annual report

2021

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imdea water institute

just water

institute imdea water

Eloy García Calvo
Director, IMDEA Water Institute
May 2022

annual report 2021

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In 2021, similarly to 2020, IMDEA Water's activities were still affected by the SARS-COV-2 pandemic. We were, however, able to take advantage of the experience and the risk management contingency plan drawn up the previous year. To name a few examples: work organization, internal and external communication and threat and opportunity monitoring were periodically analyzed by the crisis committee. Said committee was created with the ultimate aim of protecting staff health.

Performance indicators that do not depend on social interaction have again remained stable or increased when compared to pre-pandemic years. Indicators such as event attendance, intern intake or training and awareness-raising activities, although they have significantly grown compared to 2020, are still far from pre-pandemic values.

Of the 23 projects undertaken this year, it is worth noting that 6 were European and 6 were Research Challenges (Retos Investigación). The 4 industrial doctorates are also note-worthy as they were carried out in collaboration with companies.

Work has also begun on a new project funded by the Community of Madrid that, among other things, will allow us to pilot all the technologies developed in our institution, using water of different qualities and analyzing the risks of possible chemical and microbiological contaminants. This enhances the ability to perform microbiological analyses and how to eliminate their possible effects, including cyanobacteria and genes, and antibiotic-resistant microorganisms.

In addition, a laboratory dedicated to the analysis of micro and nanoplastics is being created. This laboratory will be operational during 2022. It will be a powerful instrument to work in as a relevant a sector as the contamination of water and soil with micro and nanoplastics.

Of the 15 active contracts during the year, 6 were for the EU's Directorate-General for Environment and the European Parliament.

Among the results, it is worth highlighting the high level of quality of scientific articles (75% of them are in the first quartile (Q1)).

The METfilter spin-off, which is partially owned by IMDEA Agua, in addition to its work with urban waters and the oil-gas sector, has expanded its activity to treat waters from new sectors such as the wine industry or the pharmaceutical industry.

Finally, my thanks to all of IMDEA Agua's staff for their commitment to maintaining or increasing business in a year in which we have still faced post-pandemic challenges, despite it being easier than 2020. This long yet exceptional period has not diminished our staff's enthusiasm towards solving both everyday and unprecedented difficulties.

words from the director...

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editor
IMDEA Water Institute

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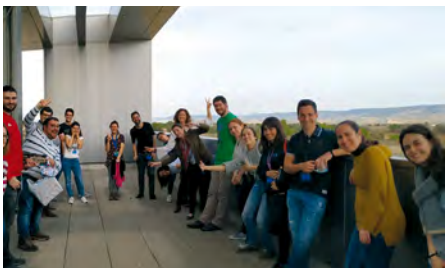
executive summary

Human Capital

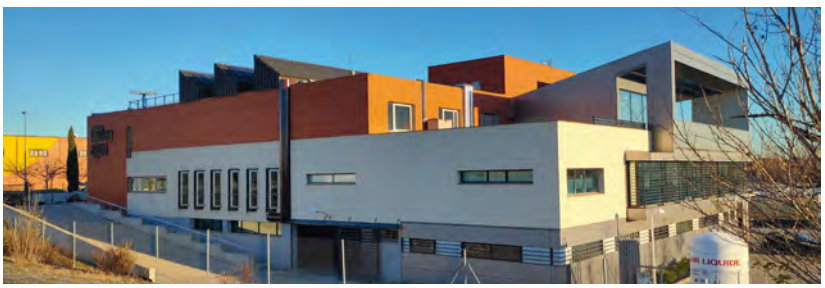
- **40** Researches
- **13** Laboratory staff
- **29** Associated researchers
- **9** Administration and management staff



Scientific results

- **58** Articles in journals, 43 in high impact journals (Q1)
- **10** Books chapters
- **36** Lectures
- **31** Round tables and experts panels
- **12** Participation in Scientific Committees
- **53** Conferences
- **4** Patents
- **4** Patents in progress
- **5** PhD thesis defended
- **40** PhD thesis in progress

Origin of funds



- Total income **3.127.457 €**
- **36%** from projects & contracts
- **7** Active international projects
- **16** National and regional projects
- **15** contracts, **6** of them belonging to Framework Contracts with the European Union

1

Spin-off METfilter

with water treatment in 3 sectors (urban, oil & gas, livestock)

4

pilot plants

membrane technology, outdoor mesocosms 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 by 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 its 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.

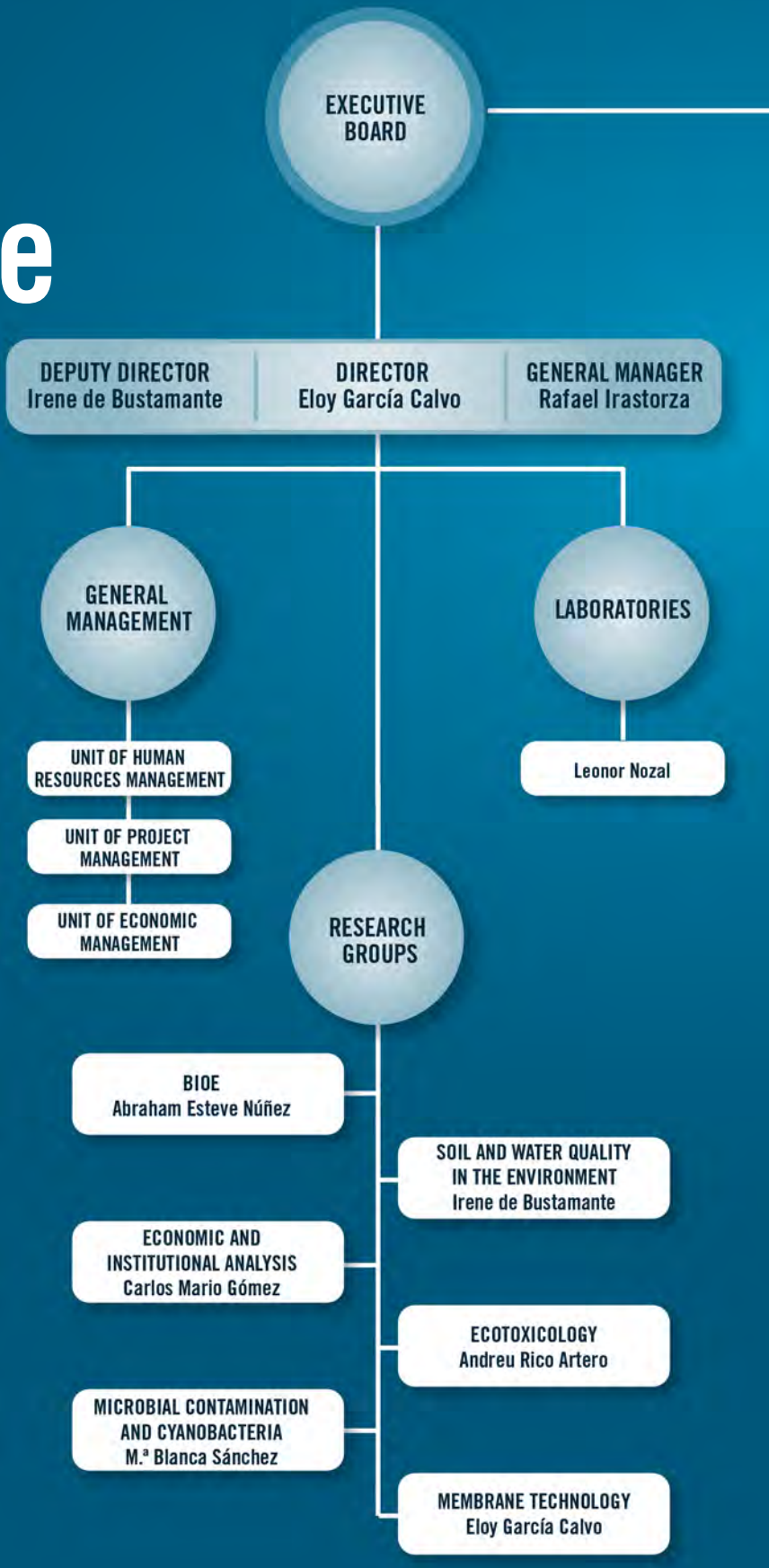
The IMDEA Water Institute has developed prestige and recognition in the areas of sustainable management of water bodies, quality and pollution, water treatment and water reuse and economic and institutional analysis.

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



our structure

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

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Full Profesor. Polytechnic University of Catalunya. Spain

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Water management consultant in innovative water supply strategies
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AQUALIA. INTEGRAL WATER MANAGEMENT

infrastructures and se

Chemical Analysis Lab
Basic Analysis Unit

Basic analysis unit: organoleptic assays (colour and turbidity) and physicochemical testing (pH, conductivity, temperature, redox potential, TKN, total phosphorus, free and total chlorine, alkalinity, TSS, TOC, DBO5, DQO, total nitrogen, etc.).

Chemical Analysis Lab
Chromatography Unit

Liquid Chromatography coupled to Ultraviolet-Visible (HPLCUV): determination of organic pollutants (pesticides, herbicides, phenols, PCBs), pharmaceutical products (antibiotics, sedatives, painkillers), foodstuffs (artificial sweeteners, antioxidants, additives), and quantitative analysis of compounds of interest.

Ion Chromatography: separation and determination of ions based on ion exchange resins.

Chemical Analysis Lab
ICP-MS Unit

Inductively Coupled Plasma Mass Spectrometry (ICP-MS Unit): determination of trace level elements in all types of matrices: semi-quantitative multi-element analysis; quantitative analysis of elements of interest; gauging isotopic ratios of an element; analysis of small sampling volumes; analysis of solid biological, organic, and inorganic samples; environmental applications; determination of metals and pollutants; speciation of metals in complex matrices; and quantification of inorganic nanoparticles.

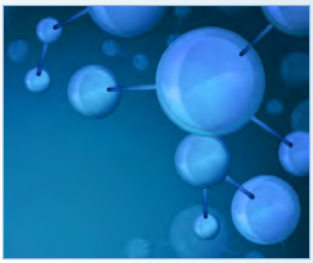
pilot plants

Membrane Technology

cientific equipment

Chemical Analysis Lab

Mass Spectrometry Unit



Mass Spectrometry Unit: analysis of organic micropollutants, determination of impurities in pesticide products, determination of exact mass and fragmentation studies, and identification of compounds or fragments by their mass spectrum.

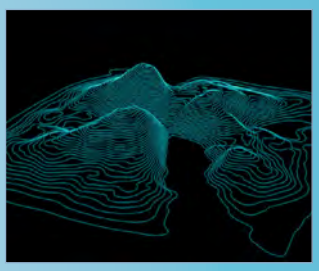
Soil Lab

Determination of physical-chemical properties of soils, sediments, and similar solid matrices: texture, moisture, pH and electrical conductivity, organic matter, total nitrogen, assimilable phosphorus, nitrates, total calcium carbonate, cation exchange capacity and exchangeable bases (Na+, K+, Ca2+, Mg2+), exchangeable aluminium, metals, phosphates retention, assimilable boron, calcium carbonate equivalent content, amorphous content (Si, Al, Fe), total organic carbon content, and moisture retention curve.

Biology and Microbiology Lab

- Monitoring of cyanobacteria blooms and their toxins.
- Analysis of biological and microbiological indicators.
- Determination of minimum inhibitory concentrations of microorganisms.
- Acute and chronic toxicity tests with algae, invertebrates, and fish.
- Microcosm and mesocosm tests at population and community level.

Geomatic Lab



Provides technology-based solutions. Fully equipped with hardware, software, and databases for modelling; development of specific maps using remote sensing techniques, GPS, and conventional documentary sources; automation of data collection; and application of simulation models.

Microbial Electrochemical Technologies

Vegetation Filters

Outdoor Mesocosm Facilities

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.

