annual report

2020

www.water.imdea.org

imdea **water** institute

just water

institute imdea water

Eloy García Calvo
Director, IMDEA Water Institute
April 2021

annual report

2020

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For IMDEA Water, just as for Spain and the rest of the world, 2020 was marked by the SARS-COV-2 pandemic. In the first two months of an apparently normal year, before the virus took hold, we organised ourselves by strengthening our IT systems and remote access tools, not only to our servers and databases but also to the data and results generated by analysis and process equipment. This contributed to the minimisation of problems associated with subsequent lockdowns.

In such a complex situation caused by strict lockdowns, a crisis committee was set up in mid-March. Its purpose was to draw up a contingency plan to protect the health of our staff and also to organise all work, including research activities, internal and external communication plans, a financial action plan linked to the extraordinary situation, and a threat and opportunity watch. This overall plan received approval from a certifying company. Fortunately, only two people from IMDEA were mildly infected, and apparently the infection occurred off-site.

For several months, one of our P2 security laboratories was used by the Military Emergency Unit for PCR analysis. These were times when, due to equipment shortages, this type of collaboration was much needed and our institution is proud that we were able to contribute, albeit modestly.

Although, for 2020, the most important indicators of activity were maintained, and even increased, others, which involve greater social interaction (such as attendance at conferences, reception of new researchers, students on training, dissemination and outreach activities) declined.

During 2020, work was carried out on 12 international projects, 8 of them H2020 projects, as well as on classic topics such as microbial electrochemical technologies, reuse, ecotoxicology, chemical and microbiological quality, and economic and institutional analysis.

Work was also carried out on 12 national projects in areas such as membrane recovery, analysis and removal of microplastics and early detection of cyanobacteria.

Work for the World Bank continued, on a contract which had been extended for a year. Collaboration with the European Parliament and the Directorate-General for the Environment was also ongoing through 3 framework contracts.

Through our spin-off, Metfilter, we continued to treat water from the petrochemical industry and to work on urban waters or similar, in this case, with the difficulties inherent to mobility restrictions.

Outreach activities such as the European Researchers' Night and Science Week had to be carried out virtually.

Among the awards received this year, it must be highlighted that the IMETLAND project came second in the EU KETBIO awards.

Finally, and this year in a special way, I would like to thank all our staff and all those who have participated in our activities for their outstanding effort in this extraordinary year. Their dedication has enabled us to continue running our institution's activities without appreciably suffering.

words from the director...

annual report 2020

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IMDEA Water Institute

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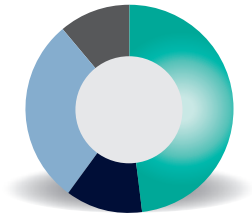
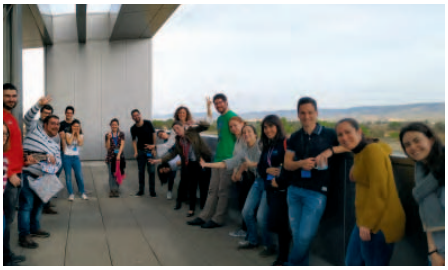
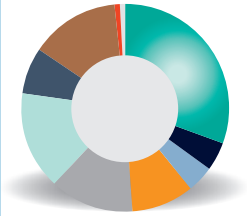
Human Capital



- **40** Researches
- **10** Laboratory staff
- **24** Associated researchers
- **9** Administration and management staff

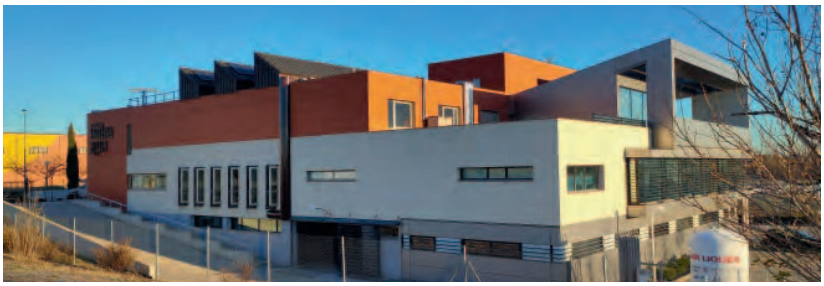


Scientific results



- **42** Articles in journals, 26 in high impact journals (Q1)
- **6** Books chapters
- **2** Scientific-Technical Reports
- **13** Lectures
- **18** Round tables and experts panels
- **21** Participation in Scientific Committees
- **10** Oral Communications
- **19** Posters
- **1** Patent
- **1** PhD thesis defended

Origin of funds



- Total income **3.342.162 €**
- **37%** from projects & contracts
- **10** Active international projects
- **14** National and regional projects
- **9** contracts, **3** of them Framework contracts with European Union

1
Spin-off METfilter

with water treatment in 3 sectors (urban, petrochemical, livestock)

4
pilot plants

membrane technology, outdoor mesocosm facilities, microbial electrochemical technologies, land application systems

4
High-level up-to-date specialized laboratories

chemical analysis, soil, biology and microbiology and geomatic

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.

vision

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.

mission

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.

purpose

Generate knowledge to provide solutions that contribute to the water sustainability of the planet.

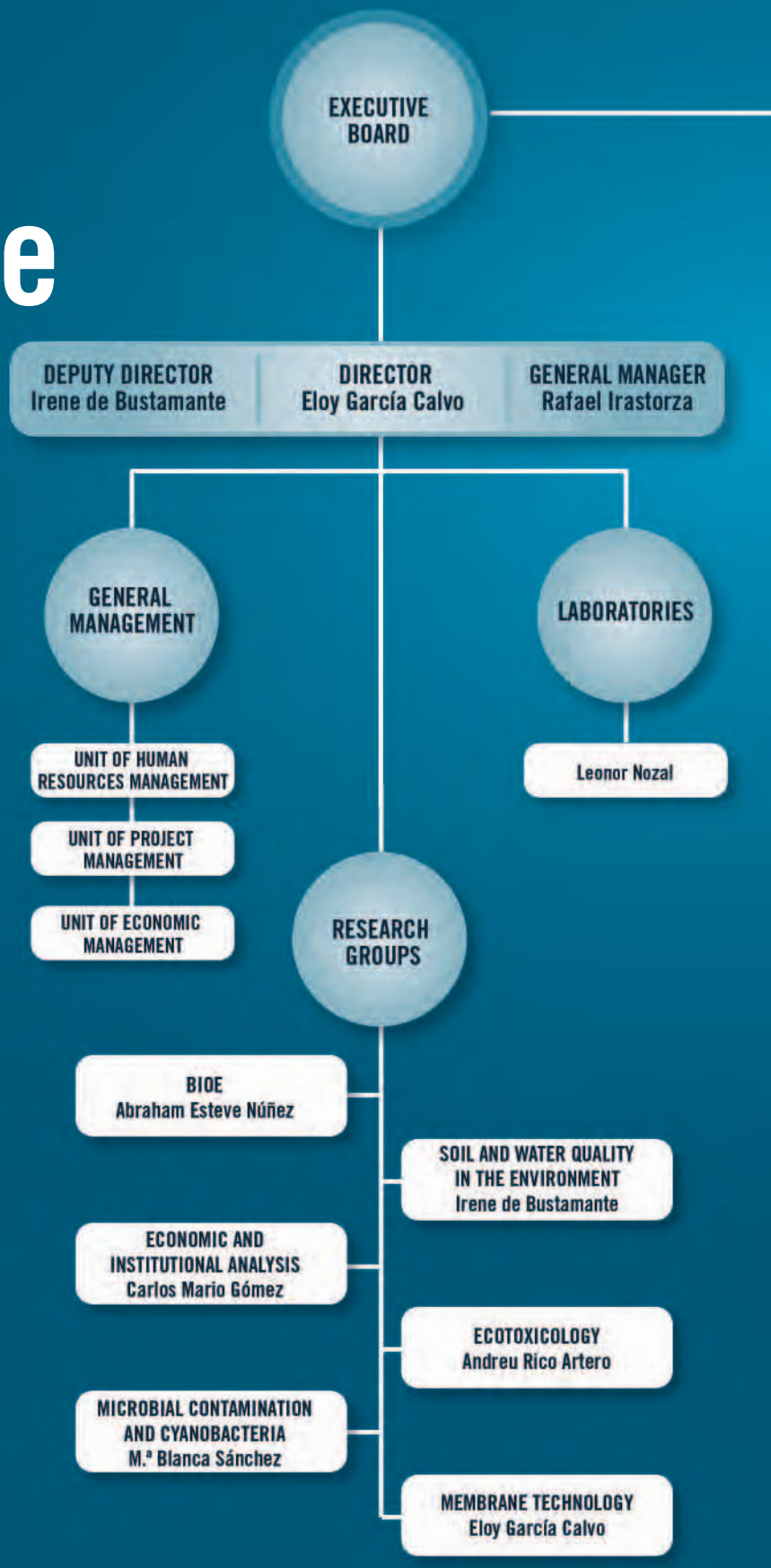
The IMDEA Water Institute has developed prestige and recognition in the areas of sustainable management of water bodies, quality and pollution, water treatment and water reuse and economic and institutional analysis.

RESEARCH GROUPS

- Soil and Water Quality in the Environment
- Membrane Technology
- Bioe
- Economic and Institutional Analysis
- Microbial contamination and Cyanobacteria
- Ecotoxicology

SUSTAINABLE DEVELOPMENT GOALS

our structure



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AQUALIA. INTEGRAL WATER MANAGEMENT

collaboration

COLLABORATION WITH RESEARCH ORGANIZATIONS

Universidad de Alcalá

Universidad Complutense Madrid

Universidad Rey Juan Carlos

CID

Universidad de Jaén

CSIC

ECOVIDA Centro de Investigaciones y Servicios Ambientales

Iñales Parque Nacional

Gobierno de España – Ministerio de Ciencia e Innovación – INIA Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria

Universitat de Girona

KISR Kuwait Institute for Scientific Research

centa

FCIHS Fundación Centro Internacional de Hidrología Subterránea

Centro para el Conocimiento del Paisaje

亚欧水资源研究和利用中心

UNIPAZ Instituto Universitario De La Paz

Centro Nacional de Areas Protegidas CNAP

JGI

Universidad de La Guajira Shiki Eirajia Pulee Wajira

COLLABORATION WITH COMPANIES

- sacyr sadyt INDUSTRIAL
- DAM Depuración de Aguas del Mediterráneo
- PERGA INGENIEROS, S.L.
- AQUACORP
- aqualia
- sacyr water SERVICES
- Petronor
- nanoelectra
- Mahou
- METfilter
- GRUPO EULEN
- GAMMA TECNOLOGIA Y MEDIO AMBIENTE

PLATFORMS AND ASSOCIATIONS

- IWA International Water Association
- Water Europe Technology & Innovation
- RHC Renewable Heating & Cooling European Technology Platform
- geoplat
- AEDyR ASOCIACIÓN ESPAÑOLA DE DESALACIÓN y REUTILIZACIÓN
- ΣH2O PLATAFORMA TECNOLÓGICA ESPAÑOLA DEL AGUA
- norman
- ASERSA Asociación Española de Reutilización Sostenible del Agua ¡Reutiliza Agua!
- SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK A GLOBAL INITIATIVE FOR THE UNITED NATIONS
- netwerch2o
- EUMED professionals & experts consortium
- QWi WATER IS OUR CONCERN
- Aeas Asociación Española de Abastecimientos de Agua y Saneamiento
- REDS RED ESPAÑOLA PARA EL DESARROLLO SOSTENIBLE

infrastructures and scientific equipment

Chemical Analysis Lab
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 model.

Applications

- Organoleptic assays: Colour and turbidity.
- Physical-chemical testing: Basic parameters such as pH, conductivity, temperature, redox potential, Total Kjeldahl Nitrogen, total phosphorus, free and total chlorine, alkalinity, suspended solids (TSS), total organic carbon (TOC), DBO_5, DQO, total nitrogen, etc.

Chemical Analysis Lab
Chromatography Unit

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^-, Cl^-, NO_2^-, Br^-, NO_3^-, PO_4^{3-}, SO_4^{2-}) in aqueous matrices.
- Cation analysis (Na^+, NH_4^+, K^+, Mg^{2+}, Ca^{2+}) in aqueous matrices.

Chemical Analysis Lab
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-quantitave multi-element analysis. To determine the major and minor elements in a sample. Allows semi-quantitative determinations of elements for which there is no comercial 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.
- Analysis of small sampling volumes (<600 µl)
- Analysing solid biological, organic and inorganic samples by acid digestion and microwave treatments.
- Environmental applications (waters, soils, sediments and residues).
- Determining metals and possible contaminants in soils (fertilisers) and inland drinking waters (dumping).
- Speciation of metals in complex matrices.
- Quantification of inorganic nanoparticles.

Chemical Analysis Lab
Mass Spectrometry Unit

Mass Spectrometry (MS) is a highly sensitive instrumental analytical technique able to quali- and quantitatively assess all types of mixtures of substances. In addition, this technique also determines the molecular mass of a compound, as well at 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 Lab

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.

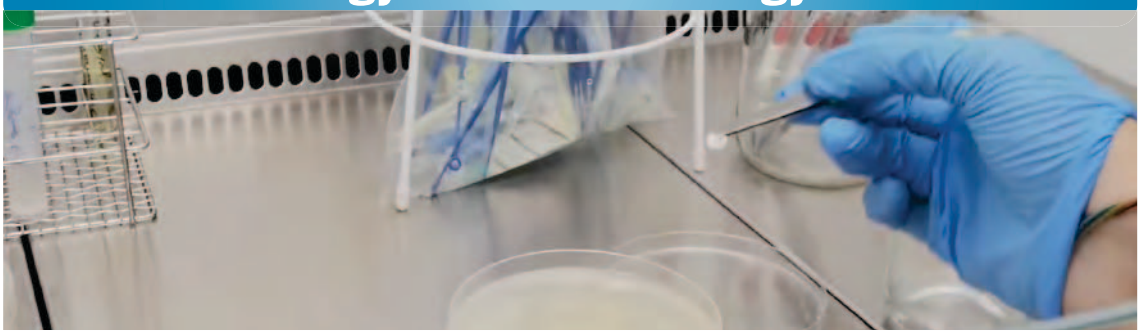
Equipment

- 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^+, K^+, Ca^{2+}, Mg^{2+}).
- 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 Lab



The Biology and Microbiology Laboratory supports water quality monitoring programs through standardized and innovative methods to achieve the objectives set by the Water Framework Directive (DMA 2000/60/EC).

Equipment

Microscopy unit: the microscopy unit is equipped with high-quality optical microscopes, with high-resolution photo-mounting systems, to facilitate identification and counting microscopic organisms:

- Light microscope.
- Stereo microscopes.
- Digital photo camera.

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:

- Electrophoresis gels Documentation System.
- Real Time PCR (AB7300) for quantitative and qualitative gene studies.
- Nano-photometer (Epoch) for the quantification of DNA and RNA.
- Gel electrophoresis equipment (Biorad) for DNA and RNA.
- Thermocycler (PCR) for DNA amplification.
- Homogenizer for DNA extraction (Precellys).

Ecotoxicology unit:

- Incubators for testing under standard conditions.
- Cultures of algae, invertebrates and fish.
- Tanks of different sizes for standard and microcosm tests.
- Bathtubs with automatic temperature and lighting regulation.

Field equipment for ecological monitoring of rivers:

- Equipment for measuring temperature, conductivity, dissolved oxygen and pH in situ.
- Electrical contact indicator.
- GPS.
- Screens and networks for macroinvertebrate and phytoplankton sampling.
- Flowmeter.

Applications

- Monitoring of cyanobacteria blooms and their toxins (microcystins) in surface waters.
- Analysis of microbiological indicators *(E. coli, Enterococcos, Coliforms, Costridium, Pseudomonas aeruginosa)* to determine the quality of drinking and recreational waters.
- Analysis of biological indicators for the determination of the ecological state of the waters.
- Determination of Minimum Inhibitory Concentrations (MICs) of microorganisms (antiobiograms).
- Acute and chronic toxicity tests with algae, invertebrates and fish following standard protocols (ISO, OECD).
- Microcosm and mesocosm test at the population and community level.

Pilot Plants

Membrane technology

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

- Two laboratory-scale cross-flow stainless steel test units for flat-sheet membranes. The systems 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.
- Three stirred cell (lab scale) for ultrafiltration and nanofiltration membranes.
- A membrane bioreactor for wastewater treatment.
- Laboratory scale electrodialysis system.
- Laboratory scale forward osmosis system.
- Automatic membrane coating device with different coating speeds and different coating thicknesses to prepare membranes for different applications.
- Table to conduct membrane autopsies.

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.

- Gradostat
- Lab-scale microbial electrochemical reactor for environmental biotechnology studies.
- Electrocoagulation reactor for wastewater treatment and removal of pollutants.

- Pre-Industrial microbial desalination stack for sustainable desalination of brackish and sea water using organic matter.
- MET4Nitrogen: It is a treatment system designed for the removal of nitrogen from waters with low loads of organic matter.
- METland® for treating real wastewater and removed of pollutants.
- Electrogenic biofilters for treating different kinds of wastewaters containing organic matter.
- Gas cromatography
- Electrochemical instrumentation.
- Microbial electrochemical fluized bed reactors (MEFBR) for wastewater treatment and to produce valuable products (bioelectrosynthesis).

Outdoor mesocosm facilities

- Artifical ponds: Twenty-four artifical ponds (1 m3) for assessing the fate and effects of chemicals in lentic ecosystems.
- Aritificial channels: Nine artificial channels (5 m length, 30 cm wide) for assessing the fate and effects of chemicals in lotic ecosystems.
- Biodiversity lagoon: artificial lagoon (30 m3) for growing aquatic plants and invertebrates for their use in the experiments.

