institute IMDEA water

www.water.imdea.org

annual report 2023

just water

Irene de Bustamante Gutiérrez
Director, IMDEA Water Institute

words from the director...

During 2023, there have been major structural changes at iMdea water. The first change was our director's retirement, Eloy García Calvo. He was the driving force behind the birth and development of our institute and we cannot thank him enough for everything he contributed.

This year we have also significantly worked on the management strategy for the next four years, under the EFQM model. The aim has been to detect and implement actions that allow us to anticipate changes.

In addition, we have renewed the HR Excellence in Research seal (HRS4R). This seal was awarded to us by the European Commission in July 2010, thus becoming the first Spanish institution (and the eleventh in Europe) to obtain this important official distinction. Among other actions this year, we have implemented the MIA Mentoring Program with the aim of facilitating new staff onboarding and favouring professional development.

iMdea water's research staff has authored numerous publications, more than half of which are published in journals in the first quartile (Q1). We have also collaborated with 38 countries thanks to the 34 national and international projects and contracts that are currently active.

In terms of our scientific infrastructures, our pilot plants' volume and degree of innovation have increased considerably. More than a dozen new analytical methodologies have been developed in the laboratories and new equipment has been acquired for the treatment and identification of microplastics. Likewise, we have witnessed continued progress in the determination of microorganisms in environmental samples through DNA sequencing, the development of methodologies for detecting and quantifying genes, the definition of bioinformatic analysis protocols and the implementation of new ways of studying the presence of genes responsible for antibiotic resistance.

We have continued to work on our commitment to gender equality by complying with our action plan in the areas of intervention planned for this year. The actions related to recruitment and hiring processes, professional classification, internal and external communication, and occupational health.

And no less important has been our website revamp. It is now more visual, attractive and modern and has a responsive design.

palabras de la directora...

En 2023, en iMdea agua ha habido cambios estructurales importantes. El primero de ellos, la retirada de primera línea de nuestro director Eloy García Calvo, impulsor del nacimiento y desarrollo de nuestro instituto; a él no le podemos dejar de expresar nuestro inmenso reconocimiento y agradecimiento.

También en este año se ha trabajado en la estrategia de gestión para los próximos cuatro años, bajo el modelo EFQM, con el fin de detectar y poner en marcha acciones que permitan poder anticiparse a los cambios.

Además, hemos renovado el sello de Excelencia en la Gestión de Recursos Humanos en Investigación (HRS4R); dicho sello nos lo otorgó la Comisión Europea en julio de 2010, convirtiéndonos en la primera institución española (y la undécima en Europa) en obtener esta importante distinción oficial. Entre otras acciones, este año hemos implementado el Programa de Mentoría MIA con el objetivo de facilitar la incorporación del nuevo personal y favorecer el desarrollo de la carrera profesional.

El personal investigador de iMdea agua ha sido autor de numerosas publicaciones, de las que más de la mitad están publicadas en revistas del primer cuartil (Q1). Así mismo se ha colaborado con 38 países a través de los 34 proyectos y contratos nacionales e internacionales que tenemos activos.

En cuanto a nuestras infraestructuras científicas, la capacidad tanto en volumen como en grado de innovación de las plantas piloto ha aumentado considerablemente. En los laboratorios se han desarrollado más de una docena de nuevas metodologías analíticas y se han adquirido nuevos equipos para el tratamiento e identificación de microplásticos. Igualmente, se ha seguido avanzando en la determinación de microorganismos en muestras ambientales a través de secuenciación de ADN, desarrollando metodologías de detección y cuantificación de genes, protocolos de análisis bioinformáticos, e implementando nuevas vías de estudio de la presencia de genes responsables de la resistencia a los antibióticos.

Hemos seguido trabajando en nuestro compromiso con la igualdad de género, cumpliendo con nuestro plan de actuación en las áreas de intervención previstas para esta anualidad, en procesos de selección y contratación, clasificación profesional, comunicación interna y externa, y de salud laboral.

Y no menos importante ha sido el cambio de nuestra página web, con la finalidad de hacerla más visual, atractiva y moderna con un diseño responsive.

annual report 2023

www.water.imdea.org

editor
IMDEA Water Institute

graphic design
base 12 diseño y comunicación

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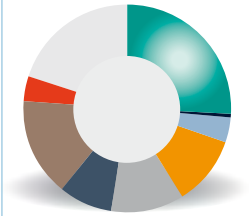
executive summary

Human Capital

- **41** Researches
- **11** Laboratory staff
- **14** Associated researchers
- **9** Administration and management staff

Scientific results



- **46** Articles in journals, 31 in high impact journals (Q1)
- **1** Books
- **7** Books chapters
- **19** Lectures
- **20** Round tables and experts panels
- **15** Participation in Scientific Committees
- **27** Conferences
- **8** PhD thesis defended
- **35** PhD thesis in progress

Origin of funds

- **38%** from projects & contracts
- **7** Active international projects
- **15** National and regional projects
- **11** contracts

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

Geomatic Laboratory

Hardware, software and databases

High-level up-to-date specialized analysis and testing laboratory

Chemical, biological and soil analysis

overview

Purpose, mission and vision - IMDEA Water

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.

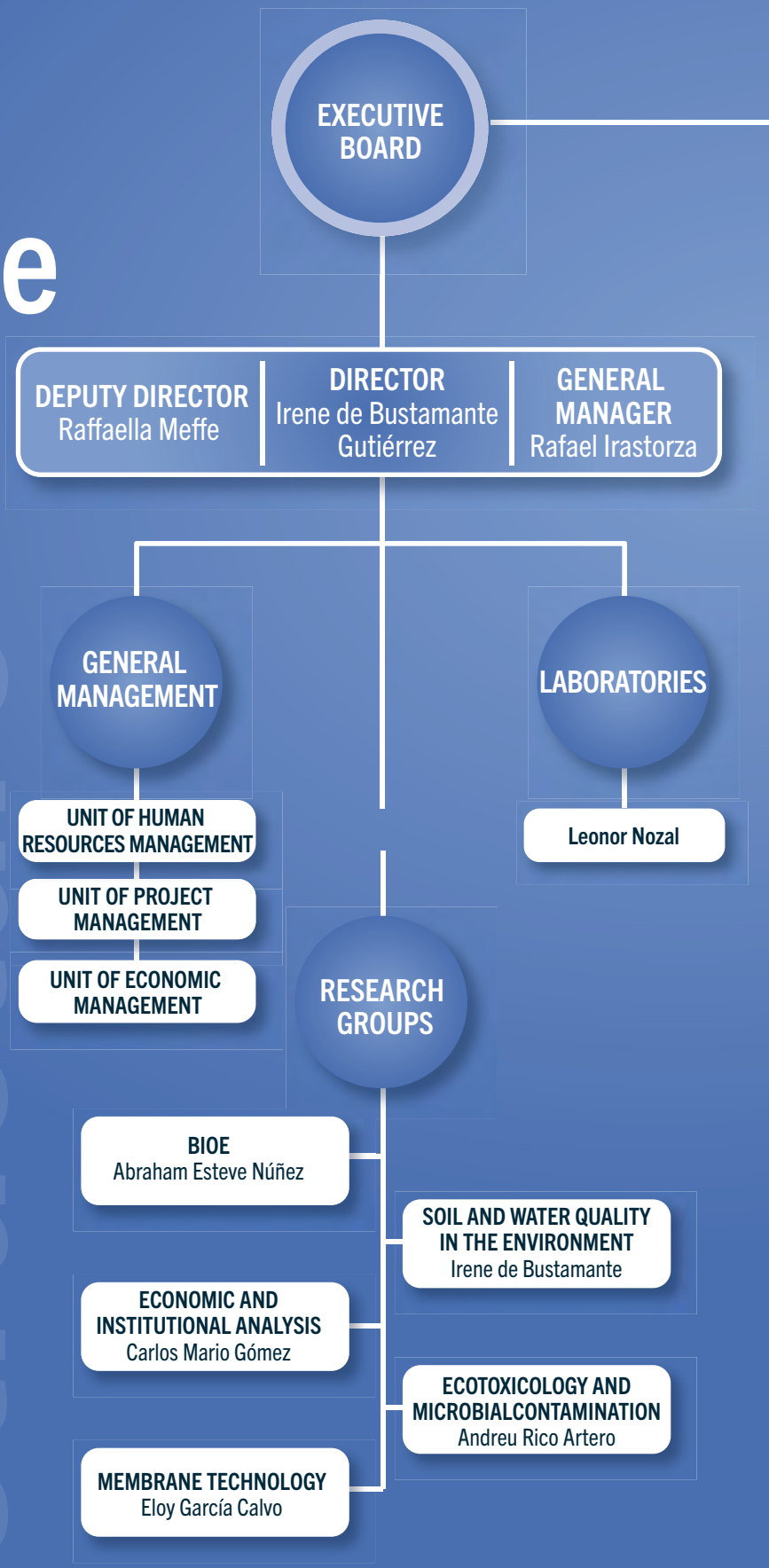
RESEARCH GROUPS

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

SUSTAINABLE DEVELOPMENT GOALS

SGD - IMDEA Water

our structure



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AQUALIA. INTEGRAL WATER MANAGEMENT

infrastructures and sc

Analysis and Testing Labo

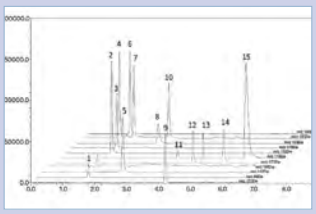
Chemical Analysis Service

Basic Analysis Unit

Determination of several physical and chemical parameters (pH, conductivity, redox potential, TKN, alkalinity, TOC, DBO_5, DQO…) laid down in the regulations on control of water quality and dumping.

Chromatography Unit

Determination of organic compounds, anions and cations in water samples by the separation principles of chromatography (HPLC and ionic chromatography).



ICP-MS Unit

Analysis of trace levels of metals, metalloids and other major elements present in different matrices (water, soil, biota, etc.) by inductively coupled plasma mass spectrometry equipment, with optional coupling with HPLC for speciation studies.

Mass Spectrometry Unit

Identification and quantification of organic compounds (pesticides, pharmaceuticals, BTEX, trihalomethanes…) at trace levels with chromatography systems (liquid and gas chromatography) coupled to mass spectrometry with different kind of mass analyzers (high sensitivity and high resolution).

pilot plants

Membrane Technology

ientific equipment

ratory

Micronanoplastic Unit

Analysis of micro and nanoplastic particles (MNPs) in environmental samples (water, soil, sediment). Identification of the polymer type, physical characterization (shape, size…) and semi-quantification.

Biological Analysis Service

Microbial Ecology Unit

Analysis of biological and microbiological indicators.

DNA and RNA sequencing for bacterial biodiversity studies and metagenomics

Determination of minimum inhibitory concentrations of microorganisms.

Detection and quantification of SARS-CoV-2 in wastewater.

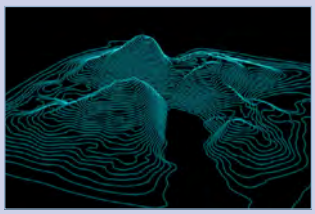
Monitoring of cyanobacteria blooms and their toxins.

Soil Analysis Service

Determination of physicalchemical properties of soils, sediments, and similar solid matrices (texture, moisture, pH, electrical conductivity, organic matter, total nitrogen…).

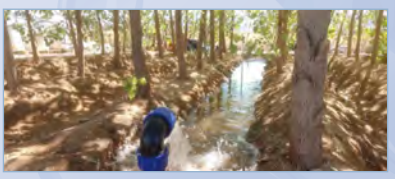
Geomatic Laboratory

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

Land Application Systems



Outdoor Mesocosm Facilities

Chemical Analysis Service
Basic Analysis Unit

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

Equipment

- Total Organic Carbon (TOC) Analyzer. TOC-V CSH model.
- Automatic titration, 809 Titrando (Methrom).
- Photometer Spectroquant Prove 100 (Merck).
- Photometer DR 3900 (Hatch).
- UV-1800 model from Shimadzu.
- Particle counter for water samples (0.2 and 2 microns). LS_200 model from Particle Measuring System Inc.
- Turbidimeter
- Colorimeter
- Muffle oven

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 Service
Chromatography Unit

Liquid Chromatography coupled to Ultraviolet/ refractive index detector (HPLC-UV/IR)

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 coupled to UV/IR detectors (Agilent Technologies).

Applications

- The field of application for this technique is very wide ranging. Some of the applications are listed here:
- Determination of bronopol in water samples.
- Succinic, lactic, fumaric, acetic acids in water.

Ion Chromatography

Ion Chromatography is a variant of High Performance Liquid Chromatography (HPLC). Separation and determination of ions is 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. It allows simultaneous determination of anions and cations with conductivity detector.

Applications

- 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 Service
ICP-MS Unit

ICP-MS is the analytical technique with the greatest potential for determination of trace level pf metals and metalloids in all types of matrices. This technique is very selective, sensitive and requires few milliliters of sample. In the case of solid samples, is necessary to perform an acid digestion prior to analysis.

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 (helium gas mode) for achieving a greater sensitivity, less background noise and a high removal of spectral interferences. Option of coupling separation techniques such as high performance liquid chromatography (HPLC) for speciation studies, and a microwave digestor ETHOS One (Milestone) for pretreatment of solid samples.

Applications

- Multielemental semi-quantitave analysis. Determination of major and minor elements present in a sample in one run.
- Quantitative analysis of elements from ng/L to mg/L levels. Linear dynamic range of 8 orders of magnitude and low detection limits (ng/L (ppt)) for most of elements.
- Low volumes of sample (<600 µL)
- Analysis of biological, organic and inorganic samples by closed acid digestion using a microwave system.
- Environmental applications (water, soils, sediments and other residues).
- Study of oxidation state and bioavailability (speciation) of metals and metalloids in complex matrices.

Chemical Analysis Service
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. The ions are separated according to their mass/charge (m/z) ratio and detected. This technique provides information of molecular fragments, which allows to determine the molecular mass of compound as well as elucidate their chemical structures.

Equipment

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

Applications

- Determination of monoisotopic mass and fragmentation studies.
- Identification of organic compounds by comparison of experimental spectral information with GC-MS and LC-HRMS libraries and databases.
- Analysis of organic micropollutants in waters by GC-MS/MS (organochlorine and organophosphorus pesticides, trihalomethanes, polyaromatic hydrocarbons).
- Multi-residue quantification LC-MS/MS methods for monitorization of organic micropullutants in water, soil and biota samples at ng/L and ng/g levels.
- Development of analytical methodologies to support research projects about new environmental concerning issues, and to answer the new requirements in current legislation regarding water quality.

Chemical Analysis Service
Micronanoplastics Unit

This is a unit specialized in the analysis of MNPs in environmental samples, provided by specific instrumentation, as pyrolysis and infrared microscopy for the identification, characterization and semi-quantification of the micro and nano particles

Pyrolysis coupled to GC-MS is the most common technique used for the quantification of MNPs in a diversity of samples. During the pyrolysis process, the fragmentation of the plastic polymers occurs due to the high temperatures applied, and specific fragments are separated and detected in the GC-MS. Thus, identification and quantification of different types of polymers as polyethylene, polystyrene, polypropylene, PET, PVC… that are present in the samples is possible.

Infrared microscopy techniques allows the MNP particles location (10 µm or lower sizes), the count, identification and size and type distribution. Information obtained from this analysis is complementary to the one obtained by Py-GC-MS.

For particle separation the use of a filed-flow fractionation system is an option. With this system the separation of MNP particles from 10 nm to 20 µm is possible, thus different fractions of a sample with different particle sizes can be recovered. Then these fractions can be analyzed by Py-GC-MS or µFTIR-Raman, so complementary information about size distribution, molecular weight and surface charge can be obtained.