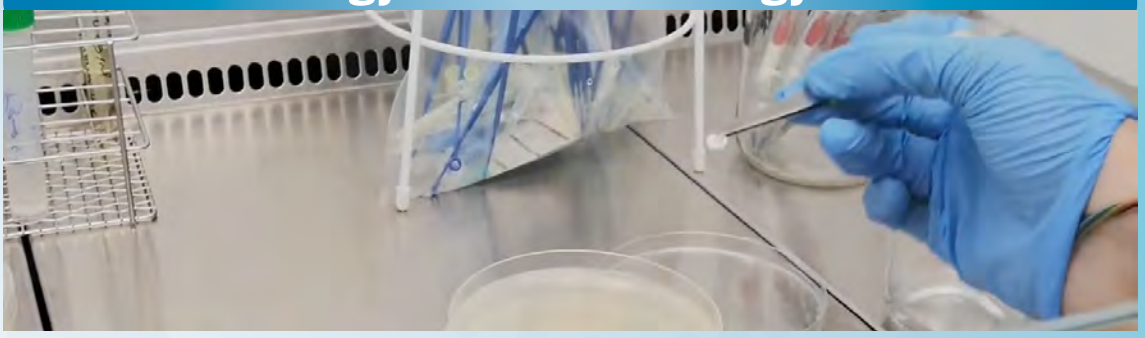
Equipment

- 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,* Enterococos, 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 tests at 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 series.
- 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

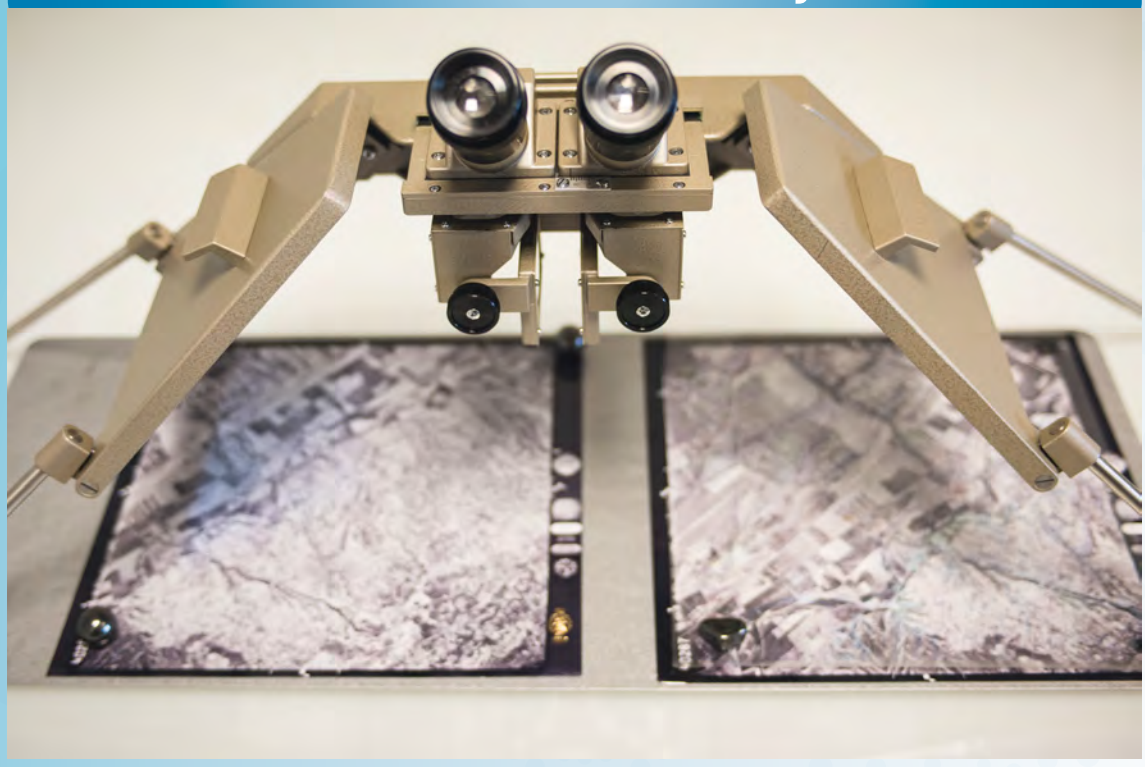
Pilot plant to carry out wastewater treatment and reuse researchs using nature-based solutions.

- 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).


Schott Duran
Schott Duran

projects and contracts

projects and contracts

1. Projects

1.1. Urban and Industrial Wastewater Treatment

1.1.1. Antibiotics, hormones, persistent and mobile organic contaminants and pathogens, the complex mixture in agriculture and livestock scenario. Risk to health or natural attenuation? (Nat4Health)

Objectives

The general goal of Nat4Health is to determine the risk to human health associated to chemical and biological contaminants of emerging concern (CECs) in agriculture and livestock scenarios and the natural attenuation processes that could buffer the contamination spreading.

General activities

- Development of multimatrix analytical methods for chemical and biological CECs.
- Field reconnaissance about the occurrence and propagation of CECs in agricultural parcels irrigated with WWTP effluents impacted water and their potential entry into the food chain.
- Close-up on CEC removal in soils under different irrigation regime, with special attention on the role played by microbial degradation.
- Evaluation of extensive and intensive livestock as a source of contamination and the potential airborne dissemination.
- Assessment of the health risk derived from the spread of persistent, mobile, and toxic compounds, hormones, antibiotics, antibiotic resistant bacteria, virus, and protozoa.

Expected results

Nat4Health will lay the foundations for creating the technical, diagnostic and risk analysis infrastructure necessary to identify and quantify chemical and biological CECs transmissible through water, food and air and accurately determine their real relevance to human public health.

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. Control and elimination of chemical and biological risks in the water cycle (CLEAN-CM)

Comunidad de Madrid

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Fondo Europeo de Desarrollo Regional
Una manera de hacer Europa
Financiado como parte de la respuesta de la Unión a la pandemia de COVID-19

Objectives

Project CLEAN-CM (Call REACT-UE) aims to study methodologies to assess and eliminate biological (with SARS-CoV-2 as a model) and chemical risks in different matrices (wastewater, reclaimed and groundwater).

General activities

- Adaptation of water lines and their treatment to produce different matrices.
- Technical assessment of conventional water treatment processes and those developed at IMDEA Water to eliminate biological and chemical risks.
- Development of in situ monitoring protocols for biological and chemical pollutants

Expected results

- Scientific: creation of a database of the presence of SARS-CoV-2 in wastewater shared through the NORMAN network. Open science and dissemination activities to raise awareness about the impacts of pollutants of emerging concern and inform scientists, professionals, and policy makers about the research results.
- Social: prevention of health crises caused by transmission outbreaks and increase of antibiotic resistance through applying R+D+I to society.
- Economic: innovation-based growth by reaching a competitive position in the sector through synergies and collaboration with national and international institutions. Creation of employment and talent retention.

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

MINISTERIO DE CIENCIA E INNOVACIÓN
UNIÓN EUROPEA
FONDO EUROPEO DE DESARROLLO REGIONAL
AGENCIA ESTATAL DE INVESTIGACIÓN

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.

Comunidad de Madrid

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

Objectives

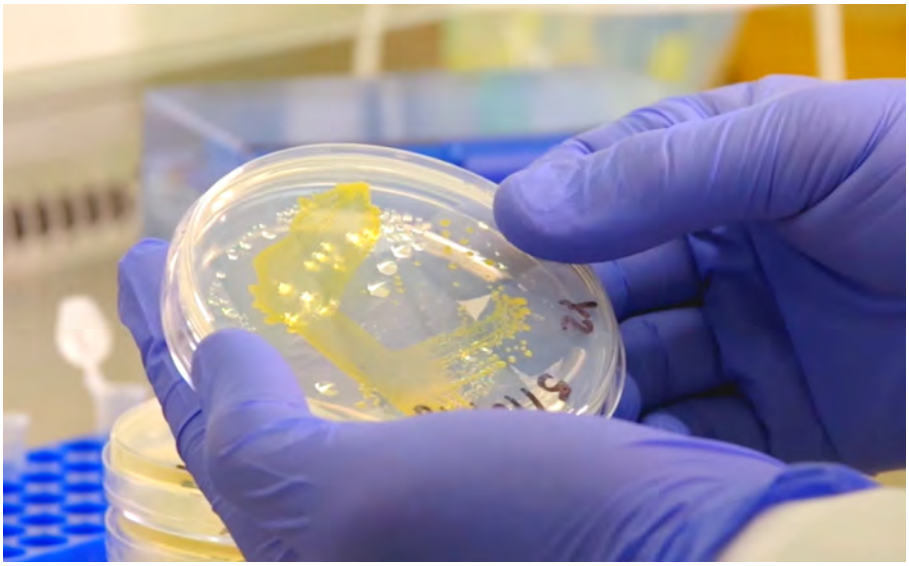
Our project aims to evaluate the role of microbial electrochemistry in the biodegradation of emerging pollutants from real urban wastewater generated at IMDEA Water Institute.

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. 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.

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

Comunidad de Madrid

Objectives

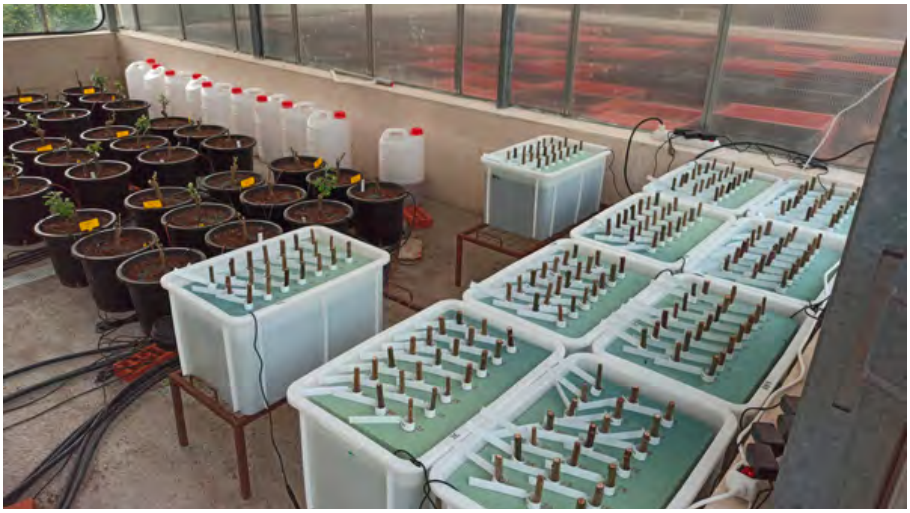
The main objective is to develop a process for the regeneration and reuse of water from beer industry, based on technologies that imitate nature such as vegetation filters, within a context of circular economy and biosustainability, and in which biomass production is produced.

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-macroeconomic 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

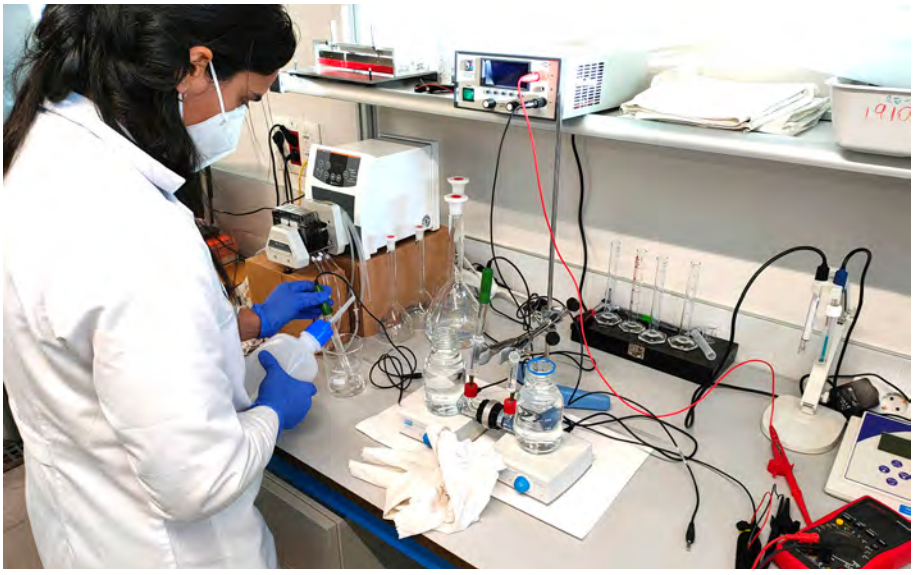
The main objective of INREMEM 2.0 is the recovery of valuable compounds such as water, nutrients (phosphates or nitrates) and other salts (NaCl), from wastewater with high salinity content, using hybrid systems based on recycled membranes coming from discarded RO membranes.

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. Exploration of wastewater as a complementary, rapid, and objective indicator of the consumption of substances of abuse (ESARNET2)

Objectives

The objective of the ESARNET2 project is to monitor and quantify the use of licit and illicit drugs by the Spanish population.

General activities

Monitoring of drugs or drug markers in wastewater in different WWTPs to calculate temporal consumptions patterns in at least 25% of the Spanish population.

Expected results

A database of drug concentrations and consumption data per province and statistical analyses to compare these results with other monitoring sources.

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

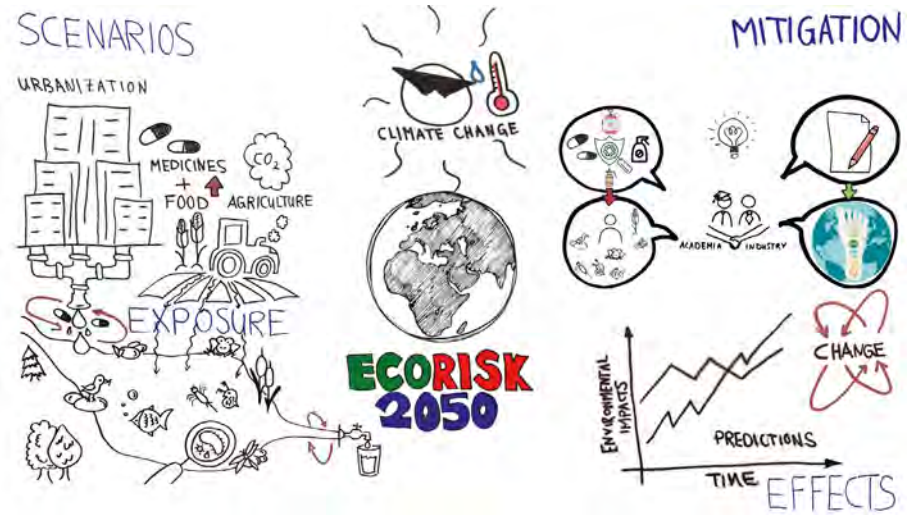
ECORISK2050 aims a) to assess how the input of chemicals from agriculture and urban environments and their fate, transport and effects are affected by global climate change; b) to identify potential adaptation and mitigation strategies, and c) to develop a set of tools for use by industry and policy 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. 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. Plastic in Agricultural Production: Impacts, Lifecycles and Long-Term Sustainability (PAPILLONS)

Objectives

To assess the use, environmental fate and risks of plastic and microplastics in European agriculture.

