



water

2025

 ^{institute}
imdea
water

annual
report

just water
www.agua.imdea.org

words from the director...



Water is essential. It sustains life, keeps everything functioning, and plays a structural role in the development of our societies. Without it, there is no health, no economic activity, no environmental balance, and no sustainable future.

And yet, for too long, it has remained in the background of many strategic debates. It has been treated as a given resource, assumed to be abundant by default, without fully integrating its complexity into planning and decision-making. This invisibility contrasts with its central role in all the systems that support our daily lives.

Water is, by definition, a cross-cutting resource. It directly affects key sectors such as agriculture, industry, energy, and public health. At the same time, it shapes territories, connects ecosystems, and influences social and economic dynamics. Its global nature is reflected in its cycle, which does not recognize administrative or political boundaries.

This importance stands in contrast to the uneven distribution of water resources, which creates significant differences between regions—from contexts of relative abundance to scenarios of structural water stress. These

inequalities are driven both by natural factors and by management models, highlighting the close relationship between water systems and their governance. In the face of increasing pressure from climate change, it is essential

to move towards more proactive management models, capable of anticipating risks and supporting decision-making based on scientific knowledge. In this context, research plays a fundamental role.

In 2025, IMDEA Water has continued to consolidate its position as an international

reference in the field of water. Its activities are mainly structured around research projects and knowledge transfer contracts, addressing in an integrated manner the main strategic areas related to sustainable water management and environmental protection. These include water security and climate change adaptation, managed

Water is, by definition, a cross-cutting resource that connects ecosystems, sectors, and societies beyond political boundaries.

Irene de Bustamante Gutiérrez

Director, IMDEA Water



aquifer recharge—including the development of regulatory instruments—and wastewater treatment and reuse as key components of the circular economy.

In addition, IMDEA Water conducts research in areas such as aquatic biodiversity conservation, advances in membrane technologies and their optimization, and the study of innovative processes such as environmental bioelectrochemistry. These lines are complemented by the assessment of ecological and human health risks associated with emerging contaminants of concern, such as pharmaceuticals, micro- and nanoplastics, chemical additives, and per- and polyfluoroalkyl substances (PFAS), as well as by research on antimicrobial resistance and the presence of cyanotoxins. At the same time, the institute promotes the development of advanced biosensors that enable automated water quality monitoring, contributing to more efficient, data-driven, real-time management.

Furthermore, IMDEA Water has played a relevant and proactive role in the design, conceptual development, and validation of public policy instruments related to water within the European Union. It has also actively participated in the implementation and monitoring processes of these policies, contributing scientific and technical knowledge to the deployment of advanced technologies and the development and optimization of

water infrastructures. This work has been carried out in close collaboration with European institutions, public administrations, and other key stakeholders, fostering the

integration of innovation and sustainability into water resource management.

At IMDEA Water, we conduct high-impact research to address key challenges in water security, climate change adaptation, and the circular economy.

This Annual Report reflects the enthusiasm, commitment, and excellence that characterize the daily work of the IMDEA Water team—diverse, interdisciplinary, and international, with more than one-third of its staff

being of non-Spanish nationality. Thanks to this collective effort, the institute not only generates high-impact scientific and technical knowledge, but also actively contributes to improving the way our societies understand, plan, and manage such an essential resource as water.

palabras de la directora...

El agua es esencial. Sostiene la vida, hace que todo funcione, y constituye un elemento estructural en el desarrollo de nuestras sociedades. Sin ella, no hay salud, no hay actividad económica, no hay equilibrio ambiental ni futuro sostenible.

Y, sin embargo, durante demasiado tiempo ha permanecido en un segundo plano en muchos debates estratégicos. Se ha considerado un recurso dado, abundante por defecto, sin integrar plenamente su complejidad en la planificación y la toma de decisiones. Esta invisibilización contrasta con su papel central en todos los sistemas que sostienen nuestra vida cotidiana.

El agua es, por definición, un recurso transversal. Interviene de manera directa en sectores clave como la agricultura, la industria, la energía o la salud pública. Al mismo tiempo, articula territorios, conecta ecosistemas y condiciona dinámicas sociales y económicas. Su carácter global se manifiesta en su ciclo, que no entiende de fronteras administrativas ni políticas.

Esta relevancia contrasta con una distribución desigual de los recursos hídricos, que genera importantes diferencias

entre regiones, desde contextos de abundancia relativa hasta escenarios de estrés hídrico estructural. Estas desigualdades responden tanto a factores naturales como a los modelos de gestión, evidenciando la estrecha relación entre los sistemas hídricos y su gobernanza. Ante la creciente presión derivada del cambio climático, resulta imprescindible avanzar hacia modelos de gestión más

proactivos, capaces de anticipar riesgos y apoyar la toma de decisiones sobre la base del conocimiento científico. En este escenario, la investigación desempeña un papel fundamental.

En 2025, IMDEA Agua ha continuado consolidándose como un referente internacional en el ámbito del agua.

Su actividad se articula

principalmente a través de proyectos de investigación y contratos de transferencia de conocimiento, en los que

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se abordan de forma integrada las principales líneas estratégicas relacionadas con la gestión sostenible del agua y la protección del medio ambiente. Entre ellas destacan la seguridad hídrica y la adaptación al cambio climático, la recarga gestionada de acuíferos — incluyendo el desarrollo de instrumentos regulatorios— y el tratamiento y reutilización de aguas residuales como elementos clave de la economía circular.

Asimismo, IMDEA Agua desarrolla investigaciones en ámbitos como la conservación de la biodiversidad acuática, el avance en tecnologías de membranas y su optimización, y el estudio de procesos innovadores como la bioelectroquímica ambiental. Estas líneas se complementan con la evaluación de riesgos ecológicos y para la salud humana asociados a contaminantes de preocupación emergente, como fármacos, micro y nanoplásticos, aditivos químicos o compuestos perfluoroalquilados (PFAS), así como con el análisis de la resistencia a los antimicrobianos y la presencia de cianotoxinas. De manera paralela, el instituto impulsa el desarrollo de biosensores avanzados que permiten la monitorización automática de la calidad del agua, contribuyendo a una gestión más eficiente, basada en datos y en tiempo real.

Además, IMDEA Agua ha desempeñado un papel relevante y proactivo en el diseño, desarrollo conceptual y validación de instrumentos de política pública relacionados con el agua en el ámbito de la Unión Europea. Asimismo, ha

En IMDEA Agua llevamos a cabo investigación de alto impacto para abordar retos clave en seguridad hídrica, adaptación al cambio climático y economía circular.

participado activamente en los procesos de implementación y seguimiento de dichas políticas, contribuyendo con conocimiento científico-técnico al despliegue de tecnologías avanzadas y al desarrollo y optimización de infraestructuras hídricas. Esta labor se ha llevado a cabo en estrecha colaboración con

instituciones europeas, administraciones públicas y otros agentes clave, favoreciendo la integración de la innovación y la sostenibilidad en la gestión de los recursos hídricos.

Esta Memoria refleja la ilusión, el compromiso y la excelencia que caracterizan la labor diaria del equipo de IMDEA Agua, diverso, interdisciplinar e internacional con más de un tercio del personal de nacionalidad no española. Gracias a este esfuerzo colectivo, el instituto no solo genera conocimiento científico y técnico de alto impacto, sino que contribuye activamente a mejorar la forma en que nuestras sociedades comprenden, planifican y gestionan un recurso tan esencial como el agua.

**editor**

IMDEA Water Institute

graphic design

www.loveodesign.es

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about us

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.





OUR 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.

OUR 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.

OUR PURPOSE

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

ODS

IMDEA Water contributes to achieving the following Sustainable Development Goals:



in figures

human CAPITAL

66

Researchers

22

Laboratory
staff

9

Associate
researchers

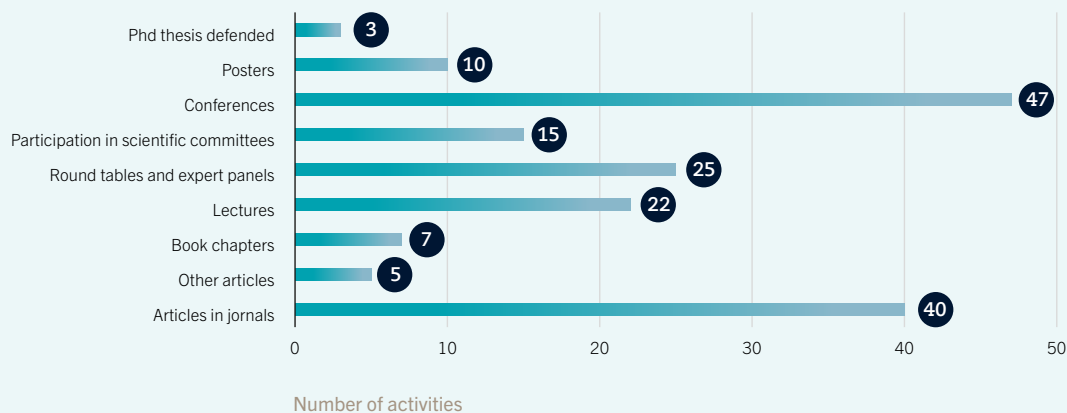
13

Administration and
management staff

scientific RESULTS



Scientific and academic activities by category



Technology TRANSFER

1

spin-off

METfilter

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

4

events

Planet 25
Transfiere
Science for Industry
Rebuild

COLLABORATIONS

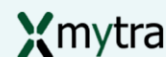
University and research associations



Platforms and associations



Companies



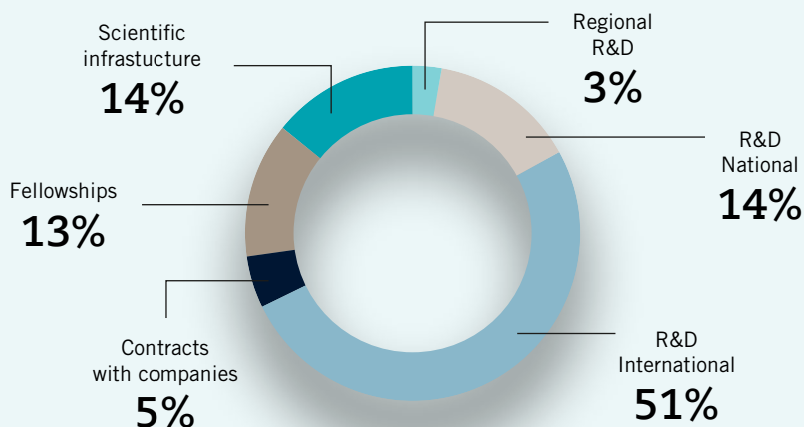
Collaborations with



origin OF FUNDS



External funding by source



The external funding achieved in 2025 represents a **historical maximum**, exceeding €4 million in total funding, largely driven by the acquisition of multiannual international projects whose execution is distributed across subsequent years.

