

ACTIVITY REPORT

CIIMAR 2025



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MESSAGE FROM THE BOARD

A new CIIMAR board was established for 2025-2028, following the change of CIIMAR's statutes, with members now consisting only of public and private entities.

In 2025, the results of the FCT evaluation of R&I Units were released. CIIMAR maintained its Excellent grade, with a total budget of €7.4 million for the coming 5 years. Part of this budget, as well as some of the HUB Azul budget, will allow the acquisition of new equipment considered fundamental by CIIMAR members for its development.

Four new infrastructures are being built, to be finished during 2026:

HUB Azul - Scientific diving centre installed in the premises under construction in the APDL Logistic area, together with a deep test tank (INESC-TEC, INEGI, Forum Oceano)

HUB Azul – CIIMAR Blue Biobank – on the -1 floor of CIIMAR headquarters to install CIIMAR Blue Biobank, as well as other experimental ecology facilities and an outreach area.

CIIMAR II – Administrative, training, outreach facilities, as well as office spaces at the former Matosinhos vaccination centre.

CIIMAR biotoxins, chemistry, microbiology, and genomics facilities – At the IPMA building in Matosinhos, to create a mirror facility to help IPMA in its mission for shellfish safety analysis and biodiversity studies.

CIIMAR maintained ISO 9001 certification and continued to implement the gender equality plan and the social and environmental responsibility plan.

In 2025, CIIMAR had an increase in its competitive funding, especially at the European level (6 Horizon Europe projects plus 7 other European-

funded projects) and 31 new FCT projects. CIIMAR is part of the ATLANTIDA II consortium, a project funded by Norte 2030 and the CCDR-N. In the 7th CEEC competition, CIIMAR achieved 14 new contracts (10 junior and 4 assistant researchers) and 20 FCT doctoral scholarships.

We recorded the implementation of 53 international projects, 31 of which were funded by the Horizon 2020 and Horizon Europe programmes and 22 by the Life, Interreg Atlantic Area, La Caixa programmes, among others. We also recorded the implementation of 3 projects financed by the PRR, totaling 117 projects and €34.7 million. CIIMAR coordinates, in the Blue Bioeconomy Pact, financed by the PRR, the creation of the Portuguese Blue Biobank, a national network of marine biobanks, including in this network CIIMAR Blue Biobank, constituted to date by three collections, LEGE_CC, CM2C, and Deep Biobank.

In 2025, we launched the second edition of internal projects SEED and COB.

CIIMAR members published 536 papers in internationally peer-reviewed journals and successfully contributed to the graduation of 35 PhD and 115 MSc students. In 2025, six patent applications were filed, and five patents were granted, of a total of 38 patents filed by CIIMAR members in the last nine years, out of which 32 patents are currently active. This reflects the increasing impact of our research and the success of the implementation of the measures to increase the technology transfer.

CIIMAR outreach activities were very robust, with 469 news items (online, TV, radio, press), and almost 1300 public engagement initiatives, including the Open day in September, with an impact on more than 143 000 people during 2025.

Director of CIIMAR
Vitor Vasconcelos

ABOUT CIIMAR

Established in 2000, CIIMAR - Interdisciplinary Centre of Marine and Environmental Research is a leading research and advanced training institution of the University of Porto research ecosystem, working at the frontier of ocean knowledge and innovation.

CIIMAR promotes excellent transdisciplinary research, technological development, advanced training, and support for public policies, contributing to advances in scientific knowledge and sustainability of ocean and coastal environments. This drives innovation and paves the way for future solutions to society's needs, opening new avenues to Blue Economy and job creation. Furthermore, CIIMAR is tackling several societal and economic challenges that humanity faces, contributing to the UN Sustainable Development Goals, and National and European relevant agendas.

CIIMAR is performing research and field monitoring programmes to enhance the physical, chemical, and biological knowledge of the marine environment and ongoing changes, while also addressing land/river/ocean and ocean/atmosphere interactions.