General activities

The project includes large-scale experiments to assess the fate and effects of microplastics on several agricultural and environmental endpoints as well as surveys to monitor consumption patterns and microplastic occurrence in different agricultural set-ups.

Expected results

Risk mitigation and management measures to be incorporated into new European policies on plastic use in agriculture.

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

Objectives

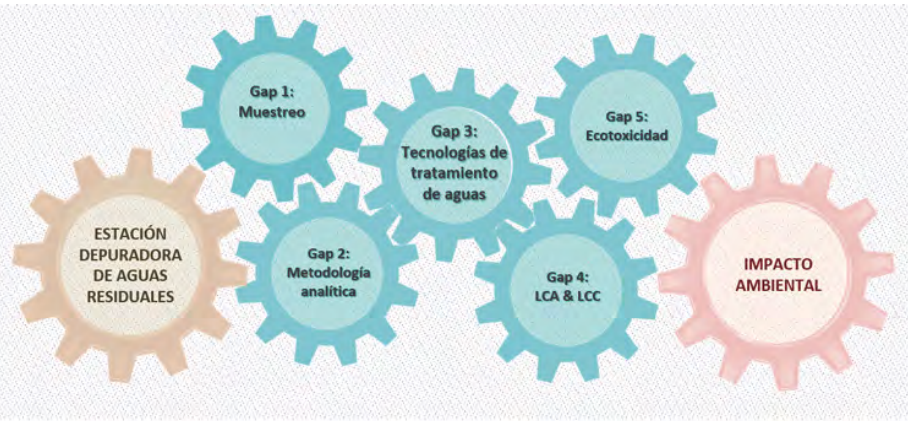
nanoCLEAN aims to implement efficient membrane technology (MBR-UF) to remove micronanoplastics (MNPs) from WWTPs as well as developing new sampling and a sensitive quantification analysis supported by Life Cycle Assessment and Life cycle Costing.

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 TERCERA DEL GOBIERNO
MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO
Fundación Biodiversidad
PIMA adapta
oecc

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. Framework contract for "Water for the Green Deal' - Implementation and development of the EU water and marine policies". DG Environment, European Commission

Objectives

A framework contract to the European Commission in activities related to the implementation and development of the EU water and marine policies (WFD, FD, GD, EQSD, DWD, UWWTD, BWD, MSFD and Water Reuse Regulation).

General activities

(1) work and advice on scientific, socio-economic, economic and technical issues relevant to the referred Directives;
(2) technical assistance for in-depth assessments of the implementation of the Directives in EU MS and for assessing information on the replies to legal noncompliance cases;
(3) evaluations of the fitness of the Directives and impact assessments and legislative support;
(4) organisation of consultation processes (workshops /meetings/conferences) and associated supporting documents and reports.

Expected results

Full assistance to the Commission in issues dealing with the water and marine polices.

Water Framework Directive Common Implementation Strategy support for Work Programme 2021-2024

Objectives

An assignment within the referred FC to provide support and advice to the Clean Water Unit in DG Environment on scientific, socio-economic, and technical issues related to the topics dealt with within the CIS. It includes support to the 5 Working Groups (Ecological Status, Ecostat), Groundwater, Chemicals, Floods, and Data and Information Sharing) and Ad-hoc Task Groups (Water Reuse and Economics) and other activities under the CIS Work Programme.

General activities

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

Expected results

The activities will contribute to meet the objectives of the CIS (Common Implementation Strategy of the Water Framework Directive) work programme for the referred period.

2.1.5. 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.

2.1.6. Update of river basin management plans and associated programmes of measures for the 4 river basins in Bulgaria. World Bank

Objectives

A study aimed at providing technical support to contribute to the correct and timely implementation of the European water legislation in Bulgaria in particular, successful and timely update of River Basin Management Plans (3rd cycle).

General activities

(1) Review of 2nd cycle RBMPs;
(2) Integration of all studies;
(3) Compilation of pressures & impacts analyses;
(4) Summary of characterization of SWBs and GWBs;
(5) Identification and characterization of protected areas;
(6) Update of environmental objectives;
(7) Risk assessment and gap analysis;
(8) Justification of exemptions;
(9) Development of PoMs;
(10) Development of draft RBMPs;
(11) Support to the public consultation process;
(12) Development of final draft RBMPs.

Expected results

Draft River Basin Management Plans (RBMPs) and Programme of Measures (PoMs) for the 4 river basins in Bulgaria.

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.

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-ongoing) 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).

3.1.2. Mission Assembly on Healthy Oceans, Seas, Coastal and Inland Waters, EU Horizon Europe Programme, DG RTD - DG for Research and Innovation, European Commission https://ec.europa.eu/info/horizon-europe/missions-horizon-europe/healthy-oceans-seas-coastal-and-inland-waters_en

Objectives

Gonzalo Delacámara is one of the 25 high-level experts providing ideas, knowledge and expertise to the Mission Board. The Missions links different disciplines, policymakers, stakeholders and citizens, and leverage public and private investments to enable large-scale transformations in key areas.

General activities

Gonzalo provides support for defining long term impacts and a set of activities at European and international level to realise them, identifying possible solutions to broad challenges and supporting European research and innovation leading to effective solutions.

Expected results

To know, restore and protect our ocean and waters by 2030 (Mission Starfish 2030) by reducing pressures on aquatic environments, restoring ecosystems and harnessing their goods and services through 5 objectives (knowledge, regeneration, zero pollution, decarbonisation and governance) and 17 targets.

3.1.3. International Desalination Association (IDA), Special Advisory Board https://idadesal.org/

Objectives

Gonzalo Delacámara chairs IDA´s Advisory Committee on Development Agencies and Public Institutions. IDA is the only global and leading association on desalination and water reuse technologies, serving more than 2,600 core members in 60+ countries with 4,000 members and 16 affiliate associations.

General activities

To provide support to IDA in terms the elaboration of a mapping of relevant Development Agencies and Institutions, in contacting them and in the development of joint strategies.

Expected results

To achieve fruitful contact and active engagement with Development Agencies and Public Institutions and expand IDA activities in new fields.

3.1.4. IWater Europe (WE, former European Water Supply & Sanitation Technological Platform, WssTP), Cluster leadership of the "Value of Water" https://watereurope.eu/

Objectives

Gonzalo Delacámara led the Water Europe's (Horizontal) Vision Leadership Team (HVLT) on the Value of Water and also was appointed as a member of the Board of Directors. WE, with 220 members (companies, RDI settings, utilities, suppliers, SMEs, users, authorities and organizations) aims at improving the coordination, collaboration, performance and competitiveness of water and related sectors in the EU and beyond.

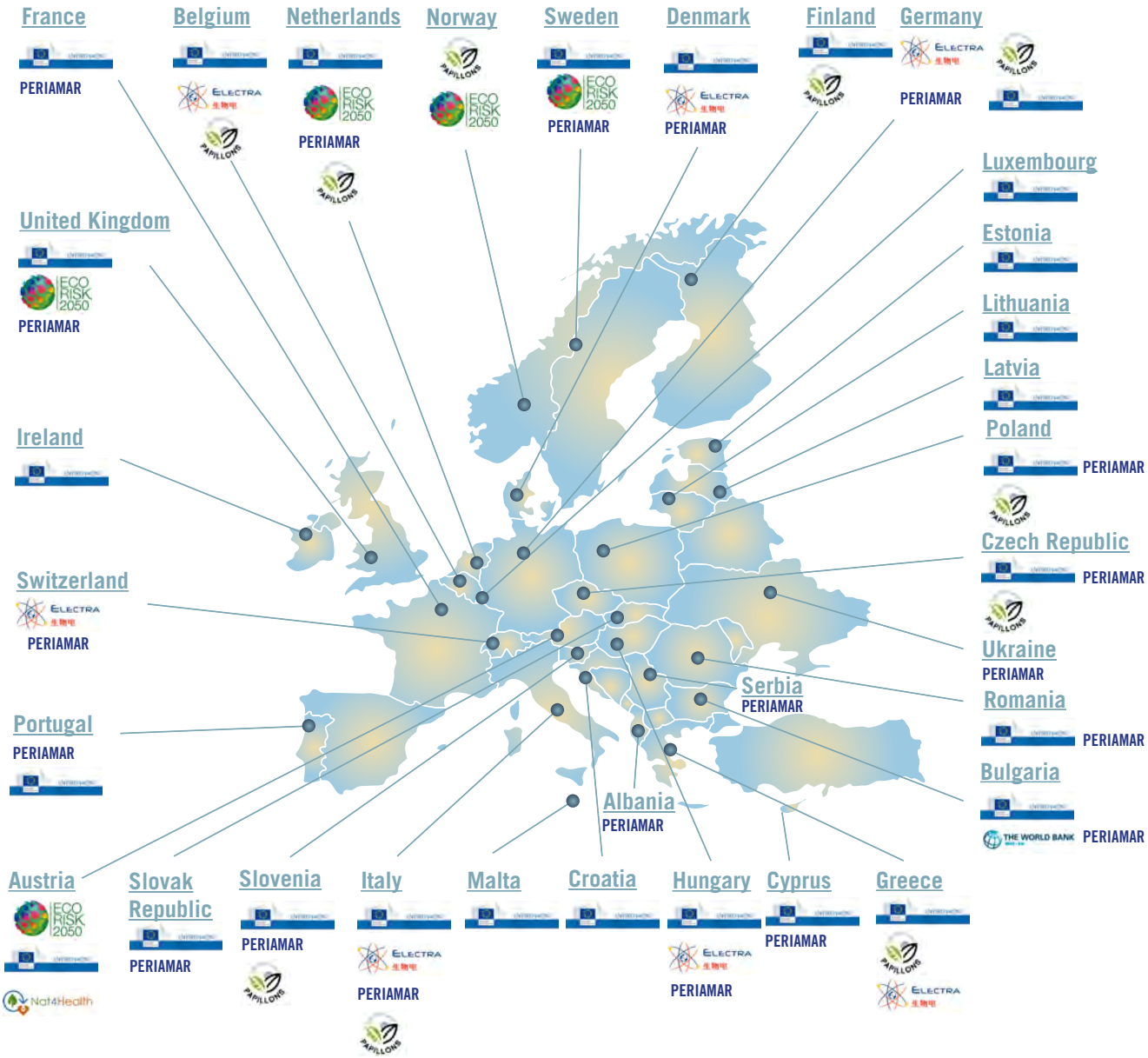
General activities

Connecting HVLT´s mission to global, EU and national initiatives on the value of water, providing inputs to WE positions and EU processes, participation in events, publications on the value of water, identifying good practices, linking with the remaining 8 HVLTs and the 18 Working Groups of WE.

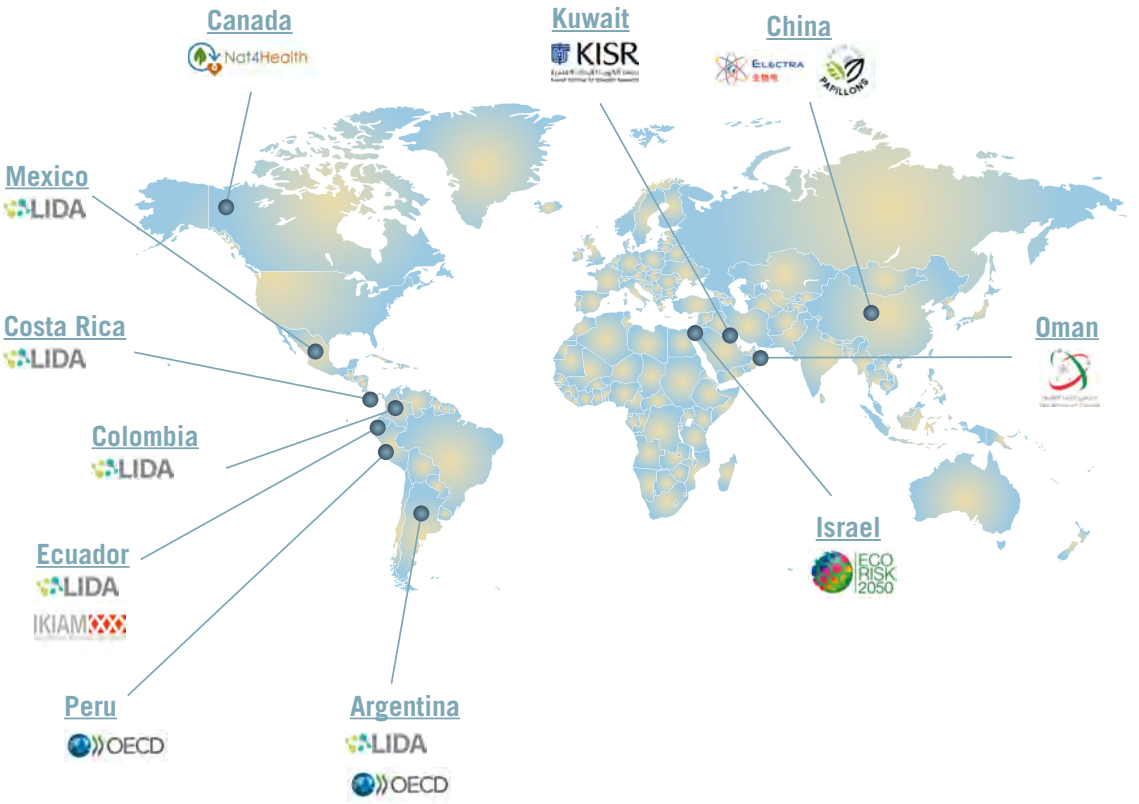
Expected results

Help to drive the transition to a Water-Smart Society by defining actions to foster and accelerate the process of bringing successful innovation to market in Europe and beyond (with collaborative initiatives within industry sectors, enabling RTD projects and innovation and raising sector relevance).

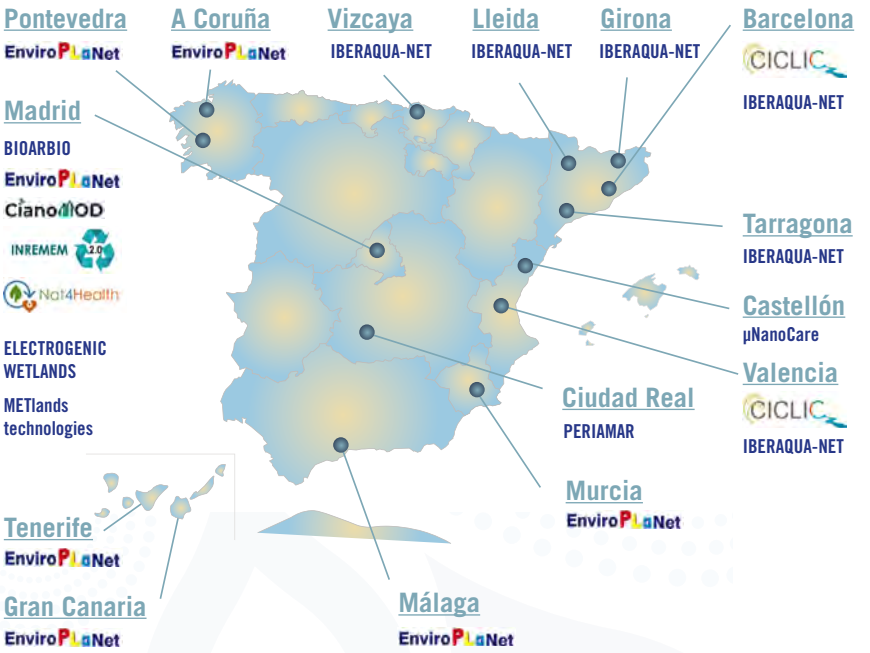
European collaboration in projects, contracts and other european initiatives



International collaboration in projects, contracts and other international initiatives



Spanish collaboration in projects, contracts and other initiatives



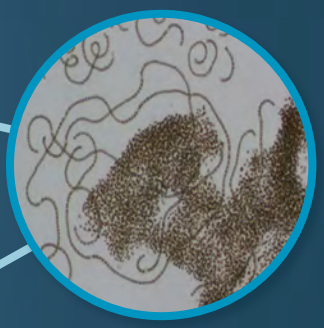
research groups

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. Junkal Landaburu Aguirre
Researcher

Dr. Raquel García Pacheco
Associated Researcher

Laura García Pina
Research Support

Helena Ocaña Biedma
Research Support

Anamary Pompa Pernía
Predoctoral Researcher

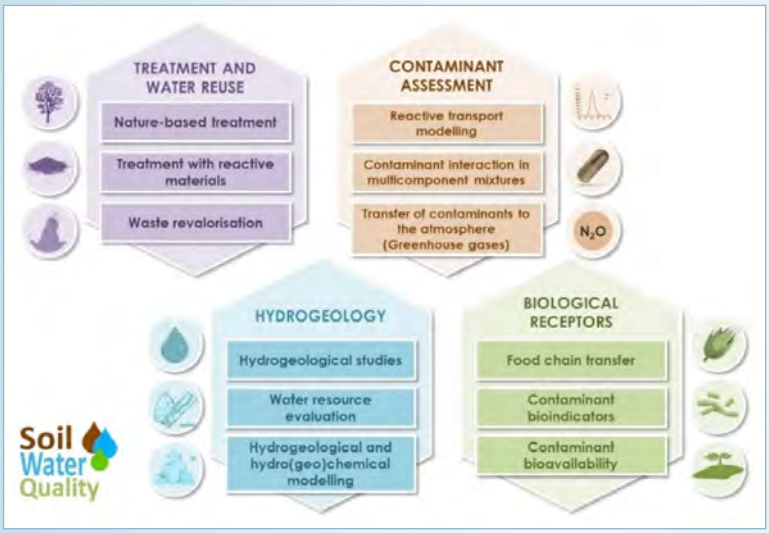
Amaia Ortiz de Lejarazu Larrañaga
Predoctoral Researcher

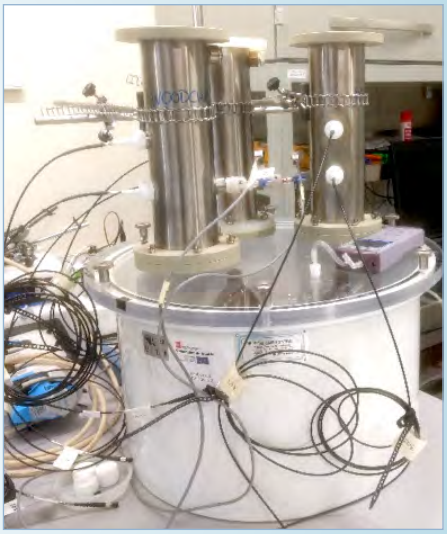
Carmen Tamarit Rausell
Research Support

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 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/

Dr. Irene de Bustamante Gutiérrez
Main Researcher

Dr. Juan Antonio Pascual Aguilar
Associated Researcher

Dr. María de las Virtudes Martínez Hernández
Researcher

Dr. Lucila Candela
Associated Researcher

Dr. Raffaella Meffe
Researcher

Soil and Water Quality in the Environment

Lucía Barbero Morales
Research Support

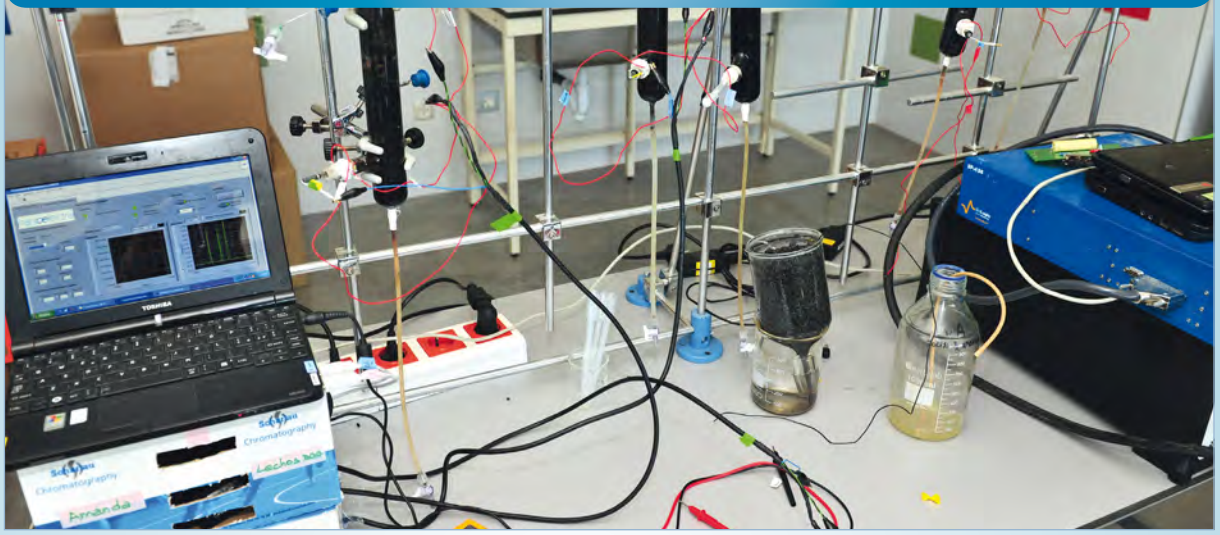
Dr. Ana de Santiago Martín
Researcher

Marina Alba Peña
Research Support

Raúl Jerónimo Pradana Yuste
Associated Predoctoral Researcher

Blanca Huidobro López
Predoctoral Researcher

Bioe



bioe
biotechnology for a sustainable sustainable environment

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/

Dr. Karina Boltes Espínola
Associated Researcher

Dr. Abraham Esteve Núñez
Main Researcher

Dr. Juan Manuel Ortiz Díaz-Guerra
Researcher

Dr. Raúl Berenguer Betrián
Associated Researcher

Dr. Antonio Berná Galiano
Researcher

Dr. Arantxa Aguirre Sierra
Associated Researcher

Bioe

Belén Barroeta
Science Communicator

Amanda Prado de Nicolás
Associated Predoctoral Researcher

Mario Jiménez Conde
Associated Predoctoral Researcher

Marina Ramírez Moreno
Predoctoral Researcher

Colin Wardman
Predoctoral Researcher

Lorena Peñacoba Antona
Associated Predoctoral Researcher

Eduardo Noriega Primo
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

Dr. Pedro León García
Associated Researcher

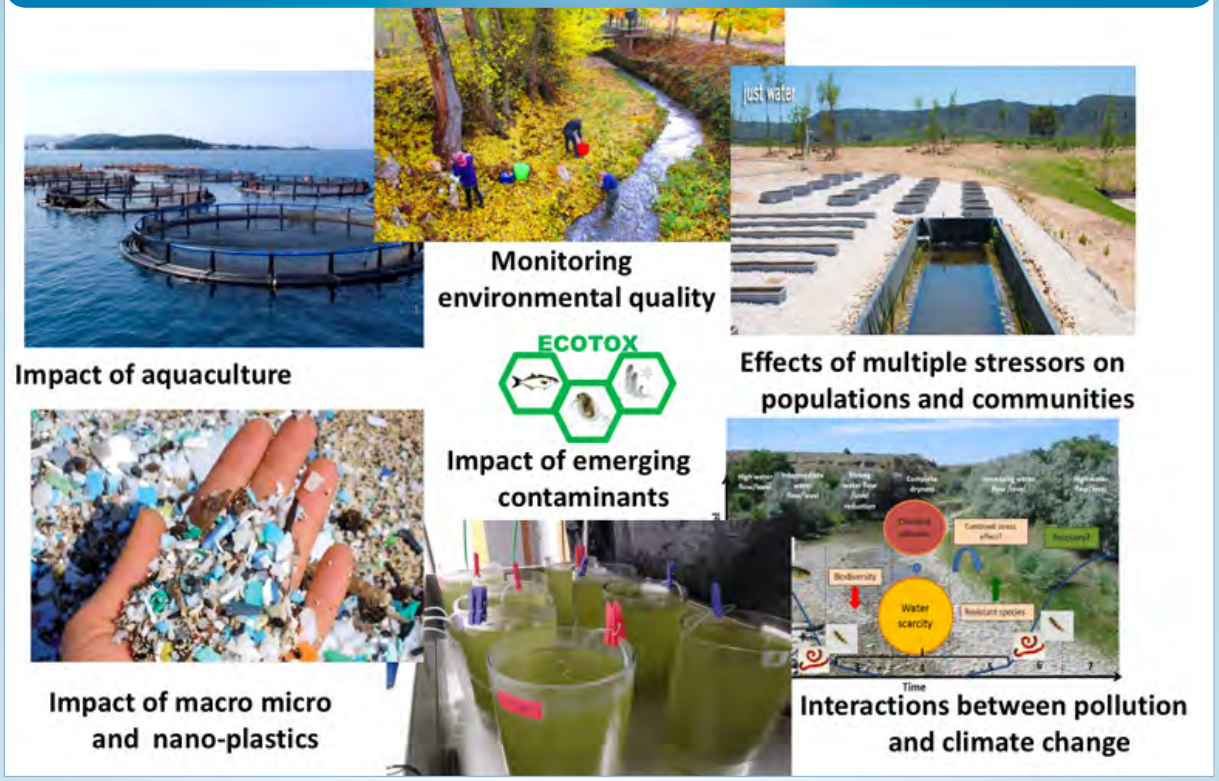
Dr. Alice Luminita Petre
Associated Researcher

Dr. Roberto Rosal García
Associated Researcher

Biological and Advanced oxidation technologies

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
Associated Researcher

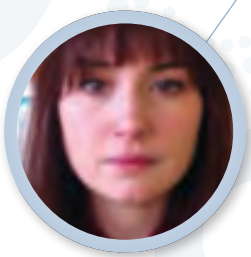
Dr. Andreu Rico Artero
Main Researcher

Dr. Paula Redondo Hasselerharm
Researcher

Theresa Schell
Predoctoral Researcher

Sara Martínez Pérez
Predoctoral researcher

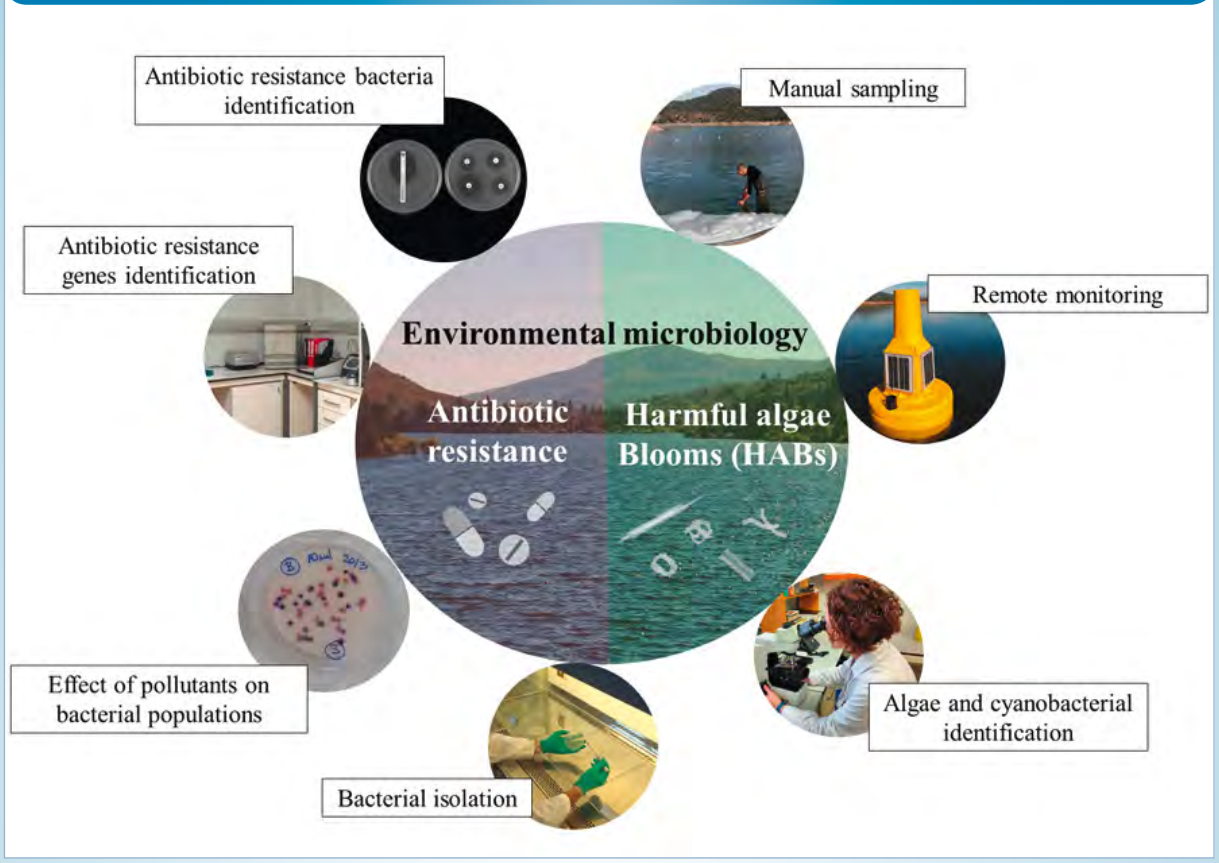
Francesco Polazzo
Predoctoral Researcher



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 (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

Dr. Francisco Carreño Conde
Associated Researcher

Dr. María Blanca Sánchez
Main Researcher

Dr. Jesús Morón López
Associated Researcher

Microbial contamination and Cyanobacteria

Ángel G. Pompa Pernía
Research Support

Lorena Martínez García
Research Support

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

Dr. Alberto del Villar García
Associated Researcher

Dr. Carlos Mario Gómez Gómez
Main Researcher

Gonzalo Delacámara Andrés
Researcher

Economic and institutional analysis

Marta Rodríguez
Research Support

Marta Arenas Romasanta
Research Support

laboratory staff

Francisco Martínez Serrano
Laboratory Technician

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

Carolina Guillén Fuentes
Laboratory Technician

Mónica Díaz González
Laboratory Technician

Dr. Sandra Jiménez Falcao
Laboratory Technician

Dr. María Isabel López Heras
Laboratory Technician

Dr. Laura Cherta Cucala
Laboratory Technician

Simón Monllor Alcaraz
Laboratory Technician

Diego Parra Robles
Laboratory Technician

Dr. Melina Crettaz Minaglia
Laboratory Technician

Beatriz Peinado Rodríguez
Laboratory Technician

management area and administration

Rafael Irastorza Vaca
General Manager

Mari Luz Barquilla Crespo
Economic Manager

Dr. Juana Sanz García
R&D 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

Laura Sánchez González
Technical of economic management

Alicia Fernández Rodríguez
R&D Technical support

Josefa Simón Recio
Secretary

Research results and knowledge dissemination

1. Scientific Papers

1.1 Articles in journals

1. **Asensio, Y., Llorente, M., Sánchez-Gómez, A., Manchón, C., Boltes, K. and Esteve-Núñez, A. (2021)**
Microbial Electrochemical Fluidized Bed Reactor: A Promising Solution for Removing Pollutants From Pharmaceutical Industrial Wastewater.
Frontiers in Microbiology, 12. ISSN 1664-302X

2. Asensio, Y., Llorente, M., Fernández-Labrador, P., **Manchón, C.**, **Ortiz, J.M.**, Ciriza, J.F., Monsalvo, V., **Rogalla, F.**, and **Esteve-Núñez, A.** (2021)
Microbial electrochemical fluidized bed reactor (ME-FBR): An energy-efficient advanced solution for treating real brewery wastewater with different initial organic loading rates.
Journal of Environmental Chemical Engineering, 9 (6). p. 106619. ISSN 22133437

3. **Asensio, Y., Llorente, M., Fernández-Labrador, P., Ortiz, J.M., Ciriza, J.F., Monsalvo, V., Rogalla, F., and Esteve-Núñez, A. (2021)**
Upgrading fluidized bed bioelectrochemical reactors for treating brewery wastewater by using a fluid-like electrode.
Chemical Engineering Journal, 406. ISSN 13858947

4. **Rodríguez-Sáez, L., Landaburu, J., Molina, S., Gacía-Payo, C., and García-Calvo, E. (2021)**
Study of surface modification of recycled ultrafiltration membranes using statistical design of experiments.
Surfaces and Interfaces, 23. ISSN 2468-0230

5. **Arenas, A., Dolédec, S., Vighi, M., and Rico, A. (2021)**
Effects of anthropogenic pollution and hydrological variation on macroinvertebrates in Mediterranean rivers: A case-study in the upper Tagus River basin (Spain).
Science of The Total Environment, 766. p. 144044. ISSN 00489697

6. **Bijlsma, L., Picó, Y., Andreu, V., Celma, A.,Estévez-Danta, A., González-Mariño, I., Hernández, F., López de Alda, M., López-García, E., Marcé, R.M., Miró, M., Montes, R., Pérez de San Román-Landa, U., Pitarch, E., Pocurull, E., Postigo, C., Prieto, A., Rico, A., Rodil, R., Valcárcel, Y., Ventura, M., and Quintana, J.B. (2021)**
The embodiment of wastewater data for the estimation of illicit drug consumption in Spain.
Science of The Total Environment, 772. p. 144794. ISSN 00489697

7. **Bijlsma, L., Pitarch, E., Hernández, F., Fonseca, E., Marín, J.M., Ibáñez, M., Portolés, T., and Rico, A. (2021)**
Ecological risk assessment of pesticides in the Mijares River (eastern Spain) impacted by citrus production using wide-scope screening and target quantitative analysis.
Journal of Hazardous Materials, 412. p. 125277. ISSN 03043894

8. **Blanco, A., Senán, J., García-Pacheco, R., and Pascual, J.A. (2021)**
MCE–GIS evaluation for the potential location of RO membrane recycling plant in the Segura River Basin, Spain.
Environmental Earth Sciences, 80 (8). ISSN 1866-6280

9. **Botella, M., Corada-Fernández, C., García-Delgado, M., Candela, L., González-Mazo, E., Lara-Martín, P.A., and Jiménez-Martínez, J. (2021)**
Structural control of the non-ionic surfactant alcohol ethoxylates (AEOs) on transport in natural soils.
Environmental Pollution, 269. p. 116021. ISSN 02697491

10. **Carreño, F., Sipols, A.E., De Blas, C.S., and Mostaza-Colado, D. (2021)**
A Forecast Model Applied to Monitor Crops Dynamics Using Vegetation Indices (NDVI).
Applied Sciences, 11 (4). p. 1859. ISSN 2076-3417.

11. **Chakraborty, S., Shet, S.M., Pereira, M.M., Nataraj, S.K., and Mondal, D. (2021)**
Designing biopolymer-based artificial peroxidase for oxidative removal of dibenzothiophene from a model diesel fuel. International
Journal of Biological Macromolecules, 183. pp. 1784-1793. ISSN 01418130

12. **Contreras-Martínez, J., García-Payo, C., and Khayet, M. (2021)**
Electrospun Nanostructured Membrane Engineering Using Reverse Osmosis Recycled Modules: Membrane Distillation Application.
Nanomaterials, 11 (6). p. 1601. ISSN 2079-4991

13. **Contreras-Martínez, J., García-Payo, M.C., Arribas, P., Rodríguez-Sáez, L. and Lejarazu-Larrañaga, A. and García-Calvo, E. and Khayet, M. (2021)**
Recycled reverse osmosis membranes for forward osmosis technology.
Desalination, 519. p. 115312. ISSN 00119164

14. **Contreras-Martínez, J., Mohsenpour, S., Ameen, A.W., Budd, P.M., García-Payo, C., Khayet, M. and Gorgojo, P. (2021)**
High-Flux Thin Film Composite PIM-1 Membranes for Butanol Recovery: Experimental Study and Process Simulations.
ACS Applied Materials & Interfaces, 13 (36). pp. 42635-42649. ISSN 1944-8244

15. **Essalhi, M., Khayet, M., Ismail, N., Sundman, O., and Tavajohi, N. (2021)**
Improvement of nanostructured electrospun membranes for desalination by membrane distillation technology.
Desalination, 510. p. 115086. ISSN 00119164

16. **Essalhi, M., Khayet, M., Tesfalidet, S., Alsultan, M., and Tavajohi, N. (2021)**
Desalination by direct contact membrane distillation using mixed matrix electrospun nanofibrous membranes with carbon-based nanofillers: A strategic improvement.
Chemical Engineering Journal, 426. p. 131316. ISSN 13858947

17. **Ewusi-Mensah, D., Huang, J., Chaparro, L.K., Ródenas, P., Ramírez-Moreno, M.,Ortiz, J.M., and Esteve-Núñez, A. (2021)**
Algae-Assisted Microbial Desalination Cell: Analysis of Cathode Performance and Desalination Efficiency Assessment.
Processes, 9 (11). ISSN 2227-9717

18. **Fabregat-Safont, D., Ibáñez, M., Bijlsma, L., Hernández, F., Waichman, A.V., de Oliveira, R., and Rico, A. (2021)**
Wide-scope screening of pharmaceuticals, illicit drugs and their metabolites in the Amazon River.
Water Research, 200. p. 117251. ISSN 00431354

19. **García-Pacheco, R., Li, Q., Comas, J., Taylor, R.A., and Le-Clech, P. (2021)**
Novel housing designs for nanofiltration and ultrafiltration gravity-driven recycled membrane-based systems.
Science of The Total Environment, 767. p. 144181. ISSN 00489697

20. **González-Mariño, I., Ares, L.,Montes, R., Rodil, R., Cela, R., López-García, E., Postigo, C., López de Alda, M., Pocurull, E., Marcé, R.M., Bijlsma, L., Hernández, F., Picó, Y., and Andreu, V., Rico, A., Valcárcel, Y., Miró, M., Etxebarria, N., and Quintana, J.B. (2021)**
Assessing population exposure to phthalate plasticizers in thirteen Spanish cities through the analysis of wastewater.
Journal of Hazardous Materials, 401. p. 123272. ISSN 03043894

21. **Greño, M., Amariei, G., Boltes, K., Castro-Puyana, M., García, M.A., and Marina, M.L. (2021)**

Ecotoxicity evaluation of tetramethrin and analysis in agrochemical formulations using chiral electrokinetic chromatography.
Science of The Total Environment, 800. p. 149496. ISSN 00489697

22. Gupta, P., Tabish Noori, M., Esteve-Núñez, A., and Verma, N. (2021)
An insight into the bioelectrochemical photoreduction of CO2 to value-added chemicals.
iScience, 24 (4). p. 102294. ISSN 25890042

23. Jiménez-Jiménez, S., Amariei, G., Boltes, K., García, M.Á., and Marina, M.L. (2021)
Enantiomeric separation of panthenol by Capillary Electrophoresis. Analysis of commercial formulations and toxicity evaluation on non-target organisms.
Journal of Chromatography A, 1639. p. 461919. ISSN 00219673

24. Jiménez-Jiménez, S., Amariei, G., Boltes, K., García, M.Á., and Marina, M.L. (2021)
Stereoselective separation of sulfoxaflor by electrokinetic chromatography and applications to stability and ecotoxicological studies.
Journal of Chromatography A, 1654. p. 462450. ISSN 00219673

25. Kalantzi, I., Rico, A., Mylona, K., Pergantis, S.A., and Tsapakis, M. (2021)
Fish farming, metals and antibiotics in the eastern Mediterranean Sea: Is there a threat to sediment wildlife?
Science of The Total Environment, 764. p. 142843. ISSN 00489697

26. Larrea-Murrell, J.A., Bacchetti, T., Heydrich-Perez, M., Lugo-Moya, D., Esteve-Núñez, A., Boltes, K., and Rojas-Badia, M.M. (2021)
Impact of chemical and microbiological water quality on bacterial community assemblage of San Juan River (Sierra del Rosario, Biosphere Reserve, Cuba).
Tecnología y Ciencias del Agua, 12 (3). pp. 82-123. ISSN 2007-422

27. Llamas-Dios, M.I., Vadillo, I., Jiménez-Gavilán, P., Candela, L., and Corada-Fernández, C. (2021)
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34. Vighi, M.
Chi dobbiamo temere: l'uomo o la natura?
21° Congresso SITOX. Società Italiana di Tossicologia. Bolonia (Italia). 26/10/2021.

35. Zarzo, D.
Advanced Technologies for Joint Desalination & Water Reuse.
Conferencia Internacional sobre Reutilización y Reciclaje del Agua IDA 2021. Roma. 11 - 13/10/2021.

36. Zarzo, D.
Legal Frameworks on Reuse for Agriculture and Drinking Water.
Conferencia Internacional sobre Reutilización y Reciclaje del Agua. IDA. Roma. 11 - 13/10/2021.

5. Round tables and experts panels

1. **Barroeta, B.**
Panel de discusión: EU's zero pollution ambition – Best practice in science communication.
ICONS. 08/06/2021.

2. **Barroeta, B.**
Round table: EU-ISMET goes to high schools.
5th European Meeting of the International Society for Microbial Electrochemistry and Technology (EU-ISMET). Girona. 13 - 15/09/2021.

3. **Barroeta, B.**
Workshop moderator: Electrobioremediation - ECOMONDO, The Green Technology Expo. Ecomondo Scientific Technical Committee and H2020 project ELECTRA.
Rimini (Italia). 26 - 29/10/2021.

4. **Barroeta, B.**
Round table: ISMET public engagement community. How to bring microbial bioelectrochemistry closer to the public?
ISMET. Online. 13 /12/ 2021.

5. **Barroeta, B.**
Comunicación del cambio climático en redes sociales: estrategias, emociones e imágenes.
Seminario ClimaEnRedes. Universidad de Navarra, Pamplona. 13 - 14/12/2021.

6. **Delacámara, G.**
Round table online: Agua limpia y saneamiento.
Mesa de Acción ODS 6 Perú Sostenible. Online. 04/02/2021.

7. **Delacámara, G.**
Expert Panel moderator: Valuing Water-The United Nations World Water Development Report 2021.
MEP Group. Online. 26/03/2021.

8. **Delacámara, G.**
Expert Panel: II Foro sobre Infraestructuras y Ecosistemas Resilientes, Plan de Recuperación de la Economía Española.
Ministerio para la Transición Ecológica y el Reto Demográfico. Online. 19/04/2021.

9. **Delacámara, G.**
Expert Panel: New Waves Festival.
European Junior Water Programme (EJWP). Online. 22/04//2021

10. **Delacámara, G.**
Expert Panel: Peru Steering Committee
Water Resources Group 2030 - WRG2030, World Bank. Online. 29/04/2021.

11. **Delacámara, G.**
Expert Panel: Webinar Internacional Agua: gestionando la complejidad.
La Gobernanza del agua como oportunidad para el desarrollo. Universidad Continental de Perú. Online. 18/05/2021.

12. **Delacámara, G.**
Round table online: Nature Based Solutions – transitioning towards resilient cities.
Barcelona Architecture Week 2021. Institute for Advanced Architecture of Catalonia (IAAC). Barcelona. 10/05/2021.

13. **Delacámara, G.**
Round table: Seminario Internacional del Agua.
Madrid Platform - Hub Internacional de negocios entre Europa y América Latina. MSH Global y Ayuntamiento de Madrid. Madrid. 10/05/2021.

14. Delacámara, G.
Round table online: Presentación de conclusiones del Grupo de Trabajo FIDE sobre Emergencia Climática y gestión del agua.
Fundación FIDE. 28/06/2021.

15. Delacámara, G.
Expert Panel: How Water Can Drive a Green, Resilient & Inclusive Recovery.
Ponencia: Key findings from recent analysis on the impacts of the pandemic on financing water and how water features in recovery packages. World Water Week. Gobierno de Países Bajos, OECD, EPA (EE. UU.), Banco Mundial. Online. 26/08/2021.

16. Delacámara, G.
Expert Panel: III Foro sobre Infraestructuras y Ecosistemas Resilientes, Plan de Recuperación de la Economía Española.
Ministerio para la Transición Ecológica y el Reto Demográfico. Online. 15/09/2021.

17. Delacámara, G.
Expert Panel. 15th Meeting of the OECD Water Governance Initiative.
Online. 27 - 28/09/201.

18. Delacámara, G.
Expert Panel: Public Utility Challenges: PPP for Water Reuse Projects.
IDA 2021 - Conferencia Internacional sobre Reutilización y Reciclaje del Agua. Roma. 11 - 13/10/2021.

19. Delacámara, G.
Expert Panel: Water Reuse: Legal, Financing, Governance, and Regulation Barriers.
IDA 2021 - Conferencia Internacional sobre Reutilización y Reciclaje del Agua. Roma. 11 - 13/10/2021.

20. Delacámara, G.
Expert Panel: Debate Gestión de recursos naturales con enfoque en el agua. Ciclo de Debates Contrapuntos Chile-UE para el proceso constituyente.
EUROSocial + Programme, IILA. Online. 20/10/2021.

21. Delacámara, G.
Expert Panel: Foro Economía circular y financiamiento. Congreso Desalación para Chile: Sostenibilidad Ambiental, Económica y Social.
Asociación Latinoamérica de Desalación y Reúso de Agua (ALADYR). Online. 20/10/2021.

22. Delacámara, G.
Round table: Encuentro COP26 ¿Por qué hay que hablarlo?
CM Vocento, Coca-Cola y Mapfre. Madrid. 02/11/2021.

23. Delacámara, G.
Coloquio de especialistas: El valor del agua. Digitalización, innovación y sostenibilidad en los recursos hídricos.
Levante El Mercantil Valenciano y À Punt. Valencia 16/11/2021.

24. Delacámara, G.
Expert Panel: Debilidades y amenazas del sector del agua en España.
Jornada Realidad y Futuro del sector del Agua en España. El Mundo, Expansión, Seopan, PWC. Madrid. 25/11/2021.

25. Delacámara, G.
Round table: What next for the blue economy in cities?
Sesión Blue cities: enhancing water security and building resilient cities. XVII World Water Congress. OECD e IWRA. Daegu (Corea del Sur). 29/11 - 03/12/2021.

26. Delacámara, G.
Mesa de debate: El valor del agua y su gestión integral en las operaciones empresariales. Preservar el agua: para las personas, por el planeta.
Expansión. Online. 20/12/2021.

27. Delacámara, G.
Mesa redonda online: Reflexiones Post COP26. Oportunidades y potencial de colaboración entre actores del sector agua y saneamiento en el Perú.
WRG 2030-World Bank. 22/12/2021.

28. **Esteve-Núñez, A.**
Performance and application cases of MET-LAND electroactive biofilters to eliminate organic micro-pollutants in municipal wastewater.
1st ELECTRA Stakeholders Workshop: ELECTRA goes to PILOT demonstrations. Girona. Semipresencial. 16/09/2021.

29. **Rico, A.**
Round table: Indicadores ecotoxicológicos en ríos y riesgo ambiental.
Congreso IBERAQUA-NET: Red nacional de ecosistemas fluviales: Retos y estrategias de futuro. Online. 24 - 25/11/2021.

30. **Rosal, R.**
Mesa redonda de debate en materia de microplásticos.
Congreso Nacional del Medio ambiente (CONAMA). Madrid. 31/05 - 03/06/2021.

31. **Rosal, R.**
Expert Panel: Avances en la investigación sobre microplásticos: proyectos de interés.
Congreso Nacional del Medio ambiente (CONAMA). Madrid. 31/05 - 03/06/2021.

6. Participation in Scientific Committees

1. **De Santiago, A., Meffe, R., Martínez-Hernández, V.**
Miembros del Working Group 7: Contaminants of emerging concern in soil and the terrestrial environment, Norman Network.

2. **De Santiago, A., Meffe, R., Martínez-Hernández, V.**
Miembros del Working Group 5: Water reuse and policy support (Geneviève Deviller, Lian Lundy), Norman Network.

3. **Delacámara, G.**
Jurado de la Semifinal del Agritech Startup Europe Accelerathon 2022.
Fundación Finnova. 25/01/2022.

4. **Delacámara, G.**
Miembro de la Junta Directiva (Board Member) de la plataforma Water Europe (anteriormente WssTP-Water supply and sanitation Technology Platform).

5. **Delacámara, G.**
Miembro del Consejo Asesor de A Mediterranean Water And Journalism Platform on Sustainable Development (AMWAJ).

6. **Delacámara, G.**
Miembro (Visionario) del Future UniLab, Think Tank de UNA Europa.

7. **Esteve Núñez, A., Barroeta, B.**
Miembros del comité científico de 5th EU-ISMET 2021.

8. **Esteve Núñez, A.**
Miembro del Comité Científico de WETPOL 2021.

9. **Meffe, R., Martínez-Hernández, V.**
Miembros del Working Group 4: Nano-and micro scale particulate contaminants (Ralf Kaegi, Bert van Bavel), Norman Network.

10. **Molina, S. y Landaburu, J.**
Miembros del Working Group 4: Microplástics, Norman Network.

11. **Molina, S. y Landaburu, J.**
Miembros del Working Group 5: Water reuse and policy support, Norman Network.

12. **Rico, A.**
Miembro del Comité Científico de SETAC Europe 31st Annual Meeting.
Sevilla. 03 - 06/05/ 2021.

7. Conference

7.1 Oral Commucations

1. **Álvarez, R., Andreu, V., Aristu, M.A., Bijlsma, L., Bonansea, R., Cela, R., Celma, A., Corominas, L., Domínguez, N., Estévez-Danta, A., Etxebarria, N., Fontanals, N., González-Mariño, I., Hernández, F., Isorna, M., Lara, P., Lertxundi, U., López de Alda, M., López-García, E., Marcé, R.M., Martínez, S., Miró, M., Montes, R., Orive, G., Pérez de San Román-Landa, U., Pérez-López, C., Pitarch, E., Pocurull, E., Picó, Y., Postigo, C., Prieto, A., Rico, A., Rodil, R., Rodríguez-Mozaz, S., Rosende, M., Soriano, Y., Valcárcel, Y., Ventura, M., Zuloaga, O., Quintana, J.B.**
ESAR-Net: A Spanish network for monitoring illicit and licit substance addictions in Spain by wastewater-based epidemiology. Testing the Waters 5 Conference.
University of Queensland. Brisbane, Australia. 28/09 - 01/10/2021.

2. **Asensio, Y., Llorente, M., Manchón, C., Sánchez, A., Ortiz, J.M., Boltes, K., Esteve-Núñez, A.**
Industrial wastewater treatment using ME-FBR.
Remtavares Workshop 2021: Enhancing wastewater treatment technologies and waste valorization. UAM. 10/12/2021.

3. **Asensio, Y., Manchón, C., Boltes, A.K., Esteve-Núñez, A.**
Electrobioremediation of Pharma pollutants is boosted in a Microbial Electrochemical Fluidized Bed Reactor.
EU-ISMET Online. 5th European Meeting of the International Society for Microbial Electrochemistry and Technology. Girona. 13 - 15/09/2021.

4. **Barbero, L., Huidobro, B., Pradana, R., Martínez-Hernández, V., Meffe, R., De Santiago, A., López-Heras, I., Nozal, L., De Bustamante, I.**
Management approaches of nature-based solutions using soil to attenuate nutrients and contaminants of emerging concern.
AquaConSoil 2021. Online. 15 - 17/06/2021.

5. **Barbero, L., Martínez-Hernández, V., Huidobro, B., Meffe, R., Pradana, R., Hernández-Martín, J.A., De Santiago, A., De Bustamante, I.**
Impacto del uso de astillas de madera como enmienda al suelo en un filtro verde piloto: atenuación de nutrientes.
XIV Jornadas de Investigación de la Zona No Saturada - ZNS'21. A Coruña. 09 - 11/11/2021.

6. **Barbero, L., Martínez-Hernández, V., Huidobro, B., Meffe, R., Pradana, R., Hernández-Martín, J.A., De Santiago, A., De Bustamante, I.**
Impacto del uso de astillas de madera como enmienda al suelo en un filtro verde piloto: dinámica de la infiltración.
XIV Jornadas de Investigación de la Zona No Saturada - ZNS'21. A Coruña. 09 - 11/11/2021.

7. **Berná, A., De Deus, A., Torruella, D., Manchón, C., Vázquez, J. Esteve-Núñez, A.**
IoT biosensing: a microbial electrochemical sensor for monitoring water quality.
EU-ISMET Online. 5th European Meeting of the International Society for Microbial Electrochemistry and Technology. Girona. 13 - 15/09/2021.

8. **De Deus Villagra, A., Díaz, E., Coleto, I., Muniesa, F., Esteve-Núñez, A.**
Electrobioremediation Of Soil Polluted With The Insecticide Lindane. 5th European Meeting of the International Society for Microbial Electrochemistry and Technology.
EU-ISMET. Girona. 13 - 15/09/2021.

9. **De Santiago, A., Meffe, R., Teijón Ávila, G., Martínez-Hernández, V., López-Heras, I., Nozal, L., I. de Bustamante.**
Does unplanned water reuse for maize irrigation pose a threat?
Conferencia: AquaConSoil 2021. Online. 15 - 17/06/2021.

10. **Esteve-Núñez, A., Esteve, R., Jiménez, M., Peñacoba, L., López, M., Ramírez-Vargas, C.A., Arias, C., Salas, J.J.**
Full scale operation of decentralized urban wastewater using METland® technology. 5th European Meeting of the International Society for Microbial Electrochemistry and Technology.
EU-ISMET. Girona. 13 - 15/09/2021.

11. **Fabregat-Safont, D., Ibáñez, M., Bijlsma, L., Hernández, F., Waichman, A.V., Oliveira, R., Rico, A.**
Using collision-cross section for filtering high-resolution mass spectrometry data during target and suspect wide-scope screening: Application to Amazon River samples.
XX Reunión de la Sociedad Española de Cromatografía y Técnicas Afines (SECyTA). Online. 18 - 19/11/2021.