Land application systems

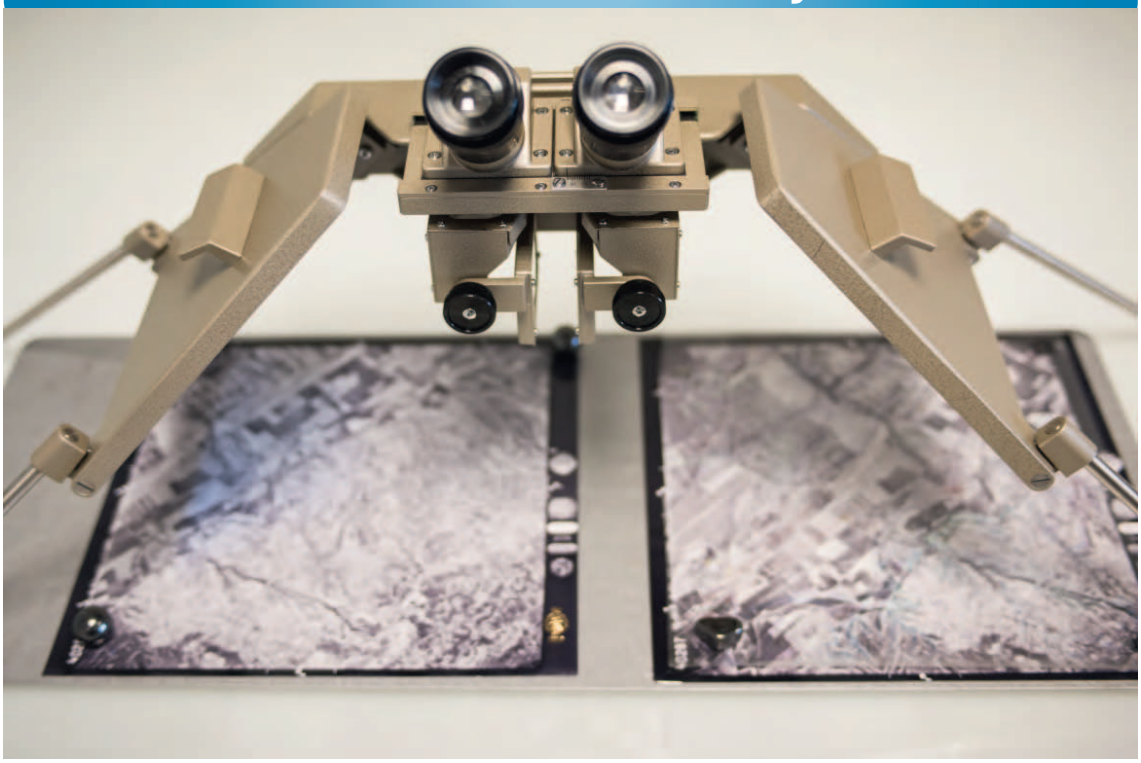
Pilot plant to carry out wastewater treatment and reuse researchs using nature-based solutions.

- Vegetation filters: two plots of 50 m^2 equipped with: flow meters, irrigation hydrants, impulse pumps, possibility of installing ttanks to test any type of water, piezometers and lysimeters.

- Column leaching equipment: The equipment is used to study the contaminant reactive transport under variable saturated conditions. The system includes the following components:

1. Peristaltic pump to provide at a controlled rate the influent containing the contaminant solution to the system.
2. Flow cell filled up with the reactive porous media through which contaminants infiltrate.
3. Vacuum chamber and pressure regulator (unsaturated conditions only): The flow cell outlet is connected to the vacuum chamber through which the moisture content is modified.
4. Tensiometers with pressure transducers: to measure the soil water tension in the flow cell. The tension is then related to the water content using the porous media-water retention curve.
5. Oxygen dipping probes to monitor the redox conditions in the flow cell. The optical measurement is based on the fluorescence-quenching effect of oxygen.
6. Fraction collector to sample at regular time steps the effluent from the flow cell.

Geomatic Laboratory



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.

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

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

projects and contracts

1. Projects

1.1. Urban and Industrial Wastewater Treatment

1.1.1. Microbial Desalination for Low Energy Drinking Water (MIDES)

http://midesh2020.eu/

Objectives

The MIDES H2020 Project is focused on the development of new desalination technologies with low energy consumption. MIDES is the acronym for MIcrobial DESalination, and we use bioelectrochemical systems for desalination of seawater with energy consumption below 0.5 kWh m^{-3}, using the energy contained in organic matter.

General activities

MIDES project is made up of 10 partners from 7 different countries, a broad consortium that covers all the aspects of the project may involve, from the development of materials to the modelling and control of processes, with a remarkable scientific and technical development of the systems.

Expected results

The project envisaged the validation of MDC technology at pilot plant scale for brakish and sea water desalination, in order to determine the most favourable markets for the application of technology, from water treatments for industry, tertiary systems, decentralized desalination, to other potential uses.

1.1.2. Electricity driven low energy and chemical input technology for accelerated bioremediation (ELECTRA)

https://www.electra.site/

Objectives

ELECTRA is a 4-year Research Innovation Action consisting of one EU-Chinese- consortium. ELECTRA aims to jointly develop and test highly innovative bioelectrochemical systems in bioremediation at both laboratory scale and environmentally relevant conditions.

General activities

ELECTRA will lift microbial electrochemical systems to a next level for field applications and *in situ* remediation of pollutants. ELECTRA will deliver two sets of 10 innovative

environmental MET-based biotechnologies, tailored for different environmental matrixes (wastewater, groundwater, flooded soil…) and accelerating the removal of several classes of pollutants and mixtures thereof.

Expected results

In the environment, electron-flow typically limits degradation, and is difficult to control; this major hurdle can be overcome with electromicrobiology. We expect to develop new solutions minimizing or eliminating energy and/or chemical needs for removing different pollutants from different matrixes.

1.1.3. 3D-Printing electricity-producing bacteria: a new paradigm for developing graphene-based biosensors (PRINTBIO)

https://attract-eu.com/selected-projects/

Objectives

The overall goal of PRINTBIO is to "domesticate" and to 3D print the electricity-producing bacteria form the genus *Geobacter* to convert this strain in *à-la-carte* bioelectrochemical biosensor using graphene-based screen printed electrode as electrochemical platform.

General activities

We are following a 3D printing approach to create *Geobacter*-derived functional using a electroconductive and biocompatible hydrogel. Moreover we will follow a system biol-

ogy approach to test genetically engineered. *Geobacter* strains able to switch on-off the capacity of electricity production conditioned to the presence of a specific analyte.

Expected results

To develop a proof of concept case regarding the use of a novel bioelectrochemical 3D-platform for detecting pollutants by using the metabolism of electroactive bacteria from *Geobacter* genus.

1.1.4. Microbial electrochemical reactors based on fluid-like electrodes: a new biotech platform for performing environmental applications (MET-FLUID)

Objectives

Our project aims to design, construct and operate a microbial electrochemical fluidized bed reactor ME-FBR platform to explore different biotechnological applications with an environmental focus. We have designed a work plan to accelerate the screening of the technology with a sole purpose: to identify potential environmental cases that can lead to successful projects beyond MET-FLUID.

General activities

We are exploring both anodic and cathodic electrochemical performance by using fluid-like electrodes. In this context we are investigating the use of new materials, and microorganism with novel capacities for removing pollutants or synthesize high valuable products.

Expected results

We expect to develop a bioelectrochemical platform for finding new environmental application in the field of bioremediation of bioelectrosynthesis at proof-of-concept level. At the end of the Project the TRL c) should be high enough to suggest a further development.

1.1.5. Design and construction of electrogenic wetlands for the removal of emerging pollutants in urban wastewater

Objectives

Our project aims to evaluate the role of microbial electrochemistry in the biodegradation of emerging pollutants from real urban wastewater generated at IMDEA Water Institute.

General activities

We have constructed a electrochemically-assisted constructed wetland, so-called METland®, in the facilities of IMDEA WATER with the purpose of treating the dairy production of wastewater from the institute. We are **monitoring the pollutant removal (including COD, nutrients and emerging pollutants) together with ecotoxicological parameters of treated wastewater**.

Expected results

We expect to setup the operation conditions for METland® technology to achieve the optimal removal of pollutants from a real urban wastewater with low COD. The treatment in combination with ultrafiltration should generate a water with re-use quality.

Comunidad de Madrid

1.1.6. Design, construction and validation of METlands technologies applied to the disposal of nutrients in wastewater

Objectives

This project aims to explore the electron donor capacity of vegetal waste for promoting nitrate reduction (denitrification) in bioelectrochemically-assisted constructed wetland (so-called METland®).

General activities

Our *modus operandi* includes the exhaustive analysis of potential materials through a circular economy strategy. We are treating real wastewater from IMDEA water headquarters using a denitrifying prototype of METland® in combination with ultrafiltration. We are also exploring the microbial communities responsible of coupling electrons from waste and nitrate reduction.

Expected results

We expect to setup the operation conditions for generating a nitrogen-free high quality effluent from an office building that may serve as inspiration for future implementations.

1.1.7. Bioelectrochemical anaerobic oxidation of ammonia for sustainable N removal from wastewater (ELECTRAMMOX)

Objectives

1. Cultivation and characterization of ammonia oxidizing electroactive bacteria from natural environments rich in feammox communities.
2. Bioelectrochemical N removal in mesocosms mimicking METlands.
3. Integration of electrammox bacteria in a pilot scale METland treating real N bearing wastewater.

General activities

In Electrammox we cultivate electroactive ammonia oxidizing microorganisms in microcosms and continuous bioreactors. The cultures will be characterized electrochemically

and phylogenetically. Following steps will investigate the application of these enrichment cultures to the removal of N pollution in real domestic wastewater.

Expected results

Electrammox aims at deepening into the diversity of microorganisms able of oxidizing ammonia by utilizing a solid electron acceptor. We expect demonstrate the feasibility of applying bioelectrochemical systems for the removal of ammoniacal pollution of wastewater.

1.2. Reclaimed Water Reuse

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

Objectives

FILVER+ aims to develop an Amended Land Application System (ALAS) as a technology for secondary and tertiary treatment enhanced by the application of low cost and easy to get amendments. Target contaminants are nutrients, pathogens and contaminants of emerging concern.

General activities

Test different soil amendments to improve attenuation of target contaminants; identify reactive processes in the vadose zone; upscale experimental results to pilot scale evaluating the performance of the ALAS; economical and financial analysis.

Expected results

The enhanced treatment achieved by Filver+ will entail a sustainable solution for small and scattered populations transforming residues (wastewater and pruning wastes) into valuable resources.

1.2.2. Irrigation of crops with surface water contaminated with pharmaceuticals and trace metals: natural attenuation or health risk? (FatePharM)

Objectives

FatePharM aims to assess the fate in the environment of pharmaceuticals and trace metals and the associated risk for human health during unplanned water reuse for crop irrigation.

General activities

Assess the contamination status of several environmental compartments; identify contaminant transport dynamic through the soil; evaluate the impact of chemical mixtures on soil quality; elucidate the fate of antibiotic resistance bacteria, assess the translocation of contaminants through the crops.

Expected results

Data from the extensive research of FatePharM will contribute to determine the level of exposure for the environment and the human health in unplanned water reuse for crop irrigation.

1.2.3. Generating biomass with regenerated waters: Opportunity for the Circular Bioeconomy (BIOARBIO)

Objectives

The main objective is to develop a process for the regeneration and reuse of water from beer industry, based on technologies that imitate nature such as vegetation filters, within a context of circular economy and biosustainability, and in which biomass production is produced.

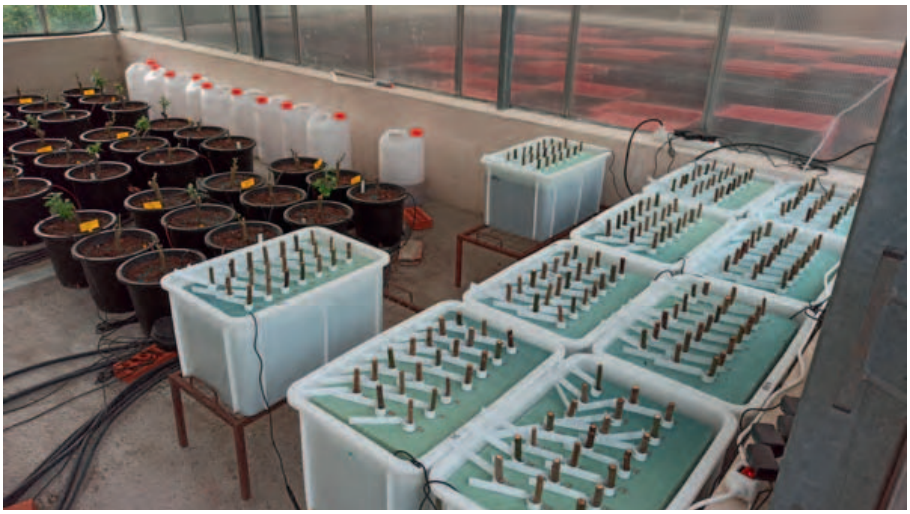
General activities

Evaluation of different amendments that improve the attenuation of pollutants.
Identification of pollutant abatement processes

Characterization of plant material of the genus Populus (autochthonous species and productive hybrids) based on the potential for adaptation to cultivation conditions through the use of water from the agri-food industry as a substitute for conventional irrigation. Assessment of vegetation filter efficiency in terms of pollutant removal, aquifer recharge, biomass production and mitigation of the carbon footprint of the plantation.

Expected results

Pollutant leaching mitigation.
Recovery of the water resource.
Reduced costs of industrial wastewater treatment.



1.3. Economic and Institutional Analysis

Objectives

Analyse the link between water, policies, the economy and institutions.

General activities

Applied research on the following issues: analysis of the design and implementation of economic policy instruments for sustainable water management (economic behavior analysis, Economic Policy Instruments-EPIs); economic dimensions of Integrated water resources management (environmental & natural resources economics, hydro-economic modelling and analysis/prioritization of water investments, CBA, CEA, cost-recovery analysis, new decision-making methods, socio-ecological modelling, economic evaluation of ecosystem services, regulatory impact assessment, link environmental policy-macroe-

conomic performance, climate change adaptation and disaster risk reduction and nexus approach); urban water cycle economic regulation and water governance.

Expected results

Make useful scientific contributions for addressing current global and local water management challenges.

1.4. Membrane Technology

1.4.1. Immobilized Laccases for the degradation of aromatic compounds from wastewaters (LIDA)

http://www.cyted.org/es/lida

Objectives

The network is composed by 15 research groups 7 Ibero-American countries. The main objective of LIDA network is to develop sustainable strategies based on immobilized novel laccase enzymes for the degradation of phenolic and aromatic compounds from different industrial wastewaters.

General activities

The network organizes different dissemination and training activities and promotes the exchange of professors and PhD students between the research groups participating in the project. LIDA networks looks for new funding opportunities to carry out research projects.

Expected results

The network will boost the cooperation between research institutes and industries, creating new consortiums, research projects and promoting the scaling up of sustainable enzymatic systems for water treatment.

1.4.2. Hybrid wastewater treatments based on recycled membranes with the objective of zero liquid discharge (ZLD) (INREMEM 2.0)

http://inremem.simplesite.com/

Objectives

The main objective of INREMEM 2.0 is the recovery of valuable compounds such as water, nutrients (phosphates or nitrates) and other salts (NaCl), from wastewater with high salinity content, using hybrid systems based on recycled membranes coming from discarded RO membranes.

General activities

INREMEM 2.0 proposes the combination of different hybrid systems based on recycled membranes (Membrane Bioreactor, Nanofiltration, Membrane Distillation and Electrodialysis) with the aim of treating wastewaters with high salinity content. In addition, the project will perform the Life Cycle Assessment and the Life Cycle Costing of the proposed hybrid systems.

Expected results

INREMEM 2.0 will obtain high quality water fit for crop irrigation and valuable compounds from high salinity wastewaters. In this sense, INREMEM 2.0 promotes the movement of membrane technology and wastewater treatments towards the concept of zero liquid discharge (ZLD) and circular economy.

1.4.3. Preparation of H2020 project: Life cycle thinking for membrane technology (MEMCYCLE)

Objectives

The main objective of MEMCYCLE is to contribute in changing the actual economic model towards a circular economy model by creating a missing link of membrane waste management focused on end-of-life membrane sorting, disassembly/separation, recycling and re-introduction of the recycled material into the market.

General activities

MEMCYCLE will allow the meeting of different stakeholders, from producers to end-users with the advice of an interdisciplinary panel of experts. These alliances will also be a motivation for posterior collaborations, research actions and synergies that can be extrapolated to other fields or technologies valuable in the circular economy transition within the water sector.

Expected results

MEMCYCLE will provide important social and environmental benefits. It will increase the sustainability of water treatments based on membranes, improving their durability and it will reduce the environmental costs associated with this technology reducing wastes.

1.5. Ecotoxicology

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

Objectives

TAPAS is a four-year EU Horizon 2020 collaborative research project formed by 15 partners and aimed to promote and consolidate the environmental sustainability of the European aquaculture sector.

General activities

TAPAS research looks into different aquaculture sectors by performing eight different case studies in both marine and freshwater environments. These case studies will help to test, improve and develop new models for far- and near-field environmental impact

assessments, providing better monitoring, observation, forecasting and early warning technologies.

Expected results

One of the key project outcomes is the Aquaculture Toolbox, which provides tools and guidance to support the planning and licensing of aquaculture in Europe. TAPAS will enhance the public image of aquaculture and contribute to a better understanding of the sustainability of aquaculture in the EU.

1.5.2. Effects of global change on the emission, fate, effects and risks of chemicals in aquatic ecosystems (ECORISK2050)

https://ecorisk2050.sites.uu.nl/

Objectives

ECORISK2050 aims a) to assess how the input of chemicals from agriculture and urban environments and their fate, transport and effects are affected by global climate change; b) to identify potential adaptation and mitigation strategies, and c) to develop a set of tools for use by industry and policy makers.

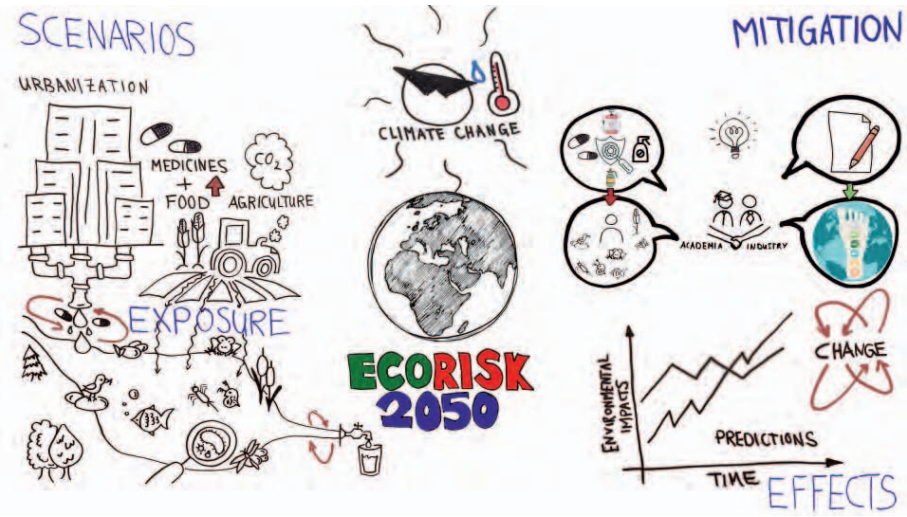
General activities

The project will organize training activities and secondments for 13 early stage researchers dedicated to tackle different aspects of the fate, effects and risks of chemicals in the

environment. Knowledge gained by experiments and modelling approaches developed within the project will help to forecast future risks of chemical pollution.

Expected results

The project will deliver the next generation of scientists, consultants and industry and governmental decision-makers who have the knowledge and skill sets required to address the changing pressures that chemicals emitted by agricultural and urban activities pose to aquatic systems on the path to 2050.



1.5.3. Pesticide risk assessment for amphibians and reptiles (PERIAMAR)

https://periamar.com/

Objectives

The PERIAMAR COST action aims to develop a strategy to coordinate efforts in order to address the research needs relative to pesticide risk assessment for amphibians and reptiles at the European level.

General activities

The action will integrate expertise provided by herpetologists, ecologists, toxicologists, environmental chemists and risk assessors trough several meetings and workshops, and will provide opportunities for early researcher and senior researcher exchange across more than 20 institutions in Europe.

Expected results

The action will stimulate networking and training in order to maximize the capacities of the scientific community to prevent amphibian and reptile declines because of environmental pollution, and will contribute to the development of sustainable pesticide regulations and policies.

1.5.4. Smart tools and technologies to assess the environmental fate and risk of contaminants under climate change (CICLIC-ECOREST)

https://www.proyectociclic.com

Objectives

The CICLIC project aims to develop smart environmental technologies and tools that can be used to monitor the occurrence, fate and impacts of contaminants in Mediterranean wetland ecosystems in a scenario of climate change.

General activities

The project is formed by three sub-projects (WETANPACK, TRAPPER, ECOREST), which will perform field assessments and monitoring in the Albufera Lake (Valencia) and the Llobregat delta (Barcelona). In-situ chemical and biological monitoring will be performed to parameterize models and risk scenarios.

Expected results

CICLIC proposes an innovative toolbox that will include aspects regarding massive data analysis, novel contaminant monitoring and analytical techniques, wastewater reuse and analysis, metabolomics, environmental and ecological modelling, ecotoxicological tools, and ecosystem vulnerability and resilience analysis.

1.5.5. Assessing the risk of anthropogenic contaminants in the Amazon River (SILENT AMAZON)

http://www.silentamazon.com/

Objectives

The main goal of the SILENT AMAZON project will be to assess how and to what extent current demographic pressure and industrial activities are impacting the Amazonian biodiversity at local and regional scale.

General activities

SILENT AMAZON will perform the largest chemical monitoring campaign performed so far in the Amazon River and will take water, fish and plant samples to monitor the presence of pharmaceuticals, pesticides, fragrances, persistent organic pollutants, microplastics, metals and other industrial compounds (PFAS).

Expected results

The project will provide maps of chemical pollution and risk-based information regarding priority substances and biological groups that are expected to be impacted. Overall, the project will contribute to the development of sustainable chemical use practices and environmental regulations in the region.

1.5.6. Research network on the risk of pollution and water scarcity in Iberian aquatic ecosystems in a context of global change: management recommendations (IBERAQUA-NET)

http://iberaquanet.com/

Objectives

IBERAQUA-NET aims to provide insights into the current challenges related with water scarcity and chemical pollution in Spanish rivers, both from a scientific and a management perspective.

General activities

- Establishing a network between the involved partners.
- Perform maintenance of the already ongoing channels for dissemination and outreach of the existing research projects.
- Carry out meetings with Water Basin Authorities and other stakeholders involved in freshwater monitoring at the national level.

Expected results

- Original ideas for new research projects and collaborations.
- Transfer of knowledge to the stakeholders, end-users and the wider public.
- Promoting at the EU agenda the specific issues of global change in the basins of the Iberian region, including the update of the Water Framework Directive.

1.6. Micro and Nanoplastics

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

http://www.waterjpi.eu/joint-calls/joint-call-2016-waterworks-2015/impasse

Objectives

The general aim of IMPASSE is to assess the environmental fate, effects and risks of microplastics in agricultural and freshwater environments, and to find solutions which will safeguard agricultural sustainability, economic goals, and human and animal health.

General activities

The project is formed by four European partners and one Canadian. Among other activities, the project plans to perform field experiments to monitor environmental concentrations of microplastics, and laboratory experiments to test the impacts of those on terrestrial and aquatic organisms.

Expected results

The project provides knowledge that underpins the development of safe environmental policies and management regarding the use of plastics in the EU, and will develop a new model for the transport, distribution and fate of microplastics in soil and stream systems.

1.6.2. Quantification, treatment and environmental impact of micronanoplastics in WWTPs (nanoCLEAN)

Objectives

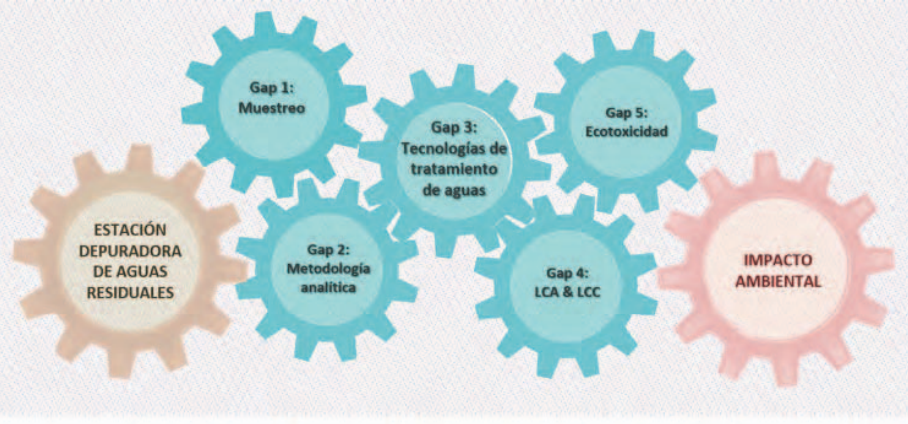
nanoCLEAN aims to implement efficient membrane technology (MBR-UF) to remove micronanoplastics (MNPs) from WWTPs as well as developing new sampling and a sensitive quantification analysis supported by Life Cycle Assessment and Life cycle Costing.

General Activities

- Development of Pyr-GC-MS for MNPs identification and quantification.
- Implementation of pressure driven membranes for MNP sampling.
- Removal of MNPs from WWTP effluents by MBR.
- Environmental impact and Life Cycle costing of implemented integrated systems.
- Dissemination and communication of results.

Expected results

nanoCLEAN will generate frontier knowledge that will help to normalize and standardize MNP quantification as well as obtaining high quality water free of MNPs. nanoCLEAN will create special awareness regarding MNP contamination.



1.6.3. Thematic Network of Micro- and Nanoplastics in the Environment (EnviroPlaNet)

https://www.enviroplanet.net/

Objectives

The network coordinates interdisciplinary Spanish research groups working on the contamination of microplastics. The aim is to improve key aspects related to the methodological dispersion of sample sampling and analysis or lack of consistency in toxicological and ecotoxicological studies.

General Activities

- To organize scientific meeting and specialized courses.
- To organize common sampling campaigns and writing common scientific publications and reports.
- Special issue editions in high impact scientific journals.
- Tromotion of the presence of the network members in international initiatives.

Expected results

- Enhanced communication between research groups.
- Boost research activities at national level that contribute to achieve new knowledge of microplastics.
- Improvement of the competitive position of Spanish research at international microplastic scientific community level.

1.6.4. Quantification of micronanoplastics in reclaimed water and agricultural ecosystems. Environmental risk assessment. (µNanoCare)

Objectives

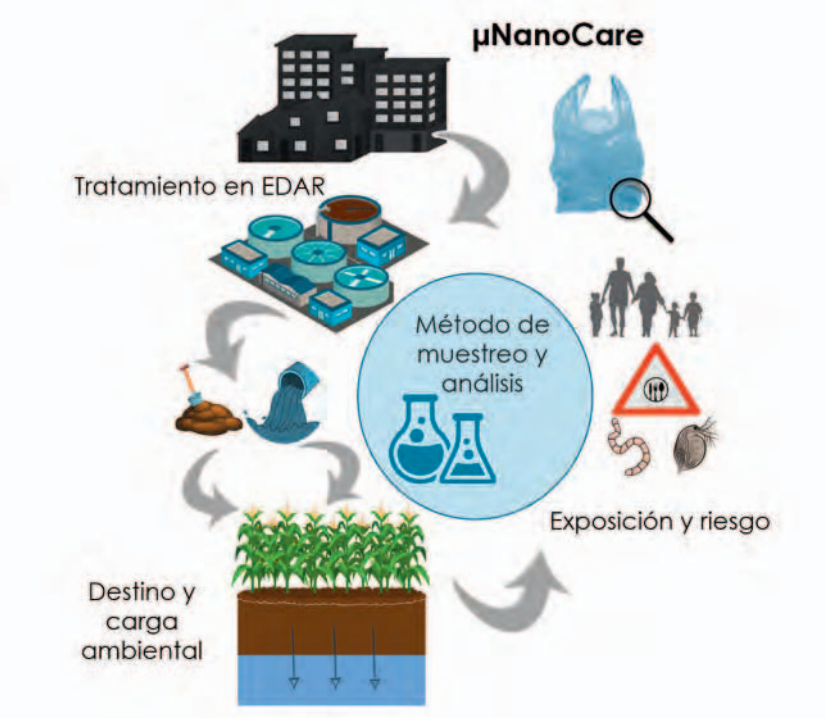
1) to develop an effective and innovative sampling and analytical methodology to quantify micro-nanoplastics (MNPs);
2) to identify eco-efficient wastewater treatments capable to minimize their discharge;
3) to assess their exposure and associated ecotoxicological risks

General activities

1) State of the art of MNPs quantification techniques and their limitations
2) Method development of MNP separation and analysis
3) Presence of MNPs and degradation study during wastewater treatment
4) MNP fate, toxicity and environmental risk
5) Study of wastewater treatment feasibility to remove MNPs

Expected results

1) an analytical method to quantify MNPs based on TDS-GC/MS
2) a separation system of MNPs during sampling using membrane technology
3) a comparison of different tertiary treatments to remove MNPs including their eco-efficiencies
4) an environmental risk assessment of MNP in agricultural systems



1.7. Cyanobacteria and Cyanotoxins

1.7.1. Development of a predictive model for the management of algae and cyanobacterial proliferation events associated with climate change based on remote sensing techiques and data acquisition systems (CianoMOD)

CianoMOD

Objectives

CianoMOD project targets four objectives related to cyanobacteria and algae blooms:

a) To determine the mechanisms that allow blooms of cyanobacteria.

b) To stablish their relationship to climate change.

c) To obtain insight on their environmental consequences.

d) To create monitoring and prediction mechanisms.

General activities

CianoMOD will develop the following tasks:

a) Historical analysis of water properties.

b) Continuous water monitoring with sensors.

c) Correlation of measurements with satellite images.

d) Creation of mathematical models to predict cyanobacteria blooms.

e) Development of online platforms for remote data query.

Expected results

CianoMOD results will be presented as

a) a methodological protocol for the study of cyanobacteria blooms,

b) the development of a “predictive” model,

c) the construction of a consultation platform in Internet and

d) the development of a participatory strategy for raising awareness of society.

With the support:

GOBIERNO DE ESPAÑA
VICEPRESIDENCIA CUARTA DEL GOBIERNO
MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO

Fundación Biodiversidad

PIMA adapta

oecc Oficina Española de Cambio Climático

1.8. Tool Development for Water Resource Management

Objectives

The general aim of the research line is the development of digital spatial 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.

General activities

Tasks areas are related to the spatial-temporal analysis and management of water resources through different tasks as:

a) Model development using remote sensing information.
b) Development of instruments for decision support.
c) Construction of automatic data collection systems.
d) Development of on-line participatory platforms.

Expected results

Expected results are related to digital products such as algorithms development derived from remote sensing imagery analysis, decision support systems for water management and best practices, development of water models using GIS techniques or construction of collaborative web maps.

1.9. Hydraulic Heritage

Objectives

Research into water heritage aims to resolve conflicts between the existence of heritage structures and the current social need for development and growth. Specific objectives concentrate on the evaluation, visibility and potential development as socio-economic resource of water heritage.

General activities

Four main working lines have been created:

a) Inventory of heritage systems using digital technologies.
b) Development of spatial structures for decision making.
c) Analysis of socio-economic values to support for endogenous economic development.
d) Assessment of heritage and traditional landscape impacts.

Expected results

Research and technical development undertaken pursuit results related to the development of action plans related to the integral consideration of water heritage, the application of virtual and augmented reality and the construction of collaborative on-line tools.

1.10. Water and Energy

1.10.1. Attracting Talented Researchers within the Spanish Campus of International Excellence 'Smart Energy' and the region of Madrid (GOT ENERGY TALENT)

http://gotenergytalent.uah.es/

Objectives

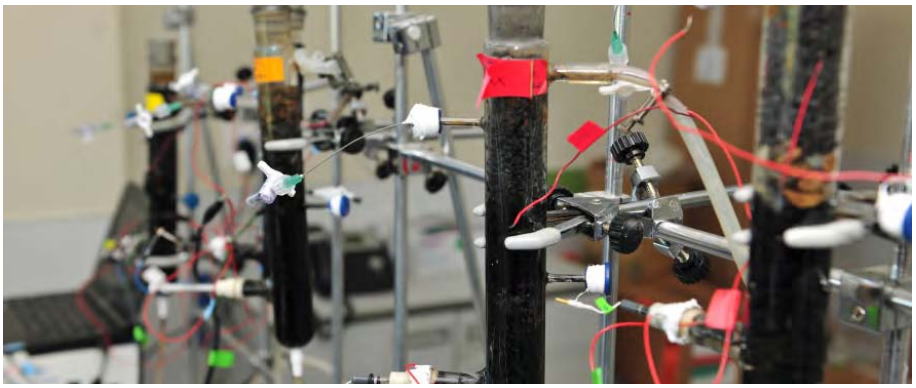
GOT ENERGY TALENT is a highly competitive, merit-based fellowship programme aimed at incorporating postdoctoral talent to enable them to conduct their own research project and bringing it closer to the society.

General activities

GOT ENERGY TALENT will bring in 34 experienced researchers to develop a 24-month stay through 2 open calls at international level, over its 60 months of implementation. The postdoctoral fellows will have a full trans-national mobility experience and access to the research facilities of the organizations partnering the programme. IMDEA Water is a host institution.

Expected results

The project address to produce a positive effect not only in terms of excellent science and talent attraction but also by strengthening the regional economy and promoting international networking.



2. Contracts

2.1. Economic and Institutional Analysis

2.1.1. Framework Service Contract in five (5) lots for provision of external expertise on regulatory and policy issues in the field of environmental policies, climate change, sustainable development, public health and food safety: (Lot II: climate change). European Parliament

Objectives

A framework contract to provide support to the work of the Committee on the Environment, Public Health and Food Safety (ENVI) in the European Parliament regarding the impacts, benefits and costs of issues and policies related to climate change (Lot II).

General activities

Support in terms of briefings, in-depth analysis, studies and workshops to be held.

Expected results

Full assistance to the Parliament implementation assessments, Committees´ own initiatives and Commission initiatives.

2.1.2. Framework Contract on economic analysis of environmental policies and analytical support in the context of Better Regulation. DG Environment, European Commission

Objectives

A framework contract to the European Commission to support economic analysis of European environmental policies.

General activities

Support in consultation processes (design, assistance, analysis reports…) and in the evaluation of environmental policies and regulations (background documents, assessment reports, elaboration of strategic documents…).

Expected results

Full assistance to the Commission in the process of carrying out economic analysis of environmental policies (to be designed to deliver their objectives in a cost-effective manner and considering the linkage economy-environment and also measuring progress consistently with environmental directives and the work on Circular Economy) within the framework of Better Regulation (the Agenda to design and evaluate EU policies and laws transparently and backed up by the citizens and stakeholders).

Support Study for the impact assessment on the revision of the Urban Wastewater Treatment Directive - Directive 91/287/EEC

Objectives

An assignment within the referred FC to support the European Commission with an assessment of impacts of a range of options for the review of the UWWTD keeping consistency with other regulations (Water Framework Directive, Drinking Water Directive, Sewage Sludge Directive and Water reuse regulation).

General activities

Definition of an impact assessment methodology, collection of thematic information (EU-27) to inform the analysis of impacts and performing the analysis of impacts.

Expected results

In coordination with JRC and OCDE, the study will provide sound evidence for the assessment of policy options for the review of the Urban Wastewater Treatment Directive.

Support to the evaluation of the Sewage Sludge Directive - Directive 86/278/EEC

Objectives

An assignment within the referred FC to support the European Commission undertaking a study for an evaluation of the Sewage Sludge Directive.

General activities

Review its implementation, assessing its effectiveness, efficiency, coherence, relevance and EU added value, and support the stakeholder consultation. Carrying out an exploratory study comparing different scenarios, preparing the implementation report (period 2016-2018, EU-27) and updating the questionnaire.

Expected results

The assignment will produce an evaluation of the SSD and will be an useful input providing sound evidence for the assessment of the necessity for a possible review of the Sewage Sludge Directive.

2.1.3. Framework Contract on evaluation, review and development of EU water policy. DG Environment, European Commission

Objectives

Supporting the evaluation, review and development of freshwater policy for Europe.

General activities

Support to: working/expert groups; organisation of workshops; development of guidance documents and technical reports on issues related to implementation EU water policies and other specific areas; policy development; evaluation of the WFD and REFIT process of the FD.

Expected results

Full assistance to the Commission in issues dealing with: the CIS of the WFD (Water Framework Directive) and FD (Floods Directive); integrated assessment of the implementation of the EU water legislation (WFD, priority substances Directive, GWD and FD) and 2nd River Basin Management Plans (RBMPs) and the 1st Flood Risks Management Plans (FRMPs); WFD/FD implementation in Member States; infringement cases, evaluation of the WFD and the REFIT (Regulatory Fitness and Performance Programme) of the FD.

Economic data related to the implementation of the Water Framework Directive and the Floods Directive and the financing of measures

Objectives

An assignment within the referred FC to provide a comprehensive overview of publicly available economic data related to the implementation of the EU water policy (2nd RBMPs and 1st FRMPs) and to the financing of measures, now and in the future, at national level.

General activities

The study will compile and provide a comprehensive analysis of information on water tariffs, financial, environmental and resource cost recovery across 27 countries.

Expected results

Detailed information to inform Member State follow-up actions and Sustainable Finance and as an input to a joint study between the European Commission and the OECD on investment needs and the economics of the WFD (Water Framework Directive) and the FD (Floods Directive).

Water Framework Directive Common Implementation Strategy support for period 2020-2021

Objectives

An assignment within the referred FC to support the work of the CIS Working Groups (Ecostat, Groundwater, Chemicals, Floods) and Ad-Hoc Task Groups (Water Reuse and Economics ATG) of the Water Framework Directive.

General activities

Attendance at meetings, taking minutes and conclusions and other support to groups; provision of analytical, technical and scientific papers; and contribution to the identification of priority areas for the next programme to be developed through interaction with DG Environment.

Expected results

The activities carried out within the framework of this contract will contribute to meet the objectives of the CIS work programme for the referred period.

2.1.4. Update of the economic analysis needed for the preparation of the third River Basin Management Plans (RBMP) in Bulgaria. World Bank

Objectives

A study aimed at updating the economic analysis needed for the preparation of the 3rd RBMPs (River Basin Management Plans) in Bulgaria, based on the stocktaking and gap analysis review of the 2nd RBMPs and the European Commission´s Member State Assessment Report on the second planning cycle.

General activities

Economic analysis of water use; CEA; affordability analysis of main and supplementary measures; CBA of supplementary measures; assessment of HMWBs; Baseline BAU scenario; environmental costs assessment; resource cost assessment with any increasing pressures under BAU scenario; financial cost recovery of water services; water pricing and fees and extent of non-recovered financial costs of water services and environmental and resources costs.

Expected results

Full updated economic analyses as an input to overall work programme to prepare 3rd cycle RBMPs.

2.2. Reclaimed Water Reuse

2.2.1. Sustainable desert ecosystem management with use of treated wastewater for forage irrigation in Kuwait. Kuwait Institute for Scientific Research (KISR)

Objectives

The project is aimed to evaluate:

a) quality of TWW, produced in different water treatment plants in Kuwait;

b) forage biomass yield and nutritional quality responses to TWW irrigation

c) potential accumulation of emerging contaminants in the soil and forage biomass.

General activities

a) Summarize existing information

b) Sampling TWW, chemical analysis and results assessment

c) Field experiments at KISR

d) Evaluation of forage nutrition qualities

e) In-vitro and in vivo studies

f) Soil Health Assessment of Intensive Agricultural Practices on Desert Native Ecosystem.

Expected results

The deliverables will demonstrate the safe use of TWW for forage irrigation, as an economically appealing alternative to discharge of this resource into sea, without causing degradation of soil quality, ecosystem sustainability or risk of food safety.

2.3. Ecotoxicology

2.3.1. Implementation of the Ecotoxicology and Environmental Monitoring Unit at IKIAM. IKIAM

Objectives

To develop and implement an Ecotoxicology and Environmental Monitoring Unit at the Regional University of the Amazon of Ecuador (IKIAM) capable of evaluating the water quality status of the Napo River making use of advanced ecotoxicological methods.

General activities

Researchers from Ecuador and Spain will work together in the standardization of toxicity test protocols with Amazonian organisms, the identification of the pollution sources of the Napo River, the evaluation of concentrations of pesticides and metals and the design of toxicity studies to assess the contamination risks on populations and communities.

Expected results

This project will contribute to the consolidation of the ecotoxicology research line at IKIAM and will collaborate with National Laboratory of Reference in Waters (LNRA) of Ecuador to improve the prospective risk assessment of chemical substances. It will make a proposal for the inclusion of new toxicological tests in the Ecuadorian regulation.

2.4. Membrane Technology

2.4.1. Use of end-of-life reverse osmosis membranes to treat wastewater for industrial and agricultural use (REROM). Research Council (TRC) of Oman.

مجلس البحث العلمي
The Research Council

Objectives

REROM aims to investigate the potential recycling/modification of discarded reverse osmosis desalination membranes for reusing them in wastewater treatment obtaining water fit for industrial and agriculture reuse.

General activities

Cost effective membrane reuse in lower specification applications, potential recycling of valuable materials and conversion of RO into micro-porous separation devices will be assessed both technically and financially.

Expected results

REROM will establish the technical and economic viability of membrane recycling outside the EU context for wastewater treatment and reuse. REROM will provide good quality water that give a chance for the farmers to plant different types of crops and encouraging Omani investment in the agricultural sector in a cost-effective manner.

3. Other innovation grants and international initiatives

3.1. Economic and Institutional Analysis

3.1.1. OECD Water Governance Initiative. Water Policy Dialogues Brazil, Argentina and Peru. (2016-on going) http://www.oecd.org/cfe/regional-policy/water-governance-initiative.htm

Objectives

IMDEA is one of the 100+ members of the OECD GWI (the most relevant policy forum on water governance worldwide with public, private and civil society stakeholders). The GWI shares knowledge and good practices on water governance, advices governments in water reforms implementation and supports the OECD Principles on water governance.

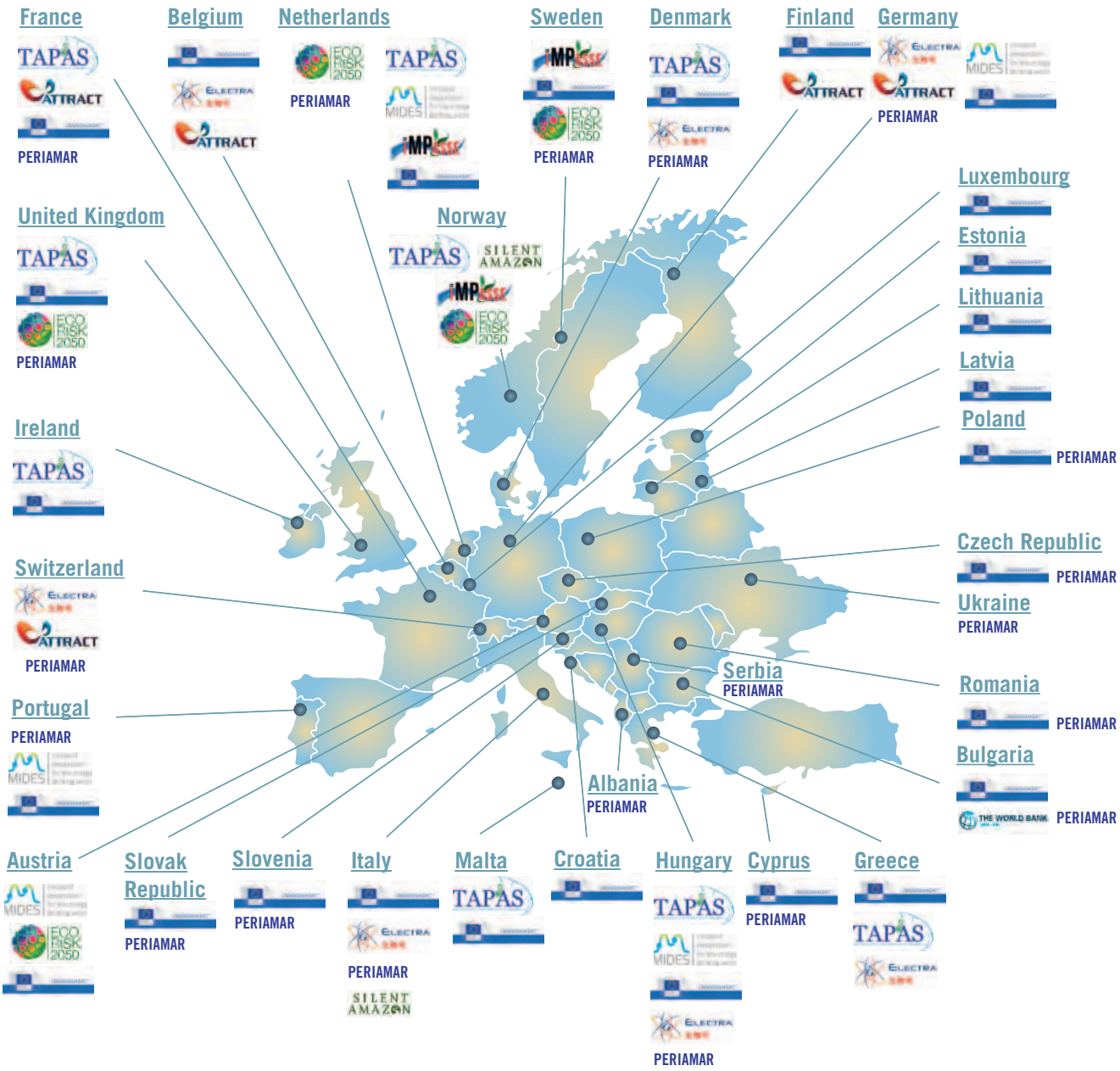
General activities

IMDEA participates twice a year in the meetings of the GWI to share good practices supporting better governance in the water sector at global scale. In 2018, IMDEA also provided expertise within the framework Country-Specific Policy Dialogues to the Governments of Argentina and Peru.

Expected results

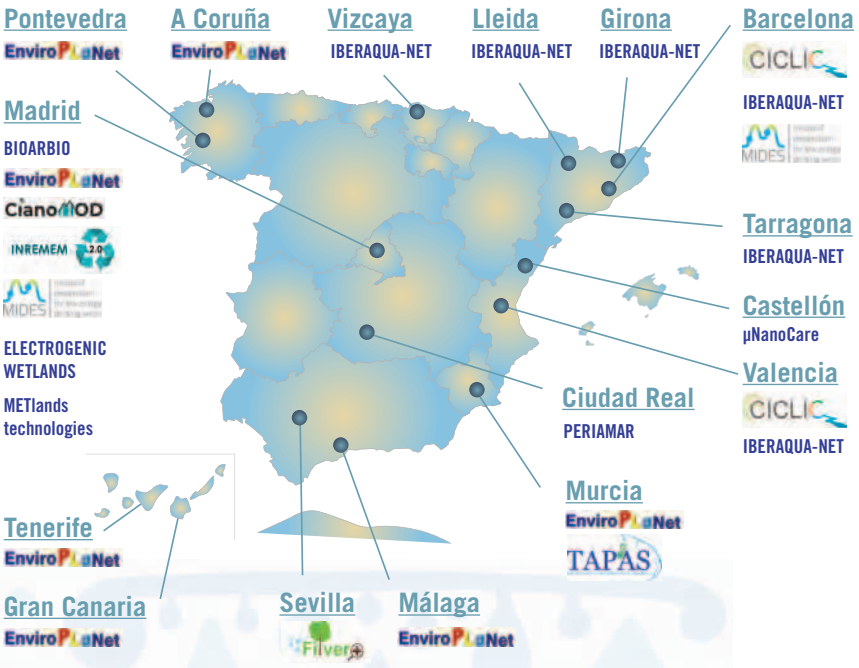
The Policy Dialogues assess multi-level governance and issues identified by the governments (i.e. water abstraction charges in Brazil, economic regulation of water and sanitation services in Argentina and Peru or the use of economic policy instruments in Peru).

European collaboration in projects, contracts and other european initiatives



International collaboration in projects, contracts and other international initiatives

Spanish collaboration in projects, contracts and other initiatives



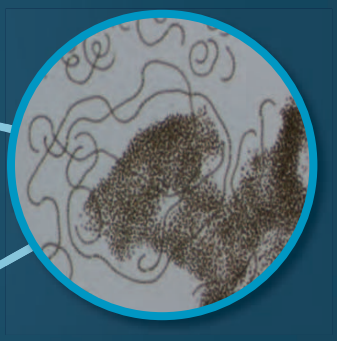
research groups

Membrane Technology

Soil and Water Quality in the Environment

research groups

Bioe



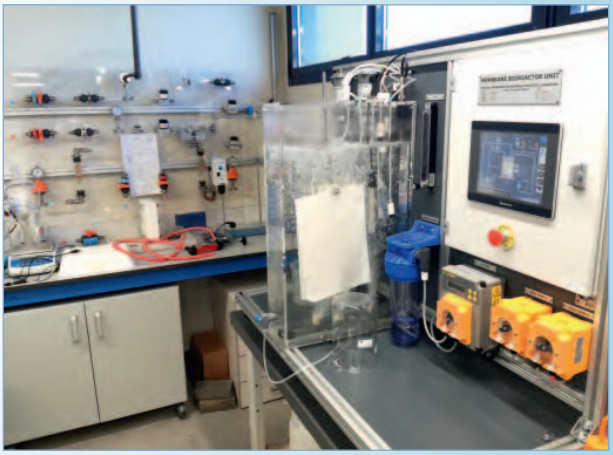
Microbial contamination and Cyanobacteria

Biological and Advanced oxidation technologies

Economic and institutional analysis

Ecotoxicology

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).

Membrane Technology

Dr. Mohamed Khayet Souhaimi
Associated Researcher

Dr. Serena Molina Martínez
Researcher

Dr. Eloy García Calvo
Main Researcher

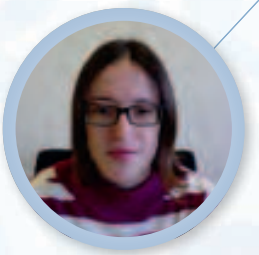
Dr. Raquel García Pacheco
Associated Researcher

Dr. Junkal Landaburu Aguirre
Researcher

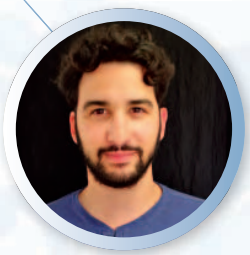
Anamary Pompa Pernía
Predoctoral Researcher

Helena Ocaña Biedma
Research Support

Amaia Ortiz de Lejarazu Larrañaga
Predoctoral Researcher



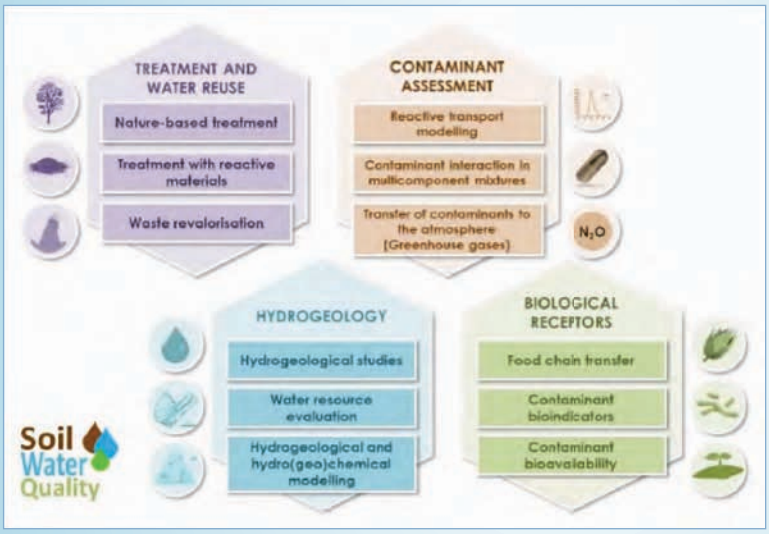
Carmen Tamarit Rausell
Research Support

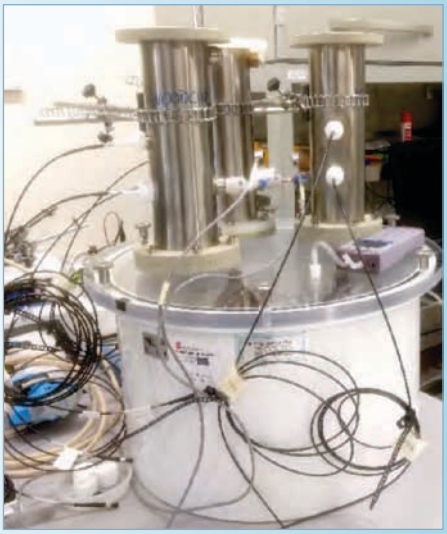


Jorge Senán Salinas
Research Support

Laura Rodríguez Saez
Research Support

Soil and Water Quality in the Environment





The research activity of our group is dedicated to assess environmental contamination in soil and water compartments and to adapt nature-based solutions to treat contaminated water. In particular, we investigate:

- The adaptation and improvement of non-conventional treatment technologies based on natural attenuation processes such as land application systems (Nature-based solutions);
- The transfer and interaction between chemical substances (mainly nutrients, metals and contaminants of emerging concern) in multiple scenarios developing specifically designed experiments and reactive transport models;
- The bioavailability of contaminants in soils by the use of bioindicators and the study of their transfer into the food chain through crop consumption.
- The quantity and quality of water resources through hydrogeological studies based on the application of multiple tools (numerical, hydrochemical and hydrogeochemical models).

