

imdea water institute



just water

institute  
**iMdea**  
water

a n n u a l   r e p o r t

2017

w w w . w a t e r . i m d e a . o r g



**Eloy García Calvo**

Director, IMDEA Water Institute  
May 2018

annual report

2017

[www.water.imdea.org](http://www.water.imdea.org)

In 2017 the sustained growth of our institute, IMDEA Water, continued, whose turning point was the move to its definite headquarters almost 3 years ago. It has also witnessed growth in personnel (14%), projects and contracts (8.7% and 100%, respectively), and financing (8.5%).

Apart from existing research lines clearly being well-established, the intention was to reinforce activities related with analysing the microbiological quality of water, and with genes and microorganisms that resist antibiotics.

Among its projects, 13 international ones stand out, of which five are H2020, two are LIFE+ and two are JPI. We coordinate two and actively participate in the rest. Regarding contracts, apart from the framework ones signed with the GD of the Natural Environment of the EU and the European Parliament, we work and form part of a contract with the World Bank for studies in the Lake Chad Basin.

Our scientific-technical production has clearly grown in terms of scientific articles, mostly in Q1 journals of SCI, and especially international book chapters.

The spin-off Metfilter came about in the bioelectrogenesis area, and in 2017 it set the bases to use this technology to treat wastewater with a high content of hydrocarbons. This technology is presently in the demonstration stage with promising results.

IMDEA Water was the first Spanish research centre to obtain the EU Seal of Excellence for its human resources management in research. Managing a complex organisation like a multidisciplinary research centre requires an objective, rigorous and structured analysis of its operation. As a tool for this analysis, we used the EFQM Excellence Model and obtained the European Seal of Excellence 300+ for our improvement efforts.

Some examples of our institute's international projection are the "Mohammed bin Rashid Al Maktoum. Global Water Award" in Dubai, one of our researchers being named the leader of the group "The Value of Water" from the European Technology Platform for Water, or our participation as a Water Governance Initiative (GWI) member of the OECD.

As in previous years, our training commitment has led to seven of our researchers obtaining their PhD, and 69 students from 12 different countries finishing their training in the master coordinated from IMDEA Water. Our participation in forums, production of news in various media and receiving mostly international visits, etc., have continued and grown compared to former years.

Finally, as with each passing year, I wish to thank all the members of our institute for their enthusiasm, commitment and efforts to make IMDEA Water somewhat better every year.

A handwritten signature in black ink, appearing to read 'Sergio Celis', is positioned above a thin horizontal line.

words from the director...

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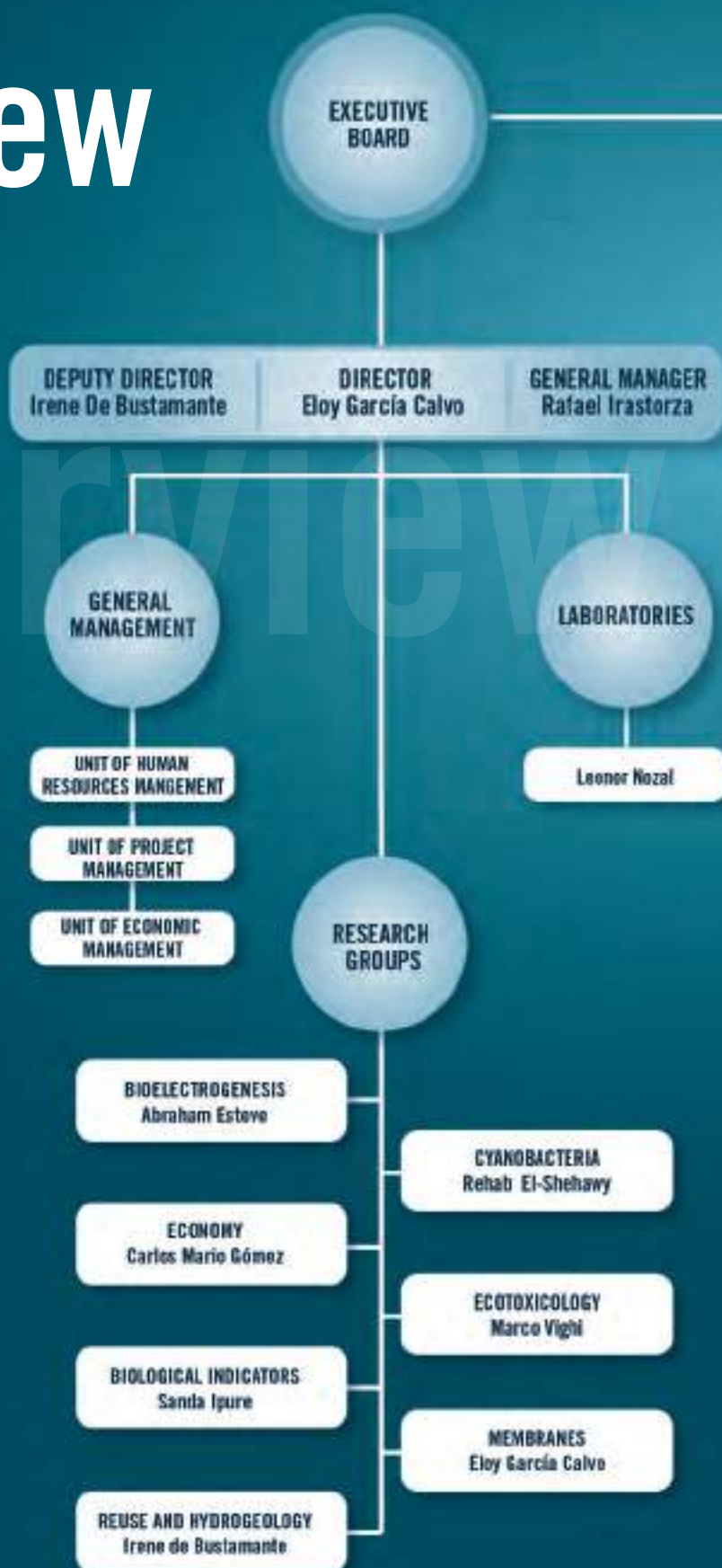
research results and  
knowledge dissemination

# overview

IMDEA Water Institute is a public 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.

The institute's vision is to become an internationally acknowledged centre of excellence for research and innovation on water issues. Helping Madrid take pride of place among the regions generating knowledge and facilitating innovation, by providing solutions to problems and challenges in water management.

The mission is to foster multidisciplinary research and innovation on water issues, generating affordable and sustainable solutions for water-related issues and management. Likewise, to create an efficient development model for science and technology in collaboration with the production sector.



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Water management consultant in innovative water supply strategies  
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# research areas

## Microbial Electrochemical Technologies

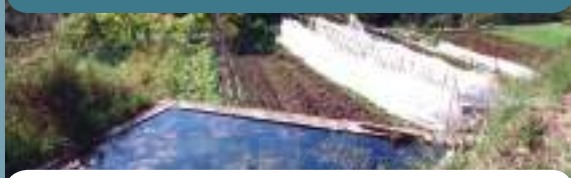


Our research group is fully devoted to merge microbial, electrochemical and engineering tools to restore polluted environments (soil and water) by exploring the world behind the microbial electrochemical technologies (MET).

Our activities are divided into:

- Physiology and biochemistry of microbial electrogenesis
- Environmental microbial electrogenesis
- Microbial electrogenesis and bioengineering

## Hydraulic heritage



Research on water heritage aims to resolve conflicts between the existence of such heritage structures and current social development and growth from a sustainable perspective.

- Inventory and evaluation of heritage systems using new technologies
- Development of putting in value and territorial management support structures
- Analysis of socio-economic values of water cultural heritage systems from an ecosystem services scope.
- Assessment of heritage and traditional landscapes impacts to be integrated in a holistic manner in complex landscape systems.

## Economic and institutional analysis



Analytical studies as per the following issues:

- Sustainable water management in areas prone to extreme weather events
- Tools & methods for assessing climate change impacts, cost and benefits of climate-proof strategies, risk assessment, and evaluation of opportunities linked to climate change adaptation
- Hydro-economic modelling & analysis
- Prioritisation of water investments
- Economic analysis of aquatic ecosystem services delivery
- Integrated assessment of river basin management plans
- Economic assessment of water policies
- Economic policy instruments for sustainable water management (including pricing water security, drought insurance, and water trading schemes)
- Water governance
- Economic analysis of water and sanitation services (including for rural areas)
- Water conflict management

Active engagement in high-level fora aimed at raising the profile of water resources management and water services in global, national, regional, and local policy agendas

## Membrane technology



The group is focused on studying the whole membrane process life cycle: from membrane preparation to their use in water treatment until their recycling.

- Development of new generation antifouling membranes by surface modification and the addition of functionalized groups and nanoparticles.
- Evaluation of different types of membranes (reverse osmosis, nanofiltration, ultrafiltration) in water treatment.
- Modification of recycled membranes and their implementation in urban wastewater treatment by membrane bioreactors (MBR) and desalination by electrodialysis (ED).



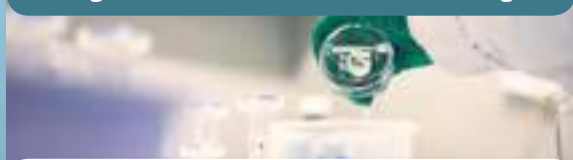
## Ecotoxicology



Assessment of the risks for ecosystems determined by contaminants and their interactions with the environment, taking into account the vulnerability of individuals, populations and communities to chemical and non-chemical stressors

- Assessing exposure to contaminants through environmental monitoring and predictive exposure models
- Assessing effects through toxicity tests with aquatic organisms at the individual, population and community level (using microcosms and mesocosms)
- Developing modelling approaches to predict effects at the individual, population and community level
- Assessing ecological quality through monitoring of invertebrates and other biological indicators
- Characterising ecological risks combining effect and exposure assessments

## Biological and Advanced oxidation technologies



Developing wastewater treatment focused on degradation of xenobiotic compounds by chemical or biological processes. This includes the development of methods for assessing the toxicity or emerging pollutants

- Ozonization
- Fenton and Photo-Fenton processes
- Photocatalysis
- Biological (aerobic and anaerobic) processes in reactors of different configurations and biostimulation of microorganisms for in-situ biodegradation

## Reclaimed water reuse



Land application systems for urban wastewater treatment of small built-up areas have several advantages:

- Managed without external energy input
- Reliable, robust and low maintenance technology
- Production of high quality biomass
- Capture of CO<sub>2</sub>
- Use wastewater reclaimed in recharge of aquifers

## Cyanobacteria and microbial contamination



The group focused their R&D activities to offer technology-based solutions to Water-based industries in relation to Cyanobacterial Harmful Algal Blooms.

- Designing monitoring programs for the development of toxic cyanobacteria blooms in reservoirs.
- Developing technology for the specific and sensitive detection of microcystins in water.
- Developing technology for the efficient and low-cost removal of microcystins during water treatment using biofilms.

On the other hand, impact of pollutants (pesticides, antibiotics and biocides) on microorganisms and antibiotic resistance in water environments is being studied.

- Potential effect of pollutants on bacterial populations
- Detection (finding and/or discovery) of antibiotic resistant bacteria (ARB) and resistance genes (ARG)
- Fitness cost linked to the acquisition of antibiotic resistance
- Resistance gene transfer and the role of pollutants

## Water and energy



Exploring the potential of integrating solar photovoltaic technologies in water treatment processes to solve the problem of safe drinking water access and/or wastewater treatment.

- Photovoltaic-photochemical hybrid solar systems
- Clean water sensors for solar disinfection

On the other hand, a low cost system based on open source tools for the monitoring of photovoltaic systems, specifying in autonomous photovoltaic systems, with a reliability and accuracy that comply with existing regulations is being developing.



# collaboration



collaboration

## COLLABORATION WITH RESEARCH ORGANIZATIONS



Universidad  
de Alcalá



Universitat d'Alacant  
Universidad de Alicante



Universidad  
Rey Juan Carlos



UNIVERSIDAD DE JAÉN





## COLLABORATION WITH COMPANIES



## PLATFORMS AND ASSOCIATIONS





# infrastructures and scientific equipment

IMDEA Water laboratories are part of the Network of Laboratories and Research Infrastructures of the Community of Madrid since 2009 with the reference number 267.

## Water Laboratory Basic Analysis Unit



In this unit we analyse several physical and chemical parameters laid down in the regulations on control of water quality and dumping.

### Equipment

- Particle counter for water samples (0.2 microns and 2 microns). LS\_200 model from Particle Measuring System Inc.
- Visible UV spectrophotometer (190-1.100 nm). UV-1800 model from Shimadzu.
- Total Organic Carbon (TOC) Analyzer. TOC-V CSH.

### Applications

- Organoleptic assays: Colour and turbidity.
- Physical-chemical testing: Basic parameters such as pH, conductivity, temperatura, redox potential, Total Kjeldahl Nitrogen, total phosphorus, free and total chlorine, alkalinity, suspended solids (TSS), total organic carbon (TOC), DBO5, DQO, total nitrogen, etc.



# Water Laboratory

## Organic and inorganic microcontaminants



### Liquid Chromatography coupled to Ultraviolet-Visible (HPLC-UV)

High resolution liquid chromatography (HPLC) is one of the most widely used separation techniques, due to its versatility and broad field of application.

#### Equipment

The HPLC Model 1200 (Agilent Technologies) apparatus includes a vacuum degasser, quaternary pump, automatic injector, thermostatted column compartment and diode detector (DAD).

#### Applications

The field of application for this technique is very wide-ranging. Some of the applications are listed here:

- Determination of organic pollutants (pesticides, herbicides, phenols, PCBs).
- Pharmaceutical products (antibiotics, sedatives, painkillers).
- Foodstuffs: artificial sweeteners, antioxidants, additives.
- Quantitative analysis of compounds of interest.

### Ion Chromatography

Ion Chromatography is a variant of High Performance Liquid Chromatography (HPLC). Separation and determination of ions is carried out, based on the use of ion exchange resins. This type of chromatography is subdivided into cation and anion exchange chromatography, with the latter featuring most applications.

#### Equipment

- Dual channel Ion Chromatography system model 861 Advances compact IC (Metrohm), with sequential chemical suppression and samples ultrafiltration. Simultaneous determination of anions and cations with conductivity detector.

#### Applications

With detection by conductivity.

- Anion analysis (F<sup>-</sup>, Cl<sup>-</sup>, NO<sub>2</sub><sup>-</sup>, Br<sup>-</sup>, NO<sub>3</sub><sup>-</sup>, PO<sub>4</sub><sup>3-</sup>, SO<sub>4</sub><sup>2-</sup>) in aqueous matrices.
- Cation analysis (Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>) in aqueous matrices.

## Water Laboratory

### Inductively Coupled Plasma Mass Spectrometry (ICP-MS) Unit



The analytical technique with the greatest potential for determination of trace level elements in all types of matrices. It is usually necessary to perform a sample digestion.

#### Equipment

Inductively coupled plasma - mass spectrometer (ICP-MS), model 7700 x (Agilent Technologies). High levels of performance, reliability and automation. Includes a collision cell system in helium mode; greater sensitivity, less background noise, increased removal of spectral interferences and 'no gas' mode. Option of coupling separation techniques such as high performance liquid chromatography (HPLC).

#### Applications

- The majority of elements in the periodic table can be analysed using this technique.
- Semi-quantitative multi-element analysis. To determine the major and minor elements in a sample. Allows semi-quantitative determinations of elements for which there is no commercial standard with an error lower than 15%.
- Quantitative analysis of elements of interest. Linear dynamic range of 8 orders of magnitude (ng/L (ppt) – mg/L (ppm)) and low detection limits (ng/L (ppt)) for most elements
- Gauging the isotopic ratios of an element.
- Analysing solid biological, organic and inorganic samples by acid digestion and microwave treatments.
- Environmental applications (waters, soils, sediments and residues).
- Determination metals and contaminants in soils (fertilisers) and inland drinking waters (dumping).
- Speciation of metals in complex matrices.
- Quantification of inorganic nanoparticles.



## Water Laboratory Mass Spectrometry Unit



Mass Spectrometry (MS) is a highly sensitive instrumental analytical technique able to qualitatively and quantitatively assess all types of mixtures of substances. In addition, this technique also determines the molecular mass of a compound, as well as the different fragments resulting from controlled break-up of the same, providing highly valuable information on the molecular structure. The ions are separated according to their mass/charge ( $m/z$ ) ratio and detected.

The great advantage of high-resolution mass spectrometry compared to low resolution is the greater precision and accuracy of the mass, due to the more high-performance features of the time of flight-quadrupole analysers (TOF and QTOF). These allow unequivocal identification of the exact mass of a compound.

### Equipment

- Bidimensional Gas Chromatography/ MS (GC x GC/ TOF). Pegasus (LECO) and GC model 7890A from Agilent Technologies.
- Gas Chromatography / Triple Quadrupole (GC-MS/MS). GC model 7890A and triple quadrupole detector model 7000 (Agilent Technologies).

This system is coupled to a Gerstel twister brand Autosampler.

- Liquid Chromatography (LC-QTOF) equipment. Triple TOF 5600 model (AB sciex).
- Liquid Chromatography /MS (LC-TOF) equipment (model G6280B, Agilent Technologies).
- Liquid Chromatography /Triple Quadrupole (LC-MS/MS) (model 6495A, Agilent Technologies).

### Applications

- Analysis of organic micropollutants in waters by GC-MS/MS (organochlorine and organophosphorus pesticides, trihalomethanes, polyaromatic hydrocarbons) by means of LC-MS (TOF) y LC-MS/MS (QTOF) (drug and multi-residue)
- Determination of impurities in pesticide products.
- Assays to determine exact mass and fragmentation studies.
- Identifying compounds, or fragments of the same, by their mass spectrum in comparison with GC-MS libraries. New analytical methods are constantly being developed to adapt to the new requirements laid down in current legislation on monitoring water quality and control parameters

## Soil Laboratory



IMDEA-Water has a laboratory dedicated to analysis of soils, sediments and similar solid matrices, such as humus or reactive materials. Activities mainly focus on determining physical-chemical properties for characterisation from an agronomic standpoint. The study of these solid matrixes is of prime importance, as characterising the soil-water system is crucial when assessing the use of water in activities such as irrigation or artificial recharge of aquifers. The impact on soil of water reuse for environmental purposes is highlighted, as it depends on the quality of the water utilised, which will vary depending on its source. This procedure thus helps define the efficacy of treatments whose effluents may be used in one of the environmental uses, or to analyse water quality according to source. In short, soil monitoring is a necessary tool when assessing the management of water resources.

### Equipment

- Area for pre-treatment of samples.
- Richards plates to calculate moisture retention.
- Microwave/Oven for digestion and extraction.

### Applications

- Texture.
- Moisture, pH and electrical conductivity.
- Organic Matter.
- Total nitrogen, assimilable phosphorus, nitrates.
- Total calcium carbonate.
- Cation exchange capacity and exchangeable bases (Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>).
- Exchangeable aluminium.
- Metals.
- Phosphates retention.
- Assimilable boron.
- Calcium carbonate equivalent content.
- Amorphous content (Si, Al, Fe).
- Total organic carbon content.
- Moisture retention curve.