FACILITIES

4

Pilot plants

1. Membrane technology
2. Outdoor mesocosms facilities
3. Microbial electrochemical technologies
4. Land application systems

3

Analysis and testing labs

1. Chemical
2. Biological
3. Soil analysis

1

Geomatic laboratory



structure

BOARD OF
TRUSTEES

SCIENTIFIC
COUNCIL

IMDEA WATER DIRECTOR

Irene de Bustamante Gutiérrez

DEPUTY DIRECTOR

Raffaella Meffe

MANAGER

María Luz Barquilla Crespo

GENERAL MANAGEMENT

Unit Of Human Resources
Management

Unit Of Project Management

Unit Of Economic Management

RESEARCH GROUPS

Aquatic Ecology And Biotechnology

Economic and Institutional Analysis

Carlos Mario Gómez Gómez

Environmental bioelectrochemistry

Abraham Esteve Núñez

Membrane Technology

Soil And Water Quality In The Environment

Irene De Bustamante Gutiérrez

ANALYSIS AND TESTING LABORATORY

Chemical Analysis Service
Soil Analysis Service

Isabel López Heras

Chemical Analysis Service
Soil Analysis Service

Laura Cherta Cucala

Biological Analysis Service

Iame Alves Guedes

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PhD in Mining Engineering and Emeritus
Full Professor at the Universidad
Politécnica de Madrid, Spain
Rey Jaime I Prize for Environmental
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Doctor Honoris Causa of University of
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Directorate-General of Universities.
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Technological Innovation.
Directorate-General for Research and
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Deputy Counsellor for the Environment,
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Regional Boards of Environment,
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Fernández-Durán*
Deputy General Director of Research
Directorate General of Research and
Technological Innovation
Regional Board of Science, Universities
and Innovation
Regional Government of Madrid. Spain

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Scientific and Technical Coordinator.
Fundación para el Conocimiento madri+d.
Madrid, Spain.

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Mancha Water Agency.

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Rey Juan Carlos University, Madrid, Spain.

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University of Alcalá, Alcalá de Henares,
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Full Professor of Chemical Engineering.
Complutense University of Madrid, Spain.

Prof. Ángel Javier Marugán Aguado
Full Professor of Chemical Engineering.
Rey Juan Carlos University, Spain.

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Full Professor of Chemical Engineering,
Complutense University of Madrid,
Spain. Coordinator of the Scientific Area
at the Spanish State Research Agency:
Environmental Sciences and Technologies
(CTM).

Prof. Dr. Rosa Galvez
Department of Civil and Water
Engineering. Université Laval, Quebec,
Canada.

Mr. Jorge A. Arroyo
Consultant specializing in innovative
water supply strategies. Texas, USA.

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Dr. Domingo Zarzo Martínez
R&D Technical Director. Murcia, Spain.

FCC Aqualia
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Director of Strategic Development and
Sustainability. Madrid, Spain.

Canal de Isabel II
Mr. Mariano González Sáez
Chief Executive Officer (CEO). Madrid,
Spain.

*Henares Business Association
(AEDHE)*
Ms. Laly Escudero Ossorio
President. Alcalá de Henares, Madrid,
Spain.

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Dr. Francisco Javier Elorza Tenreiro
Full Professor of Hydrogeology and Director
of the School of Mining and Energy
Engineering. Universidad Politécnica de
Madrid, Spain.

Dr. Lucy Mar Camacho
Associate Professor. Texas A&M University–
Kingsville, USA.

SECRETARY

Mr. Alejandro Blázquez Lidoy

scientific COUNCIL

Prof. Dr. Rafael Fernández Rubio
PhD in Mining Engineering and Emeritus
Full Professor at the Universidad
Politécnica de Madrid.
Jaime I Prize for Environmental Protection.
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Lisbon

Prof. Dr. Rosa Galvez
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Engineering. Université Laval, Quebec,
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Mr. Frank Rogalla
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Aqualia – Integrated Water Management.
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Madrid, Spain.

Prof. Dr. Lucy Mar Camacho
Associate Professor. Texas A&M University–
Kingsville, USA.

our people



Administration and Management staff

20

Research groups

22

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Laboratory staff

32



administration and MANAGEMENT STAFF



**María Luz Barquilla
Crespo**
General Manager
(since 04/2025)



Rafael Irastorza Vaca
General Manager
(until 03/2025)



Esther Solera Santiago
Accounting Technician



Catalina Nicoleta Nita
**Financial Management Support
Technician**



**Eva María Carrasco
Marina**
Human Resources Technician



Sheila García Nieto
**Administrative Support
Technician**



Josefa Simón Recio
Secretary



Sara Isabel García Rodríguez
Head of R&D Management Area



Gloria Rubio Sánchez
R&D Management Support Technician



José Ángel Gómez Martín
R&D Management Support Technician



Lucía Alvaredo Olmos
R&D Management Support Technician



Irene Malonda Herráez
Research Project Management Support Technician



Marta Rodríguez Gómez
Project Manager

research
GROUPS

Aquatic Ecology and Biotechnology



Pablo Urrutia Cordero
Main Researcher
(until 07/2025)



**Fernando Chaguaceda
Borjabad**
Researcher



**María de los Ángeles
Lezcano Vega**
Researcher



**Paula Elisa Redondo
Hasselerharm**
Researcher



**María Blanca Sánchez
Martínez**
Researcher
(until 07/2025)



Andreu Rico Artero
Associated Researcher



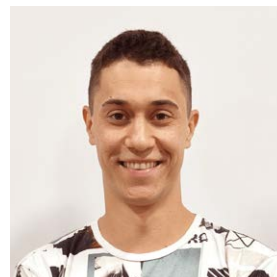
Marco Vighi
Associated Researchers



Gabriela Ágreda López
Predoctoral Researcher



María Ángeles Herrero Vieira
Predoctoral Researcher



Mario Márquez Toribio
Predoctoral Researcher



Lorena Martínez García
Predoctoral Researcher



Carla Morales Pujante
Predoctoral Researcher



Esteban Sabroso de la Torre
Predoctoral Researcher



Ana Almodóvar Pérez
Advanced Research Support Technician
(until 09/2025)



Sandra Amate Pariente
Advanced Research Support Technician
(until 09/2025)



Guillermo Cabezas Torrero
Advanced Research Support Technician



Mónica Gámez Rábano
Advanced Research Support Technician
(until 09/2025)

research
GROUPS

Economic and Institutional Analysis



**Carlos Mario Gómez
Gómez**

Main researcher



**Carlos Dionisio Pérez
Blanco**

Researcher



Mario Ballesteros Olza

Researcher



Marcos García López

Researcher

(until 08/2025)



Jesús Garrido Rubio

Researcher



**María Teresa Marcos
Almaraz**

Researcher

(until 05/2025)



**David Andrés Rivas
Tabares**

Researcher



Francesco Sapino
Researcher



Nazim Uddin
Researcher



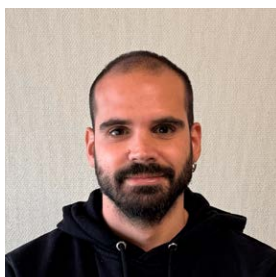
Nouredine Bouzidi
Predoctoral Researcher



Mariem Chammem
Predoctoral Researcher



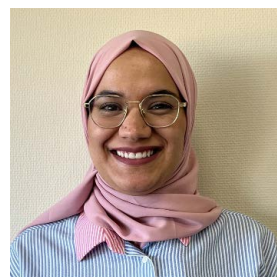
Isabella De Baptistis
Predoctoral Researcher



Héctor González López
Predoctoral Researcher



Osama Hassan
Predoctoral Researcher



Abir Neji
Predoctoral Researcher



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Advanced Research Support
Technician
(until 05/2025)



Haniyeh Salmani
Advanced Research Support
Technician



Giammauro Soriano
Advanced Research Support
Technician

research
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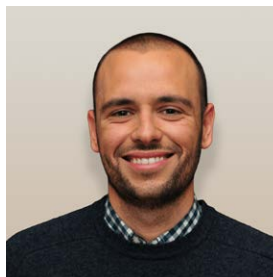
Environmental bioelectrochemistry



Abraham Esteve Núñez
Main researcher



Antonio Berná Galiano
Researcher



Jesús Morón López
Researcher



*Juan Manuel Ortiz
Díaz-Guerra*
Researcher



Anna Salvian
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Karina Boltes Espínola
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Mario Jiménez Conde
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Sara Mozo Pacheco
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Daniela Torruella Salas
Predoctoral Researcher



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(until 09/2025)



María Posada García
Advanced Research Support Technician
(until 09/2025)



Francisco Pablo Gómez Romero
Advanced Research Support Technician



Ana Jesús Vega de Armas
Advanced Research Support Technician



Belén Barroeta
Science Communicator

research
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Membrane Technology



Junkal Landaburu
Aguirre

Researcher



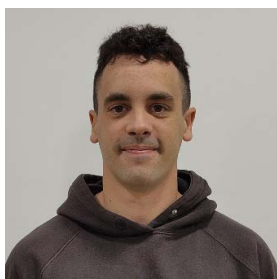
Serena Molina
Martínez

Researcher



Imane Fellahi

Predoctoral Researcher



Adrián González
García

Advanced Research Support
Technician

(until 09/2025)



Mihai Lucian Lomanar

Advanced Research Support
Technician



Francesca Nonnoi

Advanced Research Support
Technician



Ana Rubio López

Advanced Research Support
Technician



research
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Soil and Water Quality In the environment



Irene de Bustamante
Gutiérrez

Main researcher



Raffaella
Meffe

Researcher



María Virtudes
Martínez Hernández

Researcher



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Martín

Researcher



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Lledó

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Associated Researcher



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Leire Besga Oyanarte
Predoctoral Researcher



Isabel Domarco Sagra
Predoctoral Researcher



**Cynthia Emilia
Rieckhof Rivas**
Predoctoral Researcher



Ana García Arcos
Advanced Research Support
Technician



Silvia Pallaruelo Lahoz
Advanced Research Support
Technician
(until 09/2025)



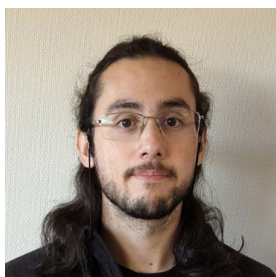
Gloria Teijón Ávila
Advanced
Advanced Research Support
Technician
(until 06/2025)



**Santiago Virseda
Mayoral**
Advanced Research Support
Technician



**Alejandro Brenlla
Gómez**
Research Support Technician
(until 10/2025)



**Diego Hermoso
de Mendoza Santos**
Research Support Technician

Laboratory STAFF



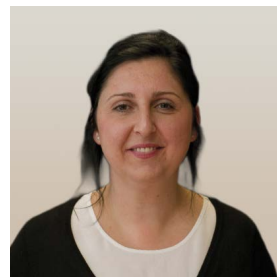
Iame Alves Guedes
Head of Biological Analysis
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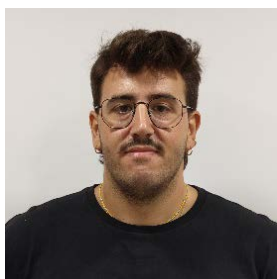
Laura Cherta Cucala
Head of Chemical and Soil
Analysis Service



**María Isabel López
Heras**
Head of Chemical and Soil
Analysis Service



Leonor Nozal Martínez
Associated Researcher.
*Head of the Bioanalysis and Quality
Control Unit. General Foundation of
the University of Alcalá*



**Juan Carlos García
Mesa**
Advanced Research Support
Technician
(until 09/2025)



**Beatriz Gallego
Fernández**
Advanced Research Support
Technician



Sara Gómez Royo
Advanced Research Support
Technician
(until 10/2025)



**María Gracia
Zangroniz**
Advanced Research Support
Technician
(until 09/2025)



Álvaro Macías
de la Rosa

**Advanced Research Support
Technician**
(until 09/2025)



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Pacheco

**Advanced Laboratory
Technician**



Lexander Ramos
Almonte

**Advanced Laboratory
Technician**



Manuel Torres
Hernández

**Advanced Laboratory
Technician**



Silvia Sánchez
González

**Advanced Laboratory
Technician**



Alejandra Arcas
Perea

Laboratory Technician



María Argudo
Fernández

Laboratory Technician



Leidy Viviana Estrada
Pérez

Laboratory Technician
(until 03/2025)



Isabel Fernández
Artime

Laboratory Technician
(until 11/2025)



Álvaro Fernández
Aparicio

Laboratory Technician



**Carolina Guillén
Fuentes**
Laboratory Technician



**Laura Maeso
Cuesta**
Laboratory Technician



**Francisco Martínez
Serrano**
Laboratory Technician



**Chantal Cristina
Monahan López**
Laboratory Technician
(01/09/2025- 29/10/2025)



**Ana Isabel Morato
Cerro**
Laboratory Technician





our research



The scientific program of the Institute is based on the development of four main strategic lines for the integrated water management:

- Sustainable Management of Water Bodies
- Quality and pollution
- Water Treatment and Water Reuse
- Economic and institutional analysis

Our research is divided into 5 groups:

Aquatic Ecology and Biotechnology

38

Economic and Institutional Analysis

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Environmental bioelectrochemistry

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Soil and water Quality in the Environment

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Research group

AQUATIC ECOLOGY AND BIOTECHNOLOGY

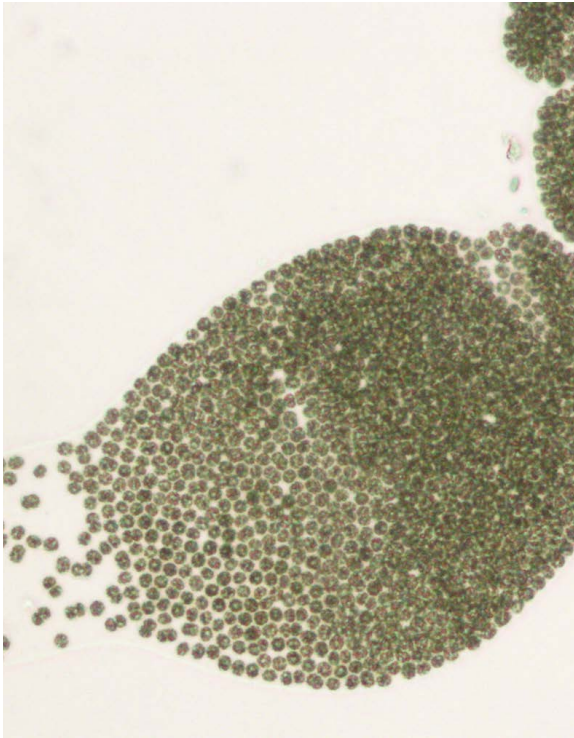


The Aquatic Ecology and Biotechnology group addresses (i) the impacts of environmental stressors on aquatic and terrestrial ecosystems at different trophic levels (from microbial communities to organisms higher in the food chain), (ii) the risk assessment of these stressors for ecosystems, and (iii) the development of nature-based solutions and technologies to mitigate their impacts. Specifically, there are three lines of research with active projects:

1. Risk assessment for aquatic and terrestrial ecosystems derived from environmental stressors (e.g., microplastics, additives, salt pollution).
2. Assessment of the impacts of environmental stressors (e.g., toxins, antibiotics, microplastics) on aquatic and terrestrial biodiversity—including microorganisms, aquatic-terrestrial insects, and birds—and ecosystem services.
3. Bioremediation of environmental pollutants (e.g., cyanotoxins, biodegradable microplastics, and their additives).

<https://aquaecotec.com/>





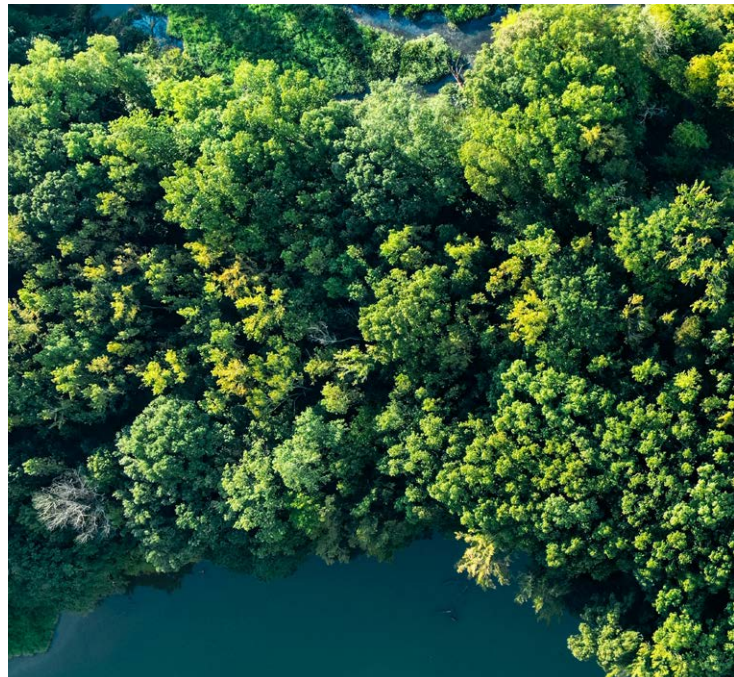


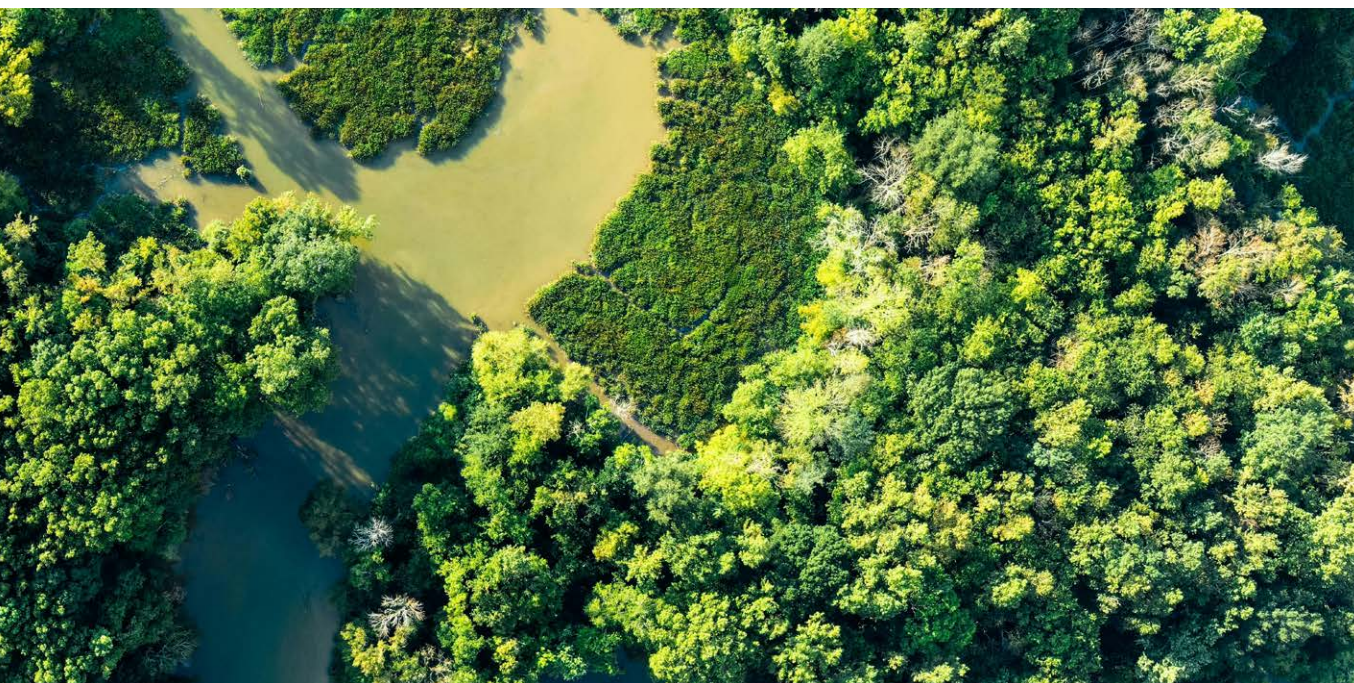
Research group

ECONOMIC AND INSTITUTIONAL ANALYSIS

The Economic and Institutional Analysis group focuses on developing and delivering policy-relevant analysis of both physical and socioeconomic systems for building and enhancing water resilience under climate and socio-economic change. The main research areas include:

- Economic and institutional analysis of water governance under climate and socioeconomic change.
- Socioecological and hydroeconomic modelling.
- Uncertainty and nonlinear change: modelling, forecasting, and analysis.
- Actionable science and stakeholder engagement: grassroot partnerships, serious games.
- Robust decision making and water resilience.







Research group

ENVIRONMENTAL BIOELECTROCHEMISTRY (BIOE)



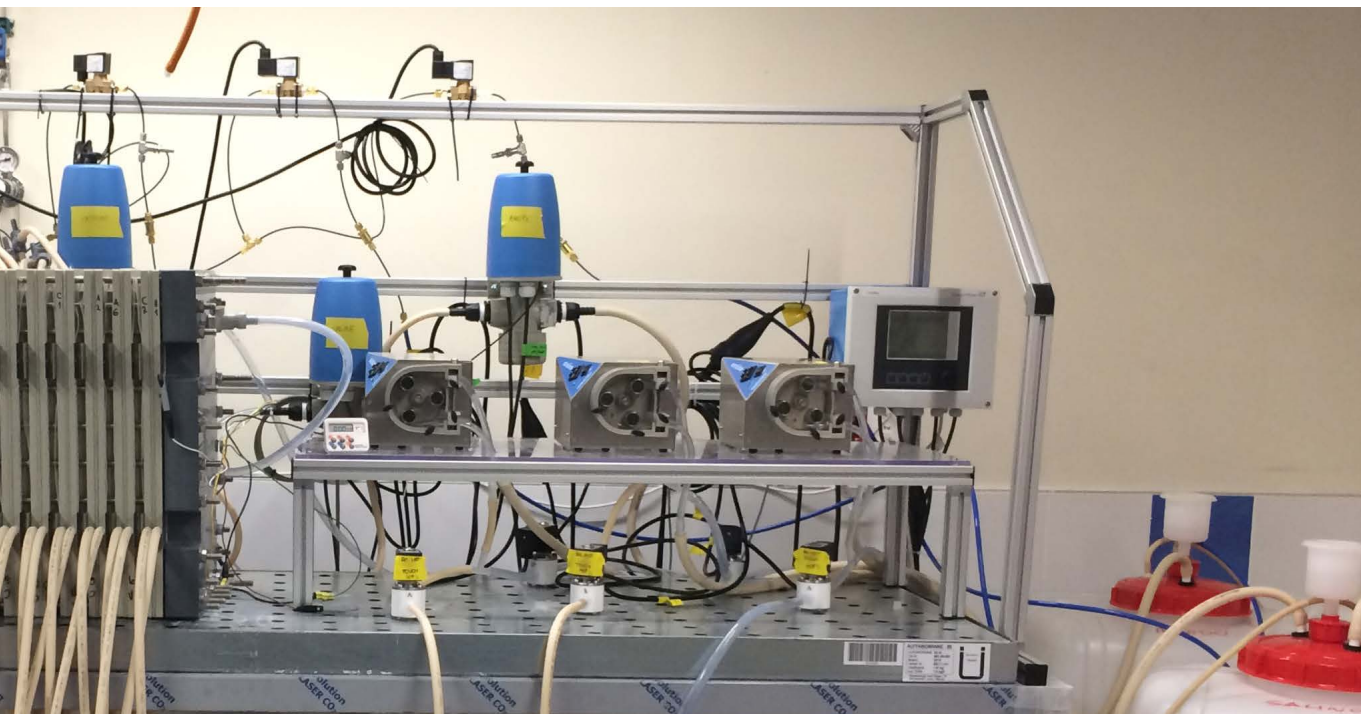
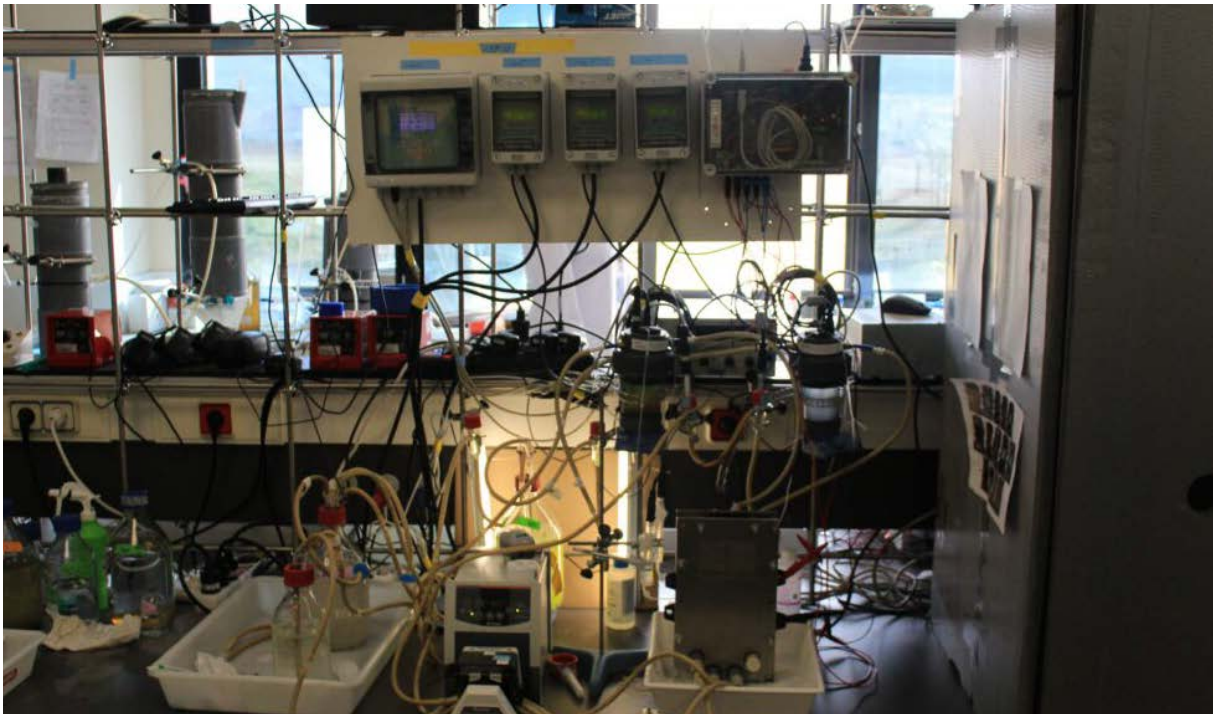
The Environmental Bioelectrochemistry group (Bioe) explores the combination of disciplines such as microbiology, electrochemistry, and engineering to develop environmental applications following a 5R strategy: Remediate, Reuse, Recover, Revalorise, and Report.

These applications are collectively known as Microbial Electrochemical Technologies (METs).

- Remediate wastewater, surface water, and groundwater
- Reuse reclaimed water
- Recover nutrients from wastewater
- Revalorisation of pollutants in wastewater by transforming them into value-added products
- Report water quality through bioelectrochemical signals from microorganisms

<https://bioegroup.es>







Research group

MEMBRANE TECHNOLOGY

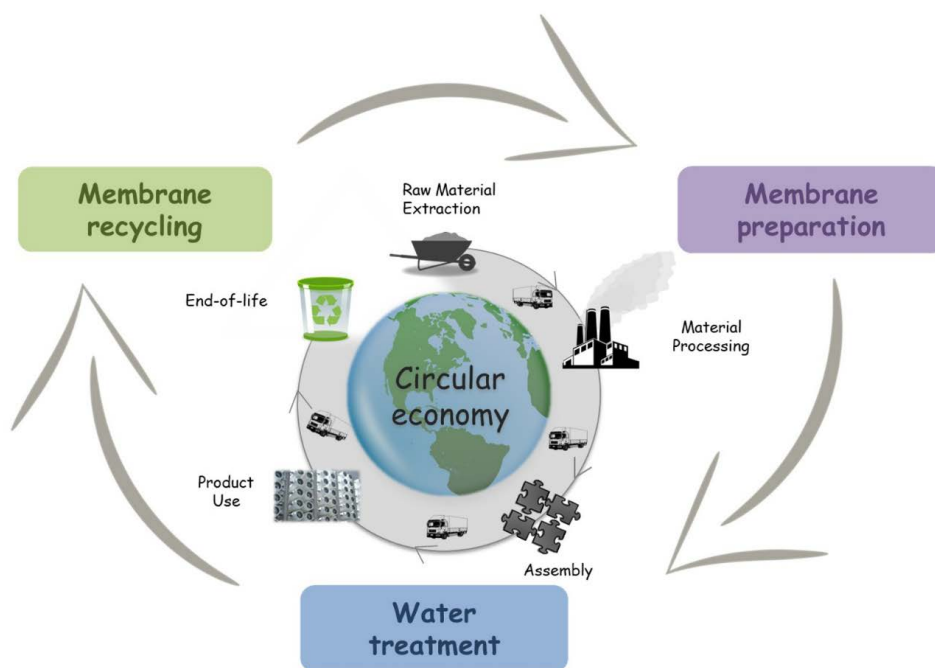
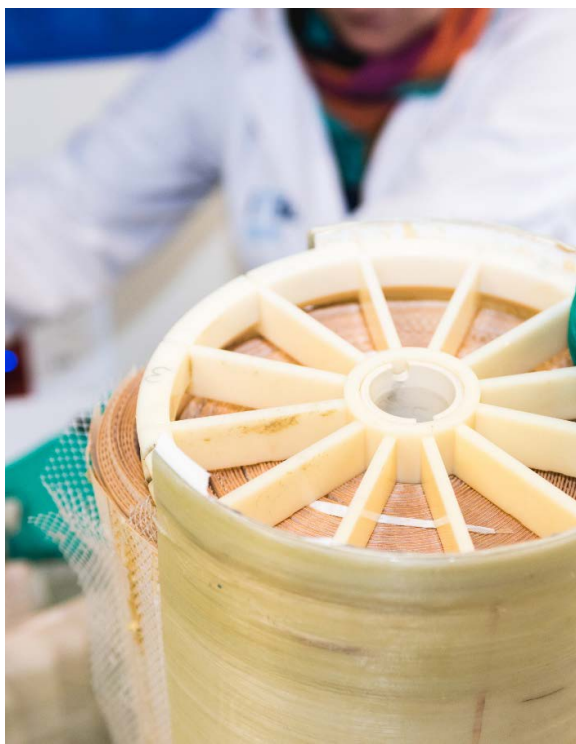


The Membrane Technology group addresses the complete life cycle of membranes: from their preparation to their use in water treatment and their recycling.

- Preparation of novel and second-generation membranes. In this research line, the group focuses on developing tailor-made membranes by incorporating nanoparticles, porous materials, and recycled polymers that enhance membrane performance for water treatment.
- Implementation of membrane technology for water treatment. In this research line, the group is currently studying the use of pressure-driven membranes and membrane bioreactors for wastewater treatment, with particular attention to the removal of emerging contaminants such as pharmaceutical compounds, microplastics and nanoplastics, as well as bacteria and antibiotic resistance genes.
- Development of alternative end-of-life membrane management pathways. In this research line, the group studies the

direct and indirect recycling of discarded membranes, as well as the recovery of polymers for their reintroduction into the water sector.







Research group

SOIL AND WATER QUALITY IN THE ENVIRONMENT



The research activity of the group focuses on the assessment of environmental contamination in the water–soil–plant continuum, as well as on the development, optimization, and long-term evaluation of nature-based solutions for water treatment and soil remediation. In particular, the group investigate:

- The occurrence, fate and transport pathways of contaminants in agricultural systems, with a particular focus on trace metals and contaminants of emerging concern, including micro- and nanoplastics, plastic additives, pharmaceuticals and pesticides, through specifically designed experimental approaches and reactive transport modelling.
- The bioavailability of contaminants in soils and their effects on soil health, using bioindicators, together with the assessment of potential human health risks associated with contaminant occurrence in soil and/or their transfer into the food chain through crop consumption.

- The persistence and transformation of contaminants in soil, including, where appropriate, the identification and isolation of soil bacteria with the potential to degrade or transform contaminants of environmental interest.
- The design, adaptation and optimization of vegetation filters as nature-based solutions based on natural attenuation processes, using woody crops with high phytoremediation potential for the removal, stabilization, and transformation of contaminants from wastewater, reclaimed water, and polluted soils.

<https://www.soilwaterquality.es/>



facilities



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Analysis and Testing Laboratory

Chemical Analysis Service

Basic Analysis Unit

Determination of several physical and chemical parameters (pH, conductivity, redox potential, TKN, alkalinity, TOC, DBO5, 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).

Micronanoparticles Unit

The unit performs comprehensive analyses of environmental and microbiological indicators, and with DNA analysis and sequencing support studies on bacterial diversity and metagenomics. It also specializes in the detection and quantification of antibiotic resistance genes and antibiotic-resistant bacteria, as well as the activity of soil enzymes.