https://www.soilwaterquality.es/

Soil and Water Quality in the Environment

Dr. Irene de Bustamante Gutiérrez
Main Researcher

Dr. Juan Antonio Pascual Aguilar
Associated Researcher

Dr. Lucila Candela
Associated Researcher

Dr. María de las Virtudes Martínez Hernández
Researcher

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Lucía Barbero Morales
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Dr. Ana de Santiago Martín
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Marina Alba Peña
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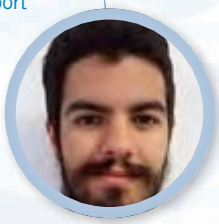
Gloria Teijón Ávila
Research Support

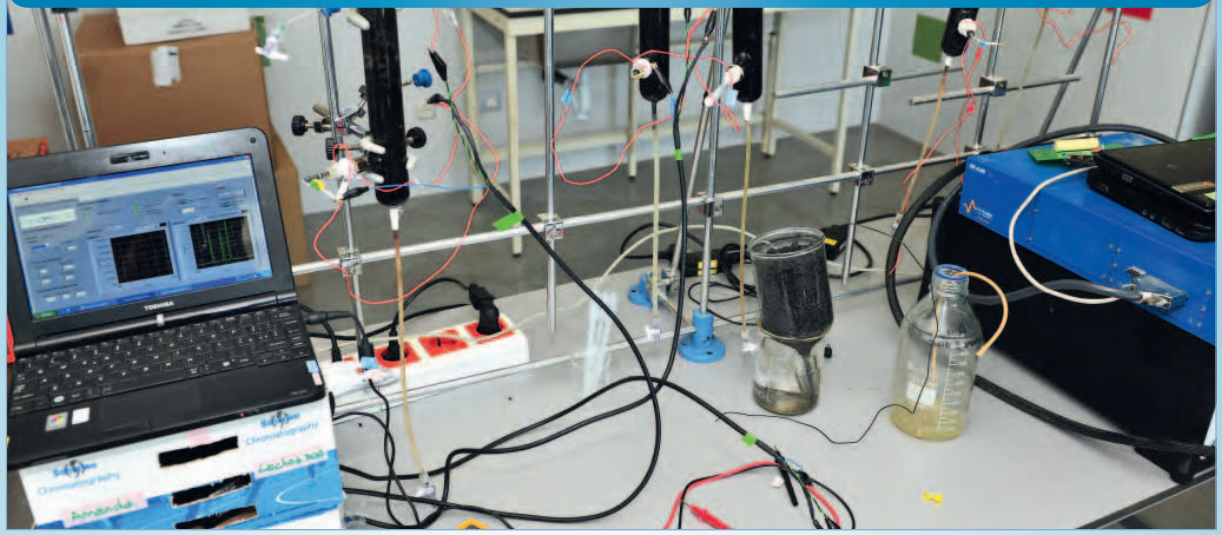
Guillermo Vaquero Quintana
Research Support



Raúl Jerónimo Pradana Yuste
Predoctoral Researcher

Blanca Huidobro López
Predoctoral Research

Bioe



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

http://bioelectrogenesis.es/

Bioe

Dr. Abraham Esteve Núñez
Main Researcher

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Dr. Pau Ródenas Motos
Researcher

Dr. Juan Manuel Ortiz Díaz-Guerra
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Dr. Raúl Berenguer Betrián
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Dr. Antonio Berná Galiano
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Eduardo Noriega Primo
Associated Predoctoral Researcher

Carlos Manchón Vállegas
Associated Predoctoral Researcher

Biological and Advanced oxidation technologies

Developing wastewater treatment focused on degradation of xenobiotic compunds 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

Biological and Advanced oxidation technologies

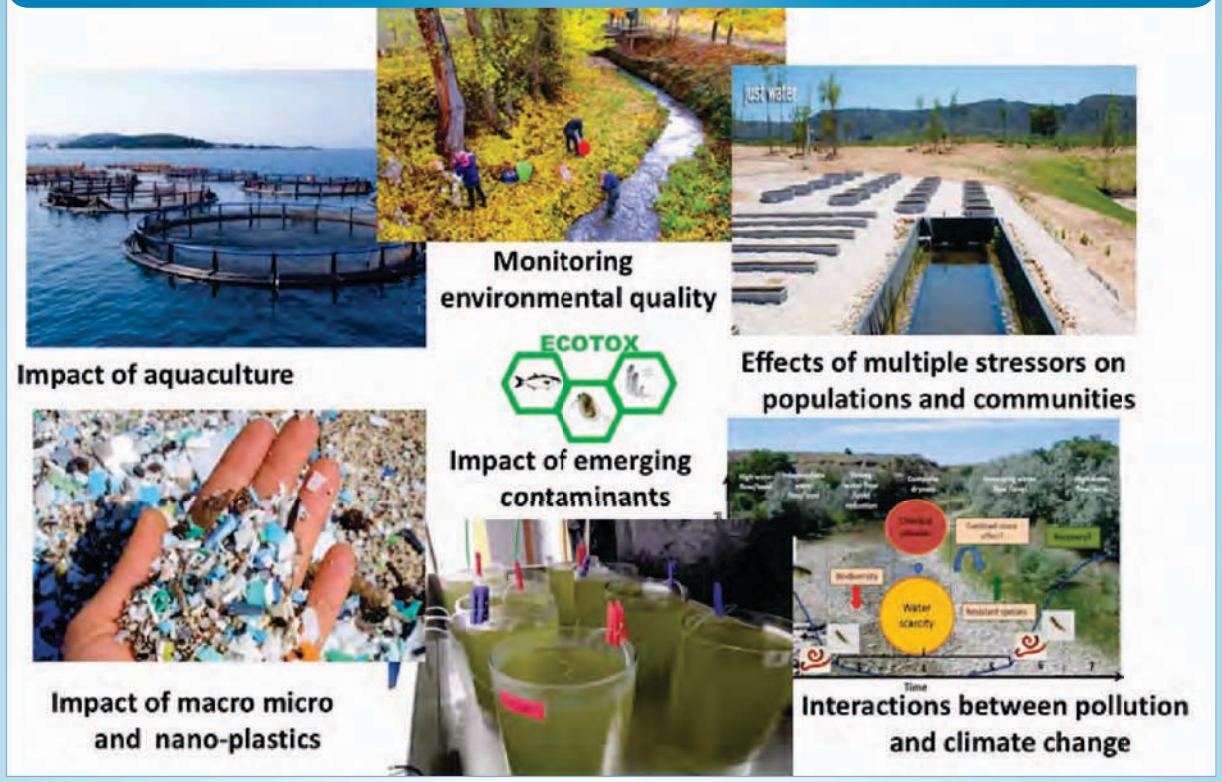
Dr. Pedro Letón García
Associated Researcher

Dr. Alice Luminita Petre
Associated Researcher

Dr. Roberto Rosal García
Associated Researcher

Dr. José Antonio Perdigón Melón
Associated Researcher

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 trough 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 trough monitoring of invertebrates and other biological indicators
- Characterising ecological risks combining effect and exposure assessments

Ecotoxicology

Prof. Marco Vighi
Main Researcher

Dr. Andreu Rico Artero
Researcher

Dr. Alba Arenas Sánchez
Researcher

Theresa Schell
Predoctoral Researcher

Francesco Polazzo
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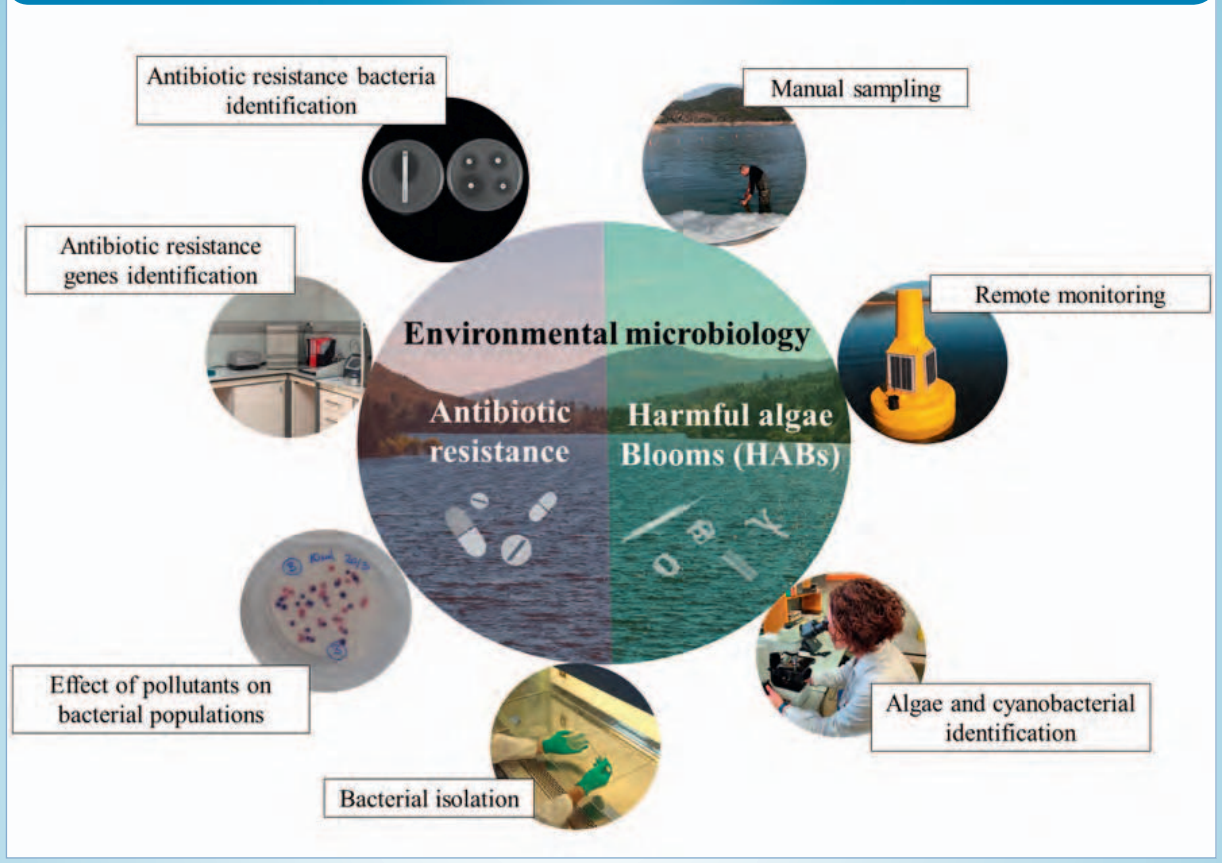
Raquel Dafouz Ramírez
Research Support

Claudia Martínez Megías
Predoctoral Researcher

Ariadna García-Astillero Honrado
Research Support

Microbial contamination and Cyanobacteria



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

Microbial contamination and Cyanobacteria

Dr. Francisco Carreño Conde
Associated Researcher

Dr. María Blanca Sánchez
Main Researcher

Dr. Jesús Morón López
Associated Researcher

Ángel G. Pompa Pernía
Research Support

Lorena Martínez García
Research Support

Borja Fernández Retuerto
Predoctoral Researcher

Economic and institutional analysis

Analysis of the design and implementation of economic policy instruments for sustainable water management

- Individual & collective economic behaviour in relation to water
- Economic policy instruments-EPIs (pricing mechanisms, markets of tradable permits, risk-management schemes and cooperation-based mechanisms)

Integrated water resources management: economic dimensions

- Environmental & natural resources economics
- Climate change adaptation (CCA) and Disaster risk reduction (DRR)
- Nexus approach (water-energy-food-biodiversity-climate)
- Hydro-economic modelling & analysis & prioritisation of water investments.
- Regulatory impact assessment (RIA) and links between environmental policy & macroeconomic performance
- Cost-benefit analysis (CBA), Cost-effectiveness analysis (CEA), Cost-recovery analysis, New decision-making theories
- Integrated assessment frameworks (i.e. social-ecological modelling) and economic valuation of ecosystem services
- Economic regulation of the urban water cycle

Economic regulation of the urban water cycle

Water Governance

Economic and institutional analysis

Dr. Alberto del Villar García
Associated Researcher

Dr. Carlos Mario Gómez Gómez
Main Researcher

Gonzalo Delacámara Andrés
Researcher

Marta Rodríguez
Research Support

Marta Arenas Romasanta
Research Support

laboratory staff

Francisco Martínez Serrano
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Carolina Guillén Fuentes
Laboratory Technician

Dr. Leonor Nozal Martínez
Quality and Laboratories Management / Laboratory responsible

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Dr. Laura Cherta Cucala
Laboratory Technician

Dr. María Isabel López Heras
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Diego Parra Robles
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Simón Monllor Alcaraz
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Dr. Alberto Blanco González
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Beatriz Peinado Rodríguez
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Noelia C. Peral Romero
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management area and administration

Rafael Irastorza Vaca
General Manager

Dr. Juana Sanz García
R&D Manager

Mari Luz Barquilla Crespo
Economic Manager

José Ángel Gómez Martín
R&D Technical support

Gloria Rubio Sánchez
R&D Technical support

Celia Barral Nieto
Technician in Economic and Administration

Angélica Manguán García
R&D Technical support

Esther Rodríguez Espinosa
Technical of economic management

Josefa Simón Recio
Secretary

Research results and knowledge dissemination

1. Scientific Papers

1.1 Articles in journals

1. **Aguirre-Sierra, A., Bacchetti, T., Salas, J.J., De Deus, A. and Esteve-Núñez, A. (2020)**
A new concept in constructed wetlands: assessment of aerobic electroconductive biofilters.
Environmental Science: Water Research & Technology. ISSN 2053-1419

2. **Al-Salmi, M., Laqbaqbi, M., Al-Obaidani, S., Al-Maamari, R.S., Khayet, M. and Al-Abri, M. (2020)**
Application of membrane distillation for the treatment of oil field produced water.
Desalination, 494. p. 114678. ISSN 00119164

3. **Arribas, P., García-Payo, M.C., Khayet, M. and Gil, L. (2020)**
Improved antifouling performance of polyester thin film nanofiber composite membranes prepared by interfacial polymerization.
Journal of Membrane Science, 598. p. 117774. ISSN 03767388

4. **Aruchamy, K., Maalige R., N., Halanur M., M., Mahto, A., Nagaraj, R., Kalpana, D., Ghosh, D., Mondal, D. and Nataraj, S.K. (2020)**
Ultrafast synthesis of exfoliated manganese oxides in deep eutectic solvents for water purification and energy storage.
Chemical Engineering Journal, 379. p. 122327. ISSN 13858947

5. **Aruchamy, K., Nagaraj, R., Manohara, H.M., Nidhi, M.R., Mondal, D., Ghosh, D. and Nataraj, S.K. (2020)**
One-step green route synthesis of spinel ZnMn2O4 nanoparticles decorated on MWCNTs as a novel electrode material for supercapacitor.
Materials Science and Engineering: B, 252. p. 114481. ISSN 09215107

6. **Buelow, E., Rico, A., Gaschet, M., Lourenço, J., Kennedy, S.P., Wiest, L., Ploy, M.C. and Dagot, C. (2020)**
Hospital discharges in urban sanitation systems: Long-term monitoring of wastewater resistome and microbiota in relationship to their eco-exposome.
Water Research X, 7. p. 100045. ISSN 25899147

7. **Corvea, J.L., Gutiérrez, R., Pascual, J.A., De Bustamante, I. and Blanco, A. (2020)**
Geoheritage Integration in the Management of the Cuban Protected Areas.
Geoheritage, 12 (3). ISSN 1867-2477

8. **De Jong, W.H., Borges, T., Ion, R. M. , Panagiotakos , D., Testai, E., Vermeire, T., Scott, M., Samaras, T., Proykova, A., Kraetke, R., Hoet, P., Bertollini, R., Duarte-Davidson, R., Slama, R., de Voogt, P., Kraetke, R., Proykova, A. and Vighi, M. (2020)**
Guidelines on the benefit-risk assessment of the presence of phthalates in certain medical devices covering phthalates which are carcinogenic, mutagenic, toxic to reproduction (CMR) or have endocrine-disrupting (ED) properties.
Regulatory Toxicology and pharmacology, 111. p. 104546.