# Biology and Microbiology Laboratory



IMDEA Water hosts a biological laboratory providing analysis on surface and groundwater to:

- Support monitoring programs of water quality by means of national and international standardized methods and in agreement with WFD 2000/60/CE y GWD 2006/118/CE.
- Technological solutions for controlling cyanobacteria and cyanotoxin removal.
- Monitor invertebrate communities from surface and groundwater ecosystems to provide an integrated ecological status assessment.

## Equipment

Ecohydrology unit: the microbiological unit is equipped with fully high-quality optical microscopes systems available with high-resolution photo-montage systems for microorganism and plankton identification:

- Light microscope.
- Stereo microscopes.
- Digital photo camera.
- Culturing facilities for algae and invertebrates.
- Microcosms and aquaria.

### *Cyanobacteria and cyanotoxins unit:*

- Incubator for cyanobacteria and bacteria cultures.
- Rotary evaporator with a cooling system, Buchi, for extraction of cyanotoxins.
- Solid Phase extraction equipment, for concentrating toxin extracts.

### *Molecular biology unit:*

- Gel Documentation System, Alphamager, for documentation of gel electrophoresis.
- Real Time PCR machine, AB7300, for quantitative and qualitative gene studies.
- Nano-photometer, Epoch, for measuring DNA concentration in as low as 2  $\mu$ l volume.
- Gel Electrophoresis Equipment, Biorad, for electrophoresis of DNA and RNA.
- PCR Thermocycler, to perform PCR reaction.
- Homogenizer for DNA extraction, Precellys, to extract DNA from bacterial cells.

## Applications

- Surface and groundwater monitoring (rivers, lakes, aquifers) based on biological indicators.
- Specimens identification of cyanobacteria green-algae, zooplankton, macroinvertebrates and aquatic plants to the lowest taxonomic resolution.
- Toxicity test (single and multiple species tests, acute and chronic) for ecotoxicological risk characterization.
- Biodegradation of cyanotoxins and diversity of biodegrading bacterial populations using classic gene markers and metagenomics studies.
- Developing technological solution for biological monitoring and elimination of cyanotoxins during water treatment.

# Pilot Plants



## Membrane technology

Membrane technology is a generic term used for any separation process in which membranes are employed. A membrane can be defined as a physical barrier separating two phases and allowing a selective transportation of compounds from one phase to the other. Membrane technology can be used for different applications such as water purification and desalination, fruit juice concentration, milk fractionation in dairy industry, etc.

In the laboratory of membrane technology the following equipment can be found:

- A laboratory-scale cross-flow stainless steel test unit for flat-sheet membranes. This system can be used as a microfiltration, ultrafiltration, nanofiltration or reverse osmosis.
- A spiral wound ultrafiltration and reverse osmosis membrane pilot plants that can be coupled and used in serie.
- A ultrafiltration stirred cell.

- A membrane bioreactor for wastewater treatment.
- A electro dialysis cell.

## Microbial electrochemical technologies

The Microbial Electrochemical Technologies pilot plant provides an ideal space for companies in the sector that want to perform pre-industrial tests based on the interaction microorganism-electrode. Currently, different designs and configurations for the treatment of urban and industrial wastewater are operated under controlled conditions before passing to the real scale. The plant is also the site of testing activities funded by prestigious innovation programs such as H2020.

## Outdoor mesocosm facilities

The mesocosm facility run by the Ecotoxicology group of the IMDEA Water Institute consists of 9 independent stream channels, 24 lotic model eco-



systems of 1 m<sup>3</sup>, and a biodiversity lagoon equipped with a macrophyte-based filter. The mesocosm facility allows the design and performance of experiments with several controls and treatments, and is perfectly suited to:

- Assess the dissipation and fate of contaminants in environmental matrices (e.g. water, sediment, biota)
- Assess the direct and indirect effects of contaminants on several biological endpoints in order to calculate safe environmental concentrations
- Evaluate the interaction between multiple stressors (chemical and non-chemical) on aquatic ecosystems

A wide range of measuring and sampling devices are available, which allow the evaluation of the following endpoints:

- Water physico-chemical parameters (DO, T, pH, EC, Alkalinity, etc.)
- Nutrient concentrations
- Biological responses at the population and community level: phytoplankton, macrophytes, zooplankton, macroinvertebrates, etc.
- Our mesocosm facility is located few meters away to our analytical chemistry lab, and can be used to represent scenarios such as those used for the regulatory risk assessment of chemicals in southern Europe.

### Land application systems

This land application system is managed by members of the **reclaimed water reuse line**.

A vegetation filter (VF), as part of land application systems, is an agroforestry system, in which pre-treated wastewater is applied to a soil surface with arboreal and herbaceous vegetation. The purification is done through the joint action of the soil, the microorganisms present in it and the plants, through a series of physical, chemical and biological processes.

The installed VF has an area of 60 m<sup>2</sup> and has planted poplars (clone I-214) with a density of 10,000 trees/ha. This is a fast growing plant species and, therefore, has high water and nutrient requirements. This allows to maximize the performance and debugging capacity of the system. In addition, the plantation undergoes short shifts (2-3 years).

The wastewater from the institute is taken to an imhoff tank to perform the pretreatment. The pre-treated water is distributed under pressure to a first VF and distributed to another different pilot of wastewater treatment and that works in a complementary way. The effluent of this last pilot is used to irrigate a second VF, of characteristics homologous to the first, and which works as a tertiary treatment. To this second VF, and since the organic matter load it is going to receive is much lower, organic amendments of plant origin have been added in such a way that the organic carbon content is increased and the elimination of contaminants is enhanced through microbial stimulation and the increase of sorption processes.

These systems make it possible to carry out the integral treatment of wastewater from IMDEA Water, as well as to know and compare the response of both filters to the treatment of different water qualities



## Geomatic Laboratory



There is a need of development of tools to support the management of the water resource, through the correct assessment of the present state of the resource and its possible evolution in different scenarios. IMDEA Water works on the methodological development and application of different tools for management support, including remote sensing, spatial databases or geodatabase construction and design, and geological and hydrological modelling.

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, with which a wide range of needs are covered, such as:

- Modelling.
- Development of specific maps using remote sensing techniques, GPS and conventional documentary sources.
- Automation of data collection.
- Application of simulation models.

### Applications research and services

- Irrigation.
- Water planning.
- Water footprint.
- Pollution control.
- Quality control.
- Floods and droughts.
- Hydraulic heritage.
- Ecological status of water bodies.
- Reuse.

### Equipment

- ARCGIS.
- GIS IDRISI.
- GIS ILWIS.
- GIS GVSIG.
- SAGA GIS.
- QUANTUM GIS.
- ERDAS IMAGINE.
- ER-MAPPER.
- OPTICKS.
- Geostatistics SURFER.
- Spatial Metric Analysis -FRAGSTAT.
- Estimation of Soil Parameters, Hydrologic Modelling - HEC and SWMM family.
- Automated water data collection systems.
- Water Erosion Models - WEAP.
- Hydrogeological models: Hydrus 1D, CXTFIT, PHREEQC-2.
- Statistical analysis programs: Tanagra, R.
- Terminals under a central server.
- Peripherals of different sizes, including printers, plotters and a medium format scanner.
- Support materials that aid data collection and its inclusion in drive systems (laptops, pagers, GPS and SLR cameras).



# Water and Energy Laboratory

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## Manufacturing

Soldering station, vacuum pumps and chambers for cell encapsulation with silicone.

## Electronic testing

- DC power supply.
- Oscilloscope.
- Function generator.
- Bench multimeter.
- Datalogger.
- Basic sun simulator (artificial lamp).

## Outdoors monitoring

- Pyranometer.
- UV radiometer.
- Portable spectroradiometer.
- Temperature sensor, wind speed, wind direction.
- Portable datalogger.
- Calibrated solar cells.
- Pumps.
- Shunt resistors for PV modules testing.
- Flowmeters.
- Hand multimeters.
- Waterproof temperature sensors.
- RTD sensors for modules temperatures.
- Adjustable mounting structure.



# projects and contracts

## 1. Projects

### 1.1. Urban and Industrial Wastewater Treatment

#### 1.1.1. A new generation of Microbial Electrochemical Wetland for effective decentralized wastewater treatment (iMETland)

<http://www.imetland.eu>



iMETland project aims at unleashing the small community economies potential through innovative wastewater treatments technologies, creating a virtuous circle connecting water, energy, ICT, land resources and safeguarding the environment. The project maximises the innovation potential of the following technical features, to be tested and validated at four different geographical locations: Mediterranean (Spain), North-Europe (Denmark), South-America (Argentina) and North-America (Mexico). iMETland innovation stands in the balanced integration of technologies, which are wisely amalgamated in the environment. Exploiting the combination of water sector, energy, ICT and land resources, the project paves the way to solve small communities wastewater treatment needs in a cost effective, energy efficient and environmental friendly manner. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 642190.





### 1.1.2. Microbial Desalination for Low Energy Drinking Water (MIDES)

<http://midesh2020.eu/>

Shortage of fresh water has become one of the major challenges for societies all over the world. Water desalination offers an opportunity to significantly increase the freshwater supply for drinking, industrial use and irrigation. All current desalination technologies require significant electrical or thermal energy, with today's Reverse Osmosis (RO) desalination units consuming electric energy of at least 3 kWh/m<sup>3</sup> – in extensive tests about ten years ago, the Affordable Desalination Collaboration (ADC) in California measured 1.6 kWh/m<sup>3</sup> for RO power consumption on the best commercially available membranes, and total plant energy about twice as high.

To overcome thermodynamical limitations of RO, which point to 1,09 kWh/m<sup>3</sup> for seawater at 50 % recovery, Microbial Desalination Cells (MDC) concurrently treat wastewater and generate energy to achieve desalination. MDCs can produce around 1.8 kWh of bioelectricity from the handling of 1 m<sup>3</sup> of wastewater. Such energy can be directly used to i) totally remove the salt content in seawater without external energy input, or ii) partially reduce the salinity to lower substantially the amount of energy for a subsequent desalination treatment. MIDES aims to develop the World's largest demonstrator of an innovative and low-energy technology for drinking water production, using MDC technology either as stand-alone or as pre-treatment step for RO.

The project focuses on overcoming the current limitations of MDC technology such as low desalination rate, high manufacturing cost, biofouling and scaling problems on membranes, optimization of the microbial electrochemical process, system scaling up and economic feasibility of the technology. This will be achieved via innovation in nanostructured electrodes, antifouling membranes (using nanoparticles with biocide activity), electrochemical reactor design and optimization, microbial electrochemistry and physiology expertise, and process engineering and control.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 685793.



### 1.1.3. Advanced Nutrient Solutions With Electrochemical Recovery (LIFE ANSWER)

The purpose of this project is to demonstrate the technical and economic feasibility of electrocoagulation and bioelectrogenic microbial treatments in medium to small industry wastewater treatment plants for zero effluent discharge. These treatments can solve the environmental problem from that kind of industries, one of the main wastewater generators right now.

The project will be developed in one of the most important beer production plant of Europe (Alovera, property of MAHOU) at a demonstration scale treating real wastewater effluent in such a way that the feasibility of a solution reproducible to other areas will be shown, involving the main stakeholders (food and drink industries, local entities, and water public bodies) during the project implementation.

#### 1.1.4. Microbial electrochemical strategies oriented to a sustainable and decentralized urban waste water reuse y (MET4HOME)

MET4HOME aims to take advantage of the metabolism of these microorganisms to change the paradigm of decentralized water purification through the design, construction and validation of a compact prototype designed to purify and disinfect the water generated by an isolated dwelling (up to 8 eq/inhab) Allowing its reuse for irrigation, sanitary tanks, etc. Taking advantage of the use of electrochemical instrumentation, we will install an electrodisinfection system for the elimination of pathogens.



#### 1.1.5. National network of microbial electrochemical technologies. IBERIMET <http://iberimet.net/>

The recent discovery of microorganisms able to have a redox communication with electrically conductive materials has generated a new scientific field under the umbrella of the so-called Microbial Electrochemical Technologies. The aim of IBERIMET is to set-up a work group with all the national active groups in the field. From the very beginning (2003) Spanish researchers showed interest in playing an important role in this newborn discipline. After one decade, Spain is the European country with the largest number of researchers in the field, and Spanish teams coordinate H2020 projects MET-based.



The nature of METs is based on three disciplines that rarely converge at high level in the same research group: microbiology, engineering and electrochemistry. IBERIMET will be a key tool for facilitating the interaction among groups with two main objectives:

- Accelerate the technological development of METs through enhancing the synergism between the partners.
- Achieve larger application scale (full scale) to make METs attractive technologies with interest for the industrial sector.

### 1.1.6. Consolider Tragua Network (TRAGUANET)

<http://www.consolider-tragua.com/>

In December 2014 the Consolider Tragua Network (TRAGUANET) became operational. This network is funded by the MINECO in the last call for Networks of Excellence “Consolider”. During two years TRAGUANET will allow the communication and collaboration among the 24 groups that were part of the project Consolider Tragua.

Traguanet continues to make progress in existing lines related to the reuse of purified wastewater in an integrated manner. Moreover, new lines will be opened as, for example, water reuse for human consumption, the water-energy binomial, the impact of nanotechnologies and nanomaterials, and the impact of reuse on climate change.

The network is open to public and private, national and foreign institutions. Dissemination and outreach efforts are also being enhanced to promote a change of trend in the social perception of “water reuse” in order to be considered as an important resource rather than a waste product.



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### 1.1.7. Madrid Advanced Wastewater Treatment Network with Non-Biodegradable Pollutants (REMTAVARES 3)

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

REMTAVARES 3 is 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: treatment advanced technologies (physical, membrane, advanced oxidation and chemical processes) and testing the ecotoxicological effects of pharmaceutical compounds on surface and groundwater crustaceans.



### 1.1.8. Meeting Microbial Electrochemistry for water (MEET-ME4water)

[http://www.eip-water.eu/MEET\\_ME4WATER](http://www.eip-water.eu/MEET_ME4WATER)

MEET-ME4WATER focuses on overcoming the barriers to scale-up and demonstration of microbial electrochemical technologies (METs) and bring them faster to market. These technologies treat wastewater and, at the same time, produce value added products (chemicals, H<sub>2</sub>, and/or desalinate water at zero energy cost simultaneously) whilst producing energy. METs have a well explored innovation potential for sustainable development of wastewater treatment systems. Further work is needed to fully control the engineering and biotechnological aspects of these systems at larger scale.

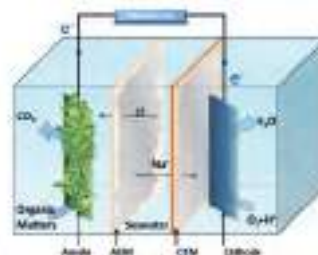
### 1.1.9. Low-energy technology for drinking water: microbial desalination (BioDES)

Shortage of fresh water has become one of the major challenges for societies all over the world. Water desalination offers an opportunity to significantly increase the freshwater supply for drinking, industrial use and irrigation. All current desalination technologies require significant electrical or thermal energy, with today's Reverse Osmosis (RO) desalination units consuming electric energy of at least 3 kWh/m<sup>3</sup> in extensive tests about ten years ago, the Affordable Desalination Collaboration (ADC) in California measured 1.6 kWh m<sup>-3</sup> for RO power consumption on the best commercially available membranes, and total plant energy about twice as high, once pre-treatment and pumping is factored.

To overcome thermodynamical limitations of RO, which point to 1.09 kWh m<sup>-3</sup> for seawater at 50 % recovery, Microbial Desalination Cells (MDC) concurrently treat wastewater and generate energy to achieve desalination. MDCs can produce around 1.8 kWh of bioelectricity from the handling of 1 m<sup>3</sup> of wastewater. Such energy can be directly used to i) totally remove the salt content in seawater without external energy input, or ii) partially reduce the salinity to lower substantially the amount of energy for a subsequent desalination treatment. BioDES aims to develop an innovative and low-energy technology for drinking water production, using MDC technology either as standalone or as pre-treatment step for RO.

The project will focus on overcoming the current limitations of MDC technology such as low desalination rate, high manufacturing cost, biofouling and scaling problems on membranes, and optimization of the microbial-electrochemical process. This will be achieved via innovation in nanostructured electrodes, antifouling membranes (using nanoparticles with biocide activity), electrochemical reactor design and optimization, microbial electrochemistry and physiology expertise. The project envisages the following main advancements over the current state of the art:

- Salt removal rate in MDC of 75-90% before RO system.
- Integrated wastewater treatment (WWT): removal of 90 % Chemical Oxygen Demand (COD).
- Desalination of seawater with energy consumption below 0.5 kWh m<sup>-3</sup>, about half of the thermodynamic energy limit of RO.
- 85% reduction in energy cost compared with current desalination plants through efficient operation and energy management.
- At least 75% reduction of the cost of desalinated water.





- Innovation in MDC design, increasing 20-fold current desalination production achieved at the moment in the largest MDC system: from 2.4 kg TDS m<sup>-3</sup> day<sup>-1</sup> to 40 kg TDS m<sup>-3</sup> day<sup>-1</sup> (referred to desalination chamber).
- Meetings with water companies at the end of the project to collaborate in market uptake of the BioDES technology.

It is important to note that IMDEA is founding members of the EIP Action Group MEET-ME4WATER. The Action Group is focused on overcoming the barriers to scale-up and demonstration of microbial electrochemical technologies (METs) and to bring them faster to market. Thus, the development of BioDES Project will provide a technological breakthrough by demonstrating the energy efficiency and the environmental benefits of such technologies for the production of drinking water, and allow fast dissemination of the advances and facilitate market uptake.

## 1.2. Reclaimed Water Reuse



### 1.2.1. Water reclamation by using a new concept of land application systems (FILVER+)

With the reference CTM2016-79211-C2 (AEI/FEDER, EU), is funded by the State Research Agency (AEI) and the European Regional Development Fund ERDF), and is part of the 2016 call for R+D+i projects of the Ministry of Economy, Industry and Competitiveness.

FILVER+ project considers the development of an Amended Land Application System (ALAS) as a technology of secondary and tertiary treatments, to maximizing removal of nutrients, microparasites/pathogens and emerging pollutants, by application of low cost and easy acquisition amendments. That will give as result a reduction of the required surface for the IVF installation and an increase of the quality of the infiltrated water, thus diminishing the impact on the underlying aquifer. The project is oriented to the search of solutions to fulfil the environmental objectives required by the Water Framework Directive, as it is recorded in the Actions Program included in the Hydrological Plans of River Basins for the Second Cycle (2015-2021), for which an investment of more than seven thousand millions of euros is planned.