Equipment

- Pyrolizer coupled to Gas Chromatography-Mass Spectrometry (Py-GC-MS). Pyrolizer model 6200 (CDS Analytical), GC model 7890B and MS model 5977B (both from Agilent Tecnologies).
- Infrared microscopy chemical imaging system (µFTIR-Raman), IRT-5000, FT/IR-6X, NRS-4500, from JASCO.
- Field-flow fractionation system coupled to ultraviolet/refraction index detector and multiangle light scattering (FFF-UV/IR-DLS), model CF 2000 from POSTNOVA.

Applications

- Identification and semi-quantification of 5 polymers (polystyrene, polypropylene, polyethylene, PET and PVC) in water samples (waste, surface and underground water) by Py-GC-MS.
- Identification, characterization and count of microplastic particles by µFTIR in water samples, soil and sediments.
- Screening of polymers in water samples by Py-GC-MS.
- Development of analytical methodologies for the determination of MNPs in other kind of samples like sludge by Py-GC-MS, by optimizing strategies for sample treatment (digestion and cleanup) and preconcentration steps.

Soil Analysis Service

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 characterization 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 utilized, 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 analyze 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 aluminum.
- Metals.
- Phosphates retention.
- Assimilable boron.
- Calcium carbonate equivalent content.
- Amorphous content (Si, Al, Fe).
- Total organic carbon content.

Intelligent greenhouse with climate control system

IMDEA Water's top-of-the-range smart greenhouse is specially designed to withstand the demanding conditions of the research environment. It is a Reylux R9 model with a wide wing and gable roof, with a surface area of 100 m^2, a total height to the zenith of 5 m, and a roof and walls made of colourless cellular polycarbonate with protection against UV radiation. It is characterised by its airtightness, insulation and resistance to humidity, which translates into high energy savings.

Applications

The greenhouse equipment allows various types of tests to be carried out, both in hydroponics and in soil and/or amendment:

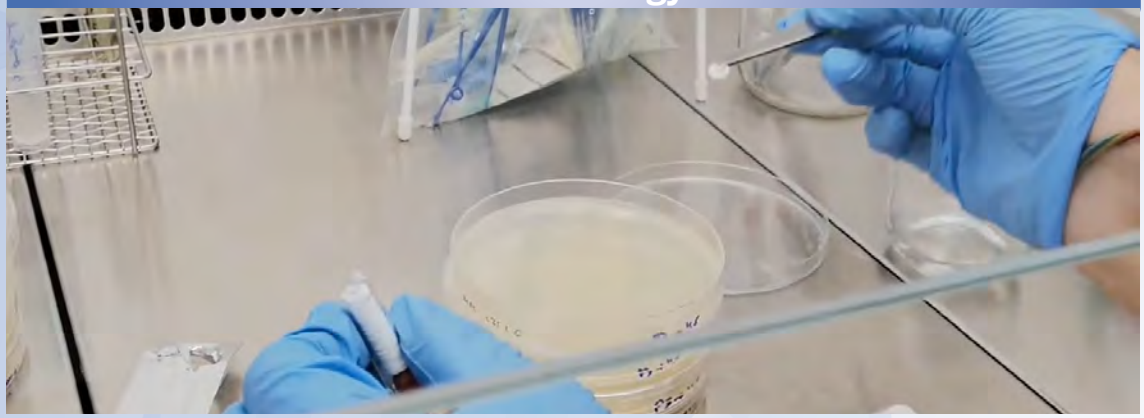
- Crop productivity: assessment of the impact of irrigation with water of different qualities, which has been subjected to different treatments, on crop yields in terms of quantity of crop per area of land.
- Plant selection: evaluation of ecophysiological parameters for the selection of plant species, including large plant species (e.g. *Populus spp., Salix spp., Typha spp.*, etc.), for use in Nature-Based Solutions, such as vegetation filters or wetlands.
- Nature-based solutions: small-scale trials of attenuation of chemical (e.g. nutrients, pharmaceuticals, metals, etc.) and biological (e.g. viruses, parasites, antibiotic-resistant bacteria) contaminants, using selected plant species, for water purification and soil phytoremediation.
- Public health risk: tests to assess the risk to food safety arising from the transfer of contaminants into the food chain via edible tissues of horticultural plants (e.g. *Lactuca sativa*, etc.).
- Environmental impact: tests to assess the ecotoxicological impact of pollutants on the soil-plant system, such as soil microbiological activity (e.g. enzymatic activity, microbial biomass, etc.) and different morphological and physiological parameters of plants (e.g. leaf area, etc.).
- Runoff and infiltration: tests using devices that simulate water movement by runoff and/or infiltration processes, with or without vegetation, to assess the mobility of pollutants present in soil or water, such as micronanoplastics.

Equipment

The greenhouse is designed to carry out independent experiments simultaneously with crops of plant species with different lighting needs depending on the growth stage under study. For this purpose, it includes computerized environmental control, cultivation tables with independent LED lighting and drip irrigation system of different classes depending on the requests of researchers and clients. It is also equipped with devices for monitoring pollutants in the water-soil-plant system.

Action funded through the agreement between the Community of Madrid (Regional Board of Education, Universities, Science and Spokesperson´s Office) and the IMDEA Water Foundation for the direct granting of a grant of 1,135,000.00 euros to finance the performance of actions in the field of research on SARS-CoV-2 and the COVID-19 disease financed with REACT-EU resources from the European Regional Development Fund.

Biological Analysis Service
Microbial Ecology Unit



The Microbial Ecology Unit provides a comprehensive microbiological analysis service, encompassing both classical and molecular methods, aimed at assessing the quality of surface waters, groundwater, and related matrices. Our analyses are carried out according to national and international standardized methods, complying with the standards established in the UNE-EN ISO norms for microbiological water quality analysis.

Equipment

Microscopes to facilitate identification and counting microscopic organisms:

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

Infrastructure for the cultivation and analysis of microorganism

- 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.