CIIMAR research programmes allow the discovery and study of new species and ecosystems, at different depths of the ocean or in other aquatic systems, and provide basic knowledge and tools to support the protection and management of marine, estuarine, and freshwater ecosystems. CIIMAR research leads to the discovery of marine products with potential biotechnological applications in multiple areas including environmental (bioremediation), human and animal health (drugs, cosmetics, nutraceuticals), and industrial (food and feed, paints and coatings). In addition, CIIMAR has research programmes dedicated to optimizing the growth potential of current and alternative species for aquaculture and to providing high-quality seafood for human consumption, which is vital for tackling nutrition and seafood quality issues.

CIIMAR Research and Innovation programmes are conducted with and for society, with several research projects engaging diverse social actors as partners. The Centre follows an innovation-based strategy to foster the development and transfer of technologies, promoting market-oriented research and industry liaison.



Disruptive ideas and technologies are driven to business ideation and acceleration programmes, enabling knowledge value creation through entrepreneurship.

In addition, CIIMAR promotes ocean literacy and public engagement in marine and environmental research, through dedicated science communication and outreach programmes. These include the management of two dynamic Centres for Environmental Monitoring and Interpretation (CMIA, acronym in Portuguese), through cooperative agreements with Vila do Conde and Matosinhos City Councils.

CIIMAR has a vibrant international community composed of members at all stages of their careers. The Centre is the hosting institution for many Master's and PhD students conducting projects in marine and environmental research. Moreover, researchers and staff can benefit from an advanced training programme that allows continuous education in scientific and transversal topics.

CIIMAR headquarters are at the stunning Porto Cruise Terminal, in Matosinhos, at the heart of the maritime industry and services in the Northern region of Portugal. The Centre has state-of-the-art facilities, with well-equipped laboratories for marine and maritime research, technological core platforms, large-scale micro and macroalgae cultivation, and animal experimentation facilities for freshwater and marine organisms approved by the Portuguese Veterinary Authority. Moreover, the Centre has supporting offices that strategically contribute to its mission, namely in attracting competitive funding, transferring technology, management of research projects, and promoting advanced training, among others.

Besides its headquarters, CIIMAR comprises other partner facilities at five units of the University of Porto – ICBAS and Faculties of Sciences, Engineering, Pharmacy and Law –, at the Polytechnic Institute of Porto, the Portuguese Institute for the Sea and Atmosphere (IPMA), and the University of Madeira. Together with the Algarve Centre of Marine Sciences (CCMAR-Algarve), CIIMAR constitutes the Associated Laboratory CIMAR-LA.

OUR VALUES

Excellence

Sustainability

Partnership and Internationalisation

Public Participation

Innovation

Communication with Society

CIIMAR also upholds the principles of freedom of research, ethical conduct, professional responsibility, good research practices, recognition of the profession, non-discrimination, gender equality, guarantee of fair working and training conditions, as well as protection of intellectual property rights.

SOCIAL ORGANS

GENERAL ASSEMBLY

PRESIDENT

University of Porto

MEMBERS

Polytechnic of Porto,
APDL

All corporate members

BOARD

DIRECTOR

Vítor Vasconcelos

BOARD MEMBERS

Ana Paula Mucha
Filipe Castro
Luísa Valente
Rodrigo Ozorio

FISCAL COUNCIL

PRESIDENT

Ecoinside

MEMBERS

Flatlantic
RiaSearch

CORPORATE MEMBERS

Algaplus

Allmicroalgae - Natural Products, S.A.

Soja de Portugal, S.A.

Flatlantic, Actividades Piscícolas. S.A.

Oceano Fresco

Tintex

RiaSearch, Lda.

Polytechnic Institute of Porto (IPP)

Ecoinside

University of Porto (UPorto)

SONAE MC

NGC

Port Authority Douro-Leixões -Viana do Castelo (APDL)

COMMITTEES

EXTERNAL ADVISORY COMMITTEE

Françoise Médale (INRAE, France)
William Gerwick (Scripps Institute of Oceanography - USA)
Mike Elliott (University of Hull, UK)
Laura Giuliano (CIESM)

ETHICS COMMITTEE

Lúcia Guilhermino
Aires Oliva Teles
Maria Emilia Sousa

ORBEA

Responsible for CIIMAR:

Vítor Vasconcelos

Responsible for supervising animal welfare:

Helena Peres

Responsible veterinarian:

Nuno Ribeiro

Scientific responsables:

Francisco Arenas
Laura Guimarães
Benjamin Costas Refojos
Luísa Valente

PHD COMMITTEE

Diogo Oliveira
Eva Lopes
João Pedro Sousa
Leonor Pizarro
Marta Ribeiro
Raquel Pinto
Rúben Pereira

BLUE YOUNG TALENT COMMITTEE

Lígia Sousa (left in August)
Mariana Reis (started in September)
Marina Dolbeth Silva
Sérgio Boo

EQUITY COMMISSION

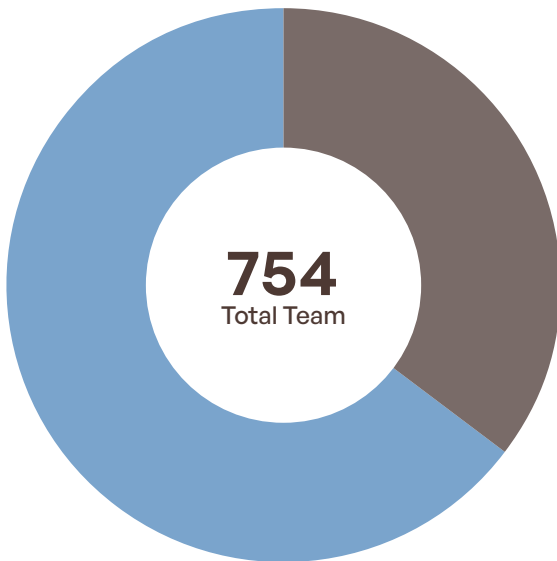
Ana Nóbrega	Pedro Cruz
Gary Kett	Ralph Urbatzka
Inês Matos	Ricardo Branco
Ingrid Cardenas	Rodrigo Ozorio
Irene Martins	Sofia Alves
Isabel Regal	
Joana Xavier	
Luís Vieira	

SUPPORTING OFFICES

OFFICE	HEAD/COORDINATOR
Accounting	Susana Barbedo
Administrative Services	Isabel Regal
Advanced Training & Careers	Ana Salgado
Biobank	Vítor Vasconcelos
Data Management & Open Science	Maria Paola Tomasino
Social & Environmental Sustainability	José Teixeira
Financial Services	André Martins
Human Resources	Isabel Regal
Image, Communication & Outreach	Ana Mena
Information Technologies	Vítor Rodrigues
Legal Support	Isabel Regal
Maintenance & Security	Rodrigo Ozorio
Onboarding Services	Isabel Regal
Project Management	Ana Machado
Public Procurement	Isabel Regal
Quality Management	Marlene Cruz and Rodrigo Ozorio
Research & Innovation Strategy & Funding	Susana Moreira
Safe Lab	Renata Soares
Secretariat & Events	Emília Afonso
Scientific Diving	Óscar Babé
Technology Transfer and Business Development	Carla Domingues
Treasury	Patrícia Todo Bom

FACTS & FIGURES*

OUR TEAM



266

Integrated PhD holders

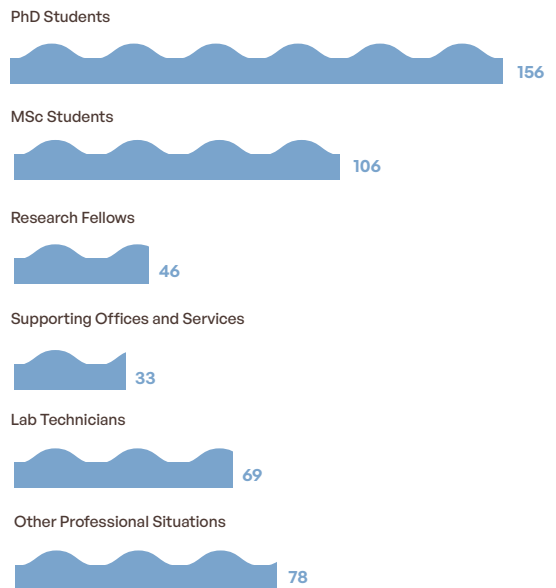
488

Non-PhD holders

INTEGRATED PHD HOLDERS



NON PHD HOLDERS



300
Female

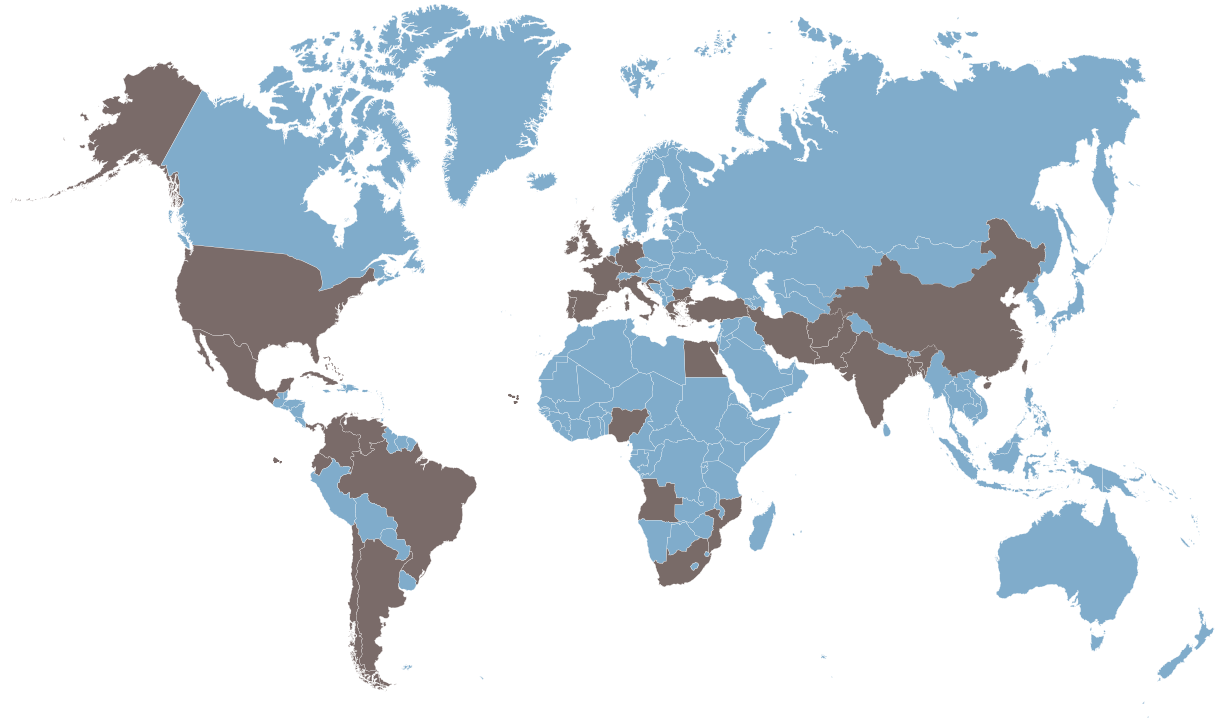
454
Male

*data include figures from CIIMAR, CMIA Matosinhos and CMIA Vila do Conde



35

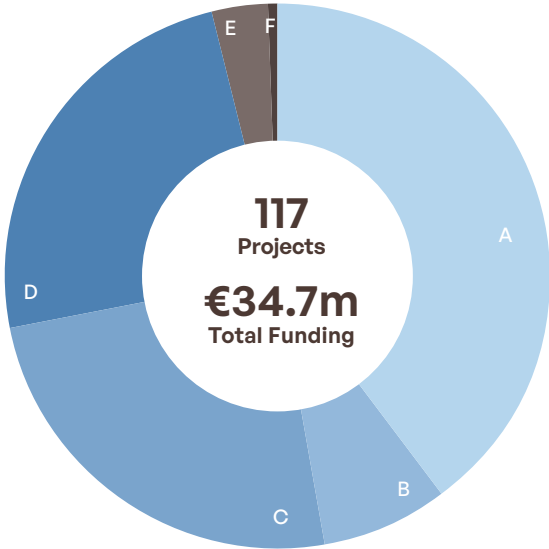
Nationalities



1 Afghanistan	1 Cape Verde	2 Mozambique
2 Angola	9 Germany	2 Nigeria
2 Argentina	1 Ecuador	1 Panama
1 Bangladesh	3 Egypt	2 Pakistan
4 Belgium	14 France	578 Portugal
1 Bulgaria	2 Greece	37 Spain
39 Brazil	4 Croatia	1 South Africa
1 Bahamas	1 Ireland	1 Turkey
3 Chile	6 India	1 United Kingdom
3 China	2 Iran	4 United States of America
4 Colombia	17 Italy	2 Venezuela
1 Cuba	1 Mexico	

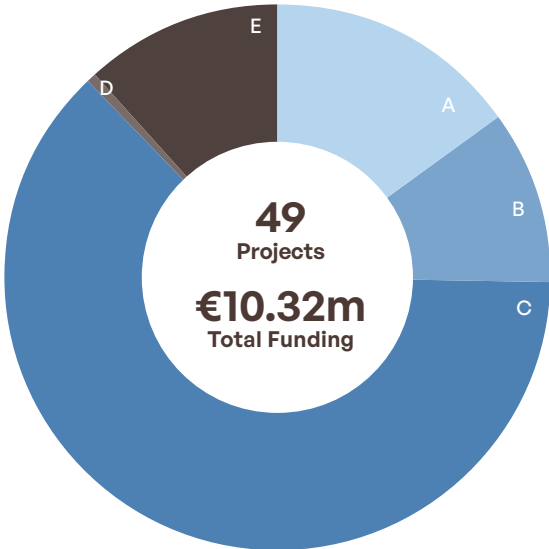
R&D PROJECTS

R&D PROJECTS IN EXECUTION DURING 2025 RESULTING FROM COMPETITIVE FUNDING



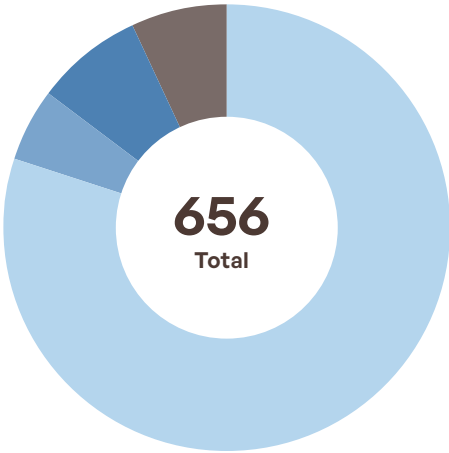
- A** €13.83m | **European Funds**
31 | Horizon 2020 / Horizon Europe, LIFE
- B** €2.63m | **Other European and International Funds**
22 | EEA GRANTS, INTERREG, La Caixa, Others
- C** €8.51m | **National Funds**
51 | COMPETE2030, OE
- D** €8.4m | **National Funds**
7 | PRR
- E** €1.19m | **National Funds**
4 | NORTE 2030
- F** €0.13m | **Other National Funds**
2

R&D PROJECTS INITIATED IN 2025 RESULTING FROM COMPETITIVE FUNDING



- A** €1.57m | **European Funds**
6 | Horizon 2020
- B** €1.04m | **Other European and International Funds**
7
- C** €6.45m | **National funds**
31 | COMPETE2030, OE
- D** €0.07m | **National funds**
1 | PRR
- E** €1.19m | **National funds**
4 | NORTE 2030

SCIENTIFIC PUBLICATIONS



526
Publications in peer reviewed journals

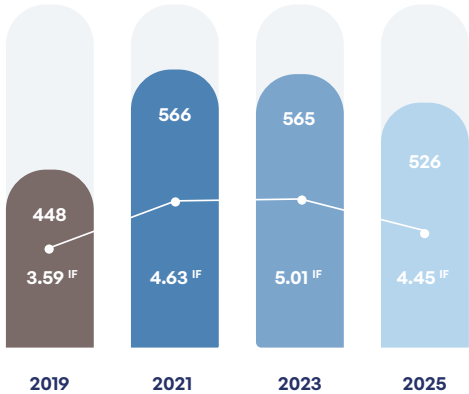
34
Books and book chapters

51
Edited special issues of journals

45
Other publications

NR. OF PUBLICATIONS IN PEER REVIEWED JOURNALS

^{IF}Average Impact Factor



81.90%
Peer-reviewed publications in open access

63.10%
Peer-reviewed publications with international collaborations

PATENTS

32
Active patents

5
Granted patents

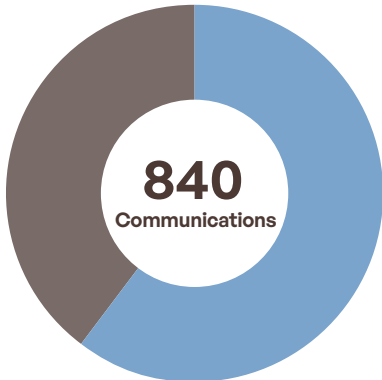
1
International patent applications

5
Provisional patent applications

PRIZES AND HONOURS



SCIENTIFIC COMMUNICATIONS AND EVENTS



52
Scientific events organised

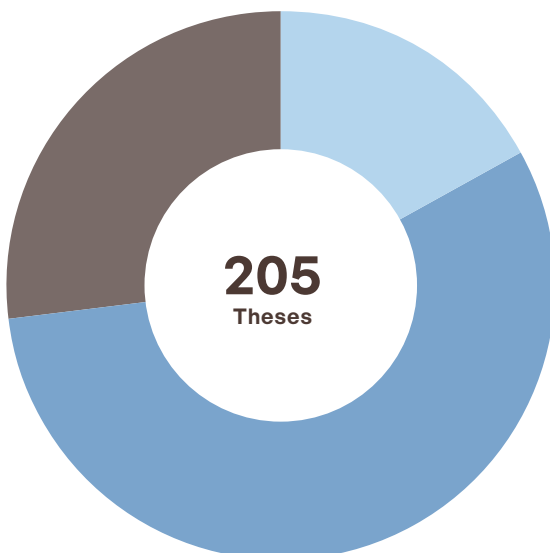
33
Scientific seminars at CIIMAR

492
Communications in
International scientific
meetings*

348
Communications
in National scientific
meetings*

*Data include oral and written communications

ADVANCED TRAINING



35*
PhD theses
* 4 in
international
universities

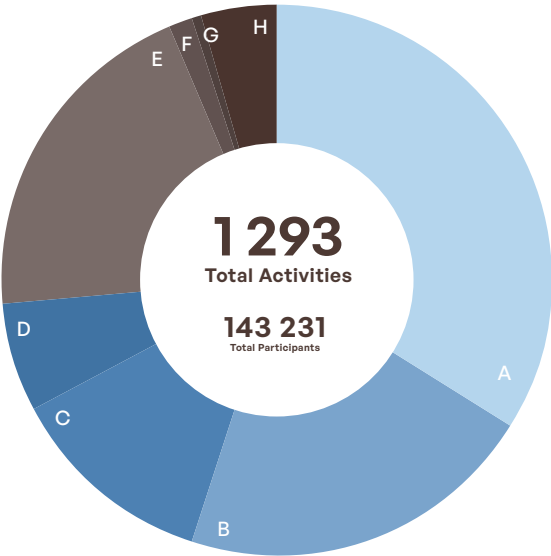
115*
MSc theses
* 16 in
international
universities

55*
BSc theses
* 2 in
international
universities

76
Training courses
organised

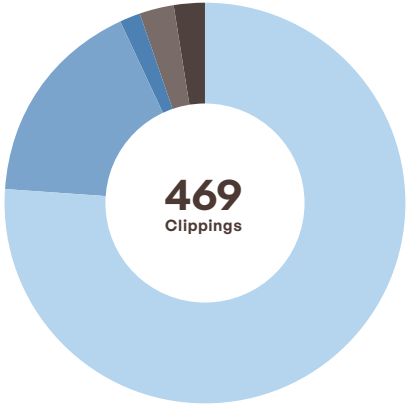
1926
Participants in
training courses

OUTREACH ACTIVITIES



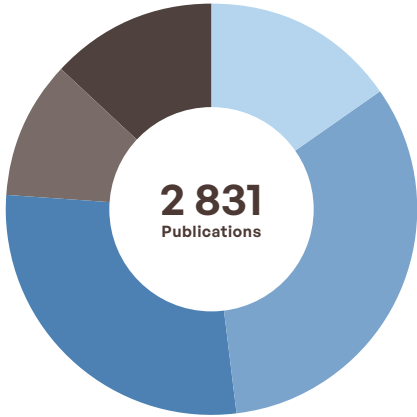
- A** 440 | **Activities and lectures at schools**
13 834 Participants
- B** 274 | **Visits and activities at CIIMAR and CMiAs**
5 725 Participants
- C** 156 | **Outdoor activities**
3 266 Participants
- D** 84 | **Public lectures**
4 805 Participants
- E** 257 | **Exhibitions**
68 269 Participants
- F** 18 | **Workshops**
319 Participants
- G** 9 | **Training actions**
20 Participants
- H** 55 | **Public events**
46 993 Participants

MEDIA OUTREACH



- 357**
Online news
- 80**
Print press
- 8**
Radio
- 13**
TV
- 11**
Online TV

SOCIAL MEDIA



- 439**
LinkedIn
- 925**
Instagram
- 797**
Facebook
- 303**
X
- 367**
Bluesky

FINANCIAL KEY FIGURES

	2022 (€k)	2023 (€k)	2024 (€k)	2025 (€k)
REVENUES FROM SALES AND RENDERING OF SERVICES	581	704	541	753
OPERATING SUBSIDIES	7 728	10 007	11 965	12 406
OTHER OPERATING INCOME	523	542	502	460
SUPPLIES AND SERVICES RENDERED	- 2 934	-3 027	-3 791	-3 595
EMPLOYEE BENEFITS EXPENSES	-5 359	-7 402	-8 357	-9 219
OTHER OPERATING EXPENSES	-92	-293	-226	-229
DEPRECIATION AND AMORTISATION	-457	-495	-583	-487
CAPEX (CAPITAL EXPENDITURE)	538	569	604	565
NET CASH	1 683	2 852	2 756	2 334
EBITDA (EARNINGS BEFORE INTEREST, TAXES, DEPRECIATION AND AMORTISATION)	451	546	650	568
PROFIT FOR YEAR	-61	46	67	80

2025 AT A GLANCE

JANUARY

- New protocol signed between CIIMAR and IPMA

FEBRUARY

- CIIMAR at School of Health (E2S) outreach event
- Vitor Vasconcelos in the Advisory Board of BlueBio Alliance

MARCH

- Fátima Carvalho, Joana Xavier e Madalena Pinto distinguished in Ciência Viva's "Mulheres da Ciência" project
- CIIMAR celebrated 25 years with a roaring twenties gala night
- CIIMAR at the 12th World Ocean Summit & Expo
- The MAELSTROM project won the Blue Rivers & Lakes award
- Inauguration of the exhibition "Biobanco Azul Português: O Guardião de Tesouros Marinhos"
- CIIMAR at VERDE PERTO event

APRIL

- CIIMAR in the Bioblitz at Fundação de Serralves
- Open Call for BYT programme
- CIIMAR new board of directors nominated
- CIIMAR assumes the presidency of the B2E CoLab Board of Directors
- TwinDEEPS Project endorsed by the OceanDecade
- CIIMAR rated Excellent in the FCT evaluation of R&D units
- Madalena Pinto distinguished by Gondomar city council

MAY

- Final Event of the Portuguese Blue Biobank Project
- CIMAR-LA Meeting

JUNE

- CIIMAR launched "25 tons de azul" video series
- World Ocean Day celebrated in a joint event between sailors and CIIMAR scientists
- CIIMAR led scientific campaign to Goringe seamount within TwinDEEPS project
- CIIMAR at the United Nations Ocean Conference 2025
- Joana Xavier distinguished by Vila do Conde city council

JULY

- BYT and BYT+ 2024/2025 Closing Session
- XV Congress of the Iberian Association of Comparative Endocrinology (AIEC) co-organised by CIIMAR
- CIIMAR at Encontro Ciência 2025

AUGUST

- CIIMAR promoted science and ocean literacy at the Ocean Race Europe Fly-By in Matosinhos

SEPTEMBER

- - CIIMAR joined PortugