babes-Bolyai University in Cluj Romania, she received her PhD degree in Biology from the Romanian Academy in 2008. She has developed research in groundwater ecology and cave fauna working in Romania at the Institute of Speleology "Emil Racovita", Cluj (Romania) since 1999. During her research career she spent several months in the Groundwater Ecology Department at the Institute for Limnology Mondsee (Austria) and National Museums of Natural History from Madrid, Bruxelles, Paris and Warsaw.

Her general interest is groundwater ecology and risk assessment; ecology and biogeography of subterranean crustaceans; and the study of evolutionary mechanisms and speciation processes in groundwater crustacean populations by using traditional approaches of classical morphology and geometric morphometry (on recent and fossils ostracods). Currently her research lines is focused on the assessment of subsurface ecological status in transitional hyporheic zone of rivers and aquifers in detrital and soluble carbonate rocks by using the groundwater crustaceans as indicators.

Dr. Iepure has authored and co-authored twenty six scientific articles of which ten are published in peer-reviewed international journal and nine are book chapters.

She has been conducted and participated in several groundwater research projects financed by the National University Research Council (NURC) in Romania.



Dr. Karina Boltes Espínola

Associated Researcher

Chemical Engineering. PhD in Chemistry from the University of Alcalá in 2000. Assistant Professor in Chemical Engineering Department. Her research is focused on optimisation of biological processes for degradation of xenobiotics using reactors of different configurations. Toxicological evaluation of mixed pollutants in wastewater and biostimulation of microorganisms for in-situ biodegradation are other research areas. She has participated in 20 research projects sponsored by the Spanish government and private enterprises. She has also been the director of a PhD thesis, and many post-graduate research projects in the Master on Hydrology and Water Management from the University of Alcalá.

Sara Tejedor Sanz

Predoctoral Researcher

Degree in Chemical Engineering from University Complutense of Madrid. Spain.

MSc in Hidrology and Water Resources Management at Alcalá University and Rey Juan Carlos University, Madrid. Spain.

Research: Wastewater Treatment by microbial electrogenesis process.



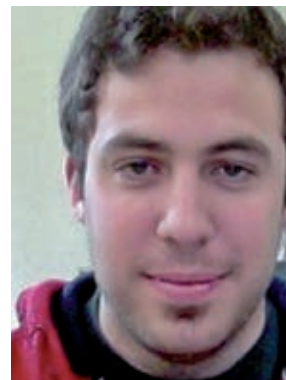
Alejandro Reija Maqueda

Predoctoral Researcher

Degree in Biotechnology from Francisco de Vitoria University. Madrid. Spain.

MSc in Hidrology and Water Resources Management at Alcalá University and Rey Juan Carlos University, Madrid. Spain.

Research: Wastewater treatment using natural purification systems (NPS): bioelectrogenic wetlands.



Rubén Rasines Ladero

Predoctoral Researcher

Degree in Environmental Sciences from Alcalá University, Madrid. Spain.

MSc in Hidrology and Water Resources Management at Alcalá University and Rey Juan Carlos University, Madrid. Spain.

Research: Ecological assessment of the subsurface water quality from the hyporheic zone.



water and climate change



Dr. Pedro Berliner

Researcher

Professor at the Blaustein Institute for Desert Research, Ben Gurion University of the Negev in Israel, teaching courses related to agrometeorology and the use of marginal waters as part of the Hydrology and Dryland Agriculture graduate student programmes. He spent his sabbatical year at IMDEA from April 2009 to March 2010 and is currently Adjunct Senior Scientist at IMDEA, collaborating in developing and heading the "Sustainable Management of Water Bodies" Department in which the efficient use of recycled sewage water in agriculture, is being addressed. He has published more than fifty articles in international peer reviewed journals and ten chapters in books on topics related to the efficient use of water in agriculture, and supervised more than thirty M.Sc. and Ph. D. Students. He was a visiting Professor at CIDESON, Mexico (1994-95) and at the Desert Research Institute, Univ. of Tottori, Japan (2001-02). He is a member of the Israeli delegation to the UNCCD (Convention for Combating Desertification), Israel's Ministry of Science representative to the ESF COST programme (domain: forests, products and services), and was one of the leading scientists that took part in a Middle East multilateral watershed and water resource management project, administered by the World Bank and various other international forums. He has led competitively funded research projects in Southern Africa, Kenya, Uzbekistan, Kazakhstan, Turkmenistan, India and Argentina. These projects were funded by the US AID, BMBF (Germany), 6PM EU and Argentina's CONICET among others.

His research areas are the mass and energy balances in the biogeosphere interface, and their dependence on the movement of water in the soil-plant-atmosphere continuum. One of the topics of special interest is the role played by the direct evaporation of water from the soil surface, in the presence or absence of plants, on the dissipation of solar energy. The use of remote sensing tools to assess the spatial distribution of these phenomena, their modelling and the expected effect of climate change on them are also among his research topics. Over the last twenty years he has paid special attention to the generation and efficient use of rainfall generated runoff for the irrigation of crops and forest, and developed the runoff agroforestry systems concept, which is particularly well adapted to arid land regions in the developing world.

Dr. Juan Antonio

Pascual Aguilar

Associated Researcher

Graduated in Geography in 1991 from the University of Valencia where he later obtained his PhD in Geography. He has taken part in 9 Spanish and European competitive projects and more than 30 non competitive projects through academic and private contracts.

He has published 39 papers between book chapters and journals, apart from other literature presented at scientific meetings. He has participated as lecturer in 2 MSc programmes and given several guest talks at national and international meetings.

His research centres on the spatial analysis and temporal study of environmental land use and water processes using the application of models and Geographical Information Systems. He has also developed his expertise in landscape assessment, particularly on issues related with the preservation of traditional agricultural patterns and water use.





Dr. María Francisca Naranjo Pérez de León

Researcher

Ph.D. in Civil Engineering, Laval University, Québec (Canada). Post doctorate -Institute of Engineering UNAM Full Lecturer, Faculty of Sciences, Adjunct and Full Lecturer, Engineering Faculty, UNAM. Head of multidisciplinary group for integrated problems and solutions in urban centres at the Water Research Centre (CIA), based in Mexico City.

Several publications in international and national journals on different topics related to statistical and probabilistic models in hydrology and water resources management in river basins and urban centres. Historical water resources planning and management.