9. **De Santiago, A., Meffe, R., Teijón, G., Martínez-Hernández, V., López-Heras, I., Alonso-Alonso, C., Arenas, M. and De Bustamante, I. (2020)**
Pharmaceuticals and trace metals in the surface water used for crop irrigation: Risk to health or natural attenuation?
Science of The Total Environment, 705. p. 135825. ISSN 00489697

10. **Díez-Herrero, A. and Garrote, J. (2020)**
Flood Risk Analysis and Assessment, Applications and Uncertainties: A Bibliometric Review.
Water, 12 (7). p. 2050. ISSN 2073-4441

11. **Fonseca, E., Hernández, F., Ibáñez, M., Rico, A., Pitarch, E. and Bijlsma, L. (2020)**
Occurrence and ecological risks of pharmaceuticals in a Mediterranean river in Eastern Spain.
Environment International, 144. p. 106004. ISSN 01604120

12. **Furdada, G., Victoriano, A., Díez-Herrero, A., Génova, M., Guinau, M., De las Heras, Á., Palau, R.M., Hürlimann, M., Khazaradze, G., Casas, J.M., Margalef, A., Pinyol, J. and González, M. (2020)**
Flood Consequences of Land-Use Changes at a Ski Resort: Overcoming a Geomorphological Threshold (Portainé, Eastern Pyrenees, Iberian Peninsula).
Water, 12 (2). p. 368. ISSN 2073-4441

13. **González-Pleiter, M., Cirés, S., Wörmer, L., Agha, R., Pulido-Reyes, G., Martín-Betancor, K., Rico, A., Leganés, F., Quesada, A. and Fernández-Piñas, F. (2020)**
Ecotoxicity assessment of microcystins from freshwater samples using a bioluminescent cyanobacterial bioassay.
Chemosphere, 240. p. 124966. ISSN 00456535

14. **Islam, M.A., Hossain, M.S., Garcia-Payo, C., Khayet, M. and Ulbricht, M. (2020)**
Mixed Poiseuille-Knudsen flow model for Gas Liquid Displacement porometry data treatment.
Journal of Membrane Science, 612. p. 118422. ISSN 03767388

15. **Lejarazu-Larrañaga, A., Molina, S., Ortiz, J.M., Navarro, R. and García-Calvo, E. (2020)**
Circular economy in membrane technology: using end-of-life reverse osmosis modules for preparation of recycled anion exchange membranes and validation in electrodialysis.
Journal of Membrane Science, 593. p. 117423. ISSN 03767388

16. **Lejarazu-Larrañaga, A., Molina, S., Ortiz, J.M., Riccardelli, G. and García-Calvo, E. (2020)**
Influence of acid/base activation treatment in the performance of recycled electromembrane for fresh water production by electrodialysis.
Chemosphere, 248 (126027). ISSN 00456535

17. **Lejarazu-Larrañaga, A., Ortiz, J.M., Molina, S., Zhao, Y. and García-Calvo, E. (2020)**
Nitrate-Selective Anion Exchange Membranes Prepared using Discarded Reverse Osmosis Membranes as Support.
Membranes, 10 (377). pp. 1-18. ISSN 2077-0375

18. Llamas, M., Vadillo, I., Candela, L., Jiménez-Gavilán, P., Corada, C. and Castro, A.F. (2020)
Screening and Distribution of Contaminants of Emerging Concern and Regulated Organic Pollutants in the Heavily Modified Guadalhorce River Basin, Southern Spain.
Water, 12 (11). p. 3012. ISSN 2073-4441

19. López-García, E., Pérez-López, C., Postigo, C., Andreu, V., Bijlsma, L., González-Mariño, I., Hernández, F., Marcé, R.M., Montes, R., Picó, Y., Pocurull, E., Rico, A., Rodil, R., Rosende, M., Valcárcel, Y., Zuloaga, O., Quintana, J.B. and López de Alda, M. (2020)
Assessing alcohol consumption through wastewater-based epidemiology: Spain as a case study.
Drug and Alcohol Dependence, 215. p. 108241. ISSN 03768716

20. López-Vargas, A., Fuentes, M. and Vivar, M. (2020)
Challenges and Opportunities of the Internet of Things for Global Development to Achieve the United Nations Sustainable Development Goals.
IEEE Access, 8. pp. 37202-37213. ISSN 2169-3536

21. Lupi, D., Tremolada, P., Colombo, M., Giacchini, R., Benocci, R., Parenti, P., Parolini, M. and Vighi, M. (2020)
Effects of pesticides and electromagnetic fields on honeybees: a field study using biomarkers.
International Journal of Environmental Research, 14. pp. 107-122. ISSN 1735-6865

22. Maalige R., N., Dsouza, S.A., Pereira, M.M, Polisetti, V., Mondal, D. and Nataraj, S.K. (2020)
Introducing deep eutectic solvents as flux boosting and surface cleaning agents for thin film composite polyamide membranes.
Green Chemistry. ISSN 1463-9262

23. Mariño, E.E., Teijón, G., Bhattacharya, P. and Schulz, C.J. (2020)
The occurrence of arsenic and other trace elements in groundwaters of the southwestern Chaco-Pampean plain, Argentina.
Journal of South American Earth Sciences, 100. p. 102547. ISSN 08959811

24. Martín-Crespo, T., Gómez-Ortiz, D., Martín-Velázquez, S., Martínez-Pagán, P., De Ignacio, C., Lillo, J. and Faz, Á. (2020)
Abandoned Mine Tailings Affecting Riverbed Sediments in the Cartagena–La Union District, Mediterranean Coastal Area (Spain).
Remote Sensing, 12 (12). p. 2042. ISSN 2072-4292

25. Martínez-Hernández, V., Meffe, R., Hernández-Martín, J., Alonso-González, A., De Santiago, A. and De Bustamante, I. (2020)
Sustainable soil amendments to improve nature-based solutions for wastewater treatment and resource recovery.
Journal of Environmental Management, 261. p. 110255. ISSN 03014797

26. Montes, R., Rodil, R., Rico, A., Cela, R., González-Mariño, I., Hernández, F., Bijlsma, L., Celma, A., Picó, Y., Andreu, V., López de Alda, M., López-García, E., Postigo, C., Pocurull, E., Marcé, R.M., Rosende, M., Olivares, M., Valcárcel, Y. and Quintana, J.B. (2020)
First nation-wide estimation of tobacco consumption in Spain using wastewater-based epidemiology.
Science of The Total Environment, 741. p. 140384. ISSN 00489697

27. Morón-López, J. and Molina, S. (2020)
Optimization of Recycled-Membrane Biofilm Reactor (R-MBfR) as a sustainable biological treatment for microcystins removal.
Biochemical Engineering Journal, 153. p. 107422. ISSN 1369703X

28. Morón-López, J., Nieto, L., Molina, S. and Lezcano, M.A. (2020)
Exploring microcystin-degrading bacteria thriving on recycled membranes during a cyanobacterial bloom.
Science of The Total Environment (736). p. 139672. ISSN 00489697

29. Mruthunjayappa, M.H., Sharma, V.T., Dharmalingam, K., Nataraj, S.K. and Mondal, D. (2020)
Engineering a Biopolymer-Based Ultrafast Permeable Aerogel Membrane Decorated with Task-Specific Fe–Al Nanocomposites for Robust Water Purification.
ACS Applied Bio Materials, 3 (8). pp. 5233-5243. ISSN 2576-6422

30. Pichel, N., Vivar, M., Fuentes, M. and Eugenio, K. (2020)
Study of a hybrid photovoltaic-photochemical technology for meeting the needs of safe drinking water and electricity in developing countries: First field trial in rural Mexico.
Journal of Water Process Engineering, 33. p. 101056. ISSN 22147144

31. Pocurull, E., Marcé, R.M., González-Mariño, I., Rodil, R., Montes, R., Estévez-Danta, A., Andreu, V., Bijlsma, L., Celma, A., Hernández, F., López de Alda, M., López-García, E., Picó, Y., Postigo, C., Rico, A., Valcárcel, Y. and Quintana, J.B. (2020)
El análisis de aguas residuales con fines epidemiológicos: presente y futuro en España. Wastewater-based epidemiology: present and future in Spain.
Revista Española de Drogodependencias, 45 (2). pp. 91-103. ISSN 0213-7615

32. Prado, A., Berenguer, R., Berná, A. and Esteve-Núñez, A. (2020)
Simultaneous characterization of porous and non-porous electrodes in microbial electrochemical systems.
MethodsX, 7. ISSN 2215-0161

33. Prado, A., Ramírez-Vargas, C.A., Arias , C.A. and Esteve-Núñez, A. (2020)
Novel bioelectrochemical strategies for domesticating the electron flow in constructed wetlands.
Science of The Total Environment, 735. ISSN 00489697

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Environmental Science and Ecotechnology, 1. p. 100013. ISSN 2666-4984

1.2 Other articles

1. Arévalo-Torres, J., Hernández, N., Zamora, P., Ramírez-Moreno, M., Ródenas, P., Ortiz, J.M., Esteve-Núñez, A., Viñas-Castillo, J.M., Amador Cabezali, D., Rogalla, F. and Monsalvo, V. (2020)
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2. Barroeta, B. (2020)
Tecnologías electroquímicas microbianas para la industria alimentaria.
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3. Delacámara, G. (2020)
The Global COVID-19 Pandemic and a false sense of (water) security.
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4. Martínez-Hernández, V., Meffe, R., Hernández-Martín, J., De Santiago, A., De Bustamante, I., Martínez, G. and Martínes Cosin, J.M. (2020)

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5. Ortiz, J.M., Barroeta, B. and Esteve-Núñez, A. (2020)
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1.3 Books

1. Leveri, A., Pascual, J.A., Sadres, M. and Rincón, P. (2020)
Escenarios de Cambio Climático en Colombia y Uruguay. Explorando el modelo hidrológico HYDROBID Climate Change Scenarios in Colombia and Uruguay. Exploring HYDROBID hydrological model. Cuadernos de Geomática, 7 . IMDEA AGUA, Centro para el Conocimiento del Paisaje, Alcalá de Henares. ISBN 978-84-09-17885-8

1.4 Books chapters

2. Dargam, F., Perz, E., Bergmann, S., Rodionova, E., Sousa, P., Andrade de Souza, F.A., Matias, T., Ortiz, J.M., Esteve-Núñez, A., Ródenas, P. and Zamora, P. (2020)
Supporting Operational Decisions on Desalination Plants from Process Modelling and Simulation to Monitoring and Automated Control with Machine Learning.
In: Decision Support Systems X - Cognitive Decision Support System and Technologies". Lecture Notes in Business Information Processing (LNBIP_DSS) (384). Springer International Publishing, Switzerland. ISBN 978-3-030-46223-9

3. Delacámara, G. (2020)
Alejándose de los precios del agua para un mundo que no existe.
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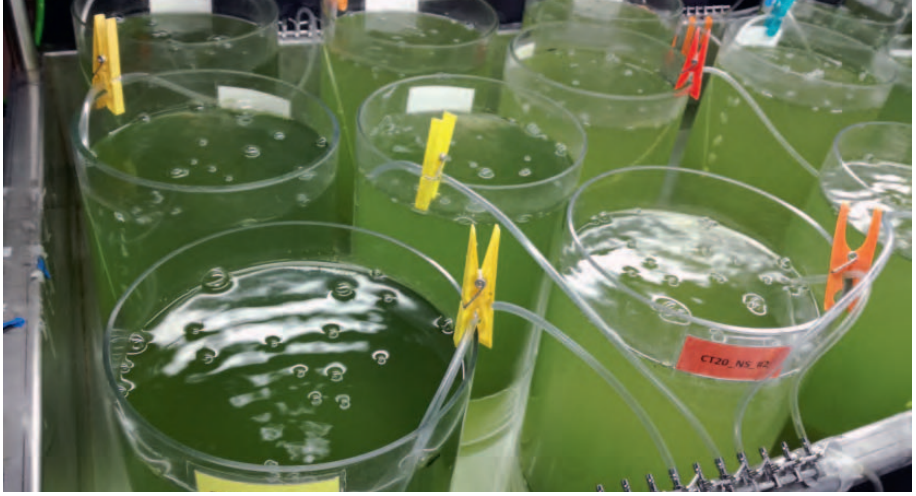

5. Delacámara, G., O´Higgins, T., Lago, M. and Langhans, S. (2020)
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6. Lillebø, A., Teixeira, H., Martínez-López, J., Genua-Olmedo, A., Marhubi, A., Delacámara, G., Mattheiß, V., Strosser, P., O´Higgins, T. and Nogueira, A. (2020)
Mitigating Negative Unintended Impacts on Biodiversity in the Natura 2000 Vouga Estuary (Ria de Aveiro, Portugal).
In: Ecosystem-Based Management, Ecosystem Services and Aquatic Biodiversity: Theory, Tools and Applications. Springer, pp. 461-497. ISBN 978-3-030-45843-0

7. Piet, G., Delacámara, G., Kraan, M., Röckmann, C. and Lago, M. (2020)
Advancing Aquatic Ecosystem-Based Management with Full Consideration of the Social-Ecological System.
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1.5 Scientific-Technical Reports

8. Candela, L., Elorza, F.J., Salehi, N., Vaquero, G. and García-Martínez, D. (2020)
A Groundwater Model for the Lake Chad Basin. Integrating data and understanding of water resources at the basin scale. A Cooperation for International Waters in Africa (CIWA) Technical Report.
Technical Report. International Bank for Reconstruction and Development / The World Bank, Washington, DC 20433. USA.

9. Vighi, M., Ion, R.M. , Scott, M., de Voogt, P. and Linders, J. (2020)
Opinion on the potential for anaerobic biodegradability in marine and freshwater of Linear Alkylbenzene Sulphonates(LAS).
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2. IT platform

1. Interactive virtual visit to the IMDEA Water Institute. European Researchers' Night in Madrid.

3. Publishing edition

1. **Barroeta, B.**
Editorial Coordinator. ISMET news # 19.

2. **Berná, A.**
Editorial Board of International Journal of Environmental Research and Public Health. MDPI editorial.

3. **De Bustamante, I.**
Review Board of ECOVIDA's Biannual Scientific Journal. Diversidad Biológica y su Gestión Integrada (Cuba). 2020

4. **Esteve-Núñez, A.**
Guest editor. Environmental Research and Public Health. Special Issue "Nature-Based and Non -Traditional Approaches for Water Quality Improvement".

5. **Esteve-Núñez, A.**
Guest editor. Minerals. Special Issue "Direct Interspecies Electron Transfer (DIET) Mediated by Electrically-Conductive Minerals'.

6. **Díez-Herrero, A.**
Guest editor. Water. Special Issue "Flood Risk Assessments: Applications and Uncertainties".

4. Lectures

1. **Berná, A.**
Microbial electrochemical sensors for wastewater and environmental concerns.
Workshop 2020 REMTAVARES - Bio3 "Innovative technologies for sustainable management of urban and industrial waste". Online. 17 y 18/12/2020.

2. **De Bustamante, I.**
Reutilización de agua: soluciones basadas en la naturaleza.
I Jornada académica internacional "Hablemos del agua". Grupo de Investigación en Gerencia de la Tierra - Facultad de Ingenierías - Universidad La Gran Colombia. 12/11/2020.

3. **Delacámara, G.**
Alineando los objetivos de la política de agua a los de desarrollo económico y social.
XIII Foro de la Economía del agua. Online. 02/12/2020.

4. **Delacámara, G.**
Masterclass: Water Governance from an Economic Viewpoint: Mastering complexity.
European Junior Water Programme (EJWP1). 17/09/2020.

5. **Delacámara, G.**
Os desafios comuns para os serviços de águas e energía.
Portugal Smart Cities Summit 2020. Fundação AIP. Lisboa (Portugal). 24/09/2020.

6. Esteve-Núñez, A.
10 years of technology development in electromicrobiology to reach the water market.
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7. Esteve-Núñez, A.
Combinación de bacterias electroactivas y sistemas electroquímicos para tratamiento eficiente de aguas residuales.
Webinar de Electroquímica. Escuela de Verano EVE 2020, Universidad de Santiago de Chile (USACH). 04/12/2020.

8. Esteve-Núñez, A.
From wastewater to new bioeconomy values using innovative bio-based solutions.
KETBIO webinar. 24/03/2020.

9. Esteve-Núñez, A.
La economía circular y la bioeconomía desde la perspectiva universitaria.
X Semana de Economía. Pontificia Universidad Católica de Ecuador. 24/11/2020.

10. García Calvo, E.
La I+D+i en IMDEA AGUA.
I Jornada académica internacional "Hablemos del agua". Grupo de Investigación en Gerencia de la Tierra - Facultad de Ingenierías - Universidad La Gran Colombia. 05/11/2020.

11. Ortiz, J.M.
Agua y coronavirus: Desde el lavado de manos a la detección temprana en aguas residuales.
Ciclo Jornadas Virtuales Multidisciplinares de la UCAV (Universidad Católica de Ávila). 19/05/2020.

12. Rico, A.
Ecological risk assessment of chemicals: current situation and future perspectives.
1st International Meeting on Behavior, Ecology and Evolution - In a Changing World (IMBEE). Organized by the Institute of Biological Sciences, Federal University of Juiz de Fora (Brasil). Online. 13 - 15/10/2020.

13. Sánchez, M.B.
The role of wastewater treatment plants in the dissemination of antibiotic resistance in the environment.
Workshop "Evolution of antibiotic resistance". Centro Nacional de Biotecnología. CSIC. Madrid. 07/02/2020.

5. Round tables and experts panels

1. De Bustamante, I.
La regeneración de las aguas residuales ¿Una opción o una necesidad?
Jornada de Debate sobre Aguas Subterráneas. Club del Agua Subterránea, Ministerio para la Transición Ecológica y el Reto Demográfico. Online. 27/10/2020.

2. Delacámara, G.
¿Cómo le damos más valor al agua?
Encuentros CONAMA: ¿Qué recuperación queremos? Fundación CONAMA. Madrid. 26/11/2020.

3. Delacámara, G.
InnoWise Challenge Labs: Finding innovative solutions for water scarcity in Southern Europe.
En el marco del SmartAgrifood Summit (Agrifood20). EIT Food. Málaga (España). 24/09/2020

4. Delacámara, G.
El Agua en la Industria, la Agricultura y la Biodiversidad. Nuevas tecnologías e innovación.
Foro del Agua de ABC. Madrid. 18/12/2020.

5. Delacámara, G.
Agua subterránea en Perú. "Cuando el desafío común es la seguridad hídrica a largo plazo. Elementos de análisis económico sobre la regulación del servicio de monitoreo y gestión de aguas subterráneas".
2030 Water Resources Group del Banco Mundial. Lima (Perú). 15/01/2020.

6. Delacámara, G.
El agua como punto transversal para el logro de los Objectivos de Desarrollo Sostenible.
Expoagua Educativa Sunass 2020: Foro hacia una educación sanitaria transversal. Sunass (Perú). 03/12/2020.

7. Delacámara, G.
OECD 6th Meeting of the Roundtable on Financing Water. Session 3: Contributing to a green and resilient recovery: A role for water-related investments.
EIB y OECD. 07/12/2020.

8. Delacámara, G.
A Water-Smart Society for a successful Post COVID19 Recovery Plan.
Sesión 1 de la Innovation Water week Digital Edition: "A Water-Smart Society for a post-COVID19 Green Deal". Organizada por WIE (Water Innovation Europe). 22/06/2020.

9. Delacámara, G.
13th Meeting of the OECD Water Governance Initiative.
Paris (Francia). 9 - 10/01/2020.

10. Delacámara, G.
Alineando los objetivos de la política de agua a los de desarrollo económico y social.
Sesión 2 del XIII Foro de la Economía del Agua. 02/12/2020.