## 1.3. Economic and Institutional Analysis

### 1.3.1. Knowledge, Assessment, and Management for AQUATIC Biodiversity and Ecosystem Services Across EU Policies. AQUACROSS <http://aquacross.eu/>



This project aims to support EU efforts to protect aquatic biodiversity and ensure the provision of aquatic ecosystem services. Funded by Europe's Horizon 2020 research programme under Grant Agreement no. 642317, AQUACROSS seeks to advance knowledge and application of ecosystem-based management (EBM) for aquatic ecosystems to support the timely achievement of the EU 2020 Biodiversity Strategy targets.

To do this, AQUACROSS considers the EU policy framework for aquatic ecosystems and builds on knowledge stemming from different sources to develop innovative management tools, concepts and business models for aquatic ecosystems.

The AQUACROSS approach is built around four pillars of work and eight case studies:

- Pillar 1: Real-world testing—the project will ensure stakeholder engagement, knowledge exchange and social learning to achieve practical policy solutions and end-user uptake.
- Pillar 2: Giving direction—it is important to understand the current political setting in order to facilitate policy coordination across aquatic ecosystems.
- Pillar 3: Increasing scientific knowledge—work under this pillar will develop and test protocols and guidance materials for testing the AQUACROSS AF in the case studies.
- Pillar 4: Improving management— building on the work undertaken in the previous pillars, this pillar aims to develop concepts, practices and tools for better implementation of EBM.





### 1.3.2. “River Restoration Benefits” (RiverRes)

<http://www.eip-water.eu/RiverRes>

The vision and mission of the RiverRes Action Group is to provide a Roadmap to address current policy challenges as opportunities for innovation through river restoration, as an example of nature based solutions. In particular, how river restoration can increase the effectiveness of EU directives and policy implementation. The current challenge -as identified in a number of documents like the EU Blueprint, the Biodiversity Strategy 2020, Climate Change Adaptation Strategy, Water Scarcity & Drought Policy, etc. is implementation and innovation.

Some of the policy challenges that can be tackled in an integrated manner include for example:

- Improving water quality: so that the positive ecosystem services from more natural river system are internalised in relation to water quality;
- Prevention against extreme events: river restoration actions to recover the lateral connectivity and floodplain are an effective Green infrastructure solution to contribute to flood control and to groundwater recharge;
- Protection of biodiversity: rehabilitating river systems contributes to restore the natural habitat of aquatic biodiversity.

RiverRes mainly targets projects that aim to reduce hydro-morphological pressures and facilitate the processes of “re-naturalization” of which allows -not only to improve their ecological status - but also to enhance the delivery of potential ecosystem services, under an integrated approach in the implementation of several EU Directives.

### 1.3.3. Smart Prices and Drought Insurance Schemes in Mediterranean Countries. (SPADIS)

<http://www.eip-water.eu/SPADIS>

SPADIS, standing for “Smart Pricing and Drought Insurance Schemes in Mediterranean Countries”, focuses on the design and implementation of economic instruments with the best potential to induce individual decisions regarding water use in order to contribute to the collective goals of reducing vulnerability to water scarcity and increasing resilience to droughts risk. As an Action Group, it contributes to two priority areas of the Strategic Implementation Plan of the EIP-Water: flood and drought risk management, on one side; water governance, on the other.

SPADIS will develop the following innovative economic instruments to manage drought risk:

- A smart-pricing scheme for urban water in order to finance increased water security, enhancing the reliability of sufficient water supply during drought periods.
- An innovative drought insurance system for irrigated agriculture to stabilize agricultural income in order to increase the resilience of rural livelihoods and to reduce current incentives to use the already over-exploited groundwater sources as buffer stocks in dry periods.

## 1.4. Membrane Technology

### 1.4.1. Transformation of disposed reverse osmosis membranes into recycled ultra-and nanofiltration membranes <http://www.life-transfomem.eu/>

TRANSFOMEM is an European Community co-funding LIFE project with contract number LIFE13 ENV/ES/000751 coordinated by IMDEA WATER. It aims to develop an innovative recycling process for reverse-osmosis membranes disposed in landfills. End-

of-life reverse osmosis membranes are transformed to lower pressure ultra-nanofiltration membranes in order to use them for wastewater treatment. LIFE TRANSFOMEM is framed in the “LIFE+ Environment Policy & Governance” component: pilot projects that contribute to the development of innovative policy ideas, technologies, methods and instruments.



### 1.4.2. Preparation, modification and characterization of pressure-driven membranes

The IMDEA Water membrane research group is focused on studying the whole membrane process life cycle: from membrane preparation, to their use in water treatment until their recycling. The group is developing new generation antifouling membranes by surface modification and the addition of nanoparticles. Further, water treatment by different types of membranes such as reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF) and microfiltration (MF) is carried and their process performance is evaluated. After recycling

the membranes (project LIFE-TRANSFOMEM), the group studies the modification of recycled membranes in order to find new applications in wastewater treatments. As an example, there is an active collaboration with the REMTAVARES 3 project, where the membrane technology group is focused on the modification of recycled membranes for the removal of emerging compounds from hospital wastewater.

The group is also developing research on the characterization, fouling (membrane autopsy) and effectiveness of different cleaning treatments of commercial membranes.

The IMDEA Water membrane research group by its associated researcher from University Complutense of Madrid, works also on the fabrication, modification and characterization of different types of new-generation membranes for a wide variety of separation processes such as membrane distillation (MD), forward osmosis (FO) and pervaporation (PV) that are implemented at different environmental applications.



### 1.4.3. Innovation and recycling of membranes for water treatment (INREMEM) <http://inremem.simplesite.com/>

The main objective of the coordinated project INREMEM is to recycle disposed reverse osmosis membranes (at laboratory scale) and to transform them into membranes that will be used in the treatment of waters from different sources: wastewater, surface water and osmotic solutions. For this reason, INREMEM studies 5 different techniques where the recycled membranes will be implemented: i) biomembranes (BM) for the treatment of surface water, ii) membrane bioreactors (MBR) for wastewater treatment, iii) forward osmosis for wastewater treatment, iv) electrodialysis (ED) for the regeneration of osmotic solutions and v) membrane distillation (MD) for the regeneration of osmotic solutions.

INREMEM studies an alternative membrane management route to the disposal in landfills once the membranes are not capable of achieving the objectives set in the water treatment processes. In this way, INREMEM will contribute to the effort of the European Union to become a “recycling society”, as it is set in the Waste Framework Directive (Directive 2008/98/CE).



## 1.5. Ecotoxicology

### 1.5.1. Tools for Assessment and Planning of Aquaculture Sustainability (TAPAS) <http://tapas-h2020.eu/>



Aquaculture is one of five sectors in the EU's Blue Growth Strategy, aimed at harnessing untapped potential for food production and jobs whilst focusing on environmental sustainability. The H2020 TAPAS project led by the University of Stirling (UK) and formed by 15 partners from 10 European countries addresses this challenge by supporting member states to establish a coherent and efficient regulatory framework aimed at sustainable growth. TAPAS uses a requirements analysis to evaluate existing regulatory and licensing frameworks across the EU, taking account of the range of production environments and specificities and emerging approaches such as offshore technologies, integrated multi-trophic aquaculture, and integration with other sectors. TAPAS will propose new, flexible approaches to open methods of coordination, working to unified, common standards. TAPAS will also evaluate existing tools for economic assessment of aquaculture sustainability affecting sectoral growth. TAPAS will critically evaluate the capabilities and verification level of existing ecosystem planning tools and will develop new approaches for evaluation of carrying capacities, environmental impact and future risk. TAPAS will improve existing and develop new models for far- and near-field environmental assessment providing better monitoring, observation, forecasting and early warning technologies. The innovative methodologies and components emerging from TAPAS will be integrated in an Aquaculture Sustainability Toolbox complemented by a decision support system to support the development and implementation of coastal and marine spatial planning enabling less costly, more transparent and more efficient licensing. Within the TAPAS project, the Ecotoxicology group of the IMDEA Water Institute is particularly involved in the ecotoxicological risk assessment of potentially toxic chemicals. The main research tasks are:

- Improvement of environmental modelling tools.
- Development of appropriate environmental quality standards.
- Ecotoxicological risk assessment of chemicals in several freshwater and marine aquaculture production scenarios.







### 1.5.2. Impacts of MicroPlastics in Agro-Systems and Stream Environments (IMPASSE)

There is evidence to suggest that each year in North America, farmed soils are exposed to up to 300,000 tonnes of MPs, which are less than 5mm in size. It is unknown whether these MPs have any direct or indirect effects on agrosystems or the freshwater environment. A primary source of MPs to agrosystems is thought to be biosolids, grey water, or sludge, which are an important source of fertiliser. It is important to foster a better understanding of any potential effects of MPs, and to develop shared management solutions. The aim of this project is to find resolutions which will safeguard agricultural sustainability, economic goals, and human and animal health. The project will be overseen by the Norwegian Institute for Water Research and is run in collaboration with three additional institutions across Europe (the Swedish University of Agriculture, the Vrije University of Amsterdam, and IMDEA-Water in Spain) and one Canadian (Trent University, Toronto). It consists of 5 inter-connected work packages which look at exposure (WP1), impacts (WP2), decision support tools (WP3), stakeholder engagement (WP4) and scenario assessment (WP5).

#### WP 1: Exposure

The movement of MPs at the field scale will be quantified and tracked. We will take samples of the biosolids before they are applied to the land, as well as sampling soil and runoff samples. Our project partners will be developing mechanisms to remove MPs from sewage sludge, with the aim of being able to provide MP-free materials for future farming activities. We will be conducting sampling in the Simcoe watershed during a few key events (heavy rainfall, drought) over the course of one year.

#### WP2: Impacts

Project partners will be assessing the uptake and responses of soil and freshwater organisms to exposure of MPs and associated chemicals through laboratory experiments. Chemicals investigated will include those which are constituent of the original plastics, and those which may become adsorbed to the plastics in the environment.

#### WP3: Decision support tools

A new model of the transport, distribution and fate of MPs in soil and stream systems will be developed using data from the field study sites. The model will be used to support conclusions





when analysing the implications of different agricultural or waste-water treatment management practices developed.

#### **WP4: Stakeholder engagement**

We aim to involve stakeholders from different interested parties (local farmers, waste water treatment managers, the research community, local municipalities and Ministries). The stakeholders would be involved in the definition of the monitoring plans (WP1), informed of the results of the monitoring, and the impacts (WP2), and will be encouraged to provide inputs for defining possible management scenarios for mitigating MP exposure and impacts (WP5). Enabling the local farming community to help shape the monitoring and development of feasible management strategies is an integral part of this program, and we aim to maintain open channels of communication throughout the project.

#### **WP5: Scenario Assessment:**

We will evaluate the resilience of management scenarios (under climate change) to control MP mobility, and to limit downstream transport. The implications of new technology for effluent/sludge processing will be assessed. Importantly, a comprehensive cost-benefit assessment will be performed to assess the economy of the management scenarios. Results will be communicated to stakeholders.

## **1.6. Water and Mining**

### **1.6.1. 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.

## **1.7. Groundwater Ecology**

### **1.7.1. Ecological assessment of groundwater ecosystems**

Groundwater is one of the most important natural resources on Earth which is currently under an exponential increase risks due to contamination and overexploitation. Integration



of knowledge resulted from groundwater ecology will significantly advance our understanding of subterranean ecosystems, in terms of improvement/maintenance of water quality, bioremediation of contaminated aquifers as well as enhancing the knowledge on groundwater habitats and biodiversity conservation. The Groundwater Ecology group of IMDEA Water is focused on applying the ecological criteria for an integrated assessment of groundwater ecosystems health, by using crustaceans as bioindicators. Our R & D activities aim to unravel the biodiversity of groundwater crustaceans and the ecological factors controlling the community's structure and function from pristine and contaminated aquifers. Current projects in the group address questions related to the impacts of agricultural practices on aquifers quality and of biotic community resilience and resistance; assess the impact of artificial recharged aquifers on groundwater ecosystems biota and the evaluation of toxic effects of emerging contaminants on groundwater crustacean species.

### **1.7.2. Surface / groundwater interactions – a biological and hydrological approach**

The hyporheic zone is the subsurface flow area beneath and adjacent to streams and rivers characterized by active vertical and lateral exchanges of nutrients and organic matter among surface and groundwater, in response to variations in discharge and bed topography and porosity. Current projects of the Groundwater Ecology group aims to: i) assess structure and dynamics of hyporheic communities from rivers and streams in the Mediterranean and Arctic regions; ii) investigate the role of the hyporheic zone as an intermediary transfer area of pollutants from the surface rivers to groundwater; and iii) delineate the lateral and vertical spatial extents of the hyporheic zone, characterize the streambed architecture and provide detailed spatial information on vertical and horizontal continuity of hyporheic zone. We combine the biological assessments of hyporheic invertebrate's community's structural patterns and ecological features with the non-invasive geophysical techniques

obtained by electrical resistivity tomography (ERT). The results of the proposed researches aims to highlight the use of hyporheic communities as an alternative proxy to investigate the water quality and surface water/ground water exchanges; to understand the hyporheic structure and function and its relation to the associated alluvial aquifers; and to provide an early warning signal of subsurface ecosystems quality decline. Our researches propose to advance our understanding of the ecohydrological processes occurring at the surface/groundwater interface and will endorse the effective incorporation of the hyporheic zone in stream management plans. Both facets are essential for the development of sustainable integrated water management strategies at the river basin level.

### 1.7.3. Monitoring endocrine disruptors in surface waters of central Spain using chronic toxicity ostracod tests – a search for an innovative region-specific risk assessment (END-OSTRACOTOX)

One of the principal examples of contaminants of emerging concern which are being discovered in surface- and ground-waters throughout Europe are endocrine disrupting compounds (EDCs). EDCs are organic substances that may interfere with the endocrine system and are found in a wide range of products used in everyday life. Recently, there has been growing interest among the scientific community in testing and learning the potential risk EDCs may pose to both, human health and freshwater ecosystems, and even if the dangers are not yet fully understood, a direct association between exposure of EDCs and changes in the reproduction, development and growth of several organisms has been already demonstrated. Bisphenol A (BPA), a commercially important compound used in the production of polycarbonate plastic and epoxy resins, is the most highly produced synthetic chemical in the world (> 3 million tons annually) with endocrine disruptive effects. The project aims are to establish a standardized protocols and to perform laboratory long-term ( $\geq$  2-generation study) BPA and selected pharmaceutical compounds toxicity tests to model benthic microcrustacean ostracod species via exposure of sediment containing BPA and PC at concentrations reported for central Spain river basins.



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## 1.8. Cyanobacteria and Cyanotoxins

### 1.8.1. Smart alert against harmful cyanobacterial blooms for the water industry (CIANOALERT)

The objective of the CianoAlert project is to develop a real-time intelligent monitoring and alerting system to warn of the development of cyanobacteria blooms in the bodies of water destined for consumption and aquaculture facilities. The solution proposed by CianoAlert, which will allow monitoring of large areas, will combine wireless sensor network technology (sensors placed in the water) with telecommunication technologies





and intelligent user interface, and the incorporation of technology controlled aircraft systems (RPAS) as remote sensing devices to obtain information relevant to the degree of affectation and the distribution and density of cyanobacteria for the implementation of a specific and sensitive system in real time, easy to handle and understand.

## 1.9. Climate Change

### 1.9.1. Towards multifunctional agricultural landscapes in Europe: Assessing and governing synergies between biodiversity and ecosystem services (TALE) <http://www.ufz.de/tale/>



TALE is an interdisciplinary research project funded within the framework of BiodivERsA/ FACCE-JPI (duration April 2015 - March 2018). The project supports choices at the spatial scale to be considered, strategies to decide on optimal land uses and a changing environment (e.g. climate change), the appropriate mix of policy instruments to be implemented and the required monitoring and evaluation schemes. The design is accompanied by stakeholder processes at local, regional and national level to achieve a high level of policy coherence. iMDEA Water Institute contributes to the creation of a hydrological model that can reflect as accurately as possible the performance of the water resources of the Cega, Eresma and Adaja watersheds as part of the Douro River basin. Assessing both qualities and quantity of watershed resources, it will be possible to predict different effects of water management strategies, land use and impacts that could affect water resources by the climate change effects. Contact: David Rivas.



### 1.9.2. Intelligent system to optimize the use of water in agriculture (SMART-HYDRO)

SMART-HYDRO aims to incorporate technological advances in sensors, multispectral images and telecommunications to control the quantity and quality of groundwater in agricultural landscape, in order to reduce energy costs, water losses and environmental impact. Within SMART-HYDRO we explore the aquifers ecosystems status affected by agricultural activities (i.e. irrigation, use of fertilizers and pesticides compounds) by analyzing the groundwater crustacean's community's structural patterns and the alterations of ecosystem services they provide related to groundwater quality.



## 1.10. 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.



## 1.11. 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.

<b>R-20-01</b>	<b>Molino harinero</b>	<b>Fin s. sive</b>	<b>1900</b>	<b>privado</b>
<b>Ubicación:</b>	Orusco de Tajuña	<b>Coordenadas:</b>	482721	4459216
<b>Tipo:</b>	Molino harinero	<b>Dimensiones:</b>	40,0 x 20,0 m	
<b>Instalaciones asociadas:</b>	Caz, acequia, noria,...	<b>Estado:</b>	Buena	Sin funciones
				
<b>Uso primario:</b>	Regadío	<b>Amenazas:</b>	Ninguna	
<b>Observaciones:</b>	Molino harinero situado en una finca particular. Mantiene muchos de los elementos propios del molino como las compuertas, una noria, las acequias de derivación y riego.	<b>Accesibilidad:</b>	Permitida autorización, finca particular	Buena



## 1.12. 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.

## 1.13. Water and Energy

### 1.13.1. Solar Photovoltaics

IMDEA Water is exploring the potential of integrating solar photovoltaic technologies in water treatment processes to solve the problem of safe drinking water access and/or wastewater treatment, by developing clean and sustainable solutions for both industrial and rural applications, increasing the systems efficiencies, reducing costs, saving energy, making water treatment systems accessible to communities with limited resources and infrastructures (especially in developing countries and/or rural or isolated areas in Europe with limited access), or improving water-drinking access in emergency situations. Current research lines include: a) photovoltaic-photochemical hybrid solar systems for the simultaneous production of drinking water and electricity with high efficiency; b) low cost clean water sensors for solar disinfection, measuring solar global irradiance, UV irradiance and temperature, and integrating these sensors with low-cost monitoring systems based in open-hardware; and c) water & solar energy nexus in developing countries to provide basic services and reduce environmental impact.





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CONSEJERÍA DE IGUALDAD Y POLÍTICAS SOCIALES

### 1.13.2. Contribution to improving the quality of life of the Saharan population through institutional strengthening of the University of Tifariti and self-management skills in health, energy and water for the population in the Saharawi refugee camps

IMDEA Water cooperate with the University of Jaén in a project funded by the Andalusian Agency for International Development Cooperation (AACID) and the University of Jaén, in collaboration with the University of Tifariti. The overall objective of this project is to contribute to improving the quality of life of the Saharawi population in the refugee camps in Tindouf (Algeria) in health, water and energy. Specifically, IMDEA Water contribute to the identification and implementation of proposals for improving technical malfunction of existing infrastructures of photovoltaic solar energy, water treatment and water distribution. IMDEA Water will also participate in training tasks of responsible personnel in camps in charge of the maintenance and repair of installed photovoltaic energy and water infrastructures.