Dr. Malaak Kallache

Researcher

She obtained her PhD on trends and extreme values of river discharge time series from the University of Bayreuth, Germany, in 2007. She also worked at the the Potsdam Institute for Climate Impact Research (Germany). From 2008 to 2010 she was experienced researcher for the Marie Curie research network NICE at the LSCE-IPSL in Gif-sur-Yvette, France. Her research interests lie mainly in the fields of data analysis of hydro-meteorological data, extreme value analysis, stochastic modeling, Bayesian model combination, downscaling, and vulnerability assessment.

She has published more than 8 papers in international peer-reviewed journals and books. Dr. Kallache has presented in numerous international scientific workshops. Furthermore, she refereed for various high impact journals. In addition, she was involved in the organization of a scientific conference and a scientific workshop, which was dedicated to the training of young researchers. She has past and ongoing international collaborations (especially in Germany and France).



Alberto de Tomás Calero

Predoctoral Researcher

Degree in Environmental Sciences from Alcalá University. Madrid. Spain.

MSc in Geographical Information Technologies from Alcalá University. Madrid. Spain.

Research: Estimating evapotranspiration through scintillometry and remote sensing.

Ojilve Ramón Medrano Pérez

Predoctoral Researcher

Degree in Civil Engineering from the Autonomous University of Santo Domingo. Santo Domingo. Dominican Republic.

MSc in Hydrology and Water Resources at Alcalá University and Rey Juan Carlos University. Madrid. Spain.

Research: Water and Energy Synergy. Distribution networks as savings instrument.



Vladimir Ernesto Abreu Saldaña

Predoctoral Researcher

Degree in Civil Engineer from the Universidad Autónoma de Santo Domingo (UASD), Santo Domingo, Dominican Republic.

MSc in Hydrology and Water Resources Management at Alcalá University, Madrid. Spain.

Research: Extreme rainfalls (cyclonic rainfalls)

Reynaldo Payano Almanzar

Predoctoral Researcher

Degree in Civil Engineering from University Católica Tecnológica de Cibao. Dominican Republic.

MSc in Hydrology and Water Resources at Alcalá University and Rey Juan Carlos University. Madrid. Spain.

Research: Hydraulic Heritage.



economic and institutional analysis



Miguel Solanes
Researcher

Head of the Department of Economic and Institutional Analysis of IMDEA Water. He has been a water and legal advisor for the United Nations since 1984. Based in New York until 1994 before being seconded to ECLAC (Economic Commission for Latin America and the Caribbean) in Santiago, Chile. He has a rich experience in water law, privatisation and regulation of water-related utilities, international and interstate (federal countries) water law and public utilities and the international agreements for protection of foreign investment. As part of his research at the UN, Miguel (M.A. in Water Resource Management at Colorado State University and Research Scholar at the Kennedy School of Government) has promoted the need for stable and secure water rights as an incentive to private investment and water markets as efficiency devices and re-allocation tools in scarcity conditions or climate change scenarios. At the same time, he has provided evidence on the risk that non-conditioned water rights may encourage monopolisation. Miguel has provided legal advice for public policy design in Guatemala, Ecuador, Paraguay, Argentina, Peru, Syria, Jordan, Trinidad and Tobago, Turks and Caicos, Bahamas, St. Vincent and the Grenadines, Gambia, Tanzania, India, China, Sudan, Turkey, Brazil, Venezuela, Yemen, Ethiopia, Mozambique, Ghana, Oman, Solomon Islands, Papua New Guinea, Tuvalu, Kiribati, Bulgaria, Costa Rica, Chile, El Salvador, Colombia, Honduras, Nicaragua, Vietnam, Thailand, Dominican

Republic, South Africa and Morocco. In 2006 he was a member of the High Level Panel of Experts advising the UNDP on his Human Development Report on water and human development. In addition, he is currently a member of the Academic Panel of GTZ Global Water Dialogues and was co-ordinator of the South American Technical Advisory Committee (SAMTAC) of the Global Water Partnership (GWP) from 2001 to 2006 and member of the Technical Committee of that institution, from 1996 to 2006.



Dr. Carlos Mario Gómez Gómez
Associated Researcher

Carlos Mario Gómez is Professor of Economics at the University of Alcalá since 1996. Graduated in Political Science (in Colombia) and Economics (in Spain), Master's in Agricultural Economics and Development at the University of London in 1992. He received his Ph.D. degree in Economics at the University of Alcalá (Madrid). He was appointed as a Research Associate at the Institute of Business and Economic Research of the University of California Berkeley in 1994, and as a Visiting Scholar for a sabbatical leave in 2000.

He has done extensive research on environmental economics with emphasis on water economics which was published in different peer reviewed national and international journals. Since 2000 he has led a sequence of competitive national projects and has been involved in the national and European economic analysis groups formed to support the implementation of the Water Framework Directive.

At IMDEA he is currently leading the research team of the EPI Water project approved in 2010 under the Seventh Framework Program of the European Union.



Gonzalo Delacámara Andrés

Junior Researcher

Lecturer on Economic Analysis at the UAH (1997-2012). Researcher of the Department of Economic and Institutional Analysis of the IMDEA Water Foundation. He has been the Coordinator of the research group on Environmental Economics at the Department of Economic Analysis of the UAH since 2001 and until 2009. International consultant for the Economic Commission for Latin America and the Caribbean (ECLAC) or the Food and Agriculture Organization (FAO) of the United Nations, the World Bank, and the Inter-American Development Bank (IADB), on water and energy economics. Gonzalo has coordinated a number of research projects over the last few years: the economic valuation of ecosystem services in Spain (Ministry of the Environment, 2005-2009), with emphasis on the valuation of water ecosystem services; the economic analysis of environmental external (marginal) costs of electricity generation (IDAE, 2004-2005) or the economic valuation of water resources (GWP and the UN, 2001-2003), with case-studies on the rivers Mendoza (Argentina), Maule (Chile), Paraíba do Sul (Brazil), Catamayo Chira (Peru) and Quindío (Colombia). Gonzalo was also a Research Manager for ECOTEC Research & Consulting (1999-2001), and developed a number of projects for the European Commission (economic analysis of environmental taxes and charges, water pricing, spatial development, etc.). In Latin America, he carried out the economic analysis of public policies for the promotion of liquid biofuels for transport (UN, 2006-2007). As a researcher of IMDEA Water, he is currently working on the analysis of economic.

