

## SCIENTIFIC AND TECHNICAL offer

# Microbial Ecology Unit

### DESCRIPTION

In the Microbial Ecology Unit of the IMDEA Water laboratory we have a service of classic and molecular microbial analyses of surface, groundwater water and related matrices in order to:

- Offer external service to research centers, companies or official organizations that request it.
- Support to water quality surveillance programs through national and international standardized methods and in accordance with the Water Framework Directive (DMA 2000/60/CE).

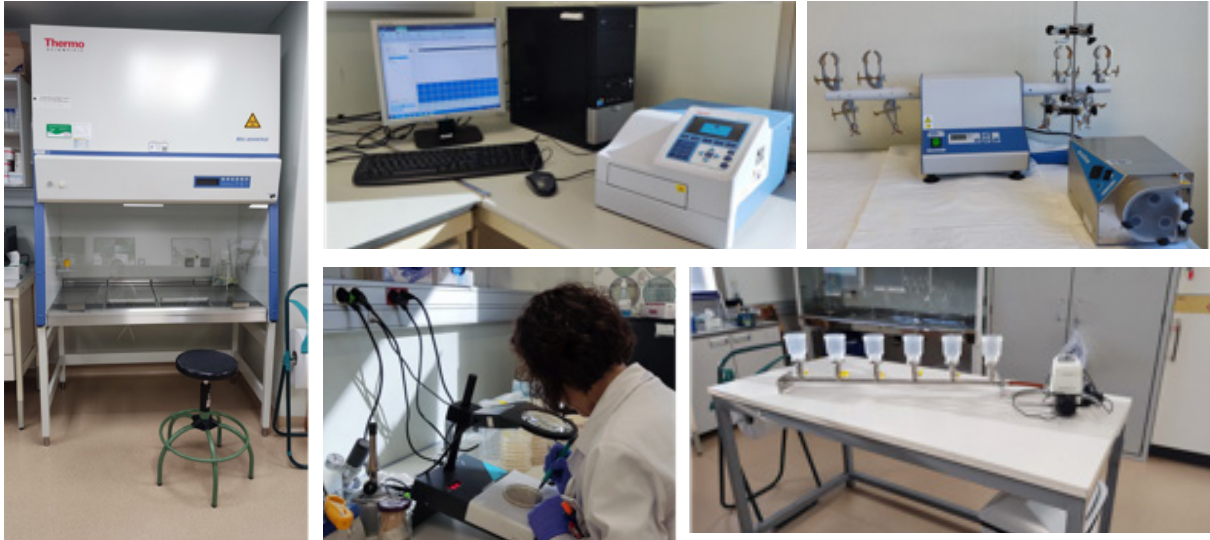
### IMDEA WATER SOLUTIONS

- Analysis of a large set of biological water indicators:
  - *Escherichia coli* and total coliforms
  - Intestinal enterococci
  - *Clostridium perfringens*
  - *Pseudomonas aeruginosa*
  - Total aerobic bacteria at 22°C and 37°C
  - *Cryptosporidium* and *Giardia*
  - *Campylobacter* sp.
- *Other microbial analyses of water characterization*
  - Antibioqram of aerobic enterobacteria
- Enzymatic activity analyses for soil and sludge quality control:
  - Phosphatase
  - Arylsulfatase
  - $\beta$ -Galactosidasa
  - Urease
- Molecular analyses in water and related matrices such as soil, biofilm, etc...:
  - DNA extraction, quantification and quality determination
  - RNA extraction, quantification and quality determination
  - Detection and quantification of SARS-CoV-2 target fragments in wastewater
  - Bacterial gene cloning
- Nowadays, we are developing new analysis techniques such as:
  - DNA and RNA sequencing by nanopore technology for bacterial biodiversity studies
  - Detection and quantification of nitrogen metabolism genes
  - Analysis of other enzymes related to nutrient cycles

## EQUIPMENT

The unit consists of three laboratories, two of them for microbiology and one for molecular biology.

The microbiology laboratories are equipped with basic equipment such as: incubators for bacteria cultures, colony counter (IUL Instrument), filtration ramps (Sartorius) and vacuum pumps for membrane filtration (Microsart and KNF), type II biological safety cabinets (Thermo Scientific, ESCO), a photometer for microplates (Thermo Scientific) to read the wavelengths of different chemical compounds and for cuvettes (WPA) to measure the optical density of bacterial cultures, rotating mixer (Invitrogen), oscillating arms (Selecta) and rod (VELP Scientifica) shakers, a BagMixer@400 homogenizer (stomacher type, Interscience) for the detection of *Cryptosporidium* and *Giardia*.



The molecular biology laboratory is equipped with a homogenizer (Precellys) to extract the DNA and RNA from bacterial cells, a nano-photometer (BioTek) and fluorimeter Qubit4 (Invitrogen) for measuring the concentration and determining the quality of DNA and RNA, thermal cyclers (Applied Biosystems and Techne) to carry out PCR reactions, gel electrophoresis equipment and a gel imaging system (Biorad) for the qualitative detection of genes, real-time PCR equipments (Applied Biosystems and Roche) for detection and quantification of genes, sequencers MinION (Nanopore) to determine the bacterial diversity of environmental samples “in situ” (MinION MK1C) and in the laboratory (MinION MK1B).



## IMPLEMENTATION SECTOR

- Government environmental institutions.
- Environmental official bodies.
- Local public entities.
- Companies.
- Universities and research centers.

## ADDITIONAL INFORMATION

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

<https://water.imdea.org/control-and-elimination-of-biological-and-chemical-risks-in-the-water-cycle-clean-cm/>

## KEYWORDS

*Biological indicators, bacterial communities, genes, metabolism, environmental health, biodiversity*

## CONTACT PERSONS

Abraham Esteve

[abraham.esteve@imdea.org](mailto:abraham.esteve@imdea.org)

María Argudo

[maria.argudo@imdea.org](mailto:maria.argudo@imdea.org)



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Contact  
[imdea.agua@imdea.org](mailto:imdea.agua@imdea.org)  
tel. +34 918 305 962

Avenida Punto Com, 2  
28805 Alcalá de Henares  
Madrid