12. **García-Astillero, A., Martínez-Megías, C., Arenas-Sánchez, A., Polazzo, F., Rico, A.**
Interaction between heat waves and pesticide contamination on zooplankton communities: Does the timing of stressor matter?
Aquacosm Symposium II. Online. 12 - 16/04/2021.

13. **Huidobro, B., Martínez-Hernández, V., Barbero, L., Meffe, R López-Heras, I., Alonso-Alonso, C., Pradana, R., Hernández-Martín, J.A., De Santiago, A., Nozal, L., De Bustamante, I.**
Impacto del uso de astillas de madera como enmienda al suelo en un filtro verde piloto: contaminantes de preocupación emergente.
XIV Jornadas de Investigación de la Zona No Saturada - ZNS'21. A Coruña. 09 - 11/11/2021.

14. **Lejarazu-Larrañaga, A., Molina, S., Ortiz, J. M., Navarro, R., García-Calvo, E.**

Preparation of Anion Exchange Membranes using recycled membranes as support for water treatment: towards the circular economy approach.
European Membrane Society. Online. 03/03/2021.

15. **Llorente, M., Tejedor, S. Esteve-Núñez, A.**
Bioelectrosynthesis of organic acids from CO2 using fluidized bed electrodes in a 3-phase reactor.
5th European Meeting of the International Society for Microbial Electrochemistry and Technology. EU-ISMET. Girona. 13 - 15/09/2021.

16. **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., López de Alda, M.**
Analysis of ethyl sulfate in wastewaters for estimation of alcohol consumption by the population: A national study conducted in Spain.
2nd Advanced Chemistry World Congress. Online. 14 -15/06/2021.

17. **Manchón, C., Muniesa, F., Asensio, Y., Esteve-Núñez, A.**
Purple phototrophic bacteria in microbial electrochemical fluidized-like bed reactors for brewery wastewater treatment.
5th European Meeting of the International Society for Microbial Electrochemistry and Technology. EU-ISMET. Girona. 13 - 15/09/2021.

18. **Martín, I., Fahd, K., Salas, J.J., Martínez-Hernández, V., Meffe, R.**
Innovation in vegetation filters for wastewater treatment and resource recovery.
Congreso Internacional 4th SmallWat21. IDiAqua. Online. 17 - 18/06/2021.

19. **Martínez-Hernández, V., Meffe, R., Hernández-Martín, J.A., Barbero, I., Huidobro, B., Pradana, R., Alonso, A., De Santiago, A., De Bustamante, I.**
Soil amendments to improve nutrient attenuation in vegetation filters.
Congreso Internacional 4th SmallWat21. IDiAqua. Online. 17 - 18/06/2021.

20. **Martínez-Megías, C., Picó, Y., Soriano, Y.,Vera-Herrera, L., Pérez, S., Rico, A.**
Proyecto CICLIC-ECOREST: objetivos y estado de desarrollo.
Congreso IBERAQUA-NET: Red nacional de ecosistemas fluviales: Retos y estrategias de futuro. Online. 24 - 25/11/2021.

21. **Meffe, R., De Santiago, A., Teijón, G., Martínez-Hernández, V., López-Heras, I., Sánchez, M.B., Peinado, B., Nozal Nozal, L., De Bustamante, I.**
Contaminants of emerging concern during unplanned water reuse: a close-up on their fate under field conditions.
Conferencia Internacional sobre Reutilización y Reciclaje del Agua. International Desalination Organization (IDA). Roma. 11 - 13/10/2021.

22. **Meffe, R., De Santiago, A., Teijón, G., Martínez-Hernández, V., López-Heras, I., Nozal, L., De Bustamante, I.**
Should we be concerned about the presence of pharmaceuticals during unplanned water reuse for crop irrigation?
XIV Jornadas de Investigación de la Zona No Saturada - ZNS'21. A Coruña. 09 - 11/11/2021.

23. **Noori, MD T., Ortiz, J.M., Esteve-Núñez, A.**
Development of a four-chamber microbial desalination cell for simultaneous treatment of Cr (VI) containing wastewater and by-products recovery.
5th European Meeting of the International Society for Microbial Electrochemistry and Technology. EU-ISMET. Girona. 13 - 15/09/2021.

24. **Peñacoba, L., Jiménez, M., Esteve-Núñez, A.**
METland® Technology: a sustainable solution for a complete removal of organic pollutants and nutrients from urban wastewater.
Remtavares Workshop 2021: Enhancing wastewater treatment technologies and waste valorization. UAM. 10/12/2021.

25. **Peñacoba, L., Jiménez, M., Landaburu, J., Molina, S., García Calvo, E., Esteve-Núñez, A.**
Treatment and reuse of wastewater based on METland® technology.

5th European Meeting of the International Society for Microbial Electrochemistry and Technology. EU-ISMET. Girona. 13 - 15/09/2021.

26. Polazzo, F., Rico, A.
Multiple stressors effects on the dimensionality of stability.
Shallow Lakes Conference. Online. 01 - 05/03/2021.

27. Polazzo, F., Oliveira, T., Arenas-Sánchez, A., Romo, S., Vighi, M., Rico, A.
Multiple agricultural stressor effects on freshwater community structure and ecosystem functioning.
Aquacosm Symposium II. Online. 12 - 16/04/2021.

28. Polazzo, F., Mangold-Doring, A., Hermann, A., Roth, S., Rico, A., Sobek, A., Van den Brink, P., Jackson, M.
Combined Effects of Heatwaves and Micropollutants on Freshwater Ecosystems: Towards an Integrated Assessment of Extreme Events in Multiple Stressors Research.
SETAC Europe 31st Annual Meeting. Online. 03 - 06/05/ 2021.

29. Ramírez, M., Esteve-Núñez, A., Ortiz, J.M.
Desalination of Brackish Water Using a Microbial Desalination Cell: analysis of the electrochemical behaviour. EU-ISMET Online.
5th European Meeting of the International Society for Microbial Electrochemistry and Technology. Girona. 13 - 15/09/2021.

30. Ramírez, M., Ródenas, P., Aliaguilla, M., Bosch, P., Borràs, E., Zamora, P., Monsalvo, V., Rogalla, F., Ortiz, J.M., Esteve-Núñez, A.
MIDES H2020 Project: Microbial Desalination for Low Energy Drinking Water. From lab-scale concept to Pilot Pant validation.
European Meeting of the International Society for Microbial Electrochemistry and Technology. EU-ISMET. Girona. 13 - 15/09/2021.

31. Ramírez, M., Ródenas, P., Aliaguilla, M., Bosch, P., Borrás, E., Zamora, P., Monsalvo, V., Rogalla, F., Ortiz, J.M., Esteve-Núñez, A.
Microbial Desalination for Low Energy water production: from concept to pilot scale implementation.
Remtavares Workshop 2021: Enhancing wastewater treatment technologies and waste valorization. UAM. 10/12/2021.

32. Rico, A., Oliveira, R., De Souza, G.S., Rizzi, C., Villa, S., López, I., Vighi, M., Waichman, A.
Medicating the Amazon: presence and ecological risks of pharmaceuticals in the Amazon River.
SETAC Europe 31st Annual Meeting. Online. 03 - 06/05/2021.

33. Rico, A., Oliveira, R., De Souza, G.S., Rizzi, C., Villa, S., López-Heras, I., Vighi, M., Waichman, A.V.
Pharmaceuticals and other urban contaminants threathen Amazonian freshwater ecosystems.
SETAC Latin America 14th Biennial Meeting. Online. 26 - 29/09/2021.

34. Torruella, D., Berná, A., Vázquez, J., Manchón, C., De Deus, A., Esteve-Núñez, A.
IoT biosensing: bioelectrochemical strategies for water quality monitoring on real time.
Remtavares Workshop 2021: Enhancing wastewater treatment technologies and waste valorization. UAM. 10/12/2021.

35. Waichman, A., De Souza, G.S., Oliveira, R., Monllor, S., Vighi, M., Rico, A.
Metal contamination in fish from the Amazon and human health risk assessment.
SETAC Latin America 14th Biennial Meeting. Online. 26 - 29/09/2021

7.2 Posters

1. Callejas-Martos, S., Manjarrés, D., Montemurro, N., Rico, A., Martínez-Megías, C., Vitale, D., Picó, Y., Pérez, S.

Occurrence of pharmaceuticals in the red swamp crayfish (Procambarus clarkii) and the Asian clam (Corbicula fluminea) by LC-HRMS/MS Q-Exactive Orbitrap.

II International Conference on Ion Analysis (ICIA2021). Opole (Polonia). 23 - 27/06/2021.

2. De Santiago, A., Meffe, R., Teijón, G., Martínez-Hernández V.M., López-Heras, I., Nozal, L., de Bustamante, I.

Atenuación de fármacos en el medio agrícola suburbano.

IX Simposio Nacional sobre Control de la Degradación y Recuperación de Suelos (CONDEGRES). Online. 24 - 25/05/2021.

3. Fonseca, E., Bijlsma, L., Pitarch, E., Hernández, F., Marín, J.M., Ibáñez, M., Portolés, T., Rico, A.

Ecological risk assessment of pesticides in the Mediterranean river basin (Mijares River) impacted by citrus production.

8th Latin American Pesticide Residue Workshop. Online. 18-20/05/2021.

4. Fernández, B., Sánchez, M.B.

Efecto del triclosan en la aparición de resistencia cruzada.

XXVIII Congreso de la Sociedad Española de Microbiologia. Online. 28/06 - 02/07/2021.

5. García-Astillero, A., Martínez-Megías, C., Arenas-Sánchez, A., Polazzo, F., Rico, A.

El orden de los factores altera el producto: Efectos combinados de las olas de calor y la contaminación por pesticidas en humedales Mediterráneos.

Congreso IBERAQUA-NET: Red nacional de ecosistemas fluviales: Retos y estrategias de futuro. Online. 24 - 25/11/2021.

6. Gonzalez-Gaya, B., Huarte, A., Prieto, A., Nestor, E., De Oliveira, R., De Souza, G.S., Waichman, A.V., Rico, A.

Presence and distribution of perfluorinated contaminants in the Amazon River.

SETAC Europe 31st Annual Meeting. Online. 03 - 06/05/ 2021.

7. Martínez-Megías, C., Arenas, A., Manjarres, D., Montemurro, N., Pérez, S., Soriano, Y., Vitale, D., Picó, Y., Rico, A.

In situ monitoring of chemical mixtures and biological effects in the Albufera Natural Park.

12th Symposium for European Freshwater Sciences Virtual Conference. European Federation for Freshwater Sciences (EFFS). Dublín (Irlanda). 25 - 30/07/2021.

8. Martínez-Megías, C., Picó, Y., Soriano, Y., Vera, L., Pérez, S., Rico, A.

Proyecto CICLIC-ECOREST: objetivos y estado de desarrollo.

Congreso IBERAQUA-NET: Red nacional de ecosistemas fluviales: Retos y estrategias de futuro. Online. 24 - 25/11/2021.

9. Mentzel, S., Martínez-Megías, C., Rico, A., Grung, M., Tollefsen, K.E., Moe, J.

A Bayesian Network approach to probabilistic risk assessment of pesticides in rice fields.

SETAC North America 42nd Annual Meeting. Online. 14 - 18/11/2021.

10. Noori, MD T., Ortiz, J.M., Esteve-Núñez, A.

Random genetic mutagenesis in Geobacter Sulfurreducens induces high cytochrome activity to tolerate with hexavalent chromium.

EU-ISMET Online. 5th European Meeting of the International Society for Microbial Electrochemistry and Technology. Girona. 13 - 15/09/2021.

11. Noriega, E., Esteve, R., Ortiz, J.M., Esteve-Núñez, A.

Electrobioremediation of aromatic hydrocarbons using downflow METland® technology.

5th European Meeting of the International Society for Microbial Electrochemistry and Technology. EU-ISMET. Girona. 13 - 15/09/2021.

12. **Peinado, B., Martínez-García, L., Martínez, F., Nozal, L., Sánchez, M.B.**
An improved method for detection and quantification of SARS-CoV-2 RNA in wastewater.
SETAC Europe 31st Annual Meeting. Online. 03 - 06/05/ 2021.

13. **Polazzo, F., Domisch, S., Flörke, M., Van den Berg, S., Van den Brink, P., Rico, A.**
A Modelling Framework to Project the Future Vulnerability of Aquatic Invertebrates to Chemicals With Different Mode of Action.
SETAC Europe 31st Annual Meeting. Online. 03 - 06/05/ 2021.

14. **Pradana, R., González, B.D., González, I., Demaría, I., Moya, J.C., Sixto, H., de Bustamante, I.**
¿Reutilizar aguas residuales de la producción de cerveza para producir biomasa, generar biodiversidad y compensar la huella de carbono? Filtros Verdes Forestales.
Congreso Nacional del Medio Ambiente CONAMA 2020. Madrid. 31/05/2021 - 03/06/2021.

15. **Redondo-Hasselerharm, P.E., Rico, A., Koelmans, A.A.**
Evaluación del riesgo ecológico de los microplásticos en sedimentos de ecosistemas de agua dulce.
Congreso Congreso IBERAQUA-NET: Red nacional de ecosistemas fluviales: Retos y estrategias de futuro. Online. 24 - 25/11/2021.

16. **Rico, A., Schell, T., Vighi, M., De Souza Nunes, G.S., Oliveira, R., Waichman, A.V., Hurley, R., Nizzetto, L.**
Presence and risks of microplastics in the Amazon River.
SETAC Latin America 14th Biennial Meeting. Online. 26-29/09/2021.

17. **Sánchez, M.B., Martínez-García, L., Peinado, B., De Santiago, A., Meffe, R., Teijón, G., Martínez-Hernández, V.**
Identifying the presence of antibiotic resistant bacteria and multidrug resistant bacteria during unplanned water reuse for crop irrigation.
SETAC Europe 31st Annual Meeting. Online. 03 - 06/05/ 2021.

18. **Waichman, A.V., Oliveira, R., De Souza Nunes, G.S., Rizzi, C., Villa, S., De Caroli Viziol, B., Montagner, C.C., Rico, A.**
Ocurrence and risks of pesticides in urban streams of the Brazilian Amazon.
SETAC Latin America 14th Biennial Meeting. Online. 26-29/09/2021.

8. Patents

1. Method for degrading microcystins in an aqueous medium. El Shehawy, R., Lezcano, MA., Morón, J. 04/11/2021. AU2016387202B2

2. Method for degrading microcystins in an aqueous medium. El Shehawy, R., Lezcano, MA., Morón, J. 02/11/2021. US11162066B2

3. Method of desalination and wastewater treatment in a microbial desalination cell reactor (MDC) Ortíz Díaz-Guerra, J.M., Esteve Núñez, A., Borjas Hernández, L.Z., Monsalvo García, V.M., Rogalla, F. 18/06/2021. ES2834599T3

4. Method of desalination and wastewater treatment in a microbial desalination cell reactor (MDC) Ortíz Díaz-Guerra, J.M., Esteve Núñez, A., Borjas Hernández, L.Z., Monsalvo García, V.M., Rogalla, F. 23/03/21. US10954145B2

9. Fellowships

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

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

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

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

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

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

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

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

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

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

Melina Celeste Crettaz Minaglia
Category: Research Support
Fund: State Research Agency

10. Phd Thesis

PhD thesis defended

1. **Juan José Castro Ríos**. Hidrología y gestión del agua en la ingeniería romana: caso de la red hidráulica de Las Médulas. Directores: Irene de Bustamante Gutiérrez y Javier Lillo Ramos (17/05/2021).

2. **Ana María Fernández Santamarina**. Análisis de factores determinantes para la estimación del régimen ecológico de caudales: aplicación a las especies piscícolas y a la vegetación de ribera en el tramo medio del río Jarama (Madrid). Directores: Ángel Luis Udías Moinelo y Fernando Magdaleno Más (25/05/2021).

3. **Amanda Prado de Nicolás**. Exploring METland technology: treating wastewater by integrating electromicrobiology into Nature-based Solution. Director: Abraham Esteve Núñez (03/09/2021).

4. **Lorena Peñacoba Antona**. Validating full scale METland solutions for decentralized sustainable wastewater treatment: techno-environmental and geospatial analysis. Directores: Abraham Esteve Núñez y Eloy García Calvo (12/11/2021).

5. **Laura Valenzuela Ávila**. Photocatalytic nanostructures coating with antimicrobial and self-cleaning properties. Directores: Roberto Rosal García y Francisca Fernández Piñas (21/10/2021).

Thesis in progress

1. **Akram Gashtasebi**. Microbial Electrochemical Strategies for recovering nutrients after treating and re-using urban wastewater from a University Campus. Directores: Abraham Esteve Núñez y Karina Boltes Espínola.

2. **Alain Oviedo Pila**. La traída de aguas superficiales a Madrid desde los antiguos proyectos, hasta la entrada del Canal de Isabel II entre 1858 y 1936. Directora: Irene de Bustamante Gutiérrez.

3. **Alejandro Donato Morales**. Por determinar. Director: Francisco Carreño Conde.

4. **Alex Fabián Palacios Carranza**. Análisis económico del uso del agua subterránea y el impacto en los sistemas de riego del cantón Quero (Ecuador). Director: Alberto del Villar García.

5. **Álvaro Pun García**. Eliminación de contaminantes emergentes del agua en sistemas bioelectroquímicos. Directores: Abraham Esteve Núñez y Karina Boltes Espínola.

6. **Amaia Ortiz de Lejarazu Larrañaga**. Anion-Exchange Membranes from end-of-life Reverse Osmosis membranes: indirect recycling approach towards a circular water sector. Directores: Serena Molina Martínez y Juan Manuel Ortiz Díaz-Guerra.

7. **Anamary Pompa Pernía**. Tratamientos terciarios de aguas residuales mediante sistemas basados en membranas recicladas. Directoras: Serena Molina Martínez y Junkal Landaburu Aguirre.

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

9. **Andrés Eduardo 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.

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

11. **Carlos Edo Cuesta**. Occurrence and environmental fate of microplastics as emerging anthropogenic pollutants. Directores: Roberto Rosal García y M.ª Soledad Faraldos Izquierdo.

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

13. **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.

14. **Colin Daniel Wardman**. Electroactive Biofilters and Adapting Microbes for their use. Director: Abraham Esteve Núñez.

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

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

17. **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.

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

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

20. **Franceso Polazzo**. Multiple stressor effects on aquatic communities' vulnerability. Director: Andreu Rico Artero.

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

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

23. 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. Directores: Eloy García Calvo y Junkal Landaburu Aguirre.

24. 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.

25. Laura Katherin Chaparro Díaz. Eliminación de contaminantes emergentes mediante una nueva generación de reactores bioelectroquímicos. Directora: Karina Boltes Espínola.

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

27. Lucía Barbero Morales. Regeneración de aguas mediante filtros verdes. Condicionantes hidrogeológicos Directoras: Irene de Bustamante Gutiérrez y Virtudes Martínez Hernández.

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

29. Marina Ramírez Moreno. Comportamiento electroquímico de celdas de desalinización microbiana a escala laboratorio. Directores: Juan Manuel Ortiz y Abraham Esteve Núñez.

30. Mario Jiménez Conde. Biofiltros electrogénicos con sustratos vegetales para la reducción de nitratos en aguas. Director: Abraham Esteve Núñez.

31. 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. Directores: Irene de Bustamante Gutiérrez y Juan Antonio Pascual Aguilar.

32. Marisela Uzcategui Salazar: 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.

33. Mercedes Echegaray Giménez. La gobernanza del agua en España. Directores: Irene de Bustamante Gutiérrez.

34. Raisa Gabriela Salvi Taga. La Modelización Numérica como Herramienta para Describir el Destino de los Contaminantes de Preocupación Emergente a través del Suelo. Directoras: Raffaella Meffe y Virtudes Martínez Hernández.

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

36. Sara Martínez Pérez. Environmental fate and risks of micronanoplastics in the soil-water interface. Directores: Andreu Rico Artero y Mª Virtudes Martínez Hernández.

37. Sara Pelegrín Mc Carthy. Planificación hidrológica comparada: España y Reino Unido. Herramienta para cumplir los ODS 2030 y cambio climático. Directores: Irene de Bustamante Gutiérrez y Antonio de Lucas Sepúlveda.

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

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

40. Ting Wei. Eliminación de contaminantes emergentes y recuperación de nutrientes a través del tratamiento de aguas residuales por la tecnología metland®. Director: Abraham Esteve Núñez.

11. Internships

Student: MD Tabish Noori
Research: Microbial Osmotic desalination with energy and nutrient recovery
Centre: Universidad de Alcalá Got Energy Talent Programme
Date: 19/09/2019 – 03/12/2021

Student: Sabrina Roth
Research: ECORISK Project .
Centre: Stockholm University (Suecia).
Date: 01/03/2021 - 31/05/2021

Student: Markus Hermann
Research: ECORISK Project
Centre: Wageningen University (Neetherlands).
Date: 22/02 – 15/10/2022

Student: Giovanni Rusconi Clerici
Research: Biotechnology
Centre: Milan University (Italy)
Date: 07/07/ - 31/12/2021

Student: Sophie Mentzel
Research: ECORISK Project
Centre: Norwegian Institute for Water Research
Date: 01/11 – 17/12/2021

12. RTD activities organization

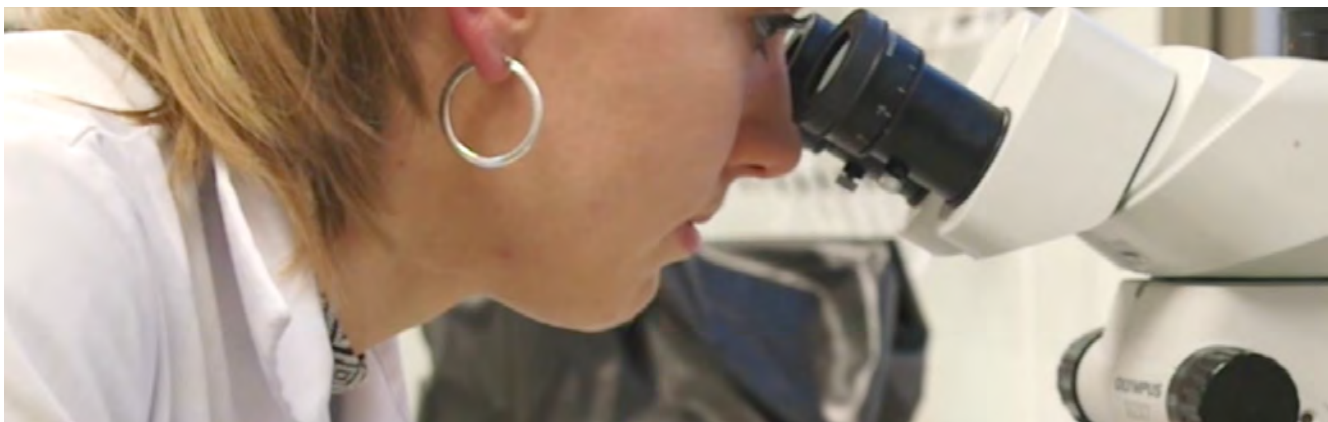
1. Seminar "Electrammox - the quest for N removal from wastewater at decentralized level". Organized by Bioe group and given by J.M. Carvajal. Online. 22/01/2021.

2. Webinar "La tecnología METland®: depurando pequeñas aglomeraciones urbanas sin coste de energía". Organized by METfilter, with the participation of A. Esteve-Núñez. 09/06/2021.

3. Summer Course "Tratamiento sostenible de aguas residuales para pequeñas poblaciones". Organized by IMDEA Water, Fundación General de la UAH y Ayuntamiento de Brihuega, and given by A. Esteve-Núñez. Brihuega, Guadalajara. 29 y 30/06/2021.

4. 1st ELECTRA Stakeholders workshop "ELECTRA goes to PILOT demonstrations". A. Esteve-Núñez, B. Barroeta. 16/09/2021.

5. Environmental Sustainability Conference: Tratamiento de aguas residuales y otros recursos para preservar el Parque Natural Cabo de Gata-Níjar. METfilter. Cámping Los Escullos. Níjar, Almería. 19/11/2021.



13. Awards, Merits and Recognitions

1. El Ministerio para la Transición Ecológica y el Reto Demográfico incluye el Proyecto TRANSFOMEM (Valorización de membranas de ósmosis inversa) en su "II Catálogo de buenas prácticas en economía circular". 12/2021.

2. ISMET (International Society for Microbial Electrochemistry and Technology) rewards with Innovation Award to Abraham Esteve Núñez for METland® technology. 14/09/2021.

3. Gonzalo Delacámara is awarded as best teacher of the EOI course 2020/21. Special mention for his dedication and transmisión of values. Escuela de Organización Industrial (EOI). Madrid. 15/07/2021.

4. Jesús Morón received Extraordinary Doctorate Award 2019-2020 from Alcalá University for his thesis Recycled-Membrane Biofilm Reactor: A sustainable biological alternative for microcystin removal 18/06/2021.

5. IMDEA Water obtains the 400+ International certification for its excellent, ennovative and sustainable management base don the new EFQM Model 2020. 04/2021

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★★★★ 2021

TALE Project (Towards multifunctional agricultural landscapes in Europe: Assessing and governing synergies between food production, biodiversity and ecosystem services), wins the "4th edition of the BiodivERsA Prize for Excellence and Impact". 11/03/2021.

6. Market Creation Potential Indicator of the Platform Innovation Radar SMART & SUSTAINABLE SOCIETY INNOVATION (European Commission) recognizes the market-creating potential of technology Electroactive constructed wetlands for pharmaceuticals bioremediation in wastewaters (METfilter) 25/01/2021.

7. Market Creation Potential Indicator of the Platform Innovation Radar SMART & SUSTAINABLE SOCIETY INNOVATION (European Commission) recognizes the market-creating potential of technology Method of desalination and wastewater treatment in a microbial desalination cell (IMDEA AGUA) 27/01/2021.

14. Other Institutional Activities

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

- Participation. XXI Science and Innovation Week. Madrid, Spain. 2021

- Participation. XII European Researchers' Night. Madrid. Spain. 2021

- Member of Euraxess Service Network. Local Contact Point

15. Platforms and associations

16. 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 Crisis-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:

17. IMDEA Water in the Media

A total of 190 news has been published in 110 different media (86 of them in regional and national area and 24 in international area) and 29 interviews and video reports have appeared in media outlets including COPE, SER, Telecinco Mediodía, Movistar+, El Mundo or Expansion, among others.

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institute imdea water

Contact
imdea.water@imdea.org
tel. +34 918 305 962
fax +34 918 305 961

Avenida Punto Com, 2
Parque Científico Tecnológico
de la Universidad de Alcalá
28805 Alcalá de Henares (Madrid) Spain