POLITÉCNICA



### 1.13.3. Open tools for technical quality in basic services: water and energy <http://www.itd.upm.es/arduino/>

Develop and disseminate low-cost devices to demonstrate the technical and economic viability of instrumentation for control and monitorize. Also evaluate the verification, improvement and technical quality evaluation capacities on the basic service provision in real conditions.

The ultimate aim is to dispose sensors that respond to low-cost and low maintenance requirements, however their development falls outside the Project scope, consequently, as an intermediate settlement, the existing commercial alternatives will be evaluated and commercial multimeasurement sensors which allow assemble the prototype and which provides a reference measure for any posible develop, will be acquired.

## 2. Contracts

- Towards the use of groundwater biodiversity as indicators for aquifers quality in agricultural watersheds of Coquimbo region (Chile): an ecological field approach. **(Organisation for Economic Co-operation and Development OECD).**
- WASH global: Capitalization of the SABA+ experience and conceptualization for the global up-scaling. **Swiss Agency for Development and Cooperation** (REF-1006-22600 Contract number: E-81051893).
- **Fundación Canal.** “Study on urban water supply and sanitation in Spain”.
- Framework Contract to provide services to support to Commission policy activities on the Bathing Water, Drinking Water and Urban Waste Water Treatment Directives. Water for citizens. **DG ENVIRONMENT, European Commission.**
- **EUROPEAN PARLIAMENT.** Multiple framework service contract in five lots for provision of external expertise on regulatory and policy issues in the fields of environmental policies, climate change, sustainable development, public health and food safety: Lot II.  
Evaluation support (through reports, studies, seminars...) of costs and benefits of actions and politics related with climate change.
- **Sadyt-Valoriza Agua.** Development of innovative technology for tertiary wastewater treatment based on land application systems.
- Framework Contract on evaluation, review and development of EU water policy. **DG ENVIRONMENT, European Commission:**
  - Integrated Assessment (IA) of the 2nd planning cycle of River Management Plans (RBMPs)
- Lake Chad Basin Groundwater Information **(World Bank)**





Figure 2. Countries collaborating in projects and contracts





# human resources

research  
groups



Membrane  
Technology



Ecotoxicology



Reclaimed  
water reuse



**Hydraulic heritage**



**Microbial Electrochemical  
Technologies**



**Cyanobacterias and  
microbial  
contamination**



**Biological and  
Advanced oxidation  
technologies**



**Economic and  
institutional  
analysis**



**Water and energy**



# Membrane Technology



**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](http://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.cnrco.es](http://www.cnrco.es), MARM Ministry and collaboration between INIA and UAH. As a researcher in the areas of biotechnology and, especially, environment he has led 17 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 5 patents, and about a hundred of scientific papers, mostly in the most relevant journals in the area, and 10 PhD directed.

Currently, he is the research coordinator of the project LIFE TRANSFOMEM, and he also coordinates two Spanish projects: INREM and TRAGUANET Network. 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.

Furthermore, during the Science Gala 2012, Consolider Tragua was acknowledged by the Directorate General of Technical and Scientific Research as one of the five projects that represent the quality of the Spanish science and that have been recently funded by the Spanish National Research Plan.



**Dr. Mohamed Khayet Souhaimi**

Associated Researcher

PhD in Physics. He is an expert on membrane science and technology (membrane design and fabrication, membrane processes including nanofiltration, emerging technologies) and water treatment (desalination, wastewater treatment, etc.). He has contributed a substantial number of articles (over 120 papers since 2000) on the subject of membrane science and technology to various international refereed journals, including among others, Journal of Membrane Science and Desalination. He has filed 5 International Patents on the fabrication of polymeric membranes for water treatment. Recently, he has published 3 books: "Membrane Distillation: Principles and Applications", Elsevier (2011), "Membrane Modification: Technology and Applications", CRC Press, Taylor & Francis Group (2012) and "Pervaporation, Vapour Permeation and Membrane Distillation", Elsevier (Woodhead Publishing Ltd) (2015); and edited 5 special issues in international journals. He has coordinated various national

and international projects funded by different institutions (European Union, Spanish Ministry of External Affairs, Spanish Ministry of Science and Innovation, Middle East Desalination Research Center (MEDRC), Abengoa Water, etc.).

He has supervised several research studies (9 Ph.D. thesis, 25 master thesis and undergraduate students). He is currently member of the European Desalination Society (EDS), the European Membrane Society (EMS) and the North American Membrane Society (NAMS). He has delivered over 60 oral presentations at national and international conferences on membranes and membrane processes and presented more than 45 posters. He is actually associate editor of the journals "Desalination" and "Water and Desalination Research Journal", and member of the editorial board of the Journals: "Applied Membrane Science & Technology", "Membrane Water Treatment (MWT)", "Membranes", "Polymers", "Applied Sciences", "Journal of Materials Science and Nanotechnology", "SAJ Nanoscience and Nanotechnology" and "Journal of Membrane Science and Research". He has recently received the prestigious "Prince Sultan Bin Abdulaziz International Prize for Water" (PSIPW, 5th edition, 2012) on Alternative Water Resources (Saudi Arabia) for his novel and creative work in membrane distillation (MD) technology that he has studied and promoted in all its theoretical and experimental aspects (from membrane synthesis to implementation).



**Dr. Serena Molina Martínez**  
Researcher

She obtained her PhD by the Complutense University of Madrid. Her doctoral thesis, supervised by Prof. Javier de Abajo and Prof. José G. de la Campa, was presented in November 2012: "Preparation of porous membranes from hydrophilic aromatic polyamides. Evaluation as membranes for ultrafiltration and pervaporation operations". Her knowledge about material science has been complemented with the Master Degree in Advanced Specialization in Plastics and Rubber at Menéndez Pelayo International University (UIMP) and Spanish National Research Council (CSIC), with the Project: "Applications of polymers in the preparation and use of membranes for brackish water distillation".

During 4 years she has worked at Institute of Polymer Science and Technology (ICTP-CSIC) and she has participated in 5 research projects on the development and testing of polymeric membranes for different water treatment operations: Ultrafiltration, Reverse and Direct Osmosis, Membrane Distillation.

She has taught laboratory practices in the Master of Advanced Specialization in Plastics and Rubber. She has presented 17 communications at several national and international conferences. She has published 12 articles in indexed journals, a patent and a book chapter.

She joined IMDEA Water in July 2014. Currently, she is involved in different projects carrying out the evaluation, modification and (spectroscopic and morphological) characterization of reverse osmosis, nanofiltration and ultrafiltration membranes.



**Dr. Junkal Landaburu Aguirre**  
Researcher

Dr. Junkal Landaburu Aguirre obtained the degree of M.Sc (Chemistry) in 2004 from the University of Basque Country, Spain. She started her PhD studies in 2006 in the Environmental and Chemical Engineering group of the University of Oulu, Finland, from where she got her doctoral degree in 2012. Her PhD thesis was focused on the removal of heavy metals from phosphorous rich wastewaters using membrane technology (Micellar-Enhanced Ultrafiltration). After defending her thesis she continued working at the University of Oulu as a postdoctoral researcher. During this period, she made a one year research stay (2014/01/01-2014/12/31) in the Chemical and Environmental Engineering group of the University Rey Juan Carlos, Spain, where she focused on the preparation of thin film composite membranes with nanoparticles.

She has worked in diverse projects related to industrial wastewater treatment. She has 16 scientific articles published in international scientific journals and 18 communications in international conferences, from which 7 were given as oral presentations.

She joined IMDEA Water in January 2015 with a Marie Skłodowska-Curie AMAROUT fellowship.



**Dr. Raquel García Pacheco**  
Researcher

Creative researcher who really enjoys being involved at multidisciplinary and dynamic scenarios. She has developed PhD at IMDEA Water, within Hydrology and Water Resource Management Program (2011-2017). Since 2014, she has been the technical responsible of the European project LIFE13-TRANSFOMEM (Transformation of end-of-life reverse osmosis membranes into nanofiltration and ultrafiltration membranes). As a result of her research activity she reached the following publications: 1 Spanish Patent, 1 Intellectual Registration Protection, 1 Thesis, 6 scientific papers (5 of them are in Q1), 5 book chapters, 6 dissemination papers and 18 congress (most of them with oral presentation contribution). Her interest on water topic is not only academic but also social. She is volunteer member of the emergency response units (ERU) of Spanish Red Cross (ERU Water and Sanitation and ERU Mass Sanitation) and has been deployed in 4 international emergencies.



**Dr. Manuel Enrique López Sepúlveda**

Research Support

BSc in Chemical  
MSc on Integral Water  
Management by the University  
of Cadiz

**Research:** European project  
LIFE13 ENV/ES/000751  
TRANSFOMEM (Transformation  
of disposed reverse osmosis  
membranes into recycled  
ultrafiltration and nanofiltration  
membranes).

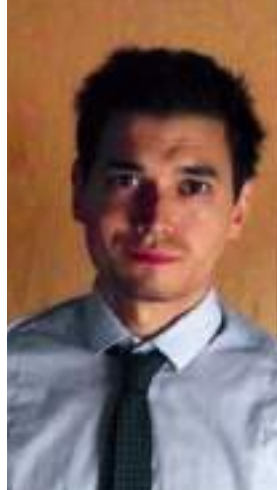


**Laura Rodríguez Saez**

Research Support

Degree in Environmental Sciences  
from Autonoma University of Madrid  
MSc in Environmental  
Management, Quality and Audit

**Research:** European project  
LIFE13 ENV/ES/000751  
TRANSFOMEM (Transformation  
of disposed reverse osmosis  
membranes into recycled  
ultrafiltration and nanofiltration  
membranes).



**Francisco Javier Rabadán Martínez**

Research Support

Degree in Chemical Engineering  
from the Murcia University and in  
Industrial Engineering at Polytechnic  
University of Cartagena

**Research:** European Project  
LIFE13 ENV/ES/000751  
TRANSFOMEM  
(Transformation of disposed  
reverse osmosis membranes into  
recycled ultra- and nanofiltration  
membranes).

**Amaia Ortiz de Lejarazu Larrañaga**

Predoctoral Researcher

Degree in Environmental Sciences  
from the University of the Basque  
Country

**Research:** Membrane technology.



**Jorge Senán Salinas**

Research Support

Degree Environmental Science at the  
University of Barcelona

MSc in Hydrology and Water  
Resources Management at  
University of Alcalá & University  
Rey Juan Carlos

**Research:** INREM project  
- CTM2015-65348-C2-1-R  
(MINECO/FEDER). Innovation and  
recycling of membranes for water  
treatment.





# Reclaimed 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 60 projects and research contracts, in 35 of them being the principal investigator. The results are reflected in more than 200 papers in journals, books and papers, two patents (one licensed) and a software.

She has also directed 8 doctoral theses, licentiate 4 PhD and 35 master's projects.

Also noteworthy is her work as Director of the Master in Hydrology and Water Resources Management, besides being part of the Educational Commission of the PhD in Hydrology and Water Resources Management.

She recently won several research awards, 3 of them related to Consolider Tragua "Treatment and reuse of wastewater for sustainable management", granted by the Board of the University of Alcalá in 2007; by the International Water Association in 2012 within of the category "Grand prize in the practical realization" and by the Directorate General of Technical and Scientific Research in 2012 as one of five representative projects funded scientific quality recently by the Spanish National Research Plan. She also won a second prize in 2012 during the XIV edition of the 3M Foundation Awards for innovation for her work "Evolution of traces of drugs in the treatment of urban waste water."



**Dr. Francisco Javier Lillo Ramos**

Associated Researcher

He graduated in Geology in 1985 from the University Complutense of Madrid and got the Diploma in Geological Engineering in 1985. He obtained a Ph.D in Earth Sciences from the University of Leeds (Britain). Afterwards, he spent ten years working in the industry, mainly as field geologist. In 1999, he joined the academic staff of the University Rey Juan Carlos, where is teaching geology and hydrology and is the Head of the Group of Geology since then. He obtained the 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 over 60 research papers, including 47 articles in peer-reviewed journals and 6 books and metodologic guides. He has been participant in 22 research projects (Spain, Chile and European Union), in 8 of them being the principal investigator. Dr. Lillo has also collaborated in several projects with industry. His research is currently focused on studies about regeneration and water quality; hydrochemical characterisation of groundwater and surface water: environmental impacts assessment of mining in air, soils and water and studies of abiotic environment in ante glacier ecosystem.



**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. 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. María del Carmen Cabrera Santana**

Associated Researcher

Ph.D. in Geology from the University of Salamanca. She has developed his professional work in the Geological and Mining Institute of Spain, in the Hydraulic Service in Las Palmas (Directorate General of Water. Canary Islands Government) and the University of Las Palmas de Gran Canaria, as Professor since 2003. Her research focuses mainly in the field of Hydrogeology of volcanic terrains, but she has also conducted studies on the stratigraphy and sedimentology of the Las Palmas detritic Formation. She is the author of numerous national and international publications.



**Dr. María del Pino Palacios Díaz**

Associated Researcher

PhD in Agricultural Engineering (1993), Polytechnic University of Valencia. Additionally, she holds a Master's Degree in Environmental Engineering by the University of Las Palmas de Gran Canaria (ULPGC). She is an expert in Techniques for Agricultural Business Management and a Specialist in Pruning. Since 1999, she is Professor in the ULPGC. Her current research lines, among others, are: agricultural reuse of reclaimed water from municipal origin; water monitoring, optimization of its management and of agronomic and health issues involved in its reuse; soil and subscriber; production of forage and biofuels; maintenance of irrigation systems; water quality (studies on the presence and movement of emerging contaminants in soil and water). She has participated in 15 research projects (in 9 of them as principal investigator) and 9 research contracts. She has 30 papers in journals and books, and in 63 International and National Conferences monographs. She has also published several dissemination articles, receiving the Canary Islands Award to the best dissemination work. She has conducted one PhD thesis.

**Dr. Lucila Candela**

Associated Researcher

PhD in Groundwater hydrology. Specialist in water resources, groundwater and groundwater pollution. She has participated in more than 50 national and international research projects as PI (EU, UNESCO, National level, private). She is co-author of 230 publications including several books as author and editor. Within her expertise she has being R&TD Manager of ERANET's Programmes-Ministry of Science and Innovation-Spain; R&TD Manager of Water Resources Programme-Ministry of Education Spain; Seconded Expert at Division of Water Sciences-International Hydrological Programme - UNESCO-Paris. She has participated as expert in International Panels: EU-External Advisory Group for Water and coastal areas; GEF-UNEP/MAP Strategic partnership for the Mediterranean sea large Marine ecosystem (Medpartnership); Edinburgh Research Partnership's, Advisory group member, University of Edimburg; Ministère de l'Ecologie, France. Member of Water Resources Projects, Paris; GRAPHIC/UNESCO Programme. Committee Member.

**Dr. María de las Virtudes Martínez Hernández**

Researcher

PhD in Hydrology and Water Resources Management at University of Alcala (2015), MSc in the same programme (2008) and BSc in Environmental Sciences at University of Alcala (2007). During her career she has worked with environmental contamination problems and water quality. Her research is mainly focused on contaminant reactive transport through porous media, environmental water reuse, and water resources management and quality. She deals particularly with emerging contaminants such as pharmaceuticals, and their natural attenuation during infiltration. In addition, she collaborates with the master programme "Hydrology and Water Resources Management". She also participates in scientific dissemination events such as Week of Science and European Researcher's night.

**Dr. María Leal Meca**

Associated Researcher

PhD in Hydrology and Water Resources Management at Rey Juan Carlos University (June 2015). BSc in Environmental Sciences at the same university and MSc in the Hydrology and Water Resources Management by University of Alcalá and University Rey Juan Carlos. She works in research projects related to the quality and pollution of groundwater bodies, with reactive transport modelling and with water reuse with environmental purposes (biomass irrigation and groundwater recharge activities). In particular she studies the interaction phenomena between nutrients and organic microcontaminants with different solid phases such as soils, clays, activated carbon, etc. She also collaborates in scientific dissemination activities such as the European Researcher's night. Currently she is a visiting professor at University Rey Juan Carlos.

**Dr. Ana de Santiago Martín**

Researcher

She obtained an European PhD in Pharmacy in 2013 in the Soil Science Department at Complutense University of Madrid where she worked as Assistant for 5 years. She specialized on the role played by soil reactive fractions and other environmental variables on metal (bio)availability in agricultural soils and its implication for the food chain.

She worked for 3 years in Quebec (Canada) at Laval University on the fate of metals, deicing salts, phosphorus, and hydrocarbons in diverse pressure scenarios (spills, peri-urban, sedimentation) as well as on eco-remediation (filter beds and constructed wetlands).

He joined IMDEA Water in 2017 within the Talent Attraction Program. Her research is currently based on the wastewater treatment (WWT) by vegetation filters for aquifer recharge and on the identification of the risk for food safety associated with the indirect reuse of surface water impacted by WWT effluents (metals and emerging contaminants) for crop irrigation.



**David Mostaza Colado**

Research Support

Degree in Environmental Sciences at University Rey Juan Carlos.

MSc in Hydrology and Water Resources Management at University of Alcalá & University Rey Juan Carlos.

Research: Intelligent system to optimize the use of water in agriculture.

**David Andrés Rivas Tabares**

Research Support

Degree in Agricultural Engineering (UNAL) from National University of Colombia.

MSc in Hydrology and Water Resources Management by (Universidad de Alcalá & Universidad Rey Juan Carlos, 2014-2015)

Research: Hydrological modeling

**Jorge Antonio Hernández Martín**

Research Support

Degree in Geological Engineering at University of Alicante.

MSc in Hydrogeology at Fundación Centro Internacional de Hidrología Subterránea

Research: Hidrogeology

**Guillermo Vaquero Quintana**

Research Support

Degree in Geological Engineering at Universidad Politécnica de Madrid.

MSc in Mining Engineering at the same university

Research: Hydrogeology

# Microbial Electrochemical Technologies



**Dr. Abraham Esteve Núñez**

Associated Researcher

Principal investigator of the Bioe Group, he develops his work in the field of environmental biotechnology, specifically in Microbial Electrochemical Technologies (MET), and its application, among others, to wastewater treatment.

Graduated in Biochemistry from the University of Murcia (1995), he carried out his doctoral research on the microbial biodegradation of explosives at the Zaidín Experimental Station (CSIC) and obtained a PhD in Biochemistry from the University of Granada with an Extraordinary Prize (2000). He completed postdoctoral studies at the Environmental Biotechnology Center of the University of Massachusetts (USA) from 2001 to 2005, and at the Astrobiology Center (INTA / CSIC, Madrid) from 2005 to 2008.

In 2009 he joined the Universidad de Alcalá as a researcher hired through the Ramón y Cajal programme. In 2013 he obtained his position as Associate Professor in the area of Chemical Engineering. He lectures in various degree courses as well as in the

Master of Hydrology and Management of Water Resources of the UAH. To date, he has conducted five doctoral theses, more than 12 master's degrees and has been a member of some 20 national and international theses committees.