11. Delacámara, G.
Economía y sostenibilidad ante el nuevo escenario
"Sociedad post-pandemia". Club The Place, espacio de innovación y experimentación de The Valley. Madrid. 15/04/2020.

12. Delacámara, G.
El valor de la política basada en evidencia de cara a la emergencia climática y la seguridad hídrica a largo plazo.
Sesión 2 del XII Foro de la Economía del Agua. 14/07/2020.

13. Delacámara, G.
14th Meeting of the OECD Water Governance Initiative.
OECD Water Governance Initiative (WGI). 02 - 03/11/2020.

14. Delacámara, G.
Maratón Digital de Acción por el Clima.
Centro de Documentación y Recursos para la Educación Ambiental en Cantabria (CEDREAC). 09/05/2020.

15. Delacámara, G.
OECD Working Party on Biodiversity, Water and Ecosystems (WPBWE): Special Session of the WPBWE.
Organized by OECD. 15/12/2020.

16. Delacámara, G.
Seminario de Políticas Públicas: Gobernanza del Agua en Perú.
Organized by OECD and MINAM (Ministerio de Medio Ambiente) de Perú. 15 - 16/12/2020.

17. Delacámara, G.
Situación y problemas de la gobernanza del agua en España. Mesa 1 "Balance hídrico y gobernanza"
Seminario online: El agua en España: Economía y Gobernanza. Organized by: FEDEA and IEF. 14/10/2020.

18. Delacámara, G.
Workshop: Quantitative Assessment of Water Security. Keynote speaker: "The Value of Water: A Water Security Perspective".
Water Europe Working Group on "Water Security". KWR Water Research Institute. Nieuwegein (Países Bajos). 29/01/2020.

6. Participation in Scientific Committees

1. Organization Committee. BioComunica20. Congreso anual de la Asociación de Comunicadores de Biotecnología-AcB. 28/09/2020. **Barroeta, B.**

2. Organization Committee. Junta de socios de la Asociación Comunicación de Biotecnología-AcB. Preparación del congreso ComunicaBiotec20. 07/05 y 21/05/2020. **Barroeta, B.**

3. Scientific Committee EU ISMET 2020 - 5th European Meeting of the International Society for Microbial Electrochemistry and Technology (ISMET), Girona. **Barroeta, B.**

4. Committee: CTN 318 "RIEGOS". Ministerio de Agricultura, Pesca y Alimentación. Ministerio para la Transición Ecológica. International Standard Organization (ISO). **De Bustamante, I., Martínez, V.**

5. Technical Awards Commission "Latinoamérica en Verde". **De Bustamante, I.**

6. Committee for the Valuation of Patent Applications and Utility Models. UAH. **De Bustamante, I.**

7. Co-director for Innowise Challenge Labs. on water scarcity, competitive event within the framework of the EIT Project "Searching for innovative solutions for water scarcity in southern Europe". Organized by EIT Food and Bioazul. Smart Agrifood Summit. Málaga. 24/09/2020. **Delacámara, G.**

8. Water Economics Forum. Academic Director and spokesman. **Delacámara, G.**

9. Leader of the Vision Task on "Value of Water" of the Water Europe platform. **Delacámara, G.**

10. Mission Assembly on Healthy Oceans. Seas, Coastal and Inland Waters, EU Horizon Europe Programme, DG RTD - DG for Research and Innovation, European Commission. **Delacámara G.**

11. Mirror group of Spain, Mission Assembly on Healthy Oceans. Seas, Coastal and Inland Waters, EU Horizon Europe Programme, DG RTD - DG for Research and Innovation. **Delacámara G.**

12. Water Governance Initiative, OCDE. **Delacámara G.**

13. External Science Advisory Council (ESAC) of KWR Watercycle Research Institute. Netherlands. **Delacámara G.**

14. Special Advisory Board, International Desalination Association (IDA). **Delacámara G.**

15. Scientific Committee. EU ISMET 2020 - 5th European Meeting of the International Society for Microbial Electrochemistry and Technology (ISMET), Girona. **Esteve-Núñez, A.**

16. Scientific Committee. 1st Virtual ISMET Meeting. **Esteve-Núñez, A.**

17. Working Group WG-4 MP Microplastics. Norman Network. **Landaburu, J., Martínez, V.**

18. Working Group WG-5 Water reuse and policy support. Norman Network. **Landaburu, J., Martínez, V., Meffe, R.**

19. Scientific Committee. XIV Jornadas de Investigación de la Zona No Saturada (ZNS). **Martínez, V.**

20. Working group of Contaminants of Emerging Concern. Plataforma Europea del Agua- Water Supply and Sanitation Technology Platform – WssTP. **Martínez, V.**

21. R&D committee member for the current Board, term ending November 2021. International Desalination Association (IDA). **Ortiz, J.M.**

7. Oral Communications

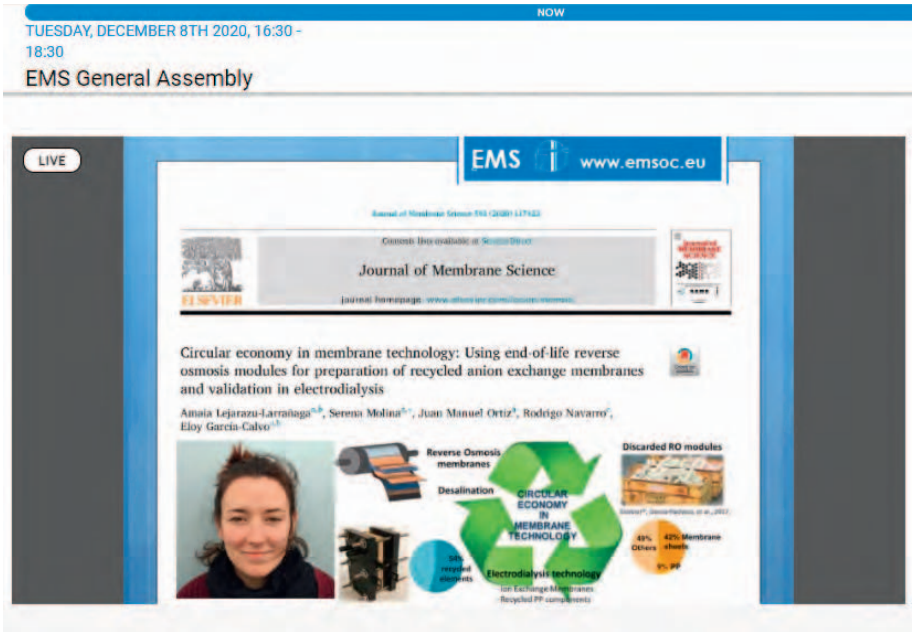
1. **Berenguer, R., Ortiz, J.M., Ramírez, M., Esteve-Núñez, A.**
Efecto de la Porosidad Inaccesible en Electrodos Activados, sobre la Electroactividad Microbiana.
V Workshop de la Red E3TECH / I Workshop Iberoamericano a Distancia E3TECH "Aplicaciones Medioambientales y Energéticas de la Tecnología Electroquímica". Online. 28 - 31/10/2020.

2. **Gonzalez-Mariño, I., Rodil, R., Montes, R., Ares, L., Andreu, V., Bijlsma, L., Etxebarría, N., Hernández, F., López de Alda, M., López-García, E., Marce, R.M., Miró, M., Pico, Y., Pocurull, E., Postigo, C., Rico, A., Valcárcel, Y., Quintana, J.B.**
Assessment of the Spanish population exposure to phthalate plasticizers as obtained by wastewater-based epidemiology.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

3. **Lejarazu, A., Molina, S., Ortiz, J.M., García-Calvo, E.**
Nitrate selective anion exchange membranes prepared by using discarded Reverse Osmosis membranes as support.
MELPRO 2020, International conference focused on membrane and electromembrane processes. Online. 8 - 11/11/2020.

4. **Lejarazu, A., Molina, S., Ortiz, J.M., García-Calvo, E.**
Preparación de membranas de Intercambio Iónico sobre soportes reciclados de membranas desechadas.
VIII Jornadas de Jóvenes Investigadores de la UAH. Online. 10 y 11/12/2020.

5. **Peñacoba, L.**
Metland, Sistema innovador y sostenible para el tratamiento de aguas residuales urbanas.
VIII Jornadas de Jóvenes Investigadores de la UAH. Online. 10 y 11/12/2020.



6. Pradana, R., Sixto, H., González, B.D., Demaría, I., Moya, J.C., González, I., Martínez-Hernández, V. De Bustamante, I.
Poplar Vegetation Filters for the Beer Industry: Wastewater Treatment Combined with Biomass Production.
XI Congreso Ibérico de Gestión y Planificación del Agua. Online. 03 - 09/09/2020.

7. Ramírez, M.
Celdas de desalinización microbiana: producción de agua potable con bajo coste energético.
VIII Jornadas de Jóvenes Investigadores de la UAH. Online. 10 y 11/12/2020.

8. Ramírez, M., Ródenas, P., Ortiz, J.M., Zamora, P., Arévalo, J., Monsalvo, V.M., Rogalla, F., Esteve-Núñez, A.
Desalinización electroquímica microbiana para la obtención sostenible de agua potable.
V Workshop de la Red E3TECH / I Workshop Iberoamericano a Distancia E3TECH "Aplicaciones Medioambientales y Energéticas de la Tecnología Electroquímica". Online. 28 - 31/10/2020.

9. Rico, A., Schell, T., Hurley, R., Nizzetto, L., Vighi, M.
Fate of microplastics in agricultural soils amended with sewage sludge.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

10. Schell, T., Cherta, L., Dafouz, R., Rico, A., Vighi, M.
Bioconcentration of organic contaminants in fish in the presence of microplastics: Is the "Trojan horse" effect a matter of concern?.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

11. Vighi, M.
Microplastiche. Origine, esposizione e rischio per l'ambiente e per l'uomo.
SITOX-19° National Congress. Società Italiana di Tossicologia. Online. 11-12/02/2020.

12. Vighi, M.
Ecotossicologia: plastica ed impatto sugli organismi. In: Plastiche, microplastiche e tossicità: quali evidenze per uomo e ambiente.
Società Italiana di Tossicologia. Online. 28/09/2020.

13. Vighi, M.
Ecological Risk Assessment in the third millennium. A new paradigm for ecotoxicology.
SETAC Argentina. Implementing Chemicals Risk Assessment Procedures in Latin America: Where Should We Go? Online. 01/12/2020

8. Posters

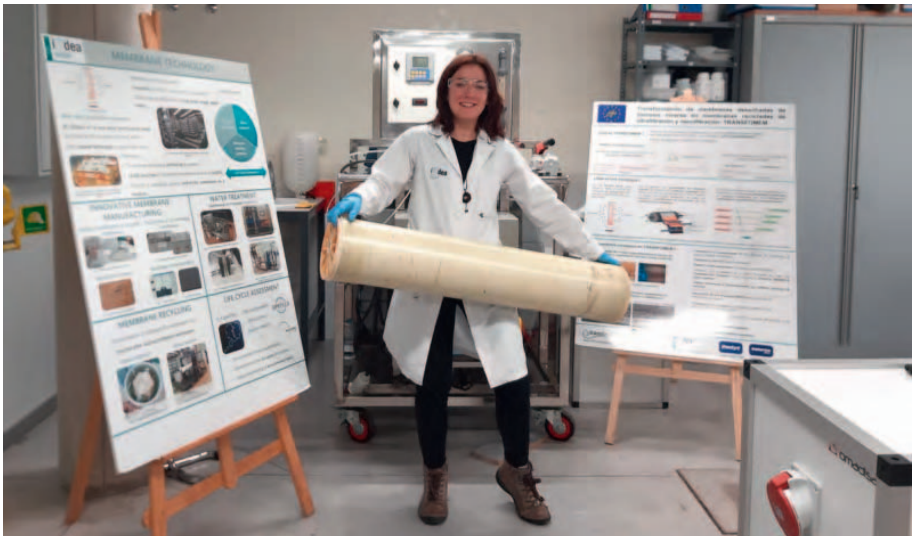
1. **Huidobro, B., López-Heras, I., Nozal, L., Martínez-Hernández, V., De Bustamante, I.**
Optimization of analytical conditions to identify transformation products (TPs) by LC-QTOF: application to monitor the wastewater treatment of a vegetation filter (VF)".
16th Annual Workshop on Emerging High-Resolution Mass Spectrometry (HRMS) and LC-MS/MS Applications in Environmental Analysis and Food Safety. Organiza IDAEA-CSIC. Barcelona (online). 15 - 16/10/2020.

2. **Lejarazu, A., Molina, S., Ortiz, J.M., García-Calvo, E.**
Nitrate selective Anion Exchange Membranes prepared by using discarded Reverse Osmosis membranes as support.
ICOM 2020, International Congress on Membranes & Membrane Processes. Online. 7 - 11/12/2020.

3. **Lejarazu, A., Molina, S., Ortiz, J.M., Riccardelli, R., García-Calvo, E.**
Increasing the performance of Anion Exchange Membranes prepared from discarded Reverse Osmosis membranes.
MELPRO 2020, International conference focused on membrane and electromembrane processes. Online. 8 - 11/11/2020.

4. **Lejarazu, A., Molina, S., Ortiz, J.M., Riccardelli, R., García-Calvo, E.**
Increasing the performance in electrodialysis of Ion Exchange Membranes prepared using discarded Reverse Osmosis membranes as support.
ICOM 2020, International Congress on Membranes & Membrane Processes. Online. 7 - 11/12/2020.

5. **Lejarazu, A., Molina, S., Ortiz, J.M., Riccardelli, R., García-Calvo, E.**
Mejorando la eficiencia en electrodiálisis de membranas de intercambio aniónico preparadas sobre membranas recicladas.
V Workshop de la Red E3TECH "Aplicaciones Medioambientales y Energéticas de la Tecnología Electroquímica". Online. 28 - 31/10/2020.



6. López-García, E., Montes, R., Postigo, C., Rodil, R., González-Mariño, I., Andreu, V., Bijlsma, L., Félix, H., Marce, R.M., Olivares, M., Pico, Y., Pocurull, E., Rico, A., Rosende, M., Valcárcel, Y., Zuloaga, O., Quintana, J.B., López de Alda, M.
Chemical fingerprint of alcohol and nicotine consumption in Spanish wastewaters.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

7. López-Herguedas, N., Castellblanco, N., Prieto, A., González-Gaya, B., Olivares, M., Etxebarría, N., Rico, A., Zuloaga, O.
Seasonal trends of xenobiotic compounds in wastewater treatment plants effluents from Madrid (Spain): target and suspect screening.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

8. Oliveira, T, Polazzo, F., Arenas-Sánchez, A., Vighi, M., Rico, A.
Nutrient enrichment and predator stress influence the impacts of pesticides on D. pulex populations under Mediterranean conditions.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

9. Ortiz, J.M.
Microbial Desalination for Low Energy Drinking Water: Pilot Plant Operation and Desalination Performance Analysis.
1st Virtual ISMET Meeting. Online. 07 - 09/10/2020.

10. Polazzo, F., Vighi, M., Arenas-Sánchez, A., Oliveira, T., Rico, A.
Multiple stressors in agricultural freshwater ecosystems: interactions between two widely used pesticides (chlorpyrifos and diuron) and nutrients under Mediterranean conditions.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

11. Ramírez, M.
Comparative performance of Microbial Desalination Cells using air diffusion and liquid cathode reactions: study of the salt removal and desalination efficiency.
1st Virtual ISMET Meeting. Online. 07 - 09/10/2020.

12. Ramírez, M., Ródenas, P., Aliaguilla, M., Bosch-Jiménez, P., Borrás, E., Zamora, P., Monsalvo, V., Rogalla, F., Ortiz, J.M., Esteve-Núñez, A.
Estudio comparativo entre celdas de desalinización microbianas con diferentes reacciones catódicas.
V Workshop de la Red E3TECH / I Workshop Iberoamericano a Distancia E3TECH "Aplicaciones Medioambientales y Energéticas de la Tecnología Electroquímica". Online. 28 - 31/10/2020.

13. Ramírez, M., Ródenas, P., Ortiz, J.M., Zamora, P. Hernández,N., Arévalo, J., Monsalvo, V., Rogalla, F., Esteve-Núñez, A.
Desalinización sostenible para la obtención de agua a bajo coste: del concepto de laboratorio al escalado en planta piloto (Proyecto H2020- MIDES).
V Workshop de la Red E3TECH / I Workshop Iberoamericano a Distancia E3TECH "Aplicaciones Medioambientales y Energéticas de la Tecnología Electroquímica". Online. 28 - 31/10/2020.

14. Rico. A., Arenas-Sánchez, A., Pasqualini, J., García-Astillero, A., Vighi, M.
Confirming the SSD and the msPAF approach for the ecotoxicological risk assessment of neonicotinoids under semi-field conditions.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

15. Rico. A., Waichman, A., Nunes, G., Oliveira, R., González-Gaya, B., Villa, S., Nizzetto, L., Vighi, M.
SILENT AMAZON: Presence and risks of anthropogenic contaminants in the Amazon River.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

16. Rodríguez, L., Landaburu, J. Molina, S., García-Calvo, E.
Study of surface modification of recycled membranes using statistical design of experiments.
ICOM 2020, International Congress on Membranes & Membrane Processes. Online. 7 - 11/12/2020.

17. Rodríguez, L., Patsios, S.I., Landaburu, J. Molina, S., García-Calvo, E., Karabelas, A.J.
Use of recycled ultrafiltration membrane for aerobic membrane bioreactor.
ICOM 2020, International Congress on Membranes & Membrane Processes. Online. 7 - 11/12/2020.

18. Schell, T., Dafouz, R., Rico, A., Vighi, M.
Acute and chronic effects of tire particles and microfibers on Daphnia magna.
SETAC SciCon, SETAC Europe 30th Annual Meeting. Online. 03 - 07/05/2020.

19. Senán, J., Landaburu, J., García-Calvo, E.
A new hierarchy for end-of-life reverse osmosis membranes? An overview through Life Cycle Assessment perspective.
ICOM 2020, International Congress on Membranes & Membrane Processes. Online. 7 - 11/12/2020.