			Intelligent Greenhouse with Climate Control System	Geomatic Laboratory
	Biological Analysis Service	Soil Analysis Service		
Plastics Unit	Microbial Ecology Unit			
performs sive biological biological along and RNA to dies on iversity nomics. ializes ction and on of esistance antibiotic- acteria, as assessment matic	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.	Determination of physicalchemical properties of soils, sediments, and similar solid matrices (texture, moisture, pH, electrical conductivity, organic matter, total nitrogen...)	IMDEA Water's smart greenhouse is a highly controlled, energy-efficient 100 m² research facility designed to withstand demanding experimental conditions and enable simultaneous studies with different crops and lighting needs. It supports a wide range of applications, including crop productivity, contaminant removal, nature-based solutions, environmental risk assessment and pollutant monitoring in soil–water–plant systems.	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.

Pilot plants

Membrane Technology



Microbial Electrochemical Technologies



Outdoor Mesocosm Facilities



Land Application Systems





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), DBO5, DQO, total nitro-gen, 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 of 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) including a collision cell system (helium gas mode) for a greater sensitivity, less background noise and a high removal of spectral interferences. Possibility of coupling a high-performance liquid chromatography (HPLC) system for speciation studies. Microwave digester ETHOS One (Milestone) for pretreatment of solid samples.

APPLICATIONS

- Multielemental semi-quantitative 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 μ L)
- Analysis of biological, organic and inorganic samples by closed acid digestion using a microwave system.
- Environmental applications (water, soils, sediments and other residues).
- Oxidation state and chemical nature of compounds in aqueous matrices.



Chemical Analysis Service

MASS SPECTROMETRY UNIT

Development and validation of cutting-edge methods in environmental studies. Analysis and extraction of contaminants in water samples (superficial, industrial and wastewater), and solid matrices (soil and biota) by mass spectrometry techniques (high resolution, HRMS, and triple cuadrupole, MS/MS).

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 coupled to Quadrupole Time of Flight (QToF) mass spectrometer (ZenoTOF 7700+, Sciex).

- Liquid Chromatography-Triple Quadrupole (LC-MS/MS) (model 6495C, Agilent Technologies).
- Solid Phase Extraction (SPE) automatic system (GX-274 ASPEC, Gilson International).

APPLICATIONS

- Extraction methodologies of pharmaceuticals, pesticides, additives, PAHs, BTEX, PFAS, cyanotoxins and y geosmin in water and soil.
- Development of multitarget quantitative methods (at ng/L levels) based on LC-MS/MS and GC-MS/MS.
- Analysis of emerging contaminants (PFAS and pharmaceuticals) in wastewater. Directive EC 2024/3019.
- Analysis of organic micropollutants in waters by GC-MS/MS (organochlorine and organophosphorus pesticides, trihalomethanes, polyaromatic hydrocarbons).
- Screening analysis (target, suspect and non-target) by high resolution techniques (LC-HRMS) for the detection of contaminants and transformation products.



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 allow 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 field-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 re-

covered. 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 Technologies).
- 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.



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

Molecular Biology Infrastructure

- MinION Mk1D, Mk1C and Mk1B platforms (Oxford Nanopore Technologies, ONT)
- Real-time PCR system LightCycler® 96 (Roche)
- NanoDrop spectrophotometer (Thermo Scientific) and Qubit™ 4 fluorometer (Invitrogen)
- Gel documentation system GelDoc™ (Bio-Rad)
- SimpliAmp™ and TC-5000 thermocyclers (Applied Biosystems)

Microscopy Facilities

Microscopes for the identification and enumeration of microorganisms:

- Fluorescence inverted microscope Ti-2 (Nikon)
- Light microscope (Olympus)
- Stereo microscopes

Culture and Analytical Infrastructure for Microorganisms

- Biosafety cabinets, autoclaves, and water baths
- Incubators for cyanobacteria and bacterial cultures
- Büchi rotary evaporator with cooling system for cyanotoxin extraction
- Multiskan™ FC microplate reader (Thermo Scientific)

APPLICATIONS

- DNA and RNA extraction from a wide range of environmental matrices
- DNA and RNA sequencing using nanopore technology for the analysis of bacterial and fungal diversity, as well as metagenomic studies
- Detection and quantification of antibiotic resistance genes, functional genes involved in biogeochemical cycles, and cyanotoxin production
- Analysis of microbiological indicators (*Escherichia coli*, *Enterococcus* spp., coliforms, *Clostridium* spp., *Pseudomonas aeruginosa*) to assess the quality of drinking and recreational waters
- Determination of Minimum Inhibitory Concentrations (MICs) and antimicrobial susceptibility testing (antibiograms)
- Assessment of soil enzymatic activities, including phosphatase, arylsulfatase, β -galactosidase, urease, and dehydrogenase.



SOIL ANALYSIS SERVICE

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.

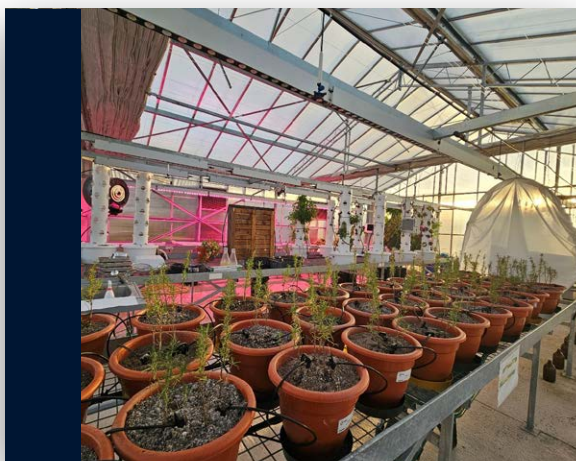
The impact on soil of water reuse for environmental purposes is highlighted, as it depends on the quality of the water utilized, which will vary depending on its source. This procedure thus helps define the efficacy of treatments whose effluents may be used in one of the environmental uses, or to analyze 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 m², 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:

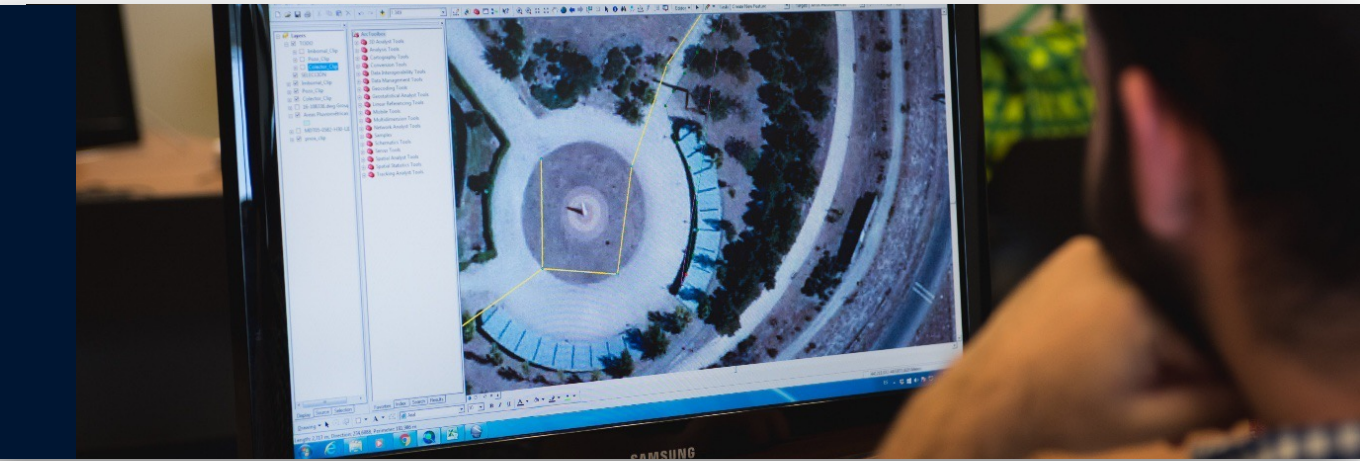
- Crop productivity: assessment of the impact of irrigation with water of different qualities, which has been subjected to different treatments, on crop yields in terms of quantity of crop per area of land.

- 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 eco-toxicological 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.



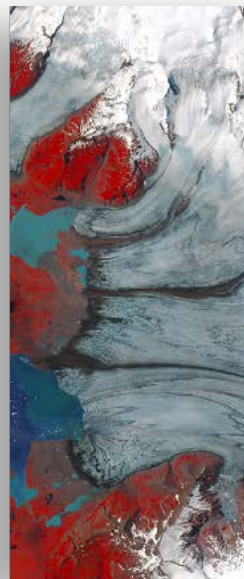
GEOMATIC LABORATORY

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, CXT-FIT, PHRE-EQC-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:

- One pilot plant spiral wound ultrafiltration mem-brane equipment.
- Laboratory scale cross flow plants with different configurations (spiral wound, hollow fiber and flat sheet membranes).
- 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

- 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 chromatography
- Electrochemical instrumentation.
- Microbial electrochemical fluized bed reactors (MEFBR) for wastewater treatment and to produce valuable products (bioelectrosynthesis).



OUTDOOR MESOCOSM FACILITIES

- Artificial ponds: Twenty-four artificial ponds (1 m³) to investigate the impacts of environmental stressors on lotic systems, as well as to develop nature-and technology-based solutions to mitigate those impacts.
- Artificial channels: Nine artificial channels (5 m length, 30 cm wide) to conduct similar research in lotic ecosystems.
- Biodiversity lagoon: artificial lagoon (30 m³) for growing biological communities for their use in experiments.



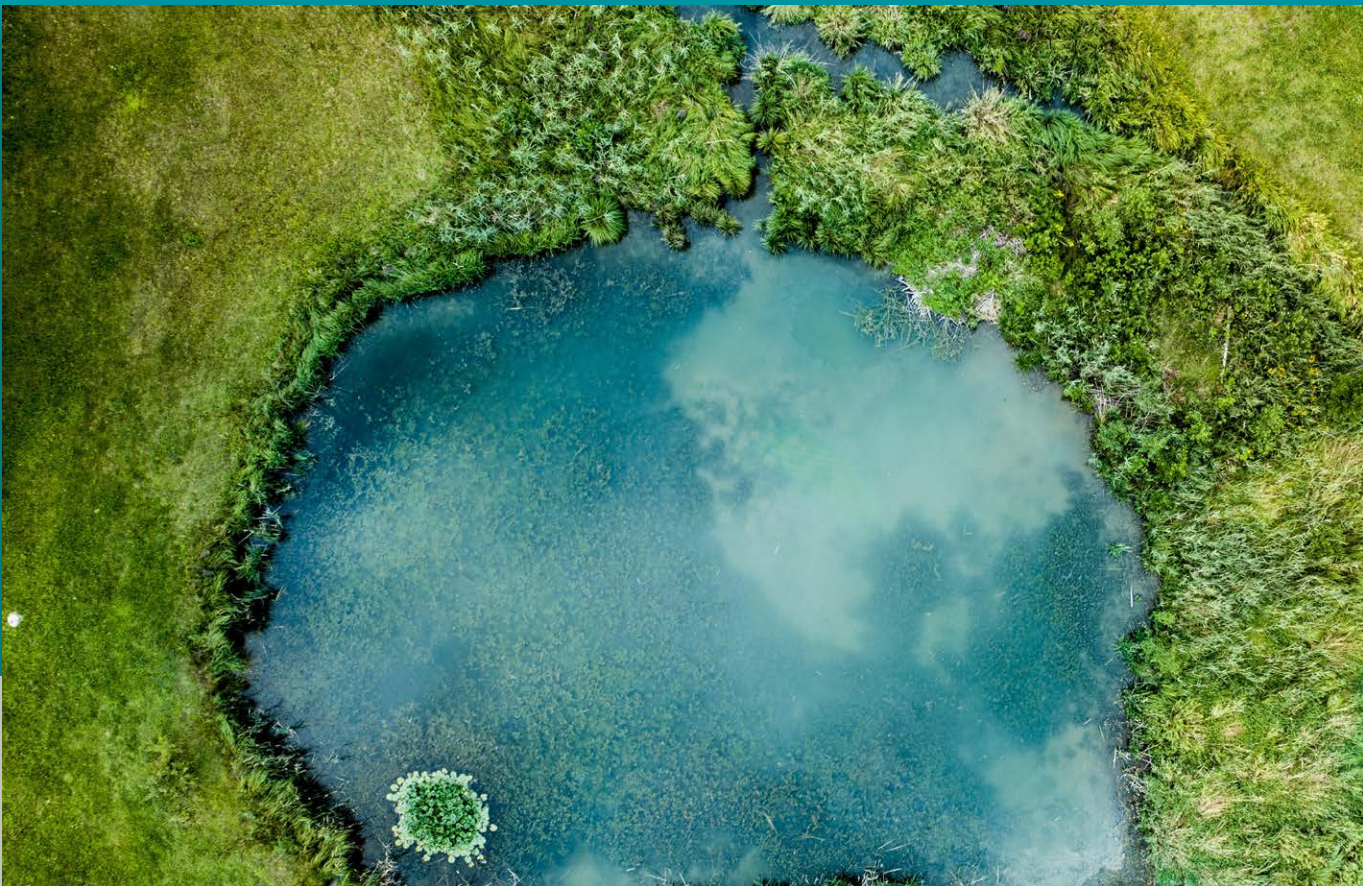
LAND APPLICATION SYSTEMS

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

- Vegetation filters: two plots of 50 m² equipped with: flow meters, irrigation hydrants, impulse pumps, possibility of installing tanks 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

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- Urban, Industrial and Agricultural Wastewater Treatment 80

Grant for Scientific and technical Equipment

80

- Acquisition of scientific-Technical equipment for REDLAB Laboratories of the Community of Madrid 80



1. PROJECTS

1.1. Urban, Industrial and Agricultural Wastewater Treatment

BEER4all

Innovative Strategies based on biotechnology and electrochemistry for producing valuable products from brewery wastewater

<https://water.imdea.org/bioe-project/beer4all/>

Grant CPP2021-008852 funded by:



Mobimet

New strategies for the sustainable production of reused water by means of modular electroactive wetland: METlands

<https://water.imdea.org/bioe-project/mobimet/>

Grant CPP2021-008936 funded by:



IBERIMET

National Network of Microbial Electrochemical Technologies

<https://water.imdea.org/bioe-project/iberimet/>

Grant RED2022-134954-T funded by:



PURPLECHEM

Bioelectrochemical stimulation of phototrophic purple bacteria: a new strategy for the conversion of industrial wastewater into value-added compounds

<https://water.imdea.org/bioe-project/purplechem/>

Grant PID2024-1630180B-C22 funded by:



TRINEFLEX

Transformation of energy intensive process industries through integration of energy, process, and feedstock flexibility

<https://water.imdea.org/bioe-project/trineflex/>

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



SMART GREEN WATER

Diffusion of innovative solutions & capacity building for smart irrigation

<https://water.imdea.org/soil-water-project/smart-green-water/>

Project S1/1.4/F0080 funded by:



MADisWater

Madrid is water: Vital technologies for water sustainability in Madrid

<https://water.imdea.org/bioe-project/madiswater/>

MADisWATER Project 'Madrid is water: Vital technologies for water sustainability in Madrid', file number 59/323466.9/25, funded by the Community of Madrid and co-funded by the European Union through the European Regional Development Fund within the ERDF Operational Programme of the Community of Madrid for the period 2021-2027, within the framework of the call for 2025 for grants to contribute to the improvement of public-private cooperation in R&D&I through consortium projects with a knock-on effect.



Co-funded by
the European Union



Fondos Europeos



1.2. Water Reuse

Nat4Health

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

<https://water.imdea.org/soil-water-project/nat4health/>

Grant PID2020-118521RB-I00 funded by:



Reuse4Food

Challenges in water reuse in the agricultural environment: a “One-Health” approach in the fight against the spread of antibiotics, resistant bacteria, and resistance genes

<https://water.imdea.org/soil-water-project/reuse4food/>

Project financed by the Ramón Areces Foundation (XXII National Competition for the Awarding of Grants for Research in Life and Matter Sciences).



FUNDACIÓN
RAMÓN ARECES

1.3. Economic and Institutional Analysis

Water4All

Water Security for the Planet

<https://water.imdea.org/economic-project/water4all/>

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



Funded by
the European Union

AQUAIBER-NET

Scientific network on the risks of extreme events and pollution on the Iberian fluvial systems: Application to management

<https://water.imdea.org/economic-project/aquaiber-net/>

Grant RED2022-134781-T funded by:



MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES



AGENCIA
ESTATAL DE
INVESTIGACIÓN

NATURA

Nature-based Solutions for Resilient Adaptation to Water Scarcity and Hydroclimatic Extremes

<https://water.imdea.org/economic-project/natura/>

Grant CNS2022-135132 funded by:



EUNOMIA

Environmental and socioeconomic ensemble using remote sensing data to manage uncertainties in groundwater management

<https://water.imdea.org/economic-project/eunomia/>

Grant PID2024-161881OB-C22 funded by:



MARCLAIMED

Integrated decision support tool for reliable and affordable application of manage aquifer recharge with alternative water resources in river basin and drought management plans

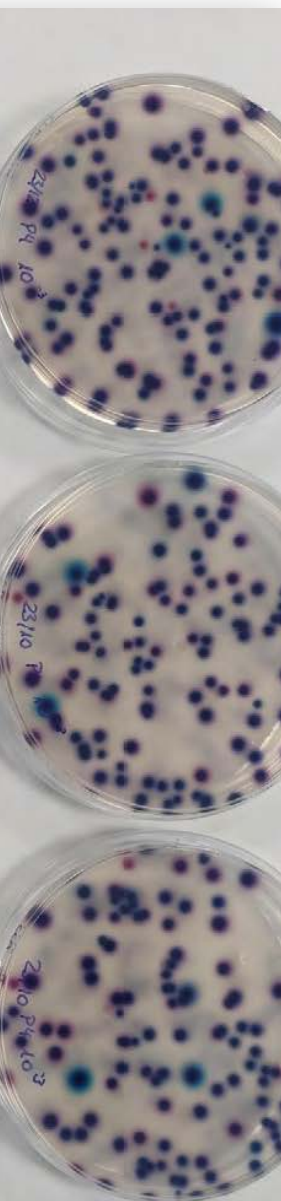
<https://water.imdea.org/economic-project/marclaimed/>

This project has received funding from the European Union under the Horizon Europe Program, with grant agreement no. 101136799.



**Funded by
the European Union**





TRANSCEND

Transformational and robust adaptation to water scarcity and climate change under deep uncertainty

<https://water.imdea.org/economic-project/transcend/>

This project is funded by the European Union's HORIZONTE EUROPE research and innovation program under grant agreement no. 101084110.



**Funded by
the European Union**

WaterTheft

Tackling Water Theft: Forecasting Adaptation Surprises

<https://water.imdea.org/economic-project/waterteft/>

This project is funded by the European Union's HORIZONTE EUROPE research and innovation program under grant agreement no. 101124884.



**Funded by
the European Union**



erc
European Research Council
Established by the European Commission

TALANOA-WATER

Talanoa Water Dialogue for Transformational Adaptation to Water Scarcity Under Climate Change

<https://water.imdea.org/economic-project/talanoa-water/>

TALANOA-WATER is part of the PRIMA Programme supported by the European Union.

The PRIMA programme is supported under Horizon 2020 the European Union's Framework Programme for Research and Innovation. Grant Agreement number: 2023



**Funded by
the European Union**

H2OSEG

Challenges posed by scarcity in achieving water security in Spain

<https://water.imdea.org/economic-project/h2oseg/>

Research project funded by the BBVA Foundation as part of the Prismas y Problemas Programme



Lived experiences of “invisibilized” slum and informal settlement populations: Climate change impacts, adaptation, and the way forward for slum transformation

<https://water.imdea.org/economic-project/lived-experiences-of-invisibilized-slum-and-informal-settlement-populations-climate-change-impacts-adaptation-and-the-way-forward-for-slum-transformation/>

This project has received funding from the **American National Red Cross**



1.4. Membrane Technology

EMERGING

Plastisphere in urban wastewaters: Membrane based hybrid systems for water reuse and sludge recycling

<https://water.imdea.org/membrane-project/emerging/>

Grant PID2022-143233OB-I00 funded by:



CMOFs4water-CM

Covalent and metalorganic frameworks for water purification of pharmaceutical contaminants

<https://water.imdea.org/membrane-project/cmofs4water-cm/>

This project has been funded through the R&D activities program with reference TEC-2024/ECO-332 and acronym CMOFs4water-CM granted by the Community of Madrid through the Directorate General for Research and Technological Innovation via Order 5696/2024.



MEMBRANET

Research Network on Membrane Science and Technology for Water Treatment

<https://water.imdea.org/membrane-project/membranet/>

Grant RED2024-153562-T funded by:



1.5. Aquatic Ecology and biotechnology

Toxic cyanobacteria as a threat to pollination in a changing climate

<https://water.imdea.org/aquaecotec-project/toxic-cyanobacteria-as-a-threat-to-pollination-in-a-changing-climate/>

Grant 2022-T1/AMB-24063 funded by:



REMOTE

Risk assessment and impact mitigation of tire wear particles and de-icing agents on river ecosystems from High Mountain National Parks

<https://water.imdea.org/aquaecotec-project/remote/>

Project 3303/2024 is funded by the Autonomous National Parks Agency of the Ministry for Ecological Transition and Demographic Challenge.



CyaNOtox

Cyanotoxin-degrading bacterium as a nature-based solution to protect freshwaters threatened by harmful cyanobacterial blooms

<https://water.imdea.org/aquaecotec-project/cyanotox/>

Grant PID2023-1514130A-I00 funded by:



HUMEBIOTA

Impact of wetland water variations on the aquatic and intestinal microbiota of birds: rapid detection of toxic cyanobacteria and other pathogens for birdlife

<https://water.imdea.org/aquaecotec-project/humebiota/>

Project 3399/2025 is funded by the Autonomous National Parks Agency of the Ministry for Ecological Transition and Demographic Challenge.





CyaNoServices

Securing freshwater supporting services for biodiversity threatened by harmful cyanobacteria across ecosystem boundaries

<https://water.imdea.org/aquaecotec-project/cyanoservices/>

CyaNoServices project is funded by MICIU/AEI /10.13039/501100011033 and co-financed by the European Union.



Geo2M

Elucidating the Origin and causes of geosmin and 2-methylisoborneol production for preventive odour management in dammed Waters

<https://water.imdea.org/aquaecotec-project/geo2m/>

Industrial doctorate (ref.: IND2024/AMB-34116) in collaboration with Canal de Isabel II and funded by the Community of Madrid.



SmartHAB

Sensing microbial activities related to harmful algae blooms

<https://water.imdea.org/bioe-project/smarthab/>

This project has received funding from the European Union's Horizon Europe research and innovation programme under the Marie Skłodowska-Curie grant agreement No 101153931.



1.6. Micro and Nanoplastics

PAPILLONS

Plastic in Agricultural Production: Impacts, Lifecycles and LONg-term Sustainability

<https://water.imdea.org/soil-water-project/papillons/>

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



**Funded by
the European Union**

AddiPlaS

Plastic chemical additive release from plastic debris and their mobility in soil agro-ecosystems

<https://water.imdea.org/soil-water-project/addiplas/>

Grant PID2022-140011OB-I00 funded by:



CARESOIL-CM

Characterization and remediation of soil and groundwater contamination in the era of ecological and digital transition

<https://water.imdea.org/soil-water-project/caresoil-cm/>

This project has been funded through the R&D activities program with reference TEC-2024/ECO-69 and acronym CARESOIL-CM granted by the Community of Madrid through the Directorate General for Research and Technological Innovation via Order 5696/2024.



**Comunidad
de Madrid**

2. CONTRACTS

2.1. *Economic and Institutional Analysis*

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

<https://water.imdea.org/economic-contract/framework-contract-on-economic-analysis-of-environmental-policies-and-analytical-support-in-the-context-of-better-regulation/>

Funded by: European Commission – DG Environment



2.1.2. Framework contract for “Water for the Green Deal” - Implementation and development of the EU water and marine policies”.

<https://water.imdea.org/economic-contract/framework-contract-for-water-for-the-green-deal-implementation-and-development-of-the-eu-water-and-marine-policies/>

Funded by: European Commission – DG Environment



2.1.3. Technical and Legal Assistance for the Implementation of EU Water Legislation and the European Water Resilience Strategy

<https://water.imdea.org/economic-contract/technical-and-legal-assistance-for-the-implementation-of-eu-water-legislation-and-the-european-water-resilience-strategy/>

Funded by: European Commission – DG Environment



2.1.4. EU Water Sector Investment Needs and Gaps Assessment

<https://water.imdea.org/economic-contract/eu-water-sector-investment-needs-and-gaps-assessment/>



2.1.5. Economic analysis of the activities and technologies developed under Research Area 6 (reuse) of the SOS-AGUA-XXI project.

UNIVERSIDAD DE ALICANTE



Universitat d'Alacant
Universidad de Alicante





2.2. Wastewater Treatment

2.2.1. Research on hybrid storage technologies and predictive modeling for transforming industries into offshore renewable energy management points.

REGENERA

<https://water.imdea.org/bioe-contract/regenera/>



Financiado por
la Unión Europea
NextGenerationEU



2.3. Membrane Technology

Promoting Water Quality, Sustainability and Circular Economy through a Madrid Hub of Innovative Technology Solutions

AQUAHUB

<https://water.imdea.org/membrane-contract/aquahub/>



CONSEJERÍA DE EDUCACIÓN,
CIENCIA Y UNIVERSIDADES



Fondos Europeos



Cofinanciado por
la Unión Europea

2.4. Circular Economy

Innovative solutions for the promotion of the valorization of complex construction and demolition waste and the decarbonization of the construction sector in the CAM

VALDESC

<https://water.imdea.org/soil-water-contract/valdesc/>



CONSEJERÍA DE EDUCACIÓN,
CIENCIA Y UNIVERSIDADES



Fondos Europeos



Cofinanciado por
la Unión Europea

2.5. Urban, Industrial and Agricultural Wastewater Treatment

Validation of a pre-pilot-scale microbial desalination system for producing desalinated water from urban wastewater

UTE MAZARRÓN 2020

3. GRANT FOR SCIENTIFIC AND TECHNICAL EQUIPMENT

3.1. Acquisition of scientific-Technical equipment for REDLAB Laboratories of the Community of Madrid

The acquisition of this scientific and technical equipment has been funded by the Community of Madrid through the 2024 Call for Grants for the Acquisition of Scientific and Technical Equipment for Laboratories Registered in the REDLAB Registry, through grant reference 2024-REDLAB/TEC-33814. This action is co-financed by the European Union (European Regional Development Fund – ERDF).



Co-funded by
the European Union



research results and scientific dissemination



Scientific Papers

84

Conferences

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Lectures

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**Knowledge
Transfer,
Innovation
and Impact**

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**Round Tables
and experts
panels**

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**Training
and Mobility**

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**Participation
in Scientific
Committees**

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**Awards, Merits
and Recognitions**

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1. Scientific Papers

Articles
in journals

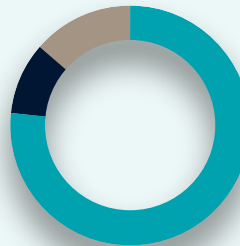
40

Other
articles

5

Books
chapters

7



Book chapters
Other articles
Articles in journals



22

2. Lectures



25

3. Round Tables and experts panels





4. Participation in Scientific Committees

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

- 9th World Conference of the International Society for Microbial Electrochemistry and Technology (ISMET), Leipzig (Germany).
- Diálogo C: La Sequía en España. Oficina de Ciencia y Tecnología del Congreso de los Diputados, Madrid (Spain).
- Committee for the review of the new strategic funding agenda of the Water4All partnership.
- Jury members of IV Premio Nacional de Nanotecnología.



5. Conferences

ORAL COMMUNICATIONS:

15 researchers have participated in a total of **47 Scientific Events**. Some examples are:

- European Geosciences Union (EGU) General Assembly
- SETAC Europe Annual Meeting (35th)
- European Bioremediation Conference (EBC-IX)
- ISMET – World Conference on Microbial Electrochemistry
- AGRIFOODPLAST – International Conference
- XIII Congreso Ibérico de Gestión y Planificación del Agua
- XL Congreso Nacional de Riegos

POSTERS:

IMDEA Agua researchers have participated with **10 posters** in events like:

- EGU General Assembly
- SETAC Europe Annual Meeting
- ISMET World Conference
- International Symposium on Functionalized Membranes





6. Knowledge Transfer, Innovation and Impact

Technology and knowledge transfer activities

PLANET25 Fair, IFEMA, Madrid. Community of Madrid stand. 15–16 January 2025.



Science for Industry (S4i) Fair, La Nave, Madrid. Community of Madrid stand. 29–30 January 2025.



REBUILD 2025 Fair, IFEMA, Madrid. Community of Madrid stand. 23–25 April 2025 Abraham Esteve-Núñez presentation: *Edificios productores de agua: Regeneración y reúso en la arquitectura sostenible*

Transfiere 2025, FYCMA, Málaga, 12–14 March 2025.

V Encuentro de socios y entidades colaboradoras de Madrid Capital Mundial-MWCC, UAX Chamberí. Madrid. 13 November 2025.

Research and Technological Development activities organization

IMDEA Water organized 8 RTD activities in 2025. These are the highlights:

- XIII Congreso Ibérico de Gestión y Planificación del Agua. Salamanca, 24 - 26/04/2025
- Water4All Webinar Series – Connecting WOLLS: Enhancing Impact and Collaboration. Online, 29/04/2025
- Annual meeting Red Nacional de Tecnologías Electroquímicas Microbianas - IBERIMET. IE University. Segovia, 29 - 30/05/2025.
- Seminar series about creative process in research: “Del Campo a la cazuela”.
- IMDEA Water Scientific Symposium. 11/12/2025



7. Training and Mobility

PhD Thesis

Anamary Pompa Pernía. Wastewater Treatment by Membrane-Based Systems: Removal of Emerging Contaminants and Water Reuse using Recycled Membranes. Director: Serena Molina Martínez. 22/05/2025

Colin Daniel Wardman. Novel Strategies for Solving Environmental Problems Through Microbial Electrochemistry. Director: Abraham Esteve Núñez. 17/10/2025

Felicia Mabel Díaz Cubilla. Efecto de contaminantes emergentes sobre la biomasa anaerobia en biorreactores de tratamiento del agua residual. Director: Ana Karina Boltes Espínola. 28/11/2025

Fellowships

1 Postdoctoral fellowship:

Jesús Morón López

HORIZON TMA MSCA Postdoctoral Fellowships - Global Fellowships

This project has received funding from the European Union's Horizon Europe research and innovation programme under the Marie Skłodowska-Curie grant agreement No 101153931.



Funded by
the European Union

Researcher from Regional Science Programme “Talent Attraction”:

Pablo Urrutia Cordero

Grant 2022-T1/AMB-24063 funded by:



Comunidad
de Madrid

15 Research Support from Regional Programme INVESTIGO:

Sandra Amate Pariente, Mónica Gámez Rábano, Marta González Jiménez, Juan Carlos García Mesa, Mario Márquez Toribio, Francisco Pablo Gómez Romero, María Gracia Zangroniz, Silvia Paralluelo Lahoz, Álvaro Jesús Macías de la Rosa, María Posada García, Gloria López Morales, Sara Gómez Royo, Adrián González García, Ana Almodóvar Pérez, Alejandro Brenlla Gómez

Contracts funded by the European Union – Next Generation EU, through the “Investigo Program”, within the framework of the Recovery and Resilience Mechanism of the European Union.



Funded by the
European Union
NextGenerationEU



Comunidad
de Madrid

6 grants from the Community of Madrid for the recruitment of pre-doctoral research staff in training:

Sara Mozo Pacheco, Imane Fellahi, Isabel Domarco Sagra, Leire Besga Oyanarte, Esteban Sabroso de la Torre y Mario Márquez Toribio.

Grants PIPF-2023/ECO-30804, PIPF-2022/ECO-26357, PIPF-2023/ECO-30804, PIPF-2024/ECO-35722, PIPF-2024/ECO-34251 and PIPF-2024/ECO-36009 funded by the Community of Madrid.



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de Madrid

3 Research Support Technicians:

Gloria Teijón Ávila, Silvia Sánchez González and Beatriz Gallego Fernández

Grants PTA2020-019363-I, PTA2022-022494, and PTA2023-023255 funded by:

**3 Laboratory Technicians:**

Laura Maeso Cuesta, Lexander Ramos Almonte and Manuel Torres Hernández Técnico

These contracts (ref: 09-PIN1-00006.8/2024) are financed with funds from the State Public Employment Service, managed by the Community of Madrid, in the framework of the 'Young Researchers Programme'.

**1 Laboratory Technician:**

Álvaro Fernández Aparicio.

Grant PEJ-2024-TL/ECO-33586. Contract co-financed by the Community of Madrid and the European Social Fund Plus (ESF+), 2021-2027.



Internships

Carmen Hernández Crespo

Centre: Institute of Water and Environmental Engineering (IIA-MA), Universitat Politècnica de València (Spain).

Date: 20/01/2025 – 20/04/2025

Julien Giovanazzi

Centre: AgroParisTech (France).

Date: 17/03/2025 – 03/09/2025

Elena Jiménez Páez

Centre: Water Institute, Universidad de Granada (Spain).

Date: 25/03/2025 – 28/03/2025

Paula Bautista Durán

Centre: Universidad de Alcalá (Spain).

Date: 09/04/2025 – 25/09/2025

Leo Feuillet

Centre: Université Côte d'Azur (France).

Date: 12/05/2025 – 29/08/2025

María José Gormaz Aravena

Centre: Lund University (Sweden).

Date: 25/08/2025 – 29/08/2025

Emanuele Giacomuzzo

Centre: University of Copenhagen (Denmark).

Date: 25/08/2025 – 29/08/2025

Emma Aguiari

Centre: Università di Torino (Italy).

Date: 11/09/2025 – 15/11/2025

Liceth Costa Redondo

Centre: Universidad Pontificia Bolivariana (Colombia).

Date: 15/09/2025 – 12/12/2025

Research stays of IMDEA Agua members

Virtudes Martínez Hernández

Centre: Institute of Water and Environmental Sciences (IIA-CA), University of Alicante (Spain).

Date: 01/06/2024 – 30/09/2025

Sara Mozo Pacheco

Centre: National Centre for Biotechnology (CSIC), Madrid (Spain).

Date: 02/02/2025 – 18/03/2025

Noureddine Bouzidi

Centre: Helmholtz Centre for Environmental Research – UFZ, Leipzig (Germany).

Date: 01/04/2025 – 31/07/2025

Silvia Blázquez Hernández

Centre: Department of Biology – Aquatic Biology, Aarhus University, Aarhus (Denmark).

Date: 15/05/2025 – 30/06/2025

Osama Hassan

Centre: Mechanical, Aerospace & Civil Engineering Department, University of Manchester (United Kingdom).

Date: 15/05/2025 – 15/07/2025

Giammauro Soriano

Centre: Euro-Mediterranean Center on Climate Change (CMCC), Venice (Italy).

Date: 15/09/2025 – 15/12/2025

Héctor González López

Centre: Euro-Mediterranean Center on Climate Change (CMCC), Venice (Italy) / Joint Research Centre (JRC Ispra), Ispra (Italy).

Date: 20/09/2025 – 20/12/2025

Osama Hassan

Centre: Chair of Hydrology and River Basin Management, Technical University of Munich (Germany).

Date: 25/09/2025 – 27/11/2025

Noureddine Bouzidi

Centre: Helmholtz Centre for Environmental Research – UFZ, Leipzig (Germany).

Date: 01/11/2025 – 30/11/2025

Francesco Sapino

Centre: Helmholtz Centre for Environmental Research – UFZ, Leipzig (Germany).

Date: 01/11/2025 – 30/11/2025

Training

Training Delivered

- **Masterclasses:**
IE University, CNDS Summer School
- **Master's Programmes:**
UAH, URJC, UAB, UC3M, IAAC - Advanced Architecture Barcelona, CIHEAM Zaragoza
- **2 Bachelor's Programmes:**
UAH, UC3M
- **3 Other Teaching Activities:**
UAH, URJC, Johns Hopkins University

47 Training Activities Received

- Environmental analysis
- Chromatography
- Mass spectrometry
- Emerging contaminants (PFAS, microplastics)
- Data science
- Digital skills
- Bioinformatics
- QGIS
- Copernicus
- Artificial Intelligence (AI)
- LiDAR
- Hydrology
- Wetlands
- Soil
- Socio-hydrology
- Horizon Europe
- Research & Innovation (R&I) management
- Data Management Plans (DMPs)
- Funding
- Innovation pathways
- Sustainability
- Circular economy
- Climate change
- One Health
- Transferable skills
- Teaching
- Leadership
- Communication

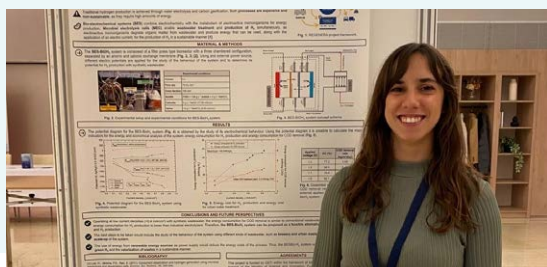


8. Awards, Merits and Recognitions

1. **Awarding of the EFQM 400+ Seal to IMDEA Water** at the event *"Day of Excellent, Innovative and Sustainable Management 2025: Driving improvement to lead the future"*, organized by the Club of Excellence in Management. Fundación ONCE, Madrid, 30/01/2025



2. **Ana Jesús Vega de Armas** was awarded by the **Royal Society of Chemistry** with the **Best Poster Communication Award** at the *Materials for Sustainable Development Conference (MATSUS25)* for her work *"Analysis of the BES-BioH2 System for Sustainable Wastewater Treatment and Simultaneous Hydrogen Production"*. Seville, 3-7/03/2025.



3. **Lorena Martínez García** received the **One Health Award** in the category *"Microplastics and other contaminants in the environment: consequences for plants, animals and humans"* for her poster *"Microbiome and resistant bacteria along the water-soil-plant continuum in a context of indirect reuse"*, presented at the *II National One Health Congress: Designing the future through science*. 29/05/2025.



4. **Noureddine Bouzidi** and **Francesco Sapino** were awarded a **research fellowship** for a research stay at the **Helmholtz Centre for Environmental Research (UFZ)** in Leipzig (Germany), within the framework of the **Planetary Solutions Programme**, for the proposal *"Drought adaptation feedback across multiple sectors: Linking land-use models and economy-wide market responses"*. 1-30 November 2025.
5. **Irene de Bustamante** was awarded ex aequo the **Custodio y Llamas Award** for Professional Career in *Hydrogeology and its Applications* in Spain, in its twenty-sixth edition, by the International Association of Hydrogeologists – Spanish Group (AIH-GE).





outreach & media impact



Outreach
94

Media impact
99



1. OUTREACH

The following outreach and science communication activities were organised or attended by IMDEA Water during 2025:

EUROPEAN RESEARCHERS' NIGHT (ERN) PROJECT

Researchers at Schools activities within ERN:

International Day of Women and Girls in Science (#11F),

10–17 February 2025.

Six talks and workshops were delivered at educational centres, targeting students from primary to upper secondary education, focused on women in science, microbiology, water science, environmental impacts, and scientific careers.



World Water Day,

21 March 2025.

Talk on “Impact of pharmaceuticals on the environment: can you help us stop it?” at IES Valmayor, Valdemorillo (Madrid).



Europe Day, 9 May 2025

Activitiy “Smart water, smart future: Exploring the circular economy” at IMDEA Agua for high school students.



World Soil Day, 2 December 2025

Visit to IMDEA Water Analytical Laboratory for a tour on contaminants by students from a Higher Vocational Training Programme in Analysis and Quality Control.



European Researchers' Night 2025, 26 September 2025

IMDEA Water organized a programme of interactive workshops and exhibition stands addressing key topics such as water quality, emerging contaminants, antibiotic resistance, microbial biodiversity, membrane technologies, soil–water interactions and microplastics, with a total participation of around 300 people.



XIV Madrid es Ciencia Fair 2025, 27–29 March 2025

Activities included a joint stand of all IMDEA Institutes under the slogan “IMDEA: science that makes your life easier” and an outreach talk. More than 26.000 people reached.





Science and Innovation Week of the Community of Madrid, 3–16 November 2025

IMDEA Water organised five workshops and one guided visit, focused on emerging contaminants, microbial diversity, membrane technologies, electroactive bacteria and sustainable water management, as well as a guided visit to the Centre of Excellence and Research in Sustainable Urban Drainage Techniques. Total participation of around 270 people.



“Será mi vocación” Programme – Community of Madrid, 6 November 2025.

Workshop “*Beyond the visible: emerging contaminants of concern*”, organized for high school students at IMDEA Water.



DELEGATIONS

Throughout 2025, IMDEA Water received **14 visits from national and international delegations**, including universities, research institutions, public authorities and companies, with the objective of showcasing its facilities and research activities and exploring opportunities for scientific, technical and strategic collaboration.



RECEPTION OF STUDENT VISITS

During 2025, a total of **13 academic visits** were hosted, involving students from vocational training programmes, undergraduate degrees, and master's programmes, from both national and international institutions (including UAH, URJC, UCM, IE University, UPV, and the EUGLOH European University Alliance).

Overall, the activities involved approximately 262 students and more than 20 lecturers and academic representatives. The visits included guided tours, seminars, and thematic workshops covering topics such as microbiology, hydrology,

ecotoxicology, circular economy, biotechnology, and environmental sustainability.

These visits were supported by the institute's research and technical staff, contributing to scientific outreach, hands-on training, and strengthened links with educational institutions at different levels.



2. MEDIA IMPACT

In 2025, IMDEA Water achieved media coverage across 59 different outlets, including 45 national and 14 international media, reflecting both strong national visibility and growing international outreach.



social MEDIA



1.147
followers



1.301
followers



4.741
followers



1.261
followers

Community

8.450

followers
in social media

357

social network
posts

WEBSITE

58.603

visits

68

web news

HIGHIMPACT INTERVIEWS AND FEATURE REPORTS

Participation of *Irene de Bustamante* in “Europa 2025” (RTVE) within a report on the **XIV Madrid Science Fair (28/03/2025)**



RETEMA

(May–June 2025, No. 263)

Feature report based on an interview with *Abraham Esteve*.
Interview with *Marcos García López* and other experts.



El Periódico

(24/06/2025)

Article based on an interview with *Eloy García Calvo* and other experts addressing water quality and filtered tap water practices.

The Conversation

Los microplásticos que no llegan al océano se acumulan en el suelo

Los meteoritos del desierto de Atacama se han convertido en refugios para microorganismos terrestre.

Hallamos vida en la Antártida más inhóspita: los secretos del aire y el hielo

Los fármacos y pesticidas que contaminan los humedales costeros mediterráneos



Metland® system applied in José Isbert Park, in Rivas-Vaciamadrid (Madrid).



EFQM 400+ Seal Award for IMDEA Water



IMDEA Agua activities for the European Researchers Night 2025, included in the weekly agenda of City Confidential.



Coverage of the One Health Award received by Lorena Martínez and national biotechnology prizes.



IMDEA Agua programme for the Science and Innovation Week at Aguasresiduales.info

IMDEA Agua participa en la Semana de la Ciencia y la Innovación con seis actividades divulgativas

Compartir 597 Suscripción a la Newsletter



- El Instituto IMDEA Agua vuelve a sumarse a esta iniciativa con seis actividades gratuitas diseñadas para acercar la investigación sobre el agua, los microorganismos y los contaminantes emergentes a estudiantes y público general

Article based on an interview with *Andreu Rico* about Madrid's water quality by analysing pharmaceuticals, microplastics, and faecal contamination in the Manzanares River.

oticias

El Confidencial 25

ESTUDIO UNIVERSIDAD DE YORK

¿Es tan buena el agua de Madrid? Fármacos, microplásticos y residuos fecales en el Manzanares

Estudiantes de The Atomic Garden y la Asociación Vecinal Manzanares-Casa de Campo embottellan agua del río Manzanares para denunciar que el río está lleno de residuos de medicamentos, esencialmente



El río Manzanares en abril tras las intensas lluvias. (EFE/Borja Sánchez-Trillo)

Por Lucía Franco
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