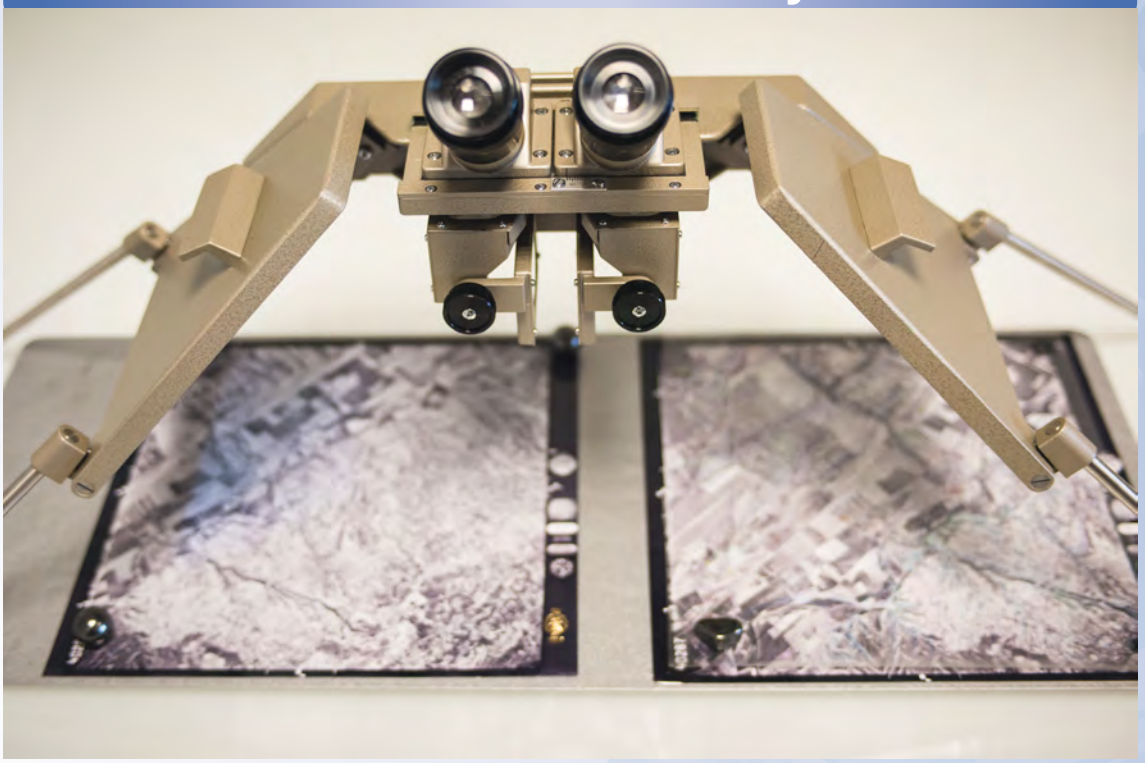
Molecular biology infrastructure

- MinION (Nanopore) MK1C and MK1 sequencers
- Real-time PCR LightCycler 96 (Roche) and AB7300 (Thermo)
- Nanophotometer (Biotek) and Qubit4 fluorometer (Invitrogen)
- Gel documentation system GelDoc Go Imaging System from Bio-Rad
- SimpliAmp and TC-5000 thermocyclers (Applied Biosystems and Techne)
- Real Time PCR (AB7300) for quantitative and qualitative gene studies.
- Homogenizer for DNA extraction (Precellys).

Applications

- DNA and RNA Extraction from different matrices
- DNA and RNA sequencing using nanopore technology for bacterial biodiversity studies and metagenomics.
- Detection and quantification of specific genes of environmental relevance, such as those related to the nitrogen cycle, antibiotic resistance, and microcystin production.
- Analysis of microbiological indicators (E. *coli*, *Enterococos*, Coliforms, *Clostridium*, *Pseudomonas aeruginosa*) to determine the quality of drinking and recreational waters.
- Determination of Minimum Inhibitory Concentrations (MICs) of microorganisms (antiobiograms).
- Quantification of cyanobacteria and their toxins (microcystins) in surface waters.

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).

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.

projects and contracts

projects and contracts

1. Projects

1.1. Urban, Industrial and Agricultural Wastewater Treatment

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

Design, construction and validation of METlands technologies applied to nutrient removal in wastewater - IMDEA Water

Grant IND2018/AMB-9197 funded by:

Comunidad de Madrid

1.1.2. Innovative Strategies based on biotechnology and electrochemistry for producing valuable products from brewery wastewater (BEER4all)

BEER4all - IMDEA Water

Grant CPP2021-008852 funded by:

1.1.3. National Network of Microbial Electrochemical Technologies (IBERIMET)

IBERIMET - IMDEA Water

Grant RED2022-134954-T funded by:

MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

AGENCIA ESTATAL DE INVESTIGACIÓN

1.1.4. New strategies for the sustainable production of reused water by means of modular electroactive wetland: METlands (Mobimet)

Mobimet - IMDEA Water

Grant CPP2021-008936 funded by:

1.1.5. Photo microbial electrochemical fluidized bioreactor (photoME-FBR): a new strategy for treating industrial wastewater and producing high-valuable products (photoELECTRA)

photoELECTRA - IMDEA Water

Grant PID2021-128700OB-I00 funded by:

1.1.6. Sustainable bioconversion of CO2 using Microbial Electrochemical Tools based on fluid-like electrodes (BIOCO2MET)

BIOCO2MET - IMDEA Water

Grant TED2021-132870B-I00 funded by:

1.1.7. Transformation of energy intensive process industries through integration of energy, process, and feedstock flexibility (TRINEFLEX)

Trineflex - IMDEA Water

This project is funded be the European Union's HORIZON EUROPE research and innovation programme under grant agreement No 101058174.

1.1.8. New system-driven bioremediation of polluted habitats and environment (NYMPHE) - METfilter, S.L.

NYMPHE - IMDEA Water

This project is funded be the European Union's HORIZON EUROPE research and innovation programme under grant agreement No 101060625.

1.1.9. Microbial electrochemical technologies for wastewater polluted by hydrocarbons Microbial electrochemical technologies for wastewater polluted

hydrocarbons - IMDEA Water

Industrial doctorate with METFILTER, S.L.

Grant DIN2018-009782 funded by:

1.2. Water Reuse

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

BIOARBIO - IMDEA Water

Grant IND2019/AMB-17191 funded by:

Comunidad de Madrid

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

Nat4Health - IMDEA Water

Grant PID2020-118521RB-I00 funded by:

1.3. Economic and Institutional Analysis

1.3.1. Water Security for the planet (Water4All)

Water4All - IMDEA Water

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement no. 101060874.

1.3.2. Scientific network on the risks of extreme events and pollution on the Iberian fluvial systems: Application to management (AQUAIBER-NET)

Aquaiber-Net - IMDEA Water

Grant RED2022-134781-T funded by:

1.4. Membrane Technology

1.4.1. Plastisphere in urban wastewaters: Membrane based hybrid systems for water reuse and sludge recycling (EMERGING)

EMERGING - IMDEA Water

Grant PID2022-143233OB-I00 funded by:

1.5. Ecotoxicology

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

ESARNET2 - IMDEA Water

Funded by:

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

PERIAMAR - IMDEA Water

Reference: CA18221. Funded by:

1.5.3. Toxic cyanobacterial blooms as a threat to pollination in a changing climate

CYANOBACTERIAL - IMDEA Water

Grant 2022-T1/AMB-24063 funded by:

1.5.4. Ecological risks of chemicals in the future (ECORISK2050)

ECORISK2020 - IMDEA Water

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000210.

1.6. Micro and Nanoplastics

1.6.1. Plastic in Agricultural Production: Impacts, Lifecycles and Long-Term Sustainability (PAPILLONS)

PAPILLONS - IMDEA Water

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000210.

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

nanoCLEAN - IMDEA Water

Grant PID2019-111519RA-I00 funded by:

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

µNanoCare - IMDEA Water

Grant RTC2019-007261-5 funded by:

1.6.4. Plastic chemical additive release from plastic debris and their mobility in soil agroecosystems (ADDIPLAS)

AddiPlaS - IMDEA Water

Grant PID2022-140011OB-I00 funded by:

1.7. Water and Energy

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

http://gotenergytalent.uah.es/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 754382.

2. Contracts

2.1. Economic and Institutional Analysis

2.1.1. Multiple Framework service contract in four (4) lots for the provision of external expertise on regulatory and policy issues in the fields of: Lot 2: Climate Change.

European Parliament

2.1.2. Framework Contract on economic analysis of environmental policies and analytical support in the context of Better Regulation.

ENVIRONMENT

2.1.3. Framework contract for "Water for the Green Deal' - Implementation and development of the EU water and marine policies".

ENVIRONMENT

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

ENVIRONMENT

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

THE WORLD BANK
IBRD • IDA

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

THE WORLD BANK
IBRD • IDA

2.1.7. The impact of the Dutch Nitrogen Ruling on affected European Union Member States and innovative solutions to nutrient removal from water. UK Department for Environment Food & Rural Affairs

2.2. Reclaimed Water Reuse

2.2.1. Sustainable desert ecosystem management with use of treated wastewater for forage irrigation in Kuwait.

KISR
معهد الكويت للأبحاث العلمية
Kuwait Institute for Scientific Research

2.3. Wastewater Treatment

2.3.1. Research on hybrid storage technologies and predictive modeling for transforming industries into offshore renewable energy management points. REGENERA - IMDEA Water

Financiado por la Unión Europea
NextGenerationEU
GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN
Plan de Recuperación, Transformación y Resiliencia
CDTI INNOVACIÓN