He is the author of 40 scientific publications and 7 national and international patents, one of them a PCT awarded by Madrid + d (2015). He has participated and coordinated diverse national and European projects, among them iMETland (awarded by Madrid + d in 2016) and MIDES, both of Horizonte2020 programme. Secretary of the European section of ISMET (International Society for Microbial Electrochemistry and Technology), in 2013 he was editor of ISMET news, the society's quarterly newsletter. In addition, he was responsible for EU-ISMET 2014, the European Congress.

Since 2014 he has been responsible for MEET-ME4WATER, an action group in the EIP Water.

He is also coordinator of IBERIMET, the National Network of Microbial Electrochemical Technologies, which gathers the main Spanish groups in the field.

In 2016 he received the First Prize of the Campus of International Excellence 'Intelligent Energy' for the work *Electrosynthesis of bio-products of high added value and bioenergy from wastewater through mixed cultures of photobacteria illuminated with infrared light*.



**Dr. Antonio Berná Galiano**

Researcher

Dr. Antonio Berná Galiano obtained a degree in Chemical Engineering from the University of Alicante in 2000. In this university, he achieved a PhD in Materials Science (2014), specialized in spectroelectrochemical studies for characterization of interfacial processes such as the specific adsorption of anions. In 2007, he began to apply spectroelectrochemical techniques to the study of the bacteria/electrode interaction and the involved charge transfer processes (Angew. Chem. Int. Ed. 47 (2008) 4874-4877). Since 2010 until March 2015, he was a contracted researcher at the Department of Analytical Chemistry, Physical Chemistry and Chemical Engineering in the University of Alcalá. Currently, as researcher at IMDEA Water, Dr. Berná has focused his research on the study of the electrochemical engineering aspects for the application of the microbial Bioelectrogenesis in such a fields as wastewater treatment.





**Dr. Juan Manuel Ortiz Díaz-Guerra**

Researcher

Chemical Engineer (2002) and PhD on Electrochemistry (2009) at University of Alicante, Spain ("Program: Electrochemistry: Science & Technology"). His thesis was entitled "Desalination of brackish water by electrodialysis powered directly by solar photovoltaic energy: feasibility study and modelling" (Supervisors: Prof. Antonio Aldaz Riera and Prof. Vicente Montiel Leguey).

Researcher of "Applied Electrochemistry and Electrocatalysis" Group, University Institute of Electrochemistry, University of Alicante (Spain), during the period 2002-2012, being his interests the electrochemical processes for environmental protection, waste water treatment using electrochemical technology, energy production and storage, microbial electrochemistry (microbial fuel cells), and electrochemical systems powered by renewable energy.

From 2010 to 2012, he was involved as researcher in BacWire Project (project co-financed by the Seventh Framework Programme of the European Union), developing a new concept of microbial fuel cell using nanomaterials and functionalized electrodes ([www.bacwire.eu](http://www.bacwire.eu)).

From 2013, his scientific research is focused on development of waste water treatment processes using microbial electrochemical technology, formerly in FCC Aqualia S.A. as "Project Manager" at Innovation

and Technology Department, and currently at Environmental Biotechnology Research Group of IMDEA Water (Principal Investigator: Abraham Esteve-Núñez). He is author of various scientific papers and more than 20 communications in international conferences and workshops, and co-author of 2 patents related to water technologies.

Among his professional and scientific interests: Bioelectrochemical Engineering, Water technology, Desalination systems, New developments based on membrane technology and electrochemical concepts, and low-energy technologies for water treatment and production of drinking water.



**Dr. Alessandro A. Carmona Martínez**

Researcher

He has a degree on B.Sc. Environmental Engineering from the National Polytechnic Institute of Mexico (2001-2005). His thesis was entitled: "Batch bio-H<sub>2</sub> production with inhibited methanogenic consortia from organic solid waste".

Later he obtained a M.Sc. degree on Environmental Biotechnology (2005-2008) at CINVESTAV-IPN, Mexico during which he worked on the topic "Electricity production in microbial fuel cells fed with spent organic extracts from hydrogenogenic fermentation of organic solid wastes".

From 2008 to 2012 he moved to Germany to do a Ph.D. (magna cum laude) at TU Braunschweig. There he conducted research on "Electron transfer mechanisms in electrochemically active microbial biofilms".

In 2012 he spent 3 months at the VU Amsterdam, The Netherlands as a scientific visitor where he studied "Outer membrane cytochromes of microbial biofilms by a combination of surface-enhanced resonance Raman scattering spectroscopy and electrochemistry".

From 2012 to 2015 he moved to France where he worked as Postdoctoral Researcher at INRA-Narbonne. There he worked mainly on three topics: (i) "Coupling H<sub>2</sub> production by dark fermentation and microbial electrolysis", (ii) "Electron transfer mechanisms of novel electrochemically active bacteria" and (iii) "Microbial electrosynthesis of acetate".



**Dr. Sara Tejedor Sanz**

Researcher

Degree in Chemical Engineering at the Complutense University of Madrid and Master in Hydrology and Water Resources Management at the UAH/URJ. Last year studied at the Technical University of Denmark (DTU, Copenhagen) and 6-month internship the Department of Environmental Engineering in the area of bioenergy. In the last 5 years she has worked as a researcher at IMDEA Water, FCC Aqualia and the University of Alcalá, being linked to projects of public-private partnerships related to microbial electrochemical technologies as Aquaelectra, ITHACA, BioSO<sub>4</sub> and EM4EM. She currently works for IMDEA Water as predoctoral researcher in collaboration with the group Bioelectrogénesis of Dr. Abraham Esteve Núñez in the line of wastewater treatment by microbial electrogenesis.



**Dr. Pau Ródenas Motos**

Researcher

BSc in Chemistry (2007) by the University Jaume I of Castellón. In 2012 he obtained his MSc on Nanoscience and Nanotechnology from University of Valencia, Jaume I University, University of Alicante, University of Castilla-La Mancha, Autonomous University of Madrid and University of Valladolid. He graduated with the final Master Thesis with the title: Photoelectrolysis of water using nanostructured semiconductors.

In 2012 he visited Bar-Ilan University (Israel) for one month where he participated in the modification of hematite structures using microwave and electrodeposition doping techniques.

From 2012 to 2016, he studied Ph.D. and worked as a Researcher at WETSUS (Netherlands) for the European BioElectroMET project. He received his doctorate from the University of Wageningen on April 21, 2017, with the thesis entitled "Bioelectrochemical metal recovery with Microbial Fuel Cells."

In May 2017 IMDEA Agua contracts Pau Rodenas as a researcher for the European project MIDES in Microbial Desalination.



**Amanda Prado de Nicolás**

Predoctoral Researcher

Degree in Biology at University Rey Juan Carlos.  
MSc in Biotechnology at University Autónoma of Madrid.  
Research: Wastewater treatment through the use of electrogenic wetlands with electroactive biochar as a biofilter substrate.



**Colin Wardman**

Predoctoral Researcher

Degree in Science in Marine Biology from Humboldt State University in California.  
MSc in Science in Microbiology from the University of Massachusetts.  
Research: Microbial electrochemical technologies.



**Marina Ramírez Moreno**

Research Support

Degree in Chemistry from University of Alcalá.  
MSc in Fine Chemicals.  
Research: European H2020 research project MIDES "Microbial Desalination for Low Energy Drinking Water".



**Belén Barroeta García**

Research Support

Degree in Journalism at Complutense University of Madrid  
Specialist in Socioeconomic Journalism, UCM  
Diplome of Advanced Studies in Journalism, UCM  
Research: Representation of hydraulic fracturing (fracking) in the Spanish newspapers; science communication.



# Biological and Advanced oxidation technologies



**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

Roberto Rosal received Master degrees with honours in Chemistry and in Business Administration and a Ph.D. degree in Chemistry from the University of Oviedo with 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 currently at the Department of Analytical Chemistry and Chemical Engineering of the University of Alcalá and associated researcher at the Advanced Study Institute of Madrid (IMDEA Agua). His recent scientific interests are focused on water treatment with emphasis on aqueous micropollutants and the processes for their removal. This includes the development of methods for assessing the toxicity of emerging pollutants comprising engineered nanoparticles and their mixtures. He is also working on the bio-nano interaction of engineered materials and the production of fouling resistant membranes,

particularly nanofibrous electrospun materials. He participated in more than thirty financed research projects and R&D contracts and published over eighty scientific articles and book chapters. He is currently leading several projects with national and international funding.



**Dr. José Antonio Perdigón Melón**  
Associated Researcher

PhD in Chemistry from the University of Alcalá. Associate Professor at the University of Alcalá since 2011, assigned to the area of Chemical Engineering. He has taught Chemistry and Environmental Engineering at various degrees and Master. Author of over 30 articles based on synthesis and characterization of catalysts and wastewater treatment, he has participated in over 18 projects of national and international research. He has directed more than 10 undergraduate, graduate and Master Thesis projects. The research developed in recent years have focused on the treatment processes of wastewater and associated toxicity, and the study of water conditioning processes (fit-to-use) both by processes of ozonation and electrooxidation.



### Dr. Alice Luminita Petre

Associated Researcher

She received a BSc in Chemistry and a MSc in Physical Chemistry and Applied Radiochemistry from the University of Bucharest (Romania) and a PhD with European PhD Mention in Catalysis from the Université Claude Bernard Lyon I (France) under the supervision of Dr. Aline Auroux (France) and Dr. Niculae I. Ionescu (Romania). The PhD work involves the synthesis, the bulk/superficial characterization and the catalytic properties for selective catalytic reduction of NOx of supported gallium oxide catalysts. She received the “I. G. Murgulescu” National Award in Physical Chemistry of the Romanian Academy in 2001. PhD fellowships in Institut de Recherches sur la Catalyse, Villeurbanne (France) and postdoctoral stays at the RWTH Aachen (Germany) under the supervision of Prof. Wolfgang Hoelderich and the Institute of Catalysis and Petrochemistry (CSIC, Madrid).

Since 2007 she was a researcher from the National Science Program Ramón y Cajal in the Department of Analytical Chemistry and Chemical Engineering of the University of Alcalá, Madrid. Associate Professor University of Alcalá since 2012 assigned to the area of Chemical Engineering.



### Dr. Karina Boltes Espínola

Associated Researcher

She has taught Environmental Engineering graduate and undergraduate courses and directed over 15 research dissertations.

She has participated in more than twenty financed research projects and R&D contracts and she has published over thirty five articles in peer-reviewed journals. Main research interests lie in the area of the synthesis of new materials and catalysts, advanced oxidation processes, cytotoxicity and aquatic toxicity of emerging and priority pollutants, oxidation intermediates and complex mixtures of toxicants.

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 3 PhD thesis, and many post-graduate research projects in the Master on Hydrology and Water Management from the University of Alcalá.



# Ecotoxicology

annual report  
2017



**Prof. Marco Vighi**  
Researcher

Marco Vighi took the degree in Biology at the University of Milano, in 1969. He operated in the field of environmental pollution since 1969, working at the Water Research Institute of the National Research Council in Italy. In 1983 he got a chair at the University of Milano where he was professor of Agricultural Ecotoxicology. In 1998, he moved to the Department of Earth and Environmental Sciences of the University of Milano-Bicocca, where he was professor of Ecology and Applied Ecology and responsible of the Research Group on Ecotoxicology up to November 2015, when he retired.

Up to the early 1980s, his scientific activity was mainly addressed to applied hydrobiology and eutrophication of marine and fresh waters. In the last three decades, the research activity moved toward ecotoxicology. Main research fields are: ecotoxicology of organic pollutants on aquatic and terrestrial ecosystems at different levels of organization; Quantitative

Structure-Activity Relationships (QSAR); distribution and fate of contaminants (monitoring and modeling); long range transport of persistent organic pollutants; effects and environmental fate of complex mixtures; environmental risk assessment; bridging ecotoxicology with environmental economy. He published more than 160 scientific papers and books on applied ecology and ecotoxicology.

From 1991 to 2013 Marco was member of Scientific Advisory Committees on Toxicology and Ecotoxicology of the European Commission, DG SANCO (CSTE, CSTE, SCHER). Since April 2016 he is member of Scientific Committee on Health, Environmental and Emerging Risk (SCHEER) of the European Commission. In several occasions he was consultant on environmental issues for the FAO/UNEP, for the World Health Organisation and for the UNEP/POPRC (Persistent Organic Pollutants Review Committee) on issues related to the Stockholm Convention. From 2002 to 2005 he was Senior Consultant of the Project "Phase-out of pesticidal POPs in China", developed by the UNPD (United Nations Development Programme) in collaboration with the Chinese government, with the aim of the implementation of the Stockholm Convention in China.

Marco is incorporated at IMDEA Water since December 2015 with the objective of developing a new research line on Aquatic Ecotoxicology and Ecological Risk Assessment.



**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 are 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. Andreu Rico Artero

Researcher

Andreu Rico holds a BSc in Agricultural Engineering (graduated with honours) and a high-education degree (Licenciatura) on Environmental Sciences from the Polytechnic University of Valencia, Spain. In 2009, he obtained his MSc on Aquatic Ecology and Water Quality Management from Wageningen University, the Netherlands. During his master studies he focused on assessing the fate and toxicological effects of pesticides in tropical freshwater ecosystems and collaborated with two international projects, in Brazil and Costa Rica. In May 2014, Andreu Rico obtained his PhD on Ecotoxicology and Chemical Risk Assessment from Wageningen University. As part of his PhD he investigated the environmental risks posed by the use of veterinary medicines in Asian aquaculture. After his PhD he worked for a year and a half in Alterra (the Netherlands), where he specialized on the ecological risk assessment of pesticides and other emerging contaminants (pharmaceuticals, home-care products). Andreu Rico has participated in 6 international projects and has a strong background on the design of experiments and predictive models for the ecological risk assessment of contaminants. He is an active member of the Society of Environmental Toxicology and Chemistry and is co-author of more than 20 papers, 30 conference proceedings and a large number of reports for the EU and the chemical industry. During the last few years he has participated in the supervision of

master students and in the 'Chemical Stress Ecology and Risk Assessment' course of Wageningen University.

Andreu Rico joined the IMDEA Water Institute in December 2015, under the framework of the Marie Skłodowska-Curie AMAROUT program. His main objective is to develop a new research line on aquatic ecotoxicology and ecological risk assessment. One of his main interests is to identify key stress factors that affect aquatic populations and communities under Mediterranean conditions, as well as to evaluate their interactive effects with urban, agricultural and industrial pollution. His investigations aim to develop new modeling tools that are able to integrate the multiple stress factors related to global climate change into a more sophisticated and environmentally relevant risk assessment framework for contaminants.



## Dr. Belén González Gaya

Researcher

BSc in Environmental Science at Autonomous University of Madrid (2007). MSc in Aquatic Ecology and Water Quality at Wageningen University (The Netherlands) (2009). During her master studies she develop practical stages in the Benthic Ecology Laboratory of Ischia, Stazione Zoologica Anton Dorn (Naples), and a long internship at the Coastal Ecosystems Laboratory of the Museo Argentino de Ciencias Naturales in Buenos Aires.

In October 2015, she obtains her PhD on Marine Sciences by the University of Barcelona.

Her PhD thesis, entitled "Occurrence, transport and fate of Persistent Organic Pollutants in the Global Ocean", was developed inside the Malaspina 2010 Project where she sampled on the Atlantic, Indian and Pacific oceans to assess the presence of these dangerous chemicals at a global scale.

She enjoyed one year of postdoctoral experience on the Institute of Organic Chemistry in Madrid.

In April 2017, she joined the IMDEA Water Institute to work on the H2020 European Project TAPAS "Tools for Assessment and Planning of Aquaculture Sustainability", studying the effects of organic pollutants from fisheries on coastal areas of the Mediterranean Sea.



**Alba Arenas Sánchez**

Predoctoral Researcher

**Degree** in Environmental Science at Autonomous University of Madrid.

**MSc** in Aquatic Ecology and Water Quality at Wageningen University and Research Centre, Holland.

**Research:** Vulnerability assessment of aquatic ecosystems to multiple stressors in the Mediterranean área.



**Andrea Castaño Sánchez**

Research Support

**Degree** in Biology from Complutense University of Madrid.

**MSc** in Environmental Geology from the Complutense University of Madrid.

**Research:** Ecotoxicology in macroinvertebrates.



**Theresa Schell**

Predoctoral Researcher

**Bachelor** in Environmental Science at University of Koblenz-Landay (Germany)

**MSc** in Ecotoxicology at the same university.

**Research:** Impacts of microplastics in agrosystems and stream environments

# Cyanobacteria and microbial contamination



**Dr. Rehab El-Shehawy**  
Researcher

She has obtained her PhD. degree in Microbiology from the University of Bayreuth Germany in 2001. She authored and co-authored more than twenty one articles. She collaborates and welcomes collaboration on both national and international levels.

Working at the interface between research and product development, Dr. El-Shehawy is currently leading the group of Cyanobacteria and Cyanotoxins dedicated to offer technology-based solutions to tackle the problems caused by over-growth (blooms) of cyanobacteria in water bodies and their toxins.



**Dr. Blanca Sánchez Martínez**  
Researcher

She obtained her M.Sc. in Biochemistry from Universidad Autónoma de Madrid (UAM). In 2005, she obtained her PhD in Molecular Biology from UAM, studying antibiotic biosynthesis regulation and resistance mechanisms of antibiotics by antibiotic producing microorganisms. In 2006 she joined the Biología Microbiana department in Centro Nacional de Biotecnología (CNB-CSIC). Her research has been focused on antimicrobial resistance mechanisms by opportunistic pathogens.

She has participated in nine national and four international projects. Dr. Sánchez has been author and co-author of twenty-seven scientific articles, twenty of them has been published in the first quartile indexed journals, as first or last author in ten of them. Her research has been presented in national and international conferences, 6 oral communications. She has also supervised three Master's degree work and two doctoral theses.



**Jesús Morón López**  
Research Support

**Degree** in Biology from University of Seville, Sevilla, Spain.

**MSc:** Molecular Genetics and Biotechnology.

**Research:** Toxic Cyanobacteria in fresh water reservoirs



**Lucía Nieto Reyes**  
Research Support

**Degree** in Biology from University of Seville.

**Research:** Toxic Cyanobacteria in freshwater.



# Economic and institutional analysis



**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**  
Researcher

Senior academic and water resources management and water economics specialist. He is currently a Research Fellow and Coordinator of the Department of Economic and Institutional Analysis of Water at IMDEA Water Institute and Faculty Member of the Belpasso International Summer School in Environmental and Natural Resource Economics.

He has recently worked on decision-making techniques for the Environment Agency (2015), as part of the support of that regulator to water utilities in England and Wales. His current roles include water policy advisor to the European Commission (EC DG ENV) as part of the Water Framework Directive (WFD) Common Implementation Strategy (CIS) Working Group on Economics and to the European Parliament (2014-2018).