9. Patents

1. Method of desalination and wastewater treatment in a microbial desalination cell (MDC) reactor. EP3336064B1 Ortíz Díaz-Guerra, J.M., Esteve Núñez, A., Borjas Hernández, L.Z., Monsalvo García, V.M., Rogalla, F.

10. Fellowships

Anamary Pompa Pernía
Category: Predoctoral researcher
Fund: Spanish Ministry of Science and Innovation

Andreu Rico Artero
Category: Researcher from *Juan de la Cierva Incorporación* Programme
Fund: Spanish Ministry of Science and Innovación

Antonio Berná Galiano
Category: Researcher from *Juan de la Cierva Incorporación* Programme
Fund: Spanish Ministry of Science and Innovación

Ariadna García-Astillero Honrado
Category: Research support
Fund: Spanish Ministry of Science and Innovation

Claudia Martínez Megías
Category: Predoctoral researcher
Fund: Community of Madrid

Alberto Blanco González
Category: Research support
Fund: Spanish Ministry of Economy, Industry and Competitiveness

Ana de Santiago Martín
Category: Researcher from Regional Science Programme "Talent atraction"
Fund: Community of Madrid

Amaia Ortiz de Lejarazu Larrañaga
Category: Predoctoral researcher
Fund: Spanish Ministry of Economy and Competitiveness

Raquel Dafouz Ramírez
Category: Research support
Fund: Community of Madrid

Noelia C. Peral Romero
Category: Laboratory technician
Fund: Community of Madrid

Borja Fernández Retuerto
Category: Predoctoral researcher
Fund: Community of Madrid

Blanca Huidobro López
Category: Predoctoral researcher from National Science Programme "Funds for the training of doctors" FPI
Fund: Spanish Ministry of Science, Innovation and Universities

Marina Ramírez Moreno
Category: Predoctoral researcher
Fund: Community of Madrid.

Marina Alba Peña
Category: Research support
Fund: Spanish Ministry of Science and Innovation.

Lorena Martínez García
Category: Research support
Fund: Spanish Ministry of Science and Innovation.

Helena Ocaña Biedma
Category: Research support
Fund: Spanish Ministry of Science and Innovation.

Luis Simón Monllor Alcaraz
Category: Laboratory technician
Fund: Spanish Ministry of Science and Innovation.

11. Phd Thesis

PhD thesis defended

1. **Berta Díez Odriozola.** Fouling and biofouling resistant membranes for water treatment processes. Director: Roberto Rosal García (22/07/2020)

Thesis in progress

1. **Akram Gashtasebi.** To be determined. Director: Abraham Esteve Núñez and Karina Boltes Espinola.

2. **Alain Oviedo Pila.** Patrimonio hidráulico histórico para la prevención de inundaciones en el levante español. Directora: Irene de Bustamante Gutiérrez.

3. **Alejandro Donato Morales.** To be determined. Director: Francisco Carreño Conde.

4. **Álvaro Pun García**. Efecto de contaminantes emergentes en lechos bioelectroquímicos. Directors: Abraham Esteve Núñez and Karina Boltes Espínola.

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

6. **Amanda Prado Nicolás.** Depuración de aguas residuales mediante uso de metland con biochar electroconductor como sustrato biofiltrante. Director: Abraham Esteve Núñez.

7. **Ana María Fernández Santamarina.** Análisis de factores determinantes para la estimación del régimen ecológico de caudales: aplicación a las especies piscíclas y a la vegetación de ribera en el tramo medio del río Jarama (Madrid). Directors: **Á**ngel Luis Ud**í**as Moinelo and Fernando Magdaleno Mas.

8. **Anamary Pompa Pernía.** Tratamiento de aguas residuales mediante sistemas híbridos basados en membranas recicladas para recuperación de compuestos valiosos. Directors: Serena Molina Martínez and Junkal Landaburu Aguirre.

9. **Andrés de Deus Villagra.** Estrategias 3D de "cableado" redox en bacterias electroactivas para recuperar ambientes contaminados. Director: Abraham Esteve Núñez

10. **Andrés Escare Ruminot.** Metodología para la estimación de la huella hídrica en campañas de exploración de cobre en escenarios de variabilidad geológica. Director: Christian Salazar Soto

11. **Blanca Huidobro López.** Regeneración de aguas mediante un nuevo concepto de filtros verdes. Condiciones hidrogeológicas. Directoras: Irene de Bustamante Gutiérrez and Leonor Nozal Martínez

12. **Carlos Edo Cuesta.** Occurrence and environmental fate of microplastics as emerging anthropogenic pollutants. Directors: Roberto Rosal García and **Mª Soledad Faraldos Izquierdo**

13. **Carlos Manchón Vállegas.** Depuración de aguas residuales y recuperación de nutrientes mediante bacterias fotótrofas rojas en reactores electroquímicos. Director: Abraham Esteve Núñez.

14. **Claudia Martínez Megías.** Ecotoxicological techniques for assessing resilience to climate change and chemical stress at the ecosystem of La Albufera (Valencia, Spain). Director: Andreu Rico Artero.

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

16. **Cristina Villar Martín.** Biosensores electroactivos. Director: Abraham Esteve Núñez.

17. **Eduardo Noriega Primo.** Tecnologías electroquímicas microbianas aplicadas al tratamento de aguas residuales industriales. Director: Abraham Esteve Núñez

18. **Elena María Chaves Chaves.** Desarrollo de una metodología para evaluar el efecto de las inundaciones en la movilización de la contaminación asociado a entornos rurales y urbanos de Costa Rica. Director: Francisco Carreño Conde.

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

20. **Flúquer Peña Laureano.** El agua subterr**á**nea en los sistemas k**á**rsticos de la reserva Nor Yauyos Cochas. Directors: Irene de Bustamante Guti**é**rrez and Javier Lillo Ramos.

21. **Franceso Polazzo.** Impacts of global change in the vulnerability of aquatic ecosystems to chemical stress. Director: Andreu Rico Artero.

22. **Jacquelyne del Rosio Chagua Flores.** Estudio hidrogeol**ó**gico, disponibilidad y calidad del agua subterr**á**nea en la cuenca Sama, Tacna, Per**ú**. Directora: Irene de Bustamante Guti**é**rrez.

23. **Jorge Carlos Delgado García**. Análisis de las implicaciones de la viabilidad de reutilización del agua en la edificación. Director: Fernando Da Casa Martín.

24. **Jorge Senán Salinas**. Análisis de Ciclo de Vida en la transición a la Economía Circular. Caso de estudio: El reciclaje en la tecnología de membrana. Directora: Junkal Landaburu Aguirre.

25. José María Campo Carrera. Aplicaciones del avance en el conocimiento del fenómeno del niño y las influencias del cambio climático, en la hidrología operativa en la costa de Ecuador. Director: Ángel Luis Udías Moinelo

26. Juan José Castro Ríos. Hidrología y gestión del agua en la ingeniería romana: caso de la red hidráulica de Las Médulas. Directors: Irene de Bustamante Gutiérrez and Javier Lillo Ramos

27. Laura Chaparro Díaz. Eliminación de contaminantes emergentes con sistemas bioelectroquímicos. Directors: Karina Boltes Espínola and Abraham Esteve Núñez.

28. Laura Rodríguez Sáez. Uso de membranas recicladas de ultrafiltración en biorreactores de membrana para tratamiento de aguas residuales. Directoras: Junkal Landaburu Aguirre and Serena Molina Martínez.

29. Laura Valenzuela Ávila. Photocatalytic nanostructured coatings with antimicrobial and self-cleaning properties. Directors: Roberto Rosal García and Francisca Fernández Piñas.

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

31. Lucía Barbero Morales. Destino y transporte de contaminantes de preocupación emergente en el medio ambiente: enfoque multiescala acoplado a modelización. Directoras: Irene de Bustamante Gutiérrez and Virtudes Martínez Hernández.

32. María Llorente Remartínez. Reactores electroquímicos microbianos basados en electrodos fluidizados: una nueva plataforma Biotech para el desarrollo de aplicaciones ambientales. Director: Abraham Esteve Núñez.

33. Marina Ramírez Moreno. Comportamiento electroquímico de celdas de desalinización microbiana a escala laboratorio. Director: Abraham Esteve Núñez

34. Mario Jiménez Conde. Biofiltros electrogénicos con sustratos vegetales para la reducción de nitratos en aguas. Directors: Eloy García Calvo and Abraham Esteve Núñez.

35. Mario Márquez Gallegos: Sistema urbano de drenaje sostenible como alternativa de control y regulación de aguas de lluvia en la ciudadela Urdesa de ciudad Guayaquil. Directors: Irene de Bustamante Gutiérrez and Juan Antonio Pascual Aguilar.

36. Marisela Uzcategui: Estimación del riesgo hidrogeológico a la contaminación a partir de un modelo de relación de parámetros e índices de calidad de las aguas subterráneas. Director: Javier Lillo Ramos.

37. Mercedes Echegaray Giménez. La gobernanza del agua en España. Directors: Irene de Bustamante Gutiérrez and Bernardo López-Camacho Camacho.

38. Raúl Jerónimo Pradana Yuste. Generando biomasa con aguas regeneradas; oportunidad para la bioeconomía circular. Directors: Irene de Bustamante Gutiérrez, Borja Daniel González and Hortensia Sixto Blanco.

39. Sara Pelegrín Mc Carthy. Planificación hidrológica comparada: España y Reino Unido. Herramienta para cumplir los ODS 2030 y cambio climático. Directors: Irene de Bustamante Gutiérrez and Bernardo López-Camacho Camacho.

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

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

42. Ting Wei. To be determined. Director: Abraham Esteve Núñez.

12. Internships

Student: Jessica Andrade Vilas Boas
Research: Evaluating the effect of multiple stressors on the planktonic community
Centre: Universidad Federal Juiz de Fora, Brazil
Date: 21/08/2019 – 20/02/2020

Student: David Ewusi-Mensah
Research: Microbial electrochemical systems
Centre: University of Hubai, China
Date: 26/08/2019 – 20/01/2020

Student: MD Tabish Noori
Research: Microbial osmotic desalination with energy and nutrient recovery
Centre: Universidad de Alcalá – Got Energy Talent Program
Date: 19/09/2019 – 18/09/2020

Student: Samuel Martin
Research: Bioengineering
Centre: Universidad Libre de Bruselas, Belgium
Date: 17/02/2020 – 31/03/2020

Student: Al-Moatasen Mohammed Talib Mohammed Al-Aufi
Research: Characterizing the end-of-life reverse osmosis membranes
Centre: National University in Muscat, Oman
Date: 02-25/03/2020

13. RTD activities organization

1. H2020 MIDES 48 Month General Assembly. Encuentro online. 26/05/2020. Esteve-Núñez, A., Ortiz, J.M., Barroeta, B.

14. Institutional Activities

14.1 Awards and Merits

1. H2020 iMETland project, coordinated by Bioe Group, has been selected second best European Project by the experts of KETBIO. Junio 2020.

2. The innovation *Method of desalination and wastewater treatment in a microbial desalination cell* (Esteve-Núñez, A., Ortiz, J.M., et al.) developed by H2020 MIDES Project was assessed by the JRC's Market Creation Pontencial indicator framework as havig as a "High" level of Market Creation Potential. Innovation Radar Platform of the European Commission.

3. Esteve-Núñez, A. Primer Premio a la mejor contribución científica conjunta en los Premios 2020 CEI (Campus de Excelencia Internacional) Energía Inteligente por *Sistemas biológicos y bioelectroquímicos para la producción de hidrógeno y la fijación de carbono mediante bacterias fototróficas púrpuras.* 29/10/2020.

4. Ortiz de Lejarazu, A. Best Paper Award of the European Membrane Society for "Circular economy in membrane technology: Using end-of-life reverse osmosis modules for preparation of recycled anion exchange membranes and validation in electrodialysis (Lejarazu, A., Molina, S., Ortiz, J. M., Navarro, R., & García-Calvo, E.", Journal of Membrane Science, 593, January 2020).

5. Rico, A. Toxics 2020 Young Investigator Award.

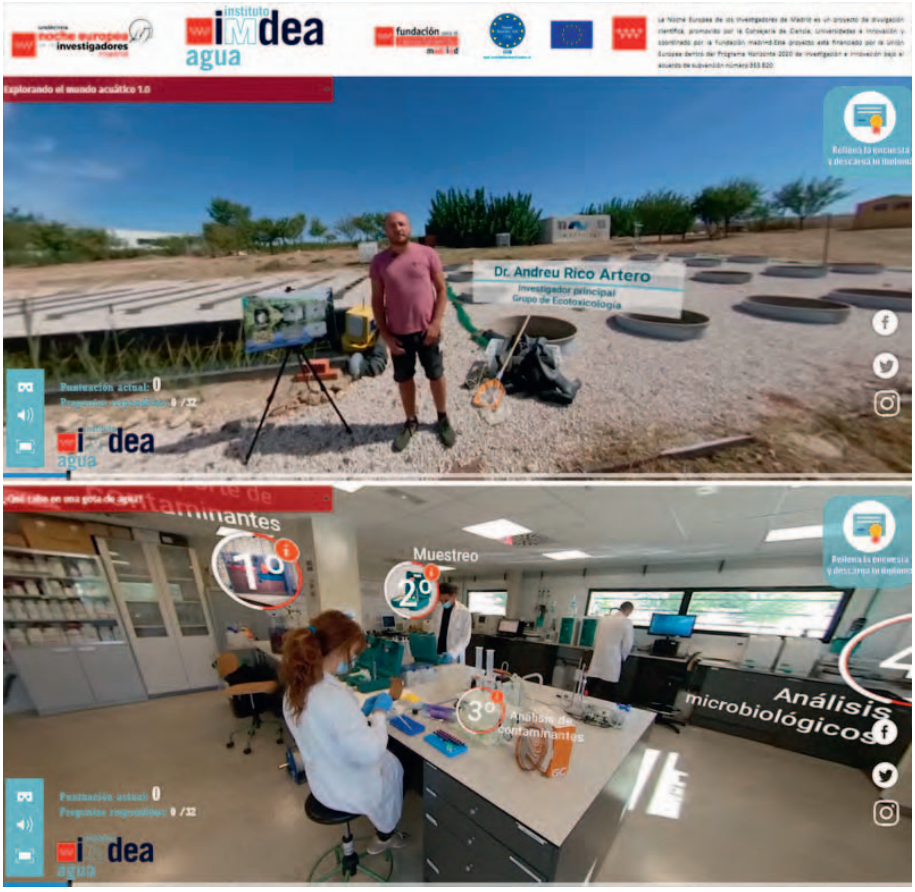
14.2 Other institutional activities

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

- Participation. XX Science and Innovation Week. Madrid, Spain. 2020

- Participation. XI European Researchers' Night. Madrid. Spain. 2020

- Member of Euraxess Service Network. Local Contact Point



14.3 Measures COVID-19

An external certifying company has verified the protocol ("Protocol of preventive action measures against COVID-19") that IMDEA Water has implemented to guarantee a safe work environment.

IMDEA Water has created a Monitoring Committee and a Cisis-Response Team with the aim of taking the necessary measures to facilitate the activity of the center in all its areas.

Taking into account the guidelines of the health authorities in relation to COVID-19, the monitoring committee has implemented the following plans:

Employee Safety Plan

Risk exposure assessment
Productive activity plan
Specific training plan
Plan for the development of on-site activity in the building
Cleaning and disinfection plan

Internal Work Organization Plan

Personal organization chart by work groups
Organizational measures in the laboratories
Coordination of business activity
Psychosocial risk measures

External Communication Plan

- Communication with visits to IMDEA Water
- Communication with associated researchers
- Communication with suppliers. Measures
- General public attention

Incident resolution system

- Incident resolution system
- Systematic resolution of general incidents
  - Teleworking
  - On-site

Economic Contingency Plan

- Covid derived expenses tracking
- Investment needs review
- Income forecast incidents
- Annual treasury plan review

Internal Communication Plan

- Communication matrix development
- Action plan: Public, systematic and channels
- Building signs: Intranet adaptation
- Specific email account

Contol indicators

- Number of incidents detected/resolved
- Number of actions in process / completed by Plan
- Number of interactions strategic surveillance
- % distribution telework/on-site

Research Activity Management Plan

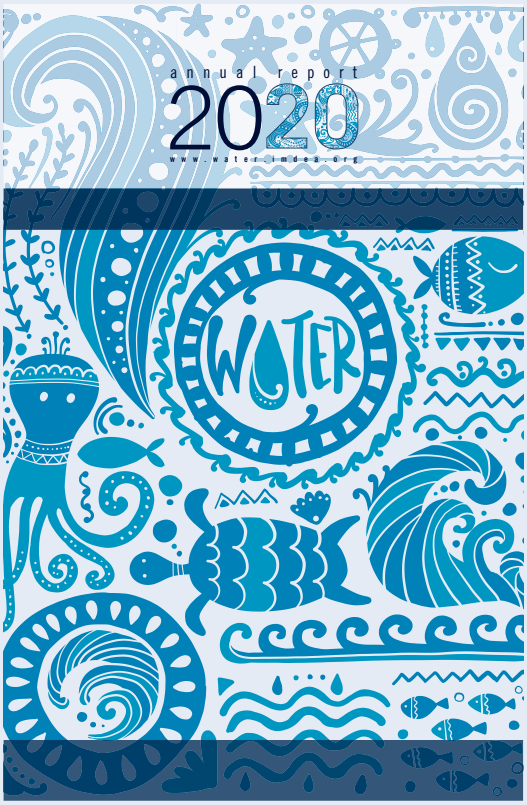
Q. Extension of the teleworking platform
Q. Map of alternative suppliers

Risk Control and Threat Surveillance Plan

- Development of the strategic monitoring process
- Development of the Evernote platform structure
- Create the "Threats COVID-19" structure
  - Political, economic, evolution of contagion security
- Create the "COVID19 Opportunities" structure
  - Innovation
  - Competition
  - Good practices

COVID Safe protocol

- APP Plus Certificate
- Certification process, evidence



institute imdea water

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