Marta Rodríguez Gómez

Predoctoral Researcher

Degree in Environmental Sciences from Autonomous University of Madrid. Spain.

MSc in Hidrology and Water Resources Management at Alcalá University and Rey Juan Carlos University, Madrid. Spain

Research: Drivers affecting the industrial structure of water and sanitation services.



Estefanía Ibáñez Moreno

Predoctoral Researcher

Degree in Environmental Sciences from Alcalá University. Madrid. Spain.

MSc in Contemporary Latin America and relations with the European Union: a strategic cooperation from the University of Alcalá. Madrid. Spain.

Research: Economic instruments for Water Management.



Carlos Dionisio Pérez Blanco

Predoctoral Researcher

Degree in Economic Sciences

MSc in Applied Economic Analysis, Alcalá University-Complutense University of Madrid and master's degree in Development Economics and International Co-operation, Rome University.

Research: Economic policy instruments for sustainable water management.



laboratory technicians

Francisco Martínez Serrano

Laboratory Technician

FPII: Environmental Chemistry.



Carolina Guillén Fuentes

Laboratory Technician

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FPII: Environmental Chemistry.



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University. Madrid.



Sonia Herrera López

Senior Laboratory Technician

Degree in Chemistry from University
of Almería, Spain.



management area and administration

Rafael Irastorza Vaca

Manager

Degree in Economic Sciences.



Juana Sanz García

R&D Management Coordinator

Degree and MSc in Environmental Sciences.



María Luz Barquilla Crespo

Accountant Technician

Degree in Economic Sciences.



José Ángel Gómez Martín

Technology transfer technician

Degree in Environmental Sciences.



Josefa Simón Recio

Secretary





4 infrastructure and scientific equipment

- 4.1. Water Analysis Lab [42]
- 4.2. Water Biology Lab [43]
- 4.3. Geomatics Lab [43]
- 4.4. Soil Lab [44]

4.1. Water Analysis Lab

The water analysis lab has up-to-date analytical equipment to enable detection of organic micropollutants. Moreover, it is fitted with all the basic scientific equipment needed to carry out research into contaminant detection and monitoring of pollution processes necessary to work on different types of water (consumption, waste, surface, etc.) in an integrated manner.

Microcontaminants

The main equipment is for chromatography, both gas and liquid, coupled with mass spectrometry:

- Bidimensional gas chromatography coupled with a mass spectrometer with flight time detector (GCxGC-TOF-MS) with an automatic multi-injection system.
- Gas chromatography coupled with a simple quadrupole mass spectrometer (GC-QqQ-MS/MS).
- Liquid chromatography coupled with mass spectrometer (LC-Q-TOF-MS/MS) for determining mass errors of less than 3 ppm.
- Necessary equipment for the extraction of samples using SPE, LLE, PLE.
- High performance liquid chromatography (HPLC-UV).
- ICP-Mass.

Basic Analysis

- Ion chromatography computer for analysis of anions and cations
- Total Organic Carbon analyser
- Thermoreactor and photometer for determining COD
- Respirometric Oxitop method for determining BOD
- Automatic titrator for alkalinity
- Volumetric sensor for measuring particles in water
- Spectrophotometers
- Multimeter (measuring pH, conductivity, and potential Redox)
- Turbidity meter and colorimeter





4.2. Water Biology Lab

The laboratory is divided in three areas: Molecular Microbiology, Microbial Bioelectrochemistry and Hydrobiology.

In addition to all basic equipment necessary to perform the research tasks, the lab is equipped with:

- Binoculars with transparent and reflected light sources, Olympus SZ51
- Microscope, Olympus CX41
- Colony counter
- Gel Documentation System, Alphamager
- Real Time PCR machine, AB7300
- Nano-photometer, Epoch

4.3. Geomatics Lab

The Geomatics Unit is a resource that provides an infrastructure dedicated to solutions based on new technologies. The Lab has a complete framework consisting of a set of hardware, software, and databases:

- Twelve terminals under a central server.
- Peripherals of different sizes, including printers, plotters and a medium format scanner.
- Support materials which aid data collection and its inclusion in drive systems (laptops, pagers, GPS and SLR cameras).
- ARCGIS
- GIS IDRISI
- GIS ILWIS
- GIS GVSIG
- ERDAS IMAGINE
- Geostatistics SURFER
- Spatial Metric Analysis -FRAGSTAT
- Estimation of Soil Parameters, Hydrologic Modelling - HEC and SWMM family
- Water Erosion Models – WEAP



4.4. Soil Lab

IMDEA Water is provided with a soil laboratory primed and ready to process and analyse soil samples. Physical, physico-chemical, and chemical soil properties are determined for the complete analysis of the soils, with special attention to processes related with soil contamination and remediation. It is equipped to carry out soil determinations such as particle size distribution, organic carbon content, water content, soil colour, pH, electrical conductivity, total calcium carbonate, cation exchange capacity, exchangeable bases and total metal contents, among others. For all analyses, the laboratory is fitted with the following equipment:

- COY Type C Vinyl Anaerobic Chamber
- Centrifuge (EPPENDORF 5810R)
- Overhead Shaker (HEIDOLPH Reax 20)
- Mixer Mill (RETSCH MM400)
- Electromagnetic Sieve Shaker (CISA RP20)
- Vibratory Micro-Mill (FRITSCH Pulverisette 0)
- Orbital Mixer and Shaker with heating platform (SELECTA)
- Drying and Sterilising Natural Convection Oven with Temperature and Time Regulation and Digital Reading (SELECTA)
- Electronic Autoclave for Sterilisation (SELECTA)
- UV-Spectrophotometer (SHIMADZU UV-1800)
- Hotplate (SELECTA) • Electronic Balance (GIBERTINI)
- Electronic Analytical and Precision Balance (SARTORIUS)
- Microprocessor Conductivity Meter (EC/TDS/NaCl/°C) (Hanna Instruments HI 2300)
- pH-Meter (CRISON GLP 21+)
- Sand Bath (SELECTA Combiplac-Sand)
- Magnetic Stirrer (NAHITA)
- Agate Mortar
- Calcimeter
- Surface Layer Scintillometer for measuring sensible heat and momentum fluxes
- Bowen Ratio Psychrometers