He is also water policy advisor for the World Bank as part of the 2030 Water Resources Group (WB, IFC, WFP – 2013-2016) framework contracts in which he has led the hydroeconomic analysis of water investments in the Pacific coastal catchments of Peru and is currently leading the work stream on the economic valuation of water resources and the use of economic incentives for water management in Mongolia, as well as the hydroeconomic analysis in two mining regions and the capital city (Ulaanbaatar).

He is an international consultant on water and energy economics for UN agencies such as ECLAC, FAO, WHO-PAHO, UNDP and UNESCO, and international development banks (WB; IFC, IDB). Within a wide range of economic analysis assignments, he has worked on different studies to link water policy and macroeconomic performance in the EU (2013-2015), as part of the so-called European Semester. He has also coordinated the research team for the EU FP7 EPI-Water project (2011-2013) on economic policy instruments for sustainable water management, in which an economic assessment of environmental outcomes of EPIs was a key outcome.

Gonzalo also coordinates IMDEA's contribution to the EIP-Water Action Group RiverRes and to the study for DG environment on maximising water reuse in the EU. Within the newly H2020 granted project AQUACROSS (2015-2018), Gonzalo leads the development of a common framework for the assessment of aquatic ecosystems.



### Dr. Alberto del Villar García

Associated Researcher

Professor in the Department of Applied Economics at University of Alcalá. Bachelor of Economics and Business Administration (UNED), Master in Public Finance and Taxation (IEF) and PhD in Economics (University of Alcalá). He has teach in numerous courses and seminars on different aspects related with Water Economy and Pricing, and since 1998 he teaches at the University of Alcalá.

His research is focused on analyzing the pricing mechanism, pricing and costs of water services, which have led to participate in multiple research projects and contracts, both as a partner and as principal researcher. The result of this activity has resulted in participation in conferences and publications of books and magazines nationally and internationally. Since 2002 he has participated as an expert in several focus groups related to water and in the water planning process resulting from the implementation of the Water Framework Directive in Spain.

His activity in IMDEA Water Instituted is related to the participation and collaboration in various research projects and activities related to water economy.



### Marta Rodríguez Gómez

Research Support

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.



### Asya Amran Marhubi

Research Support

Degree in International Development Studies and Spanish & Latin American Studies.

MSc in Corporate Social Responsibility & Sustainable Development from the EOI.

Research: H2020 research project AQUACROSS: "Knowledge, Assessment, and Management for AQUAtic Biodiversity and Ecosystem Services aCROSS EU policies".



### Marta Arenas Romasanta

Research Support

Degree in Biology from Complutense University of Madrid.

MSc in Sustainable Development and CSR – EOI Business School.

Research: Ecological, social and economic approaches for water management.





# Water and energy



**Dr. Marta Vivar García**  
Researcher

Telecommunication Engineering degree by the Polytechnic University of Madrid (UPM) and PhD on Photovoltaic Solar Energy studies by the Institute of Solar Energy within the same university (IES-UPM) in 2009. MSc on Hydrology and Water Resources Management by the University of Alcalá in 2013. She worked at the Australian National University (ANU, Australia) for three years as postdoctoral researcher, combining both research and lecturing activities. She has also worked at Tianjin University (China) for a year under Chinese public funding.

Her main research lines include the design and development of hybrid solar photovoltaic / thermal / photochemical devices that use the solar spectrum more efficiently, for the production of electricity, purified water and/or heat; and the development of low-cost clean water photovoltaic systems for solar disinfection in developing countries.

She has participated in 14 research projects, being PI in some of them. Results include 20 international journal articles, 12 national scientific journal articles, 41 communications to international conferences, 5 invited talks and 1 patent. She has supervised 18 honours and/or master students projects and completed several research stays at ANU (Australia), ZSW (Germany), University of Ferrara (Italy), Anna University (India) and Tianjin University (China).



**Natalia Pichel Mira**  
Research support

Degree in Environmental Science at the University of León.

MSc in Water Quality Science and Technology at the University of Granada.

Research: PV-photochemical systems for water treatment.



**Dr. Manuel Fuentes Conde**  
Associated Researcher

He is an Industrial Engineer (U.N.E.D) and PhD in Photovoltaic Solar Energy (University of Jaén, 2009). He worked as designer in automobile industry during two years (Valeo S.L.) and then, he worked as lecturer at University of Jaén (2000), where he got his accreditation as Tenured Associate Professor (2012). Nowadays he is Associate Professor in Electronics and Automation Engineering Department at University of Jaén.

His first research line was focused in Photovoltaic Systems, specifically, in Grid Connected Photovoltaic Systems (GCPVS), developing measurement devices for PV modules and PV systems quality controls. After his postdoctoral stays in ANU (Canberra, Australia, 6 months) and Tianjin University (Tianjin, China, 4 months) he opened a new research line focused on water purification thanks to hybrid photovoltaic-photocatalytic systems and hybrid autonomous systems (renewable energies-fuel) based on low cost design for its monitoring and management.

He has participated in 23 research projects, contracts and agreements, being the leader and principal researcher in some of them. The research results include 13 papers in international journals (JRC), 8 papers in national journals, more than 30 publications in international conferences, 3 invited talks and one patent. He is reviewer of 6 journals gathered in the ISI Science JCR and supervisor of more than 20 honour student projects of Technical Degrees.



**Ascensión López Vargas**  
Research support

Degree in Telecommunications Engineering at the University of Alcalá.

MSc in Communications and Information Technologies at the University of Alcalá.

MSc in Aerospace Research at the University of Alcalá.

Research: Solar photovoltaic-photochemical-thermal hybrid systems, clean water photovoltaic sensors for solar disinfection.

# Hydraulic heritage



**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 more than 40 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. 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 60 projects and research contracts, in 35 of them being the principal investigator. The results are reflected in more than 200 papers in journals, books and papers, two patents (one licensed) and a software.

She has also directed 8 doctoral theses, licentiate 4 PhD and 35 master's projects.

Also noteworthy is her work as Director of the Master in Hydrology and Water Resources Management, besides being part of the Educational Commission of the PhD in Hydrology and Water Resources Management.

She recently won several research awards, 3 of them related to Consolider Tragua "Treatment and reuse of wastewater for sustainable management", granted by the Board of the University of Alcalá in 2007; by the International Water Association in 2012 within of the category "Grand prize in the practical realization" and by the Directorate General of Technical and Scientific Research in 2012 as one of five representative projects funded scientific quality recently by the Spanish National Research Plan. She also won a second prize in 2012 during the XIV edition of the 3M Foundation Awards for innovation for her work "Evolution of traces of drugs in the treatment of urban waste water."



# laboratory staff

**Dr. Leonor Nozal Martínez**

Quality and Laboratories  
Management / Laboratory  
responsible  
PhD in Chemical Sciences.

**Francisco Martínez Serrano**

Laboratory Technician  
IVT: Environmental Chemistry.

**Carolina Guillén Fuentes**

Laboratory Technician  
IVT: Control and Analysis.  
IVT: Environmental Chemistry.

**Amaya Romero Salas**

Laboratory Technician  
IVT: Control and Analysis.

**Covadonga Alonso Alonso**

Laboratory Technician

Degree in Chemistry by the  
Autonomous University of Madrid,  
Spain.

**Dr. María Isabel López a**

Laboratory Technician

PhD in Analytical Chemistry by  
Complutense University of Madrid,  
Spain.

**Dr. Laura Cherta Cucala**

Laboratory Technician

PhD in Analytical Chemistry by the  
Institute for Pesticides and Water of  
the University Jaume I.

**Patricia García Doncel**

Research support

Degree in Chemistry at the University  
of Alcalá.

**Manuel Mínguez Calzada**

Laboratory Technician

IVT: Electronic Product  
Development.

**Dr. Alberto Blanco González**

Research support

PhD in Hydrology and Water  
Resources Management.

**Diego Parra Robles**

Laboratory Technician

IVT: Environmental Chemistry.



# management area and administration

**Rafael Irastorza Vaca**

General Manager

Degree in Economics and Business  
Administration Sciences.



**Dr. Juana Sanz García**

R&D Management

PhD in Environmental Sciences.



**Mari Luz Barquilla Crespo**

Economic Management

Degree in Economics Sciences.



**José Ángel Gómez Martín**

Technology transfer technician

Degree in Environmental Sciences.



**Gloria Rubio Sánchez**

R&D Technical support

Degree in Environmental Science.



**Lucía Freire Cordero**

R&D Technical support

Degree in Environmental Sciences.



**Celia Barral Nieto**

Technician in Economic  
and Administration  
Superior Technician in Administration  
and Finance



**Josefa Simón Recio**

Secretary





# Research results and knowledge dissemination

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Research results  
Research results



## 1. Scientific Papers

### 1.1 Articles in journals

1. Abril, M., Arce, M.I., Aristi, I., Arroita, M., G. Bravo, A., de Castro-Català, N., del Campo, R., Pere Casas-Ruiz, J., Estévez, E., Fernández, D., Fillol, M., Flores, L., Freixa, A., Giménez-Grau, P., González-Ferreras, A.M., Hernández-del Amo, E., Martín, E.J., Martínez, A., Monroy, S., Mora-Gómez, J. and Palacin-Lizarbe, C., Pereda, O., Poblador, S., Rasines-Ladero, R., Reyes, M., Rodríguez-Lozano, P. and Ruiz, C., Sanpera-Calbet, I., Solagaistua, L., Tornero, I., Catalán, N. (2017) *Local and regional drivers of headwater stream metabolism: insights from the first AIL collaborative project*. *Limnetica*, 36 (1). pp. 67-86. ISSN 0213-8409.
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3. Borjas, Z., Esteve-Núñez, A., Ortiz, J.M. (2017) *Strategies for merging Microbial Fuel Cell Technologies in Water Desalination processes: start-up protocol and desalination efficiency assessment*. *Journal of Power Sources*, 356. pp. 519-528. ISSN 0378-7753.
4. Daam, M.A., Rico, A. (2017) *Freshwater shrimps as sensitive test species for the risk assessment of pesticides in the tropics*. *Environmental Science and Pollution Research*. pp. 1-9. ISSN 0944-1344.
5. Franco, A., Price, O.R., Marshall, S., Joliet, O., Van den Brink, P.J., Rico, A., Focks, A., De Laender, F., Ashauer, R. (2017) *Towards refined environmental scenarios for ecological risk assessment of down-the-drain chemicals in freshwater environments*. *Integrated Environmental Assessment and Management*, 13 (2). pp. 233-248. ISSN 15513777.
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7. García-Fernández, L., García-Payo, M.C., Khayet, M. (2017) *Mechanism of formation of hollow fiber membranes for membrane distillation: 1. Inner coagulation power effect on morphological characteristics*. *Journal of Membrane Science*, 542. pp. 456-468. ISSN 03767388.
8. García-Fernández, L., García-Payo, M.C., Khayet, M. (2017) *Mechanism of formation of hollow fiber membranes for membrane distillation: 2. Outer coagulation power effect on morphological characteristics*. *Journal of Membrane Science*, 542. pp. 469-481. ISSN 03767388.



9. García-Fernández, L., Wang, B., García-Payo, M.C., Li, K., Khayet, M. (2017) *Morphological design of alumina hollow fiber membranes for desalination by air gap membrane distillation*. Desalination, 420. pp. 226-240. ISSN 00119164.
10. Iepure, S., Rasines-Ladero, R., Meffe, R., Carreño, F., Mostaza, D., Sundberg, A., Di Lorenzo, T., Barroso, J. L. (2017) *Exploring the distribution of groundwater Crustacea (Copepoda and Ostracoda) to disentangle aquifer type features—A case study in the upper Tajo basin (Central Spain)*. Ecohydrology, 10 (7). e1876. ISSN 19360584.
11. Ippolito, A., Giacchini, R., Parenti, P., Vighi, M. (2017) *Natural variability of enzymatic biomarkers in freshwater invertebrates*. Environmental Science and Pollution Research, 24 (1). pp. 732-742. ISSN 0944-1344.
12. Jafary, T and Daud, W and Ghasemi, M and Kim, B and Carmona, A., Abu Bakar, M and Jahim, J and Ismail, M (2017) *A comprehensive study on development of a biocathode for cleaner production of hydrogen in a microbial electrolysis cell*. Journal of Cleaner Production, 164. pp. 1135-1144. ISSN 09596526.
13. Khalifa, A., Ahmad, H and Antar, M., Khayet, M. (2017) *Experimental and theoretical investigations on water desalination using direct contact membrane distillation*. Desalination, 404. pp. 22-34. ISSN 00119164.
14. Lado, J.J., Pérez-Roa, R., Wouters, J.J., Tejedor-Tejedor, M.I., Federspill, C., Ortiz, J.M., Anderson, M.A. (2017) *Removal of nitrate by asymmetric capacitive deionization*. Separation and Purification Technology, 183. pp. 145-152. ISSN 1383-5866.
15. Laqbaqbi, M., Sanmartino, J., Khayet, M., García-Payo, C., Chaouch, M. (2017) *Fouling in Membrane Distillation, Osmotic Distillation and Osmotic Membrane Distillation*. Applied Sciences, 7 (4). p. 334. ISSN 2076-3417.
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16. Payano, R., Pascual, J.A., De Bustamante, I. (2017) *Criterios para la incorporación de la información sobre usos del suelo en un Sistema de Apoyo a la Toma de Decisiones sobre Patrimonio Hidráulico*. In: Cuadernos de Geomática(5) Nuevas perspectivas de la Geomática aplicadas al estudio de los paisajes y el patrimonio hidráulico. Instituto IMDEA Agua, Centro para el Conocimiento del Paisaje, CIVILSCAPE, pp. 8-22. ISBN 978-84-697-4793-3.
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1. Delacámara, G., Arenas, M., Marhubi, A., Rodríguez, M. (2017) *El sector del abastecimiento y saneamiento urbano en España*. Technical Report. Fundación Canal (Canal de Isabel II), Madrid.

2. Gómez, C.M., Delacámara, G., Jähnig, S., Mattheiss, V., Langhans, S., Domisch, S and Hermoso, V., Piet, G., Martínez-López, J., Lago, M., Boteler, B., Rouillard, J and Abhold, K., Reichert, P., Schuwirth, N., Hein, T., Pletterbauer, F., Funk, A and Nogueira, A., Lillebø, A., Daam, M., Teixeira, H., Robinson, L., Culhane, F., Schlüter, M., Martin, R and Iglesias-Campos, A., Barbosa, A.L., Arévalo-Torres, J., O'Higgins, T. (2017) *Developing the AQUACROSS Assessment Framework. Deliverable 3.2, AQUACROSS, European Union's Horizon 2020 Framework Programme for Research and Innovation Grant Agreement No. 642317*. Technical Report. European Union (H2020 FP Grant Agreement)-AQUACROSS.

3. Martin, R and Fryers, K. and Schlüter, M. and Barbosa, A.L. and Iglesias-Campos, A. and Arévalo-Torres, J. and Barbière, J. and Delacámara, G. and Gómez, C.M. and Arenas, M. and Domisch, S and Langhans, S. and Martínez-López, J. and Villa, F and Balbi, Sand Schuwirth, N and Rouillard, J (2017) *Scenario Development. Deliverable 7.2, AQUACROSS, European Union's Horizon 2020 Framework Programme for Research and Innovation Grant Agreement No. 642317*. Technical Report. European Union (H2020 FP Grant Agreement)-AQUACROSS.

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## 2. IT platform

1. *Web Mapping* del Patrimonio Hidráulico de la Comunidad de Madrid. Unidad de Geomática. Noviembre.

## 3. Lectures

1. Barroeta, B. *METlands For Wastewater Treatment: A New Generation Of Hybrid Bioelectrochemical Wetlands*. IWA Water and Development Congress & Exhibition 2017. Buenos Aires, Argentina. 13 - 16 de noviembre.

2. Blanco, A. *El uso de ArcGIS en el Instituto IMDEA Agua y el proyecto patrimonio cultural hidráulico de la Comunidad de Madrid*. Conferencia ESRI España 2017. Madrid, España, 25-26 octubre.

3. Berná, A. *S2Small2017 Int. IWA Conference on Sustainable Solutions for Small Water and Wastewater Treatment Systems*. Nantes, Francia. 22 - 26 de octubre.

4. Cabrera, M.C. *Gestión de la recarga inducida con aguas regeneradas en agricultura y usos recreativos*. Jornadas "La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales". Organizado por IMDEA Agua, Red Consolider TRAGUA, entre otros. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

5. Candela, L. *Aguas regeneradas y recarga: requisitos ambientales*. Jornadas "La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales". Organizado por IMDEA Agua, Red Consolider TRAGUA, entre otros. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

6. Castaño, A. *Ecotoxicological effects of hospital treated wastewaters and pharmaceutical metabolites on Daphnia magna and Chlorella vulgaris: an integrated experimental approach*. Workshop on Technologies for Monitoring and Treatment of Contaminants of Emerging Concern. IMDEA Agua, Consorcio REMTAVARES, etc. Madrid 23 - 24 de noviembre.

7. Del Villar, A. *Reutilización de aguas regeneradas: aproximación a los costes de producción y valoración de su uso*. Jornadas “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. Organizado por IMDEA Agua, Red Consolider TRAGUA, entre otros. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

8. Delacámara, G. *Retos sociales y de gobernanza – Los derechos humanos al agua y el saneamiento en países desarrollados: cuando la cobertura no es el desafío*. IV Foro de la Economía del Agua. Barcelona. 5 de abril.

9. Delacámara, G. *Conclusiones*. IV Foro de la Economía del Agua. Barcelona. 5 de abril.

10. Delacámara, G. *¿Definimos bien prioridades en el sector del agua?* XXXIV Edición de las Jornadas Técnicas AEAS. Asociación Española de Abastecimientos de Agua y Saneamiento. Tarragona del 24 - 26 de mayo.

11. Delacámara, G. *Conclusiones*. V Foro de la Economía del Agua. Valladolid. 7 de junio.

12. Delacámara, G. *Reflexión y conclusiones: consideraciones sobre los derechos humanos al agua y al saneamiento*. VI Foro de la Economía del Agua. Barcelona. 18 de septiembre.

13. Delacámara, G. III Diálogos del Agua. América Latina-España 2017: Hacia un pacto político del agua. Banco de Desarrollo de América Latina. Madrid. 23 de octubre.

14. Delacámara, G. *La gestión de sequías y la adaptación al cambio climático - Lecciones desde la economía*. VII Foro de la Economía del Agua. Madrid. 25 de octubre.

15. Delacámara, G. *Presentación de principales conclusiones sobre el estudio “El sector del abastecimiento y saneamiento en medio urbano”*. Fundación Canal. Madrid. 28 de noviembre.

16. Esteve-Núñez, A. *METlands: Una nueva generación de humedales basados en microorganismos electroactivos*. Jornada Técnica Depuración de Aguas Residuales: Diseño, Construcción y Explotación de Humedales Artificiales en Pequeños Municipios. Generalitat Valenciana, EPSAR, Diputación de Castellón y FACSA. Benicàssim, Castellón. 13 de junio.

17. Esteve-Núñez, A. 7th International Symposium for Wetland Pollutant Dynamics and Control (WETPOL 2017). Big Sky, Montana, Estados Unidos. 21 - 25 de agosto.

18. Esteve-Núñez, A. *Descontaminando ambientes naturales con bacterias eléctricas*. Charla TEDx en TEDxRivasVaciamadrid: Watching the Future. Rivas Vaciamadrid, Madrid. 21 de octubre.

19. Esteve-Núñez, A. *Microbial Electrochemical Technologies (MET) and the energy-water nexus*. Workshop on Technologies for Monitoring and Treatment of Contaminants of Emerging Concern. IMDEA Agua, Consorcio REMTAVARES, etc. Madrid 23 - 24 de noviembre.

20. García Calvo, E. *R&D&I in IMDEA Water Institute*. 6th De Nora R&D Symposium. Milán, Italia. 27 y 28 de septiembre.

21. García-Pacheco, R. *Life-Transformem: Reuse of recycled membranes (NF-UF) in water treatment*. Workshop “Membranes for water treatment and reuse”. LEQUIA. Girona. 15 de junio.

22. Gómez, C.M., Delacámara, G. *Seguridad hídrica y resiliencia en las ciudades. Del recurso a los servicios*. V Foro de la Economía del Agua. Valladolid. 7 de junio.

23. Gómez, C.M. EARE 2017: 23rd Annual Conference of the European Association of Environmental and Resource Economists. Atenas, Grecia. 28 de junio - 1 de julio.

**24.** Gómez, C.M. III Diálogos del Agua. América Latina-España 2017: Hacia un pacto político del agua. Banco de Desarrollo de América Latina. Madrid. 23 de octubre.

**25.** Gómez, C.M. *El desafío de garantizar la seguridad hídrica a largo plazo*. VII Foro de la Economía del Agua. Madrid. 25 de octubre.

**26.** Letón, P. *Tratamientos de oxidación avanzada en aguas regeneradas para la eliminación de emergentes. Aplicación a la recarga*. Jornadas “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. Organizado por IMDEA Agua, Red Consolider TRAGUA, entre otros. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

**27.** Letón, P. *Análisis del Ciclo de Vida. Metodologías y aplicaciones*. I Foro Ambientate: “Fundamentos del Análisis del Ciclo de Vida y experiencias en el mundo empresarial”. UAH. 24 de noviembre.

**28.** López-Heras, I. *Control de calidad en las aguas: parámetros a controlar en función de las normativas vigentes mediante técnicas de espectrometría de masas*. Jornadas de Medio Ambiente y Alimentación. Agilent Technologies. Madrid. 8 de marzo.

**29.** Ortiz, J.M. *Tecnología Electroquímica Microbiana aplicada a pequeñas comunidades*. XII Seminario Internacional de Comarcas Sostenibles. Ingenio, Gran Canaria. 4 y 5 de abril.

**30.** Ortiz, J.M. Innovative Water Saving Solutions, organizado como evento dentro de Drinktec (World's Leading Trade Fair for the Beverage and Liquid Food Industry. Munich, Alemania. 11 de septiembre.

**31.** Prado, A. *METlands For Wastewater Treatment: A New Generation Of Hybrid Bioelectrochemical Wetlands*. II Workshop IBERIMET 2017. Universidad de Girona. 18 y 19 de diciembre.

**32.** Ramírez, M. *MIDES: microbial desalination for low energy drinking water. MDC at lab scale*. II Workshop IBERIMET 2017. Universidad de Girona. 18 y 19 de diciembre.

**33.** Ródenas, P. 10th World Congress of Chemical Engineering (WCCE 2017) + 6th International Congress on Sustainability Science & Engineering (ICOSSE 2017). Barcelona. 2 - 5 de octubre.

**34.** Sanz, J. *IMETland*. Jornada informativa en la Comunidad de Madrid sobre el Programa de Trabajo 2018-2020 correspondiente al Reto Social 5: “Acción por el clima, medio ambiente, eficiencia de recursos y materias primas” del programa europeo Horizonte 2020. Madrid. 24 de noviembre.

**35.** Senán, J. 10th World Congress of Chemical Engineering (WCCE 2017) + 6th International Congress on Sustainability Science & Engineering (ICOSSE 2017). Barcelona. 2 - 5 de octubre.





36. Tejedor, S. *Tratamiento de efluentes industriales combinando técnicas electroquímicas convencionales y microbianas: proyecto ANSWER*. II Workshop IBERIMET 2017. Universidad de Girona. 18 y 19 de diciembre.

#### 4. Round tables

1. Cabrera, M.C. *Gestión y planificación de las aguas regeneradas mediante recarga inducida en riego de jardines, agricultura, usos lúdicos y medio ambiente, y en la recarga artificial*. Sesión 2ª de las Jornadas “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. IMDEA Agua y Red Consolider TRAGUA. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

2. Candela, L. *Prior Groundwater Modeling Efforts, Updating the Model, and its Utility as a Decision Making Tool*. Lake Chad basin groundwater modeling workshop. Banco Mundial y UNESCO. París, Francia. 22 - 24 de mayo.

3. Candela, L. *Requisitos legales y ambientales de las aguas regeneradas para su uso en la recarga inducida y artificial*. Sesión 3ª de las Jornadas “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. IMDEA Agua y Red Consolider TRAGUA. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

4. De Bustamante, I. Mesa redonda: *La regeneración de las aguas residuales, ¿una opción o una necesidad?*. Jornadas “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. IMDEA Agua y Red Consolider TRAGUA. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

5. De Bustamante, I. Moderadora. *Presentación experiencias prácticas*. Sesión 5ª de las Jornadas “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. IMDEA Agua y Red Consolider TRAGUA, entre otros. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

6. Del Villar, A. *Coste económico y su repercusión ambiental y social*. Sesión 4ª de las Jornadas “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. IMDEA Agua y Red Consolider TRAGUA, entre otros. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

7. Delacámara, G. Foro de debate “Meriendas Verdes”. Iniciativa de la plataforma medioambiental de la Agencia Efe, Efeverde, y Ecovidrio. Madrid. 17 de abril.

8. Delacámara, G. Mesa redonda: *El agua como generadora de prosperidad*. Foro ABC del Agua. Madrid. 27 de junio.

9. Delacámara, G. Mesa redonda: *La colaboración público-privada en el sector del agua en España*. Jornada de presentación de iAgua Magazine nº 15. Madrid. 23 de junio.

10. Delacámara, G. Mesa redonda: *Los Refugiados del Clima. Hacia una solución global*. FED. Barcelona. 6 de abril.

11. Delacámara, G. Mesa redonda: *Reutilización del agua. ¿Estamos preparados?*, organizada por la Fundación We Are Water en el marco del Día Mundial del Agua. Roca Barcelona Gallery. Barcelona. 22 de marzo.

**12.** Delacámara, G. Mesa redonda: *The challenges of water supply. Case Study: El Realito Aqueduct, San Luis Potosí (Mexico)*. PPP for Cities III International Conference "Reaching the Sustainable Development Goals in Latin American cities thanks to Public Private Partnerships". PPP for Cities (The Specialist Centre on Public Private Partnerships in Smart and Sustainable Cities), 11 de noviembre, Smart City Expo World Congress. Barcelona. 14 - 16 de noviembre.

**13.** Delacámara, G. Moderador del debate sobre el estudio "El sector del abastecimiento y saneamiento en medio urbano". Fundación Canal. Madrid. 28 de noviembre.

**14.** Delacámara, G. Panel de discusión: *¿Cómo conseguir consensos entre diversos sectores?* III Diálogos del Agua. América Latina-España 2017: Hacia un pacto político del agua. Organizado por CAF (Banco de Desarrollo de América Latina). Madrid. 23 de octubre.

**15.** Delacámara, G. *Urban water governance: what policies for greater resilience?* Plenary Session del First International Forum "Rules of Water, Rules for Life". Milán, Italia. 27 - 28 de septiembre.

**16.** Esteve-Núñez, A. Mesa redonda en EIP Water Conference and EC event "Boosting Research & Innovation in the Water Sector: The Impact of EU-funded actions", Porto Water Innovation Week. Oporto, Portugal. 24 - 30 de septiembre.

**17.** García Calvo, E. Moderador en la Jornada Técnica de AEDyR "La reutilización en la industria en el marco de la economía circular". Madrid. 1 de junio.

**18.** García Calvo, E. Moderador. *Tratamientos avanzados de las aguas residuales. Posibilidades y limitaciones para su uso en la recarga artificial e inducida en diferentes aplicaciones*. Sesión 1ª de las Jornadas "La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales". IMDEA Agua y Red Consolider TRAGUA. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.

**19.** Gómez, C.M. Discussant. *Nudge and tax in an environmental public good experiment: does environmental sensitivity matter?* Sesión "Behavioral Economics: Risk, Uncertainty and Ambiguity". EARE 2017: 23rd Annual Conference of the European Association of Environmental and Resource Economists. Atenas, Grecia. 28 de junio - 1 de julio.

**20.** Gómez, C.M. *Investigaciones a nivel internacional en el agua y el saneamiento, y retos para la investigación en el área*. Taller "El agua y el desarrollo sostenible. Retos y oportunidades para la investigación". REDS, UAH e IMDEA Agua. Congreso "Universidades y ODS". Madrid. 30 de marzo.

**21.** Gómez, C.M. Moderador. *Coste económico y su repercusión ambiental y social*. Sesión 4ª de las Jornadas "La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales". IMDEA Agua y Red Consolider TRAGUA. Fundación Gómez Pardo. Madrid. 18 y 19 de octubre.



22. Gómez, C.M. Panel de discusión: *Behavioral Economics: Risk, Uncertainty and Ambiguity*. EARE 2017: 23rd Annual Conference of the European Association of Environmental and Resource Economists. Atenas, Grecia. 28 de junio - 1 de julio.

23. Gómez, C.M. Panel de discusión: *El agua en el centro de la agenda*. III Diálogos del Agua. América Latina-España 2017: Hacia un pacto político del agua. CAF (Banco de Desarrollo de América Latina). Madrid. 23 de octubre.

24. Senán, J. *Aplicación de Análisis de Ciclo de Vida en nuevas líneas de reciclaje. La tecnología de membrana hacia la economía circular*. I Foro Ambientate: "Fundamentos del Análisis del Ciclo de Vida y experiencias en el mundo empresarial". UAH. 24 de noviembre.

## 5. Participation in Scientific Committees

1. Comisión Técnica de los Premios Latinoamericana Verde. Miembro: **De Bustamante, I.** 10 - 30 de junio.

2. Comité Científico de las Jornadas "La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales". Miembro: **De Bustamante, I.** Madrid. 18 y 19 de octubre.

3. Comité técnico de normalización de Riegos AEN/CTN318-Grupos de trabajo 7 "obras de riego" y 8 "zonas verdes". Miembros: **De Bustamante, I.** y **Martínez-Hernández, V.** MAPAMA-UNE.

4. ENMRI-Alejandro, Egipto (Environmental and Natural Materials Research Institute). Consejo Científico (Advisory Board): **EI-Shehaw, R.**

5. DG Environment (Clean water Unit). **Delacámara, G.** Asesor.

6. Parlamento Europeo en cambio climático. **Delacámara, G.** Asesor.

7. Agencias y programas de UN (UN Water UNE-SCO, FAO etc), World Bank Group (World Bank, IFC, 2030 Water Resources Group). **Delacámara, G.** Consultor

8. OCDE Water Governance Initiative. Miembro: **Delacámara, G.**

9. Foro de la Economía del Agua. Director Académico: **Delacámara, G.** Miembro del Comité Académico: **Gómez, C.M.**

10. Jornadas de Investigación de la Zona No Saturada. Miembro Comité científico: **Martínez-Hernández, V.**

11. Grupo de trabajo "emerging compounds". EU Water Supply & Sanitation Technology Platform (WssTP). Miembro: **Martínez-Hernández, V.**

12. Commission Decision C(2015)5383, Directorate General for Health and Food Safety, European Commission. Miembro del Comité Científico "Health, Environmental and Emerging Risk": **Vighi, M.**

## 6. Oral Communications

1. Aragón, C., Chiron, S., Couto, N., Undabeytia, T., Pascoal, A., Berná, A. *4KET4Reuse: seeking sustainable solutions for removing emerging contaminants in wastewater*. S2Small2017 International IWA Conference on Sustainable Solutions for Small Water and Wastewater Treatment Systems. Nantes, Francia. 22 - 26 de octubre.



2. Arenas-Sánchez, A., Lopez, I., Vighi, M., Rico, A. *Combined effects of water scarcity and an insecticide on freshwater zooplankton communities: a microcosm study*. XXVII SETAC (Society of Environmental Toxicology and Chemistry) Europe Annual Meeting: "Environmental Quality Through Transdisciplinary Collaboration". Bruselas, Bélgica. 7 - 11 de mayo.
3. De Bustamante, I. *Los objetos de conservación de la naturaleza geológica: Integración a los planes de manejo en áreas protegidas*. X Congreso de Áreas Protegidas. La Habana, Cuba. 3 - 7 de julio.
4. Esteve-Núñez, A. *METlands, a new generation of hybrid bioelectrochemical wetland for wastewater treatment*. The 7th International Symposium for Wetland Pollutant Dynamics and Control (WETPOL 2017). Big Sky, Montana, Estados Unidos. 21 - 25 de agosto.
5. Garcia-Bueno, N., Rico, A., González-Gaya, B., Van den Brink, P.J., Simis, S., Ciavatta, S., Torres, R., Falconer, L., Telfer, T., Marín, A.. *Herramientas para la planificación espacial y la sostenibilidad de la acuicultura Europea: Proyecto TAPAS*. XVI Congreso Nacional de Acuicultura. Zaragoza. 3 - 5 de octubre.
6. Gómez, C.M. *El desafío de garantizar la seguridad hídrica a largo plazo*. VII Foro de la Economía del Agua. Madrid. 25 de octubre.
7. Gómez, C.M., Gutierrez-Martín, C., López-Nicolás, A., Pulido-Velázquez, M. *What lies behind crop decisions? Coming to terms with revealing farmers' preferences towards water and risk*. EARE 2017: 23rd Annual Conference of the European Association of Environmental and Resource Economists. Atenas, Grecia. 28 de junio - 1 de julio.
8. González-Gaya, B., Cherta, L., Nozal, L., Rico, A. *Optimizing a Clean Method for Environmental Samples: Antibiotics and Matrix Interferences in Marine Sediments, Water and Biota*. 18th European Meeting on Environmental Chemistry (EMEC 18), which will be held in Oporto, Portugal. 26 - 29 de noviembre.
9. Grisoni, F., Vighi, M., Consonni, V., Villa, S., Todeschini, R. *Towards more interpretable QSARs: Lessons Learned from Aquatic Bioaccumulation Models*. XXVII SETAC (Society of Environmental Toxicology and Chemistry) Europe Annual Meeting: "Environmental Quality Through Transdisciplinary Collaboration". Bruselas, Bélgica. 7 - 11 de mayo.
10. Martínez-Hernández, V., Leal, M., Meffe, R., De Miguel, Á., Alonso-Alonso, C., De Bustamante, I., Lillo, J., Martín, I., Salas, J.J. *Comportamiento de contaminantes emergentes en la zona no saturada durante el tratamiento de aguas residuales con filtros verdes*. XIII Jornadas de Investigación en la Zona No Saturada (ZNS'17). Zaragoza. 8 - 10 de noviembre.
11. Meffe, R., Martínez-Hernández, V., De Miguel, Á., Leal, M., Alonso-Alonso, C., Salas, J.J., Lillo, J., De Bustamante, I. *Infiltración del ketoprofeno durante un tratamiento no convencional de aguas residuales y propuesta de una medida de mitigación*. XIII Jornadas de Investigación en la Zona No Saturada (ZNS'17). Zaragoza. 8 - 10 de noviembre.
12. Morón-López, J., Nieto-Reyes, L., El-Shewhawy, R. *Alerta inteligente contra floraciones nocivas de cianobacterias para la industria del agua. Cianoalert. 5º Congreso Ibérico de Cianotoxinas (CIC) y 1er Congreso Iberoamericano de Cianotoxinas*. Lugo, España. 17 - 19 de julio.

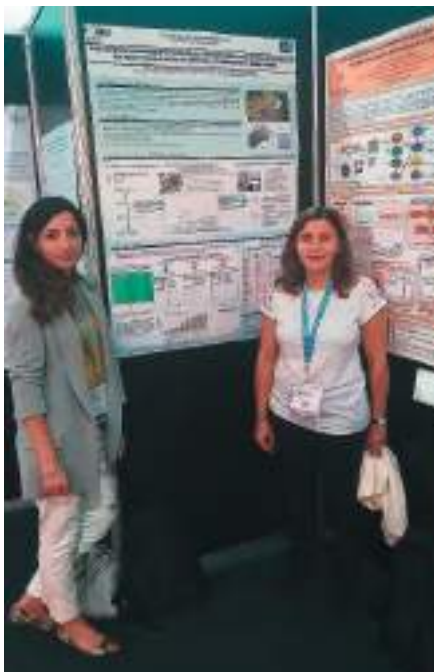


13. Ortiz, J.M. *LIFE ANSWER Project - Advanced Nutrient Solutions with Electrochemical Recovery*. Workshop: Innovative Water Saving Solutions, organizado como evento dentro de Drinktec (World's Leading Trade Fair for the Beverage and Liquid Food Industry. Munich, Alemania. 11 de septiembre
14. Ortiz, J.M., Ramírez-Moreno, M., Esteve-Núñez, A., Ródenas, P. *Microbial Desalination Cells for Low Energy Drinking Water: main concepts, advantages and limitations for real scale implementation*. 10th World Congress of Chemical Engineering (WCCE 2017) + 6th International Congress on Sustainability Science & Engineering (ICOSSE 2017). Barcelona. 2 - 5 de octubre.
15. Rico, A., Alonso, C., García-Doncel, P., Romero, A., Castaño, A., Nozal, L., Vighi, M., Arenas-Sánchez, A. *Unravelling the effects of multiple stressors on the aquatic invertebrate community in the region of Madrid (central Spain)*. XXVII SETAC (Society of Environmental Toxicology and Chemistry) Europe Annual Meeting: "Environmental Quality Through Transdisciplinary Collaboration". Bruselas, Bélgica. 7 - 11 de mayo.
16. Senán, J. *Aplicación de Análisis de Ciclo de Vida durante el proceso de ecodiseño de reciclaje de membranas de Ósmosis Inversa a Ultrafiltración y Nanofiltración*. Workshop "Alimentación, Agricultura y Agua: el análisis de ciclo de vida como herramienta hacia la sostenibilidad". Cetaqua, IRTA y la Red Española de ACV (esLCA). Barcelona. 17 de mayo.
17. Senán-Salinas, J. *Aplicación del análisis de ciclo de vida durante el proceso de escalado del reciclaje de membranas de osmosis inversa*. IV Simposio de la Red Española de Ciclo de Vida: "Gestión de residuos: hacia una economía circular". Santander. 27 de octubre.
18. Senán-Salinas, J., García-Pacheco, R., Landaburu-Aguirre, J., Terrero, P., Molina, S., García-Calvo, E. *Life Cycle Assessment of end-of-life RO membrane modules transformation alternatives into UF and NF at pilot scale*. 10th World Congress of Chemical Engineering (WCCE 2017) + 6th International Congress on Sustainability Science & Engineering (ICOSSE 2017). Barcelona. 2 - 5 de octubre.
19. Tejedor-Sanz, S., Fernández-Labrador, P., Torres, C.I., Esteve-Núñez, A. *Fluidized electrodes as electron acceptors or electron donors: strategies and applications*. ISMET Society meeting. Lisboa, Portugal. 3-6 de octubre.



## 7. Posters

1. Barroeta, B. *Del laboratorio al aula: introducción a la ciencia en centros de enseñanza mediante estrategias 3D (Diseño – Desarrollo –Difusión)*. VI Congreso de Comunicación Social de la Ciencia. Universidad de Córdoba. 23 - 25 de noviembre.
2. De Bustamante, I. *Patrimonio geológico del Parque Nacional de Viñales (Pinar del Río, Cuba): Itinerario virtual para el geoturismo y la geoconservación* X Congreso de Áreas Protegidas. La Habana, Cuba. 3 - 7 de julio.
3. Esteve-Núñez, A., Salas, J.J., Arias, C., Busalmen, J.P., Rivas, A., Stich, J.P., González, A. *METlands: A New Generation of Hybrid Bioelectrochemical Wetlands Outperforms Standard Wetlands for Treating Wastewater*. EIP Water Conference and EC event “Boosting Research & Innovation in the Water Sector: The Impact of EU-funded actions”, en el marco de la Porto Water Innovation Week. Oporto, Portugal. 24 - 30 de septiembre.
4. García-Pacheco, R., Terrero, P., Campos, E., Calzada, M., Molina, F., Landaburu-Aguirre, J., Rodríguez-Sáez, L., García Calvo, E. *End-of-life RO Membranes: Recycling and Reuse*. 6th De Nora R&D Symposium. Milán, Italia. 27 y 28 de septiembre.
5. López-Heras, M.I., Alonso, C., Nozal, L., Arenas-Sánchez, A., Rico, A., Vighi, M. *Simultaneous measurement in high resolution and mass/mass mode for qualitative and quantitative analysis of emerging contaminants in river waters*. XV Jornadas de Análisis Instrumental (JAI). Organizadas por SECyTA, SEA, SEEM y SEProt, en el marco de la 18ª edición de EXPOQUIMIA (Encuentro Internacional de la Química). Barcelona. 2 - 6 de octubre.
6. Martín Sanz, J.P., de Santiago Martín, A., Quintana Nieto, J.R., Vaquero Perea, C., Vázquez de la Cueva, A., González Huecas, C., López Lafuente, A., Valverde Asenjo, I. *Geospatial distribution of trace element availability*. 14th International Conference on Sustainable Use and Management of Soil, Sediment and Water Resources. AquaConSoil 2017. Lyon. 26-30 de junio.
7. Martín-Sanz, J.P., López Lafuente, A., de Santiago-Martín, A., Quintana Nieto, J.R., González Huecas, C., Valverde-Asenjo, I. *Caracterización de contaminantes en el suelo por almacenamiento e incendio de depósitos de neumáticos fuera de uso*. XXXI Reunión Nacional de Suelos, RENS 2017. Sociedad Española de la Ciencia del Suelo (SECS). Madrid. 6 - 9 de junio.
8. Martínez-Hernández, V., de Santiago-Martín, A., Meffe, R., Leal, M., Mostaza, D., Hernández Martín, J.A., Domínguez-Olalla, J., Pérez-Barbón, A., Blanco, A., Alonso-Alonso, C., López-Heras, M.I., Carreño, F., Lillo, J., De Bustamante, I., Martín, I., Salas, J.J., Nozal, L., Novella, J.L. *Regeneración de aguas mediante un nuevo concepto de filtro verde: FILVER+*. XXXI Reunión Nacional de Suelos, RENS 2017. Sociedad Española de la Ciencia del Suelo (SECS). Madrid. 6 - 9 de junio.



9. Morón-López, J., Nieto-Reyes, L., El-Shehawry, R. *INREMEX: Tratamiento biotecnológico de eliminación de microcistinas. Influencia de los factores abióticos en optimización de la degradación de microcistinas para el tratamiento de agua*. 5º Congreso Ibérico de Cianotoxinas (CIC) y 1er Congreso Iberoamericano de Cianotoxinas. Lugo, España. 17 - 19 de julio.

10. Prado, A., Aragón, C. Salas, J.J., Esteve-Núñez, A. *METlands: A New Generation of Hybrid Bioelectrochemical Wetlands Outperforms Standard Wetland for Treating Wastewater*. 6th De Nora R&D Symposium. Milán, Italia. 27 y 28 de septiembre.

11. Rico, A., Van den Brink, P.J. *Traits-based analysis of macroinvertebrate community responses to insecticides using mesocosm data*. XXVII SETAC (Society of Environmental Toxicology and Chemistry) Europe Annual Meeting: "Environmental Quality Through Transdisciplinary Collaboration". Bruselas, Bélgica. 7 - 11 de mayo.

12. Salas, J.J., Aragón, C. Stich, M., González, A., Manchón, C., Esteve-Núñez, R., Vázquez, J., Arias, C., Barroeta, B., Esteve-Núñez, A. *METlands: a new generation of hybrid bioelectrochemical wetlands outperforms standard wetlands for treating wastewater*. The 7th International Symposium for Wetland Pollutant Dynamics and Control (WETPOL 2017). Big Sky, Montana, Estados Unidos. 21 - 25 de agosto.

13. Senán-Salinas, J., Gómez, C.M., García-Pacheco, R., Sánchez-Lozano, N., Terrero, P., López-Sepúlveda, M., García-Calvo, E. *End-of-life Reverse Osmosis membrane valorization as Ultra-filtration and Nano-filtration: an economical and financial sight*. 10th World Congress of Chemical Engineering (WCCE 2017) + 6th International Congress on Sustainability Science & Engineering (ICOSSE 2017). Barcelona. 2 - 5 de octubre.

14. Tejedor-Sanz, S., Fernández, P., Asensio, Y., Ortiz, J.M., Rodenas, P., De Deus, A., Monsalvo, V., Ciriza, J.F., Esteve-Núñez, A. *Integration of electrochemical techniques for a complete treatment of industrial wastewater: electrocoagulation plus microbial electrochemical fluidized bed reactors*. 10th World Congress of Chemical Engineering (WCCE 2017) + 6th International Congress on Sustainability Science & Engineering (ICOSSE 2017). Barcelona. 2 - 5 de octubre.

15. Vaquero Perea, C., Valverde Asenjo, I., Martín Sanz, J.P., de Santiago Martín, A., González Huecas, C., López Lafuente, A., Vázquez de la Cueva, A., Quintana Nieto, J.R. *Soil quality recovery in a chronosequence of abandoned vineyards*. International Conference on Sustainable Use and Management of Soil, Sediment and Water Resources. AquaConSoil 2017. Lyon. 26-30 de junio.

## 8. Patents

### Granted patent

- García Pacheco, R., Molina Martínez, S., Landaburu, J., Ortiz de Lejarazu Larrañaga, A., Rodríguez Sáez, L., Rabadán, F.J., García Calvo, E. **Proceso de transformación de membranas de poliamida con enrollamiento en espiral que han agotado su vida útil en membranas de utilidad industrial**. ES2589151 A1. Solicitantes: VALORIZA AGUA, IMDEA Agua. Fecha de concesión: 11-10-2017.

### Published patents

- El Shehawry, R., Lezcano, M.A., Morón, J. **Method for degrading microcystins in an aqueous medium**. WO 2017/125619 A1. Solicitante: IMDEA Agua. Fecha de publicación: 27-07-2017

## 9. Fellowships

### Alberto Blanco González

Category: Research support

Fund: Spanish Ministry of Economy, Industry and Competitiveness

### Juan Manuel Ortiz Díaz-Guerra

Category: Researcher from National Science Programme “Young Researchers”

Fund: Spanish Ministry of Economy, Industry and Competitiveness

### Manuel Mínguez Calzada

Category: Laboratory technician

Fund: Community of Madrid

### Ana de Santiago Martín

Category: Researcher from Regional Science Programme “Talent attraction”

Fund: Community of Madrid

### Lucía Freire Cordero

Category: R&D Technical support

Fund: Spanish Ministry of Economy and Competitiveness

### Lucía Nieto Reyes

Category: Researcher support

Fund: Community of Madrid

### Andrea Castaño Sánchez

Category: Researcher support

Fund: Community of Madrid

### Amaia Ortiz de Lejarazu Larrañaga

Category: Research support

Fund: Spanish Ministry of Economy and Competitiveness

### Ascensión López Vargas

Category: Research support

Fund: Spanish Ministry of Economy and Competitiveness

### Patricia García Doncel

Category: Research support

Fund: Spanish Ministry of Economy and Competitiveness



## 10. PhD Thesis

### PhD thesis defended

**1. Alberto Blanco González.** Los mapas antiguos y su adecuación como base cartográfica para la valoración del Patrimonio Hidráulico de la Comunidad de Madrid. Directores: Irene de Bustamante Gutiérrez y Juan Antonio Pascual Aguilar. 20 de enero.

**2. José Fernando Rodrigo Quejido.** Bioelectroventing: cleaning up polluted sites using electrodes to stimulate Microbial remediation activities. Director: Abraham Esteve Núñez. 7 de abril

**3. Raquel García Pacheco.** Nanofiltration and ultrafiltration membranes from end-of-life reverse osmosis membranes. A study of recycling. Director: Eloy García Calvo. 11 de mayo.

**4. Rubén Rasines Ladero.** La ecología de la zona hiporreica asociada a los ríos Henares y Tajuña (cuenca hidrográfica del Jarama, España). Directora: Sanda Iepure. 6 de julio.

**5. M.<sup>a</sup> Ángeles Lezcano Vega.** Biodegradation of microcystins by freshwater bacteria: New genetic and ecological perspectives. Directores: Rehab El-Shehaw y Antonio Quesada del Corral. 14 de septiembre.

**6. Aránzazu Aguirre Sierra.** Integrating Microbial Electrochemical Systems in Constructed Wetlands, a New Paradigm for Treating Wastewater in Small Communities. Directores: Abraham Esteve Núñez y Juan José Salas Rodríguez. 14 de septiembre.

## PhD thesis in progress

**1. Jesús Morón López.** Desarrollo de tecnologías biológicas de control de cyano-HABs y eliminación de cianotoxinas. Directora: Rehab Elshehawy.

**2. Natalia Pichel Mira.** Photovoltaic and photochemical hybrid system for water treatment. Directora: Marta Vivar García.

**3. Amanda Prado Nicolás.** Depuración de aguas residuales mediante el uso de humedales bioelectrogénicos con biochar electroactivo como sustrato biofiltrante. Director: Abraham Esteve Núñez.

**4. David Mostaza Colado.** Estudio de la relación entre aguas superficiales y aguas subterráneas de la Masa de Agua Subterránea (MAS) Aluviales: Jarama-Tajuña (030.007). Director: Francisco Carreño Conde.

**5. Alba Arenas Sánchez.** Evaluación de la vulnerabilidad de los ecosistemas acuáticos a múltiples factores de estrés en el área mediterránea. Directores: Andreu Rico Artero.

**6. Ascensión López Vargas.** Desarrollo de equipos de bajo coste para monitorización de sistemas fotovoltaicos basados en herramientas de open-hardware y código abierto. Directores: Manuel Fuentes Conde y Marta Vivar García.

**7. Colin Wardman.** Tecnologías electroquímicas microbianas aplicadas a la depuración de aguas residuales. Director: Abraham Esteve Núñez.

**8. Amaia Ortiz de Lejarazu Larrañaga.** Innovación en el reciclaje de membranas para el tratamiento del agua. Directores: Serena Molina Martínez y Juan Manuel Ortiz Díaz-Guerra.

**9. Theresa Schell.** Sources, pathways and risk of microplastics in freshwater ecosystems. Director: Andreu Rico Artero.

**10. Georgiana Amariei.** Materiales nanoestructurados con efecto biocida para la mejora en la eficiencia del uso de agua en la industria hortofrutícola. Directores: Roberto Rosal García y Pedro Letón García.

**11. Juan José Castro Ríos.** Ingeniería hidráulica aplicada a la minería romana, estudio del sistema ruina montium. Directores: Irene de Bustamante Gutiérrez y Javier Lillo Ramos

**12. Jacquelyne del Rosio Chagua Flores.** Estudio hidrogeológico, disponibilidad y calidad del agua subterránea en la cuenca Sama, Tacna, Perú. Directora: Irene de Bustamante Gutiérrez.

**13. Berta Díez Odriozola.** Fouling and biofouling resistant membranes for water treatment processes. Director: Roberto Rosal García.

**14. Ana María Fernández Santamarina.** Análisis de las necesidades hídricas en diversas componentes del ecosistema fluvial para la definición de regímenes de caudales ecológicos. Directores: Ángel Luis Udías Moineiro y Fernando Magdaleno Mas.

**15. Idoia Martín de Lucía Ramos.** Physical and toxicological interactions between anthropogenic pollutants and engineered nanoparticles. Directores: Roberto Rosal García y Francisca Fernández Piñas.

**16. Fluquer Peña Laureano.** El agua subterránea en los sistemas kársticos de la reserva Nor Yauyos Cochas. Directores: Irene de Bustamante Gutiérrez y Javier Lillo Ramos.

**17. Jorge Carlos Delgado García.** Análisis de las implicaciones de la viabilidad de reutilización del agua en la edificación. Director: Eloy García Calvo

**18. Antonio de Lucas Sepúlveda.** Concepto, análisis histórico y determinación de excedentes de la cuenca del Tajo: aplicación al trasvase Tajo-Segura. Directores: Irene de Bustamante Gutiérrez y Bernardo López Camacho.

**19. Felicia Mabel Díaz Cubilla.** Efecto de contaminantes emergentes sobre procesos anaerobios de tratamiento de agua residual. Directores: Pedro Letón y Karina Boltes Espínola.

**20. Sergio Martínez-Campos Gutiérrez.** Plastic as vectors of microorganism in the aquatic environment. Director: Roberto Rosal.

**21. Lorena Peñacoba Antona.** Diseño y construcción de humedales electrogénicos para la eliminación de contaminantes emergentes en aguas residuales urbanas. Directores: Eloy García Calvo y Abraham Esteve Núñez.

**22. Álvaro Pun García.** Efecto de contaminantes emergentes en lechos bioelectroquímicos. Directores: Abraham Esteve Núñez y Karina Boltes Espínola.

**23. Juan Pedro Martín Sanz.** Aplicación de índices de calidad a la afección de nitrógeno y metales pesados en el suelo bajo diferentes usos en el área periurbana de Madrid. Directores: Ana de Santiago Martin e Inmaculada Valverde Asenjo.

## 11. Internships

**Student:** Raúl Berenguer Betrián  
**Research:** Microbial Electrochemical Technologies  
**Centre:** University of Alicante  
**Date:** March 06-17

**Student:** Julia Pasqualini  
**Research:** Ecotoxicology  
**Centre:** University of Milano-Bicocca (Italy)  
**Date:** March- September

**Student:** Tadeusz Namiotko  
**Research:** Groundwater ecology  
**Centre:** University of Gdansk (Poland)  
**Date:** April 3 – October 2

**Student:** Michelle Jensen  
**Research:** Ecotoxicology  
**Centre:** Wageningen University (Netherlands)  
**Date:** April 3 – July 28

**Student:** Carlos Andrés Ramírez Vargas  
**Research:** Microbial Electrochemical Technologies  
**Centre:** Aarhus University (Denmark)  
**Date:** 06 septiembre – 04 december

## 12. RTD activities organization

**1.** Course “School of technologies for treatment of emerging pollutants in hospital and urban wastewater”. REMTAVARES Consortium and IMDEA Water. Rey Juan Carlos University, Madrid. January 23 - 26.

**2.** Workshop “Water and sustainable development. Challenges and opportunities for research”. REDS, University of Alcala and IMDEA Water. Madrid. March 30.

**3.** 4th Forum on Water Economics. Barcelona. April 5.

**4.** 11th International Seminar: Are agricultural policies realizing its environmental sustainability goals? CEIGRAM, IMDEA Water and Water Observatory of Botin Foundation. Madrid. April 7.

**5.** Workshop Simulation of water purification process in emergencies using the Response Unit to Water and Sanitation Emergencies (ERU WATSAN) Cruz Roja Española and IMDEA Water. Madrid. April 20.

**6.** 5th Forum on Water Economics. Valladolid. June 7.





7. 6th Forum on Water Economics. Barcelona. September 18.

8. Workshop “La gestión de las aguas regeneradas mediante recarga inducida y artificial. Aspectos ambientales, socioeconómicos y legales”. IMDEA Water and Red Consolider TRAGUA. Fundación Gómez Pardo. Madrid. October 18 and 19.

9. 7th Forum on Water Economics. Madrid. 25 de octubre.

10. Workshop on Technologies for Monitoring and Treatment of Contaminants of Emerging Concern. IMDEA Water and REMTAVARES Consortium. Móstoles, Madrid. November 23 - 24.

5. Premio iAgua al Mejor Evento otorgado al Foro de la Economía del Agua del que es Director Académico Gonzalo Delacámara. 20 de diciembre de 2017.

6. IMDEA Agua obtiene el **Sello de Excelencia Europea EFQM 300+**. 29 de diciembre de 2017.

## 13.2 Other institutional activities

- Member of Research Laboratories Network (REDLAB).  
<http://www.madrimasd.org/Laboratorios/default.asp>



- Participation. XVII Science Week. Madrid, Spain. 2017



- Member of Euraxess Service Network. Local Contact Point



- Participation. Blog el agua. Madri+d. REMTAVARES Project.  
<http://www.madrimasd.org/blogs/remtavares/>



## 13. Institutional Activities

### 13.1 Awards and Merits

1. Vivar, M. Premio “Mohamed bin Rashid Al Maktoum Global Water Award”. Categoría “**Innovative youth award 2016**”. Dubai, Emiratos Árabes Unidos. 27 de abril.

2. Vivar, M. Premio al proyecto “Sistema híbrido solar para la desinfección de agua y producción eléctrica”, en la modalidad “Tecnologías y modelos de gestión que contribuyan a la gestión sostenible del agua” de la 4ª Edición de los **Premios al Talento Joven para la Gestión Sostenible del Agua**. Observatorio del Agua, Fundación Botín. 27 de septiembre.

3. Premio “**Atlantic Project Awards 2017**” en la categoría “Accessibility and Connectivity” al proyecto TAPAS-Tools for assessment and planning of aquaculture sustainability. Atlantic Action Plan. 8 de noviembre.

4. González-Gaya, B. **Prince Sultan Bin Abdulaziz International Prize for Water Scholarship** Oporto, Portugal. 29 de noviembre.







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