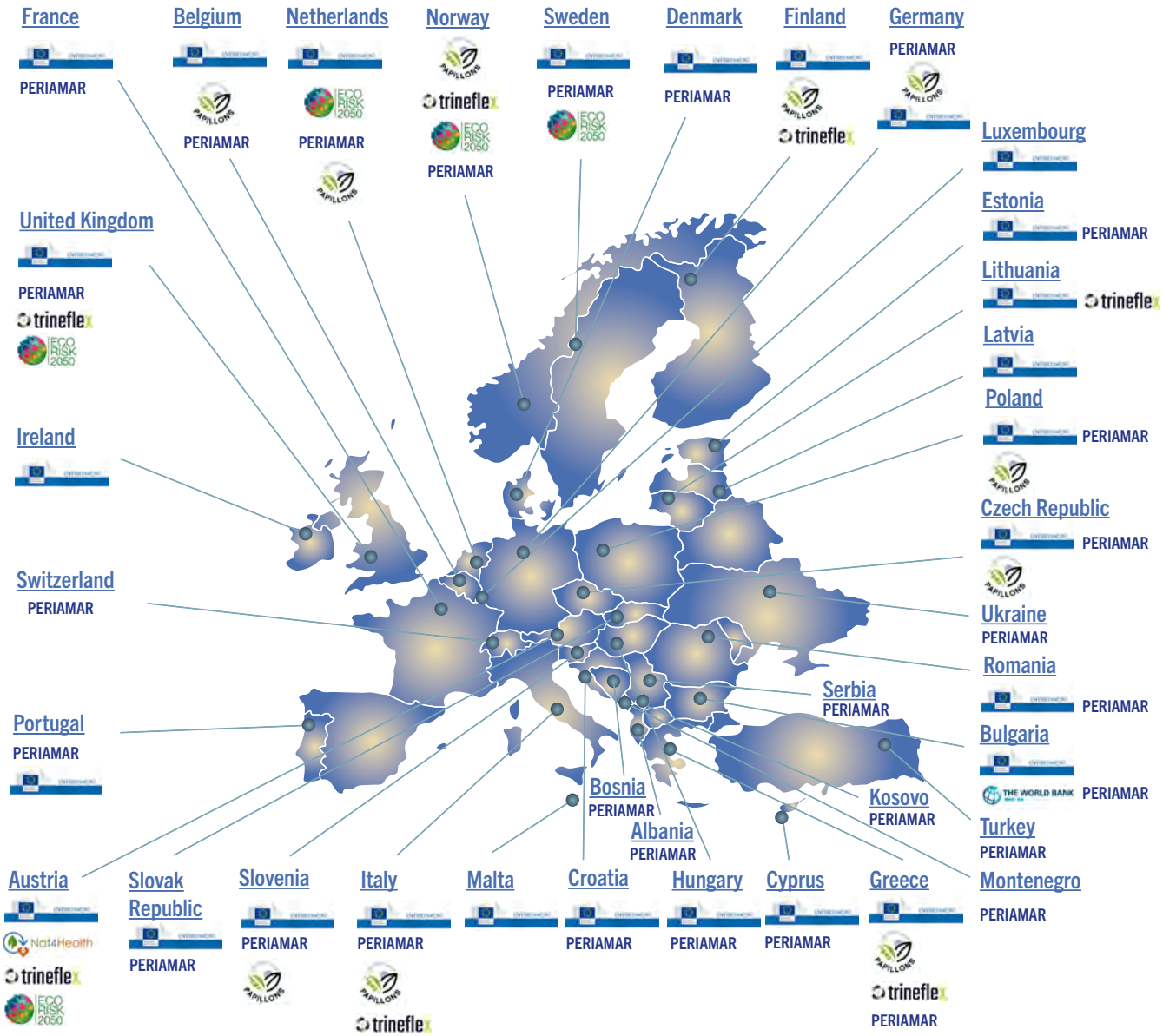
2.3.2. Advice on the design of a microbial fuel cell system within the framework of the "Zayed Sustainability Prize" project. Liceo Europeo.

3. Other innovation grants and international initiatives

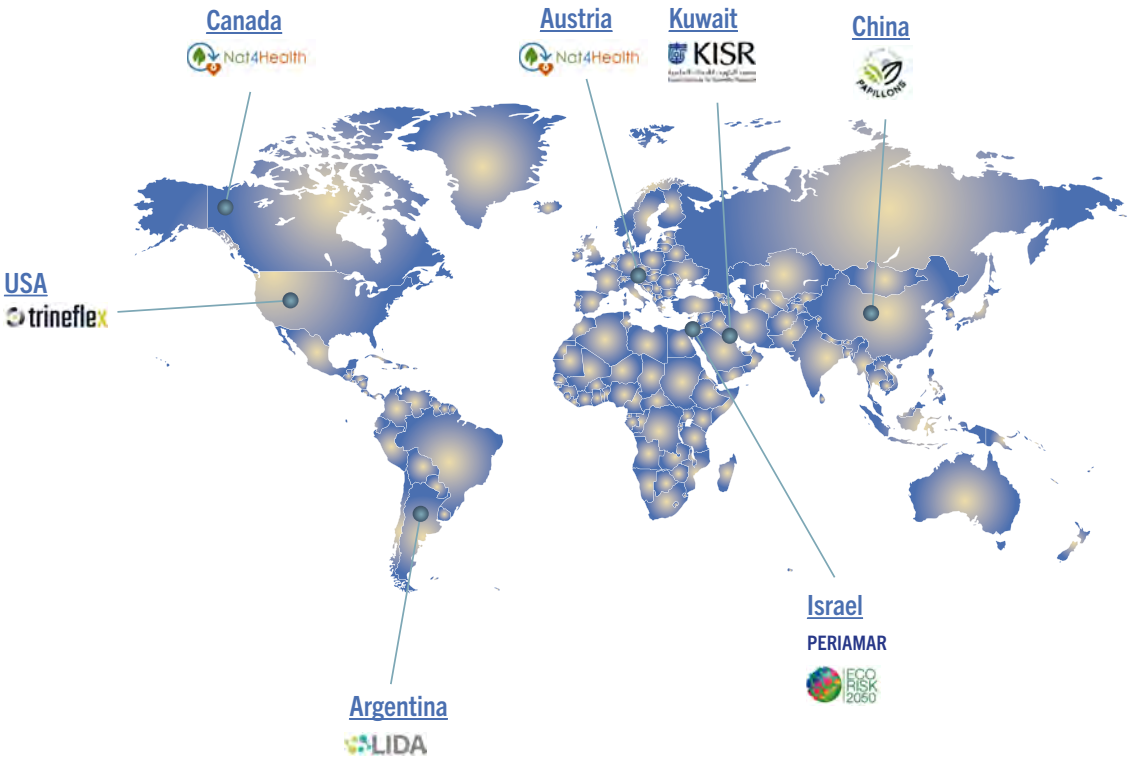
3.1. Economic and Institutional Analysis

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

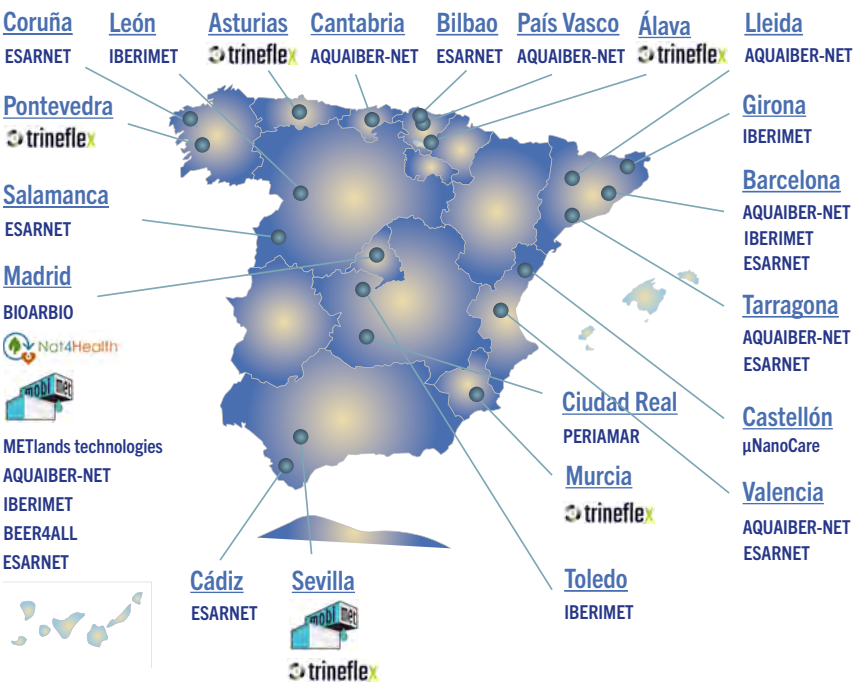
European collaboration in projects, contracts and other european initiatives



International collaboration in projects, contracts and other international initiatives



Spanish collaboration in projects, contracts and other initiatives



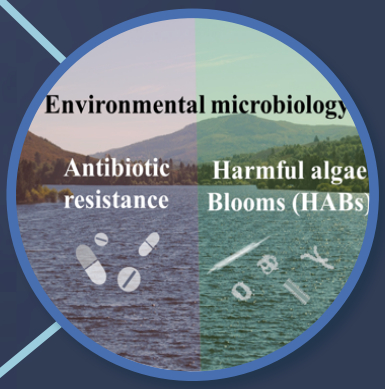
research groups

Membrane Technology

Soil and Water Quality in the Environment

research groups

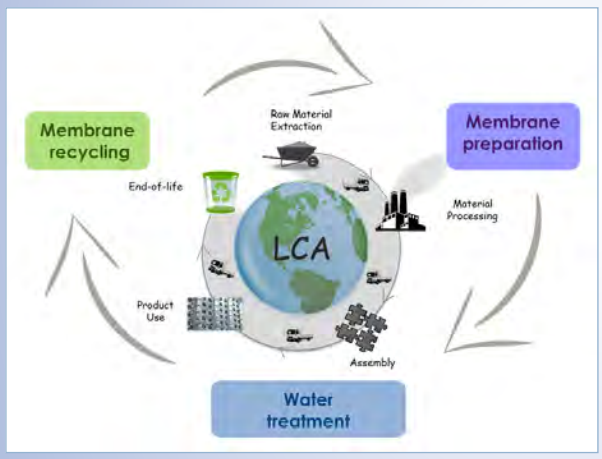
Bioe



Ecotoxicology and Microbial Contamination

Economic and Institutional Analysis

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. Eloy García Calvo
Main Researcher

Dr. Junkal Landaburu Aguirre
Researcher

Dr. Serena Molina Martínez
Researcher

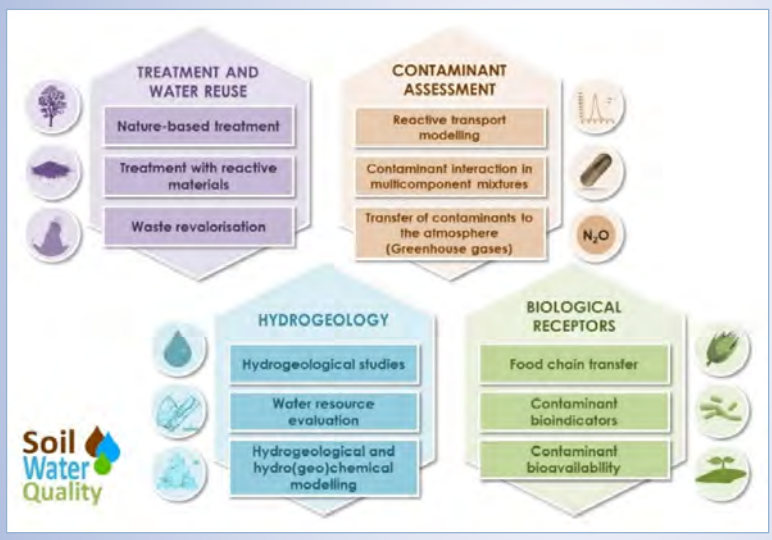
Imane Fellahi
Research Support

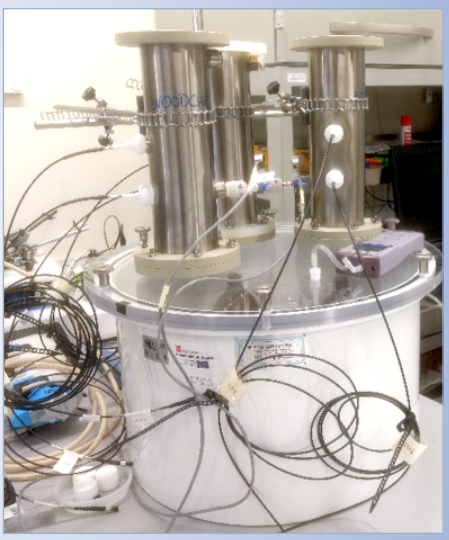
Laura García Pina
Research Support

Laura Rodríguez Saez
Research Support

Anamary Pompa Pernía
Predoctoral Researcher

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/

Soil and Water Quality in the Environment

Dr. Irene de Bustamante Gutiérrez
Main Researcher

Dr. Raffaella Meffe
Researcher

Dr. Ana de Santiago Martín
Researcher

Dr. María de las Virtudes Martínez Hernández
Researcher

Dr. Lucila Candela
Associated Researcher

Dr. Juan Antonio Pascual Aguilar
Associated Researcher

Lucía Barbero Morales
Research Support

Ana García Arcos
Research Support

Lesly Ayala Cabana
Research Support

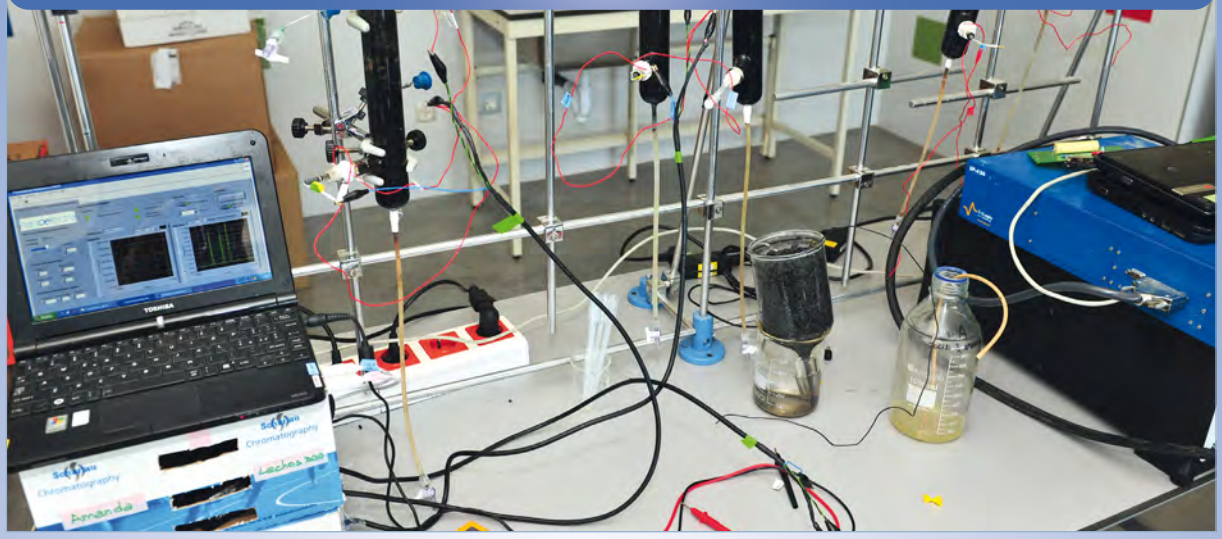
Cynthia Rieckhof Rivas
Research Support

Gloria Teijón Ávila
Technician 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. Antonio Berná Galiano
Researcher

Dr. Abraham Esteve Núñez
Main Researcher

Dr. Juan Manuel Ortiz Díaz-Guerra
Researcher

Daniela Torruella Salas
Research Support

Dr. Karina Boltes Espínola
Associated Researcher

Bioe

Silvia Blázquez González
Research Support

Belén Barroeta
Science Communicator

Marina Ramírez Moreno
Predoctoral Researcher

Colin Wardman
Predoctoral Researcher

Mario Jiménez Conde
Associated Predoctoral Researcher

Sara Mozo Pacheco
Predoctoral Researcher

Eduardo Noriega Primo
Associated Predoctoral Researcher

Ecotoxicology and Microbial Contamination

The Ecotoxicology and Microbiological Contamination group addresses three areas of research:

1. Assessment of the risks to ecosystems determined by pollutants and their interactions with the environment, considering the vulnerability of people, populations and communities to chemical and non-chemical stressors.

2. Technology-based solutions for industries in the water sector in relation to the proliferation of harmful algae caused by cyanobacteria.
   - Design of monitoring programs for the development of blooms of toxic cyanobacteria in reservoirs.
   - Development of technology for the specific and sensitive detection of microcystins in water.
   - Development of technology for the efficient and economical removal of microcystins during water treatment using biofilms.

3. Studies of the impact of contaminants (antibiotics and biocides) on microorganisms and resistance to antibiotics in aquatic environments:
   - Potential effect of contaminants on bacterial populations.
   - Detection of antibiotic resistant bacteria and resistance genes.
   - Fitness cost linked to the acquisition of antibiotic resistance.
   - Resistance gene transfer and the role of contaminants.

Ecotoxicology and Biological contamination

Dr. Andreu Rico Artero
Main Researcher

Dr. Mª Ángeles Lezcano Vega
Researcher

Dr. Paula Redondo Hasselerharm
Researcher

Prof. Marco Vighi
Associated Researcher

Dr. María Blanca Sánchez
Researcher

Dr. Pablo Urrutia Cordero
Researcher

Dr. Jesús Morón López
Associated Researcher

Ángel G. Pompa Pernía
Research Support

Dr. Theresa Schell
Research Support

Lorena Martínez García
Research Support

Daniel Franco López
Research Support

Sara Martínez Pérez
Predoctoral researcher

Ariadna García-Astillero Honrado
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. Carlos Mario Gómez Gómez
Main Researcher

Marta Rodríguez
Research Support

Economic and Institutional Analysis

laboratory staff

Dr. María Isabel López Heras
Laboratory Technician

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

Dr. Laura Cherta Cucala
Laboratory Technician

Dr. María Argudo Fernández
Laboratory Technician

Carolina Guillén Fuentes
Laboratory Technician

Francisco Martínez Serrano
Laboratory Technician

Isabel Fernández Artime
Laboratory Technician

Beatriz Peinado Rodríguez
Laboratory Technician

Dr. Melina Crettaz Minaglia
Laboratory Technician

Leidy Viviana
Laboratory Technician

Mónica Díaz González
Laboratory Technician

management area and administration

Dr. Juana Sanz García
R&D Manager

Mari Luz Barquilla Crespo
Economic Manager

Rafael Irastorza Vaca
General Manager

José Ángel Gómez Martín
R&D Technical support

Gloria Rubio Sánchez
R&D Technical support

Celia Barral Nieto
Technician in Economic and Administration

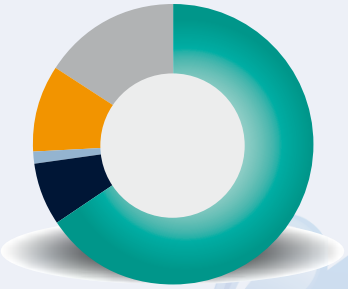
Laura Sánchez González
Technical of economic management

Lucía Alvaredo Olmos
R&D Technical support

Josefa Simón Recio
Secretary

Research results and knowledge dissemination

1. Scientific Papers



- 46 Articles in journals (31 in Q1)
- 5 Other Articles
- 1 Book
- 7 Book Chapters
- 12 Scientific-Technical Reports

1.1 Articles in journals

1.2 Other articles

1.3 Books

1.4 Book chapters

1.5 Scientific-Technical Reports

2. Lectures (19)

3. Round tables and experts panels (20)

4. Participation in Scientific Committees

We have participated in a total of 15 Scientific Committees. Some examples are:

- International Society for Microbial Electrochemistry and Technology (ISMET)
- XI Simposio del Agua en Andalucía - SIAGA
- Third International Meeting on New Strategies in Bioremediation / Restoration Processes - BioRemid 2023
- XXVIII International Symposium on Bioelectrochemistry and Bioenergetics (BES2024)
- 6th European Meeting of the International Society for Microbial Electrochemistry and Technology - EU ISMET 2023
- Scientific Committee on Health, Environmental and Emerging Risks (SCHEER). European Commission

5. Conference

5.1 Oral Commucations

12 researchers have participated in a total of 12 Scientific Events. Some examples are:

- SETAC Europe 33rd Annual Meeting , Dublin, Ireland
- 4th International Conference on Risk Assessment of Pharmaceuticals in the Environment (ICRAPHE). Barcelona Spain.
- XVI edición de las Jornadas de Investigación de la Zona No Saturada. IGME-CSIC. Seville. Spain
- 1st Workshop Applied physics to PPB-based environmental biotechnology. COST Action PurpleGain. Szeged (Hungary)
- ASLO Aquatic Sciences Meeting 2023. Palma de Mallorca (Spain)
- First Belt & Road Youth Green Low Carbon Innovation and Development International Forum. Hangzhou (China)

5.2 Posters

We have participated with 12 posters in some events like:

- SETAC Europe 33rd Annual Meeting. Dublín (Ireland).
- 4th International Conference on Risk Assessment of Pharmaceuticals in the Environment (ICRAPHE). Barcelona (Spain)
- Third International Meeting on New Strategies in Bioremediation / Restoration Processes - BioRemid 2023 (Switzerland).
- Innovation Driven Desalination Conference 2023. Jeddah (Saudi Arabia)
- FEMS2023 10th Congress of European Microbiologists. Hamburg (Germany)
- Workshop: Towards Electrochemical Sustainability. Simposio VI E3TECH. Ciudad Real, Spain

6. Fellowships

- Researcher from Regional Science Programme "Talent Atraction":
  Pablo Urrutia Cordero
  Grant 2022-T1/AMB-24063 funded by:

Comunidad de Madrid

- Researcher from Juan de la Cierva-Formación Programme.
  Paula Elisa Redondo Hasselerharm
  Grant FJC2020-045328-I funded by:

MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES · Financiado por la Unión Europea NextGenerationEU · Plan de Recuperación, Transformación y Resiliencia · AGENCIA ESTATAL DE INVESTIGACIÓN

- 7 Research Support from Statal Programme INVESTIGO:
  Ana García Arcos, Daniel Franco López, Daniela Torruella Salas, Imane Fellahi, Isabel Fernández Artime, Lorena Martínez García
  Contracts funded by the European Union – Next Generation EU.

MINISTERIO DE TRABAJO Y ECONOMÍA SOCIAL · SERVICIO PÚBLICO DE EMPLEO ESTATAL SEPE

Plan de Recuperación, Transformación y Resiliencia

- 2 Predoctoral Researcher from National Science Programme:
  Anamary Pompa Pernía, Blanca Huidobro López
  Grants PRE2019-088421 and BES-2017-082064 funded by:

MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES · UNIÓN EUROPEA Fondo Social Europeo · AGENCIA ESTATAL DE INVESTIGACIÓN

- 2 Research Support:
  Gloria Teijón Ávila, Melina Celeste Crettaz Alcaraz
  Grants PTA2020-019363-I and PTA2020-019286-I funded by:

MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES · AGENCIA ESTATAL DE INVESTIGACIÓN

7. Phd Thesis

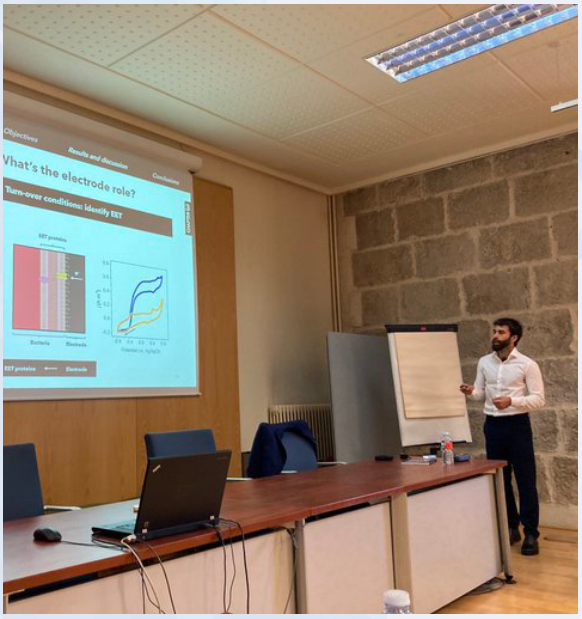
PhD thesis defended

1. **Carlos Edo Cuesta**. Occurrence and environmental fate of microplastics as emerging anthropogenic pollutants. Directors: Roberto Rosal García y M.ª Soledad Faraldos Izquierdo. 16/02/2023.

2. **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. Directors: Eloy García Calvo y Junkal Landaburu Aguirre. 17/03/2023.

3. **Álvaro Pun García**. Eliminación de contaminantes emergentes del agua en sistemas bioelectroquímicos. Directors: Abraham Esteve Núñez y Karina Boltes Espínola. 23/03/2023.

4. **Carlos Manchón Vállegas**. Electromicrobial strategies for sustainable growth of purple phototrophic bacteria. Director: Abraham Esteve Núñez. 14/04/2023.



5. **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.27/03/2023.

6. **Nafiseh Salehi Siavashani**. Assessment of groundwater hydrology of the quaternary aquifer of Lake Chad basin. Director: Lucila Candela Lledó. 07/07/2023.

7. **Andrés de Deus Villagra**. Estrategias 3D de "cableado" redox en bacterias electroactivas para recuperar ambientes contaminados. Director: Abraham Esteve Núñez.21/07/2023.

8. **Blanca Huidobro López**. Atenuación de contaminantes de preocupación emergente en filtros verdes. Identificación de productos de transformación. Directors: Irene de Bustamante Gutiérrez y Leonor Nozal Martínez. 16/10/2023.

PhD 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. **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.

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

5. **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.

6. **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.

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

8. **Cynthia Emilia Rieckhof Rivas.** Destino y transporte de los micronanolásticos a través del suelo y su potencial llegada al agua subterránea. Directors: Mª de las Virtudes Martínez Hernández and Raffaella Meffe.

9. **Daniela Torruella Salas.** Sensores electroquímicos microbianos: nueva perspectiva para la monitorización de la calidad del agua. Director: Abraham Esteve Núñez.

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

11. **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.

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

13. **Ferando Muniesa Merino**. Biofactorías "Púrpura": Estarategias bioelectroquímicas para revalorizaar el agua residual de cervecera mediante microorganismos fototróficos púrpura. Director: Abraham Esteve Núñez.

14. **Ignacio Lozano Colmenarejo**. Estudio y propuesta de un indicador global en la regulación de la calidad de los servicios urbanos del agua en España. Director: Alberto del Villar García.

15. **Imane Fellahi**. Eliminación de contaminantes emergentes en aguas residuales mediante sistemas de membrana. Director: Junkal Landaburu Aguirre and Serena Molina Martínez.

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

17. **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.

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

19. **Lesly Antonieta Ayala Cabana.** Contaminantes de preocupación emergente en el escenario agrícola, ¿riesgo para la salud o atenuación natural?. Directors: Ana de Santiago Martín and Raffaella Meffe

20. **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.

21. **Lorena Bermejo Santos**. Influencia del cambio climático en la zona no saturada del terreno y su incidencia sobre las aguas subterráneas. Estudio de un caso piloto en el humedal de Somolinos en la Cabecera del Bornova (Cuenca del Tajo). Director: Francisco Carreño Conde.

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

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

24. **Marina Bastante Rabadán.** Eliminación bioelectroquímica de micro y nanoplásticos del agua residual. Director: Ana Karina Boltés Espínola

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

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

27. **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.

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

29. **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.

30. **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.

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

32. **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.

33. **Sara Mozo Pacheco**. Desarrollo de biosensores basados en la biología sentética y bioimpresión 3D. Director: Abraham Esteve Núñez.

34. **Sergio Álvarez Blanco.** Modelización de recursos hídricos en España mediante uso de Hydro-BID. Directors: Juan Antonio Pascual Aguilar and Juan José Castro Ríos.

35. **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.

36. **Virginia Gálvez Blanca.** Distribución ambiental y toxicidad de microplásticos y nanoplásticos. Directors: Roberto Rosal García and Alice Petre Bujan.

8. Internships

1. Centre: University of Surrey (United Kingdom).
   Date: 27/02/2023 - 26/05/2023.

2. Centre: Universidad Autónoma de Coahuila (Mexico).
   Date: 01/03/2023 - 31/03/2023.

3. Centre: Université Tahri Mohamed de Bechar (Algeria).
   Date: 08/03/2023 - 08/05/2023.

4. Centre: National School for Water and Environmental Engineering Strasbourg - ENGEES (France).
   Date: 03 - 28/07/2023.

5. Centre: Universidad de Granada (Spain).
   Date: 13 - 17/11/2023.

9. RTD activities organization

1. HE Trineflex, Esamur pilot meeting. Online. Ortiz, J.M. 16/01/2023.

2. Initial Meeting of the Proyect Bioconversión sostenible de CO2 mediante herramientas electroquímica microbianas utilizando electrodos fluidizados. (BIOCO2MET). UAH. Esteve-Núñez, A., Ortiz, J.M., Boltes, K., Barroeta, B. 08/02/2023.

3. H2020 ELECTRA M48 Review Meeting. IMDEA Agua. Esteve-Núñez, A. Barroeta, B. 16/02/2023

4. Initial Meeting of the Proyect Estrategias biotecnológicas y electroquímicas para la generación de productos de alto valor añadido a partir de aguas residuales de la industria cervecera (BEER4all). IMDEA Agua. Esteve-Núñez, A., Barroeta, B., Jiménez, M. 21/02/2023

10. Awards, Merits and Recognitions

1. Juan Manuel Ortiz and Junkal Landaburu Aguirre have received recognition in the framework of the Global Prize for Innovation in Desalination (GPID) with two projects aimed to solve crucial problems in the field: microbial desalination technology for fresh water production with low energy (MDC) and transformation of disposed reverse osmosis (RO) membranes into recycled ultra and nanofiltration membranes. The award is sponsored by the Saline Water Conversion Corporation (SWCC) and major Saudi desalination companies. The Prize ceremony was held during the Innovation Driven Desalination Conference in Jeddah, Saudi Arabia on 1-3/10/2023.

2. Pre-doctoral students Daniela Torruella and Mario Jiménez have won the thirteenth edition of the international EDPR University Challenge with a project that fuses solar energy and biotechnology to capture carbon and create value-added products with the proposal Fusion of solar power and biotechnology: Use of energy surplus for production of added value products and carbon capture through Purple Photrophic Bacteria (PPB). Madrid 25/10/2024.

3. IMDEA Water has received the Manantial 2023 Prize, awarded by Club del Agua Subterránea (The Groundwater Club, CAS), for "its intense work" in supervision of doctoral theses, the development of numerous scientific and technological research projects on water resources, and the dissemination of its results at the national and international level. Madrid. 28/11/2023.

11. Other Institutional Activities

- Member of Research Laboratories Network (REDLAB). https://mcyt.educa.madrid.org/laboratorios/

- Participation. XXIII Science and Innovation Week. Madrid, Spain. 2023

- Participation. XIV European Researchers' Night. Madrid. Spain. 2023

- Member of Euraxess Service Network. Local Contact Point

- Participation. Feria Madrid Es Ciencia 2023

- Participation. Feria Transfiere 2023

12. Platforms and associations

3. IMDEA Water in the Media

A total of 42 news items were published in 67 different media outlets (55 of these in the regional and national area and 12 in the international area). In addition, 7 interviews and video stories were published in the media, including La Vanguardia, La Sexta or La Razón.

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