5 research results and knowledge dissemination

- 5.1. Scientific Papers [46]
- 5.2. Lectures [50]
- 5.3. Oral Communications [51]
- 5.4. Posters [54]
- 5.5. Fellowships [56]
- 5.6. PhD Thesis [57]
- 5.7. Internships [58]
- 5.8. Mobility [58]
- 5.9. RTD activities organization [59]
- 5.10. Academic Activities [59]

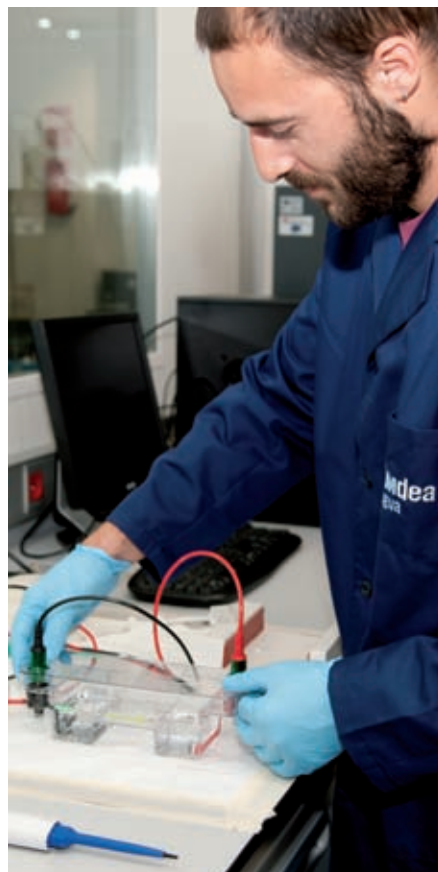
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8. Gómez, M.J. (2011). *Análisis de contaminantes emergentes en el medio ambiente con técnicas analíticas avanzadas*. 1 de abril de 2011. Conferencia en el Ciclo de Conferencias 10 Lecciones de Química. Universidad de Alcalá. Madrid. April, 2011.

9. Gómez, M.J., Herrera, S., Fernández-Alba, A.R. (2011). *Application of new multi-residue methods for the efficient evaluation of micro-contaminants in Waters*. 2nd European GCxGC Symposium. University of Regensburg. Ratisbona, Alemania. 20th-21st of September, 2011.

5.2. Lectures

1. Delacámara, G. (2011). *Estructura industrial para una prestación eficiente*. Conferencia “Construyendo compromiso, eficiencia y equidad para servicios sustentables de agua potable y saneamiento en América Latina y el Caribe”. CEPAL. Santiago de Chile, Chile. March, 2011.

2. Delacámara, G. (2011). *Links between groundwater governance, economic development and environmental benefits*. Conferencia como parte de la sesión “Perspectives from economists, finance, development agencies and environmental agencies. How to build a Global Framework for Action”. GEF Project on Groundwater Governance, UNESCO. París, Francia. September, 2011.



10. Solanes, M. (2011) *Agua, Derecho, Economía y Cambio Climático*. Presentación en Seminario organizado por el Gobierno de El Salvador, con la participación del Global Water Partnership y varios países de Centroamérica. San Salvador, El Salvador. September, 2011.

11. Solanes, M. (2011). *Derechos de Agua y Mercados en Chile: ¿Tensiones entre Individualismo y Sustentabilidad?*. Conferencia en la Universidad Complutense de Madrid. Madrid. The 16th of June, 2011.

12. Solanes, M. (2011). *Servicios de Agua Potable y Saneamiento: impacto económico y social, organización, regulación, financiación, derecho al agua*. Conferencia Magistral en la Fundación Salvadoreña para el Desarrollo Económico y Social. San Salvador, El Salvador. April, 2011.

5.3. Oral Communications

1. Corvea, J.L., Blanco, A., Goy, J.L., Farfán, H., Martínez, Y., y Novo, R. (2011). *Pinar del Río (Occidente de Cuba): Una región de alto potencial para la creación de geoparques. Avances y retos en la conservación del Patrimonio Geológico en España*. IX Reunión Nacional de la Comisión de Patrimonio Geológico (Sociedad Geológica de España). León. 13-18 of July, 2011.

2. De Miguel, A., Moyano, M., Martínez-Hernández, V., Leal, M., Pacheco, R.G. (2011). *Waste-water Reuse for Irrigation and Bio-diesel Production in Small Communities*. 2nd IWA Spain National Young Water Professionals Conference. Madrid, 15 - 17 of June, 2011.

3. De Miguel, A., Moyano, M., De Bustamante, I., Lillo, J., Leal, M., Pacheco, R.G., Salas, J.J., Martín, I. (2011). *Feasibility of wastewater irrigation for small-scale biodiesel production*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 April.

4. De Miguel, A., Sanz García, J., De Bustamante, I., De Tomás, A., Goy, J.L. (2011). *Land Application Systems as Environmentally Friendly Wastewater and Reuse Systems*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 april.

5. Del Villar, A., De Bustamante, I., Gómez, C.M., De Miguel, A. (2011). *Land Application Systems and its Assessment on Financial and Economic Criteria: The Experience of CENTA in Sothern Spain*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 april.

6. Delacámara, G. (2011). *Building baseline scenarios for the assessment of economic policy instruments for water management*. Ecologic. Berlín, Alemania. July, 2011.

7. Esteve-Núñez, A., Boltes, K., Reija, A., Bragado, N., Domínguez-Garay, A., Carpatos, J., Biel, M., Berná, A. (2011). *Microbial conversion of pollutants into electric current: strategies for monitoring and stimulating the bioremediation capacity of soil microbial communities*. 15th International Symposium on Biodeterioration and Biodegradation (IBBS-15). Viena, Austria. The 19th of september, 2011.

8. Farfán, H.; Corvea, J.L.; Días, C.; Martínez, Y.; Aldana, C. (2011). *Valores patrimoniales de los sistemas cavernarios del Parque Nacional Viñales, Cuba. Conocimiento actual y estatus de protección*. IX Reunión Nacional de la Comisión de Patrimonio Geológico (Sociedad Geológica de España). León. 13 - 18 of July, 2011.

9. Farfán, H., Corvea, J.L., Martínez, Y. (2011). *El uso de la teledetección y el análisis SIG en la evaluación de la vulnerabilidad y riesgo a la contaminación de los acuíferos del Parque Nacional Viñales, Cuba*. Congreso Ibérico sobre las Aguas Subterráneas: Desafíos de la gestión para el siglo XXI. Asociación Internacional de Hidrogeólogos Grupo Español. Zaragoza. 14 - 17 of September, 2011.

10. Fernández-Alba, A.R., Martínez Bueno, M.J., Hernando, M.D, Gómez, M.J., Ulaszewska, M.M. (2011). *Target and Non-Target Screening for Emerging Contaminants in Environmental Water Samples using LC-Triple TOF-MS*. CCE 2011. International Conference on Chemistry and the Environment. European Association of Chemical and Molecular Sciences (EuCheMS). Zurich, Suiza. 11 - 15 of September, 2011.

11. Gómez, C.M., Delacámara, G. (2011). *Assessment criteria for environmental policy instruments for sustainable water management: environmental outcomes*. Seminario EPI-Water. Wageningen University. Wageningen, Países Bajos. May, 2011.

12. Gómez, C.M., Delacámara, G. (2011). *Drought and scarcity: innovative economic policy instruments in the Tagus-Segura interconnected river basins*. EPI-Water Project inception meeting. FEEM. Venecia, Italia. January, 2011.

13. Gómez, C.M., Delacámara, G. (2011). *EPis for drought management: voluntary water right transfers from agricultural uses to the urban sector: Tagus river basin*. Seminario EPI-Water. ACTeon. Estrasburgo, Francia. October, 2011.

14. Gómez, C.M., Delacámara, G. (2011). *Payment for river regime restoration services: Ebro river basin*. Seminario EPI-Water. ACTeon. Estrasburgo, Francia. October, 2011.

15. Gómez, D., Lillo, J., De Bustamante, I., Salas, J.J., Martín, I. (2011). *Using Electrical Resistivity (ERT) to Evaluate Water Flow and Clogging Zones in a Horizontal Flow Constructed Wetland*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 April.

16. Gómez, M.J., Herrera, S., Gómez-Ramos, M.M., Solé, D., Fernández-Alba, A.R. (2011). *Aplicación de cromatografía de gases y cromatografía líquida con analizador de tiempo de vuelo para la evaluación y búsqueda automática de contaminantes orgánicos y sus productos*

de transformación en aguas. V Reunión de la Sociedad Española de Espectrometría de Masas (V RSEEM). Málaga. 11 - 14 April, 2011.

17. Lado, J.J., Wouters, J., Tejedor, M.I., Anderson, M.A. (2011). *Asymmetric Capacitive Deionization (CDI), an Emerging Technology for Water Treatment in Small Communities*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 April.

18. Leal, M., Pacheco, R.G., De Miguel, A., Martínez-Hernández, V. (2011). *TOC, Nitrogen and Phosphorus Adsorption by Different Reactive Materials: Application to the Wastewater Reuse through Horizontal Permeable Reactive Barriers*. 2nd IWA Spain National Young Water Professionals Conference. Madrid. 15 - 17 June.

19. Lillo, J., Gómez, D., De Bustamante, I., Salas, J.J., Martín, I. (2011). *Using Electrical Resistivity Tomography (ERT) to Evaluate Water Flow in a Vertical Flow Constructed Wetland*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 of April.

20. Magyari, E., Buczkó, K., Braun, M., Toth, M., Hubay, K., Korponai, J., Jakab, G., Iepure, S., Heiri, O., Hübener, T., Vennemann, T. (2011). *Biotic and abiotic responses to rapid Lateglacial climate change in the subalpine belt of the S Carpathians (Romania) - multi-proxy results from the PROLONGE project*. XVIII INQUA Congress. Quaternary sciences - the view from the mountains. Berna, Suiza. 21 - 27 of July.

21. Martínez, Y., Corvea, J.L., Novo, R., Farfán, H., Luis, M., Fleitas, R., Miranda, J.C. (2011). *El agroturismo, una alternativa viable en el desarrollo del ecoturismo en el Parque Nacional Viñales*. 6º Congreso de Ciencias Aplicadas al Turismo "Turiciencia Cuba 2011". La Habana. 2 - 4 of May.

22. Martínez, Y.; Fleitas, R.; Corvea, J.L.; Cordova, Y.; Miranda, J.C; Valdés, Y.; García, W. (2011). *Desarrollo de un Sistema agroecológico participativo integrado al manejo de los recursos naturales y culturales en la localidad El*





Capón. *Parque Nacional Viñales. Pinar del Río. Cuba*. VIII Convención Internacional sobre Medio Ambiente y Desarrollo. VII Congreso de Áreas Protegidas. La Habana, Cuba. June of 2011.

23. Martínez-Hernandez, V., Nogueras, R., De Bustamante, I., Iglesias, J.A. . (2011). *Estimación de las áreas potenciales de recarga y contaminación de la masa de agua subterránea Manzanares-Jarama con Sistemas de Información Geográfica*. Congreso Ibérico sobre las Aguas Subterráneas: Desafíos de la gestión para el siglo XXI. Zaragoza. Asociación Internacional de Hidrogeólogos Grupo Español. 14 - 17 of September.

24. Naranjo Pérez de León, M.F. (2011). *Climate change impact on hydraulic structures: Alcalá de Henares and Mexico City*. European Geosciences Union General Assembly 2011. Viena, Austria. 3 - 8 of April, 2011.

25. Naranjo Pérez de León, M.F. (2011). *Ingeniería Hidráulica en la Cuenca de México en el siglo XVI*. III Simposio Nacional sobre Patrimonio: El Patrimonio del agua visto desde las regiones. Ciudad de Puebla, México. 27 - 29 of October.

26. Pascual Aguilar, J.A., Naranjo Pérez de León, M.F., Payano Almánzar, R., Medrano Pérez, O.R. (2011). *Tecnología para la recolección de agua de niebla*. IV Simposio de Tecnohistoria «Akira Yosimura». Chiapas, México. 5 - 9 of September.

27. Payano Almánzar, R., Pascual, J.A. (2011). *Análisis de sucesos productores de caudal en pequeñas cuencas mediterráneas como apoyo a la gestión integrada y sostenible del agua*. VII Congreso Ibérico sobre Gestión y Planificación del Agua "Ríos Ibéricos +10. Mirando al futuro tras 10 años de DMA». Talavera de la Reina-España. 16 - 19 of February.

28. Peterson, D.E., Danielopol, D., Finger, K., Iepure, S., Mariani, S., Montanari, A., Namiotko, T. (2011). *Reconnaissance of ostracode assemblages in the Frasassi Caves, the adjacent sulfidic spring, and the Sentino River in the north-eastern Apennines (Marche region, Italy)*. The Geo-

logical Society of America (GSA) Annual Meeting. Minneapolis, Estados Unidos. 9 - 12 of October.

29. Reija, A., Tejedor, S., Berná, A., Boltes, K., Gutiérrez, C., Borjas, Z., Estévez, M., Cápatos, J., Biel, M., Montero, E., Barroeta, B., ?Esteve-Núñez, A. (2011). *Microbial Electrogenesis: Wastewater as an Energy Resource. The AQUA-ELECTRA Project.*? 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 April.

30. Solanes, M., Delacámara, G. (2011). *Criteria for the ex post evaluation of the IHP-VI (2002-2007)*. UNESCO Headquarters. París, Francia. January.

31. Solanes, M., Delacámara, G. (2011.) *Evaluación del IHP-VI (2002-2007)*. UNESCO Regional. Montevideo, Uruguay. March.

32. Solanes, M., Delacámara, G. (2011.) *Ex post evaluation of the IHP-VI (2002-2007): insights from Latin America and the Caribbean*. UNESCO. París, Francia. June.

33. Teerlink, J., Martínez-Hernandez, V., Drewes, J.E., De Bustamante, I. (2011). *Attenuation of Trace Organic Contaminants During Soil Treatment Associated with Onsite Wastewater Treatment Systems*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 de April.

34. Teerlink, J., Hernandez-Martinez, V., Higgins, C.P., Drewes, J.E. (2011). *Attenuation of Trace Organic Chemicals in Onsite Wastewater Soil Treatment Units as a Function of Hydraulic Loading Rate*. RMSETAC 24th Annual Chapter Meeting. Denver, CO, Estados Unidos. May.

35. Teerlink, J., Hernandez-Martinez, V., Higgins, C.P., Drewes, J.E., McCray J., Siegrist, R. (2011). *Fate and Transport of Trace Organic Chemicals in Soil Treatment Units Associated with Onsite Wastewater Treatment Systems*. ASA-CSSA-SSSA International Annual Meetings 2011. Fundamentals for Life: Soil, Crop, & Environmental Sciences. San Antonio, TX, Estados Unidos. 16-19 of October.

36. Tejedor, S., Berná, A., Esteve-Núñez, E. (2011) *Electrogenic denitrification in a bioelectrochemical electrolysis cell by Geobacter lovleyi: an alternative for nitrogen removal in waste-waters*. 3rd International Microbial Fuel Cell Conference 2011. Leeuwarden, Holanda. 6 -8 of June.

5.4. Poster

1. Arregoitia Sarabia, C. (2011). *Desalination and Natural Hazards*. European Geosciences Union General Assembly 2011. Viena, Austria. 3 - 8 de April, 2011.

2. Corvea, J.L., Gutiérrez, R. (2011). *Los Geoparques: iniciativa internacional de turismo científico o de naturaleza, de múltiples potencialidades en el occidente cubano*. 6º Congreso de Ciencias Aplicadas al Turismo "Turiciencia Cuba 2011". La Habana, Cuba. 2 - 4 of May, 2011.

3. Corvea, J.L., Martínez, Y., Blanco, A. (2011). *La problemática de las aguas en el Parque Nacional Viñales (Cuba): bases para una gestión integrada al plan director*. Congreso Ibérico sobre las Aguas Subterráneas: Desafíos de la gestión para el siglo XXI. Asociación Internacional de Hidrogeólogos Grupo Español. Zaragoza. 14 - 17 of September, 2011.

4. Corvea J.L., Martínez Y., De Bustamante I., Blanco A. (2011). *Influencia de las aguas en la gestión del Parque Nacional Viñales: bases para su integración en el plan de manejo*. III Simposio de Ecología, Sociedad y Medio Ambiente "ECOVIDA 2011". Viñales, Pinar del Río, Cuba. 6 - 8 of December, 2011.

5. Domínguez-Garay, A., Berná, A., Ortiz-Bernad, I., Esteve-Núñez, A. (2011). *Influence of Soil Structure on Outperforming Sedimentary Microbial Fuel Cell in low conductivity soil*. 3rd International Microbial Fuel Cell Conference 2011. Leeuwarden, Holanda. 6 -8 of June, 2011.

6. Domínguez-Garay, A., Reija, A., Barroeta, B., Berná, A., Esteve-Núñez, A. (2011). *Harvesting electricity from natural environments: role of rooting in sedimentary microbial fuel cell fuelled by rice plants*. 1st International PlantPower Symposium. Gante, Bélgica. The 10th of February, 2011.

7. Esteve-Núñez, A., Boltés, K., Reija, A., Bragado, N., Domínguez-Garay, A., Carpatos, J., Biel, M., Berná, A. (2011). *Electrogenic microcosm: strategies for monitoring and stimulating the bioremediation capacity of soil microbial communities*. 3rd International Microbial Fuel Cell Conference 2011. Leeuwarden, Holanda. 6 -8 of June, 2011.

8. Gómez, M.J., Herrera, S., Solé, D., Fernández-Alba, A.R. (2011). *Spatial and Temporal Evaluation of Organic Contaminants in The Henares River Basin (Madrid, Spain). Main Findings and Transformation Products Evaluation*. ICCE 2011. International Conference on Chemistry and the Environment. European Association of Chemical and Molecular Sciences (EuCheMS). Zurich, Suiza. 11 - 15 of September, 2011.



9. Gómez-Ramos, M.M., Pérez-Parada, A., Agüera, A., García-Reyes, J.F., Fernández-Alba, A.R. (2011). *Automated Analytical Procedures for the Screening of Non-Target Transformation Products (TPs) in Photochemical Processes*. ICCE 2011. International Conference on Chemistry and the Environment. European Association of Chemical and Molecular Sciences (EuCheMS). Zurich, Suiza. 11 - 15 of September, 2011.
10. Herrera, S., Gómez, M.J., Sridhara Chary, N., Fernández-Alba, A.R. (2011). *Determination of Volatile Organic Compounds in Waters by Dynamic Headspace Coupled with Comprehensive Two-Dimensional GasChromatography Time-of-Flight Mass Spectrometry*. ICCE 2011. International Conference on Chemistry and the Environment. European Association of Chemical and Molecular Sciences (EuCheMS). Zurich, Suiza. 11 - 15 of September, 2011.
11. Iepure, S., Namiotko, T., Magyari, E. (2011). *Ostracod preservation and response to Late Glacial and Early Holocene climate changes in a sub-alpine belt lake of the southern Romanian Carpathians*. 7th European Ostracodologists' Meeting. Graz, Austria. 25-30 of July, 2011.
12. Kallache, M. (2011). *Statistical extreme value analyses of changes in the context of climate change. What can we transfer from flood analyses to the assessment of droughts?* WCRP Workshop on Climate and Droughts. Barcelona. 02 - 04 of March, 2011.
13. Leal, M., Pacheco, R.G., Lillo, J., Bustamante, I., De Miguel, A., Carreño, F., Martínez-Hernández, V. (2011). *Horizontal permeable reactive barriers for groundwater recharge with wastewater: kinetics and adsorption assays*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 of April.
14. Medrano Pérez, O.R. (2011). *Sinergy water and energy to natural disaster: a challenge of sustainability in large cities*. European Geosciences Union General Assembly 2011. Viena, Austria. 3 - 8 of April.
15. Naranjo Pérez de León, M.F., Payano Almánzar, R. (2011). *Las Infraestructuras Hidráulicas Tradicionales y su Dinamismo en la Gestión Territorial*. VI Congreso Nacional de Ingeniería Civil. Valencia. 23 y 24 of November, 2011.
16. Naranjo Pérez de León, M.F., Payano Almánzar, R. (2011). *Modificación del Paisaje por las Obras Hidráulicas Antiguas en una Cuenca Hidrográfica*. VI Congreso Nacional de Ingeniería Civil. Valencia. 23 y 24 of November, 2011.
17. Novo, R., Luis, M.; Ulloa, S., Acosta, M., Corvea, J.L., Martínez, Y., Palacio, E., Gonzáles, L., Acosta, Z. (2011). *Propuesta de nueva reserva de Biosfera: Sierra de los Órganos. Pinar del Río. Cuba*. VIII Convención Internacional sobre Medio Ambiente y Desarrollo. VII Congreso de Áreas Protegidas. La Habana, Cuba. June, 2011.
18. Pascual Aguilar, J.A., Andreu, V., Pico, Y., Vázquez-Roig, P. (2011). *The influence of connected urban and agricultural surface water flows in the presence of emerging contaminants (pharmaceutical compounds) in protected natural wetlands*. GEOMED 2011 – 4th International Conference on Medical Geology. Bari, Italia. 20-25 of September, 2011.
19. Pascual Aguilar, J.A., Andreu, V., Rubio, J.L. (2011) *Influence of the research scale on runoff generation data in a Mediterranean catchment*. 6th International Congress of European Society for Soil Conservation. Thessaloniki, Grecia. 9 – 14 of May, 2011.
20. Pascual Aguilar, J.A., Andreu, V., Vázquez-Roig, P., Pico, Y. (2011) *Detección de drogas ilícitas en aguas superficiales como fuente potencial de degradación del suelo*. V Simposio Nacional Sobre Control de la Degradación y uso sostenible del suelo. Murcia. 27 – 30 of June, 2011.
21. Pascual Aguilar, J.A., De Bustamante I., Sanz J.M. (2011). *Los itinerarios de paisaje como instrumento social de educación y sensibilización ambiental*. III Simposio de Ecología, Sociedad y Medio Ambiente "ECOVIDA 2011" . Viñales, Pinar del Río, Cuba. 6 - 8 of December, 2011.

22. Pascual Aguilar, J.A., Sanz García, J.M., De Bustamante, I. (2011). *Using environmental metrics to evaluate the spatial and temporal impact of landscape artificialization on soil hydrology and fertility*. SPATIAL 2 (TIES European Regional Conference). Foggia, Italy. 1 y 2 of September, 2011.

23. Reija, A., Tejedor, S., Berná, A., Boltes, K., Domínguez-Garay, A., Gutiérrez, C., Borjas, Z., Estévez, M., Cárpatos, J., Biel, M., Montero, E., Barroeta, B., Esteve-Núñez, A. (2011). *Microbial Electrogenesis: Wastewater as an Energy Resource*. 3rd International Congress Smallwat 2011. Sevilla. 25 - 28 of April.

24. Teli, S.B., Pacheco, R.G., Arregoitia Sarabia, C. (2011). *Poly(vinyl alcohol)-H-ZSM-5 zeolite mixed matrix membranes for pervaporation separation of methanol-benzene mixture*. ICOM 2011. International Congress on Membranes and Membranes Processes». Ámsterdam, Holanda. 23 - 29 of July, 2011.

25. Tejedor, S., Berná, A., Esteve-Núñez, E. (2011) *Electrogenic denitrification in a bioelectrochemical electrolysis cell by Geobacter lovleyi: an alternative for nitrogen removal in wastewaters*. 3rd International Microbial Fuel Cell Conference 2011. Leeuwarden, Holanda. 6 -8 of June, 2011.



5.5. Fellowships

María de las Virtudes Martínez Hernández

Research: Emerging contaminants and groundwater

Category: Support Research Fellowship

Fund: Scientific and Technological Research Regional Plan



David Solé Fernández

Category: Senior laboratory technician

Fund: Spanish Ministry of Science and Technology Affairs (MICINN)



José Ángel Gómez Martín

Category: Technology Transfer Technician

Fund: Spanish Ministry of Science and Technology Affairs (MICINN)



Sonia Herrera López

Category: Senior laboratory technician

Fund: Spanish Ministry of Science and Technology Affairs (MICINN)



Smallwater fellows



5.6. PhD Thesis

Extreme rainfalls (cyclonic rainfalls)

Vladimir Ernesto Abreu Saldaña

Water Footprint and Water Resources Stress

Ángel de Miguel García

Estimating evapotranspiration through scintillometry and remote sensing

Alberto de Tomás Calero

Quanawat in Alcalá de Henares

Enrique Fernández Tapias

Membrane Technology

Raquel García Pacheco

Analysis of priority and emerging pollutants in soil samples and their impacts on groundwater

Victor González Naranjo

Economic instruments for Water Management

Estefanía Ibáñez Moreno

Asymmetric Capacitive Deionisation for water treatment applications

Julio José Lado Garrido

Horizontal Permeable Reactive Barriers for groundwater recharge with treated wastewater

María Leal Meca

Emerging contaminants and groundwater

María de la Virtudes Martínez Hernández

Water and Energy Synergy. Distribution Networks as savings instruments

Ojilve Ramón Medrano Pérez

Hydraulic Heritage

Reynaldo Payano

Economic policy instruments for sustainable water Management

Carlos Dionisio Perez Blanco

Ecological assessment of the subsurface water quality from the Hyporheic zone

Rubén Rasines Ladero

Wastewater Treatment using Natural Purification Systems (NPS) bioelectrogenic wetlands

Alejandro Reija Maqueda

Drivers affecting the industrial structure of water and sanitation services

Marta Rodríguez Gómez

Analysis of the physical environment for an integrated management of natural areas: The Protected Landscape of El Rebollar (Águeda river basin, Salamanca, Spain).

Juana María Sanz García

Wastewater Treatment by microbial electrogenesis

Sara Tejedor Sanz



5.7. Internships

Student: Darío Salinas Palacios

Research: Geopolitics of Water in Spain: conflicts and rivalries of power in the region of Murcia

Centre: University of Paris 8 Vincennes-Saint Denis

Date: January – July 2011

Student: M^a Jesús Martínez Bueno

Research: Development of analytical methods for the determination of organic pollutants in environmental waters

Centre: University of Almería

Date: February – May 2011

5.8. Mobility

Predoctoral Researcher: Alberto de Tomás

Centre: University of Copenhagen

Date: July – October 2011

Predoctoral Researcher: Raquel García Pacheco

Centre: University of Edinburgh

Date: September – December 2011

Predoctoral Researcher: María Leal Meca

Centre: University of Freiburg

Date: April-August 2011

Predoctoral Researcher: Julio Lado Garrido

Centre: University of Wisconsin, Madison. USA

Date: September – December 2011

internships

mobility



5.9. RTD activities organization

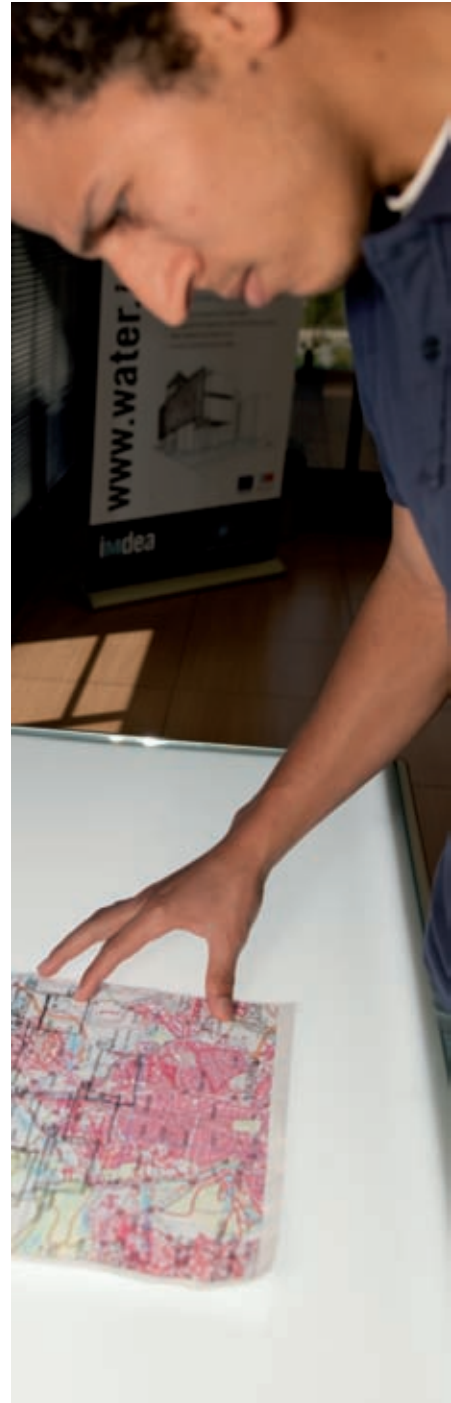
- Organization of International Seminar «Sustainability, efficiency and fairness in provision of potable water and basic cleaning services in Ibero-America». In collaboration with the Iberoamerican General Secretariat (SEGIB) and the Raúl Prebisch Chair (IELAT). 22-23 April. Madrid. Spain.
- Co-organization of I Symposium on water management in protected areas. In collaboration with Ecovida (Environmental Research and Services Centre); SNAP (National System of Protected Areas). 2-6 November. Viñales (Cuba).
- Members of the scientific committee and executive secretariat at the I Symposium on water management in protected spaces. 2-6 November. Viñales (Cuba).
- Vice-chair of the Executive Committee and Chair of the Committee and scientific committee member at the 7th International ANQUE Congress on “Integral water cycle: present and future”. 13-16 July. Oviedo. Spain.

5.10. Academic Activities

- Participation in the development and instruction of the “Master in Hydrology and Water Resources Management” organised by the University of Alcalá and Rey Juan Carlos University in Madrid. Spain.
- Participation in Doctorate course in “Hydrology and Water Resources Management”. University of Alcalá.

academic
activities

RTD
activities
organization



institutional activities

6

6.1. Collaboration [61]

6.2. Institutional Activities [63]



6.1. Collaboration

With Research Organizations

1.  **Universidad de Alcalá**
2.  **Universidad Rey Juan Carlos**
3.  **UNIVERSIDAD DE ALMERÍA**
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10. 
11.  **CONSEJERÍA DE ECONOMÍA E INNOVACIÓN TECNOLÓGICA**
Comunidad de Madrid
12.  **UNIVERSIDAD FRANCISCO DE VITORIA**
VINCE IN BONO MALUM
13. 
14. 
15.  **CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS**
16. 
17. 



With Companies

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6.3. Institutional Activities

- Member of Human Resources Strategy Group (European Commission). Euraxess Rights.



- Member of Research Laboratories Network (REDLAB).
- Participation in 11th Science Week. Madrid. Spain. 2011.
- Participation in the UAH International campus of excellence.
- Member of Euraxess Service Network. Local Contact Point



- Member of working group 3 "Setting standards for shallow geothermal energy" of AENOR.
- Participation in blog "El Agua". Madri+d.



editor
imdea water institute

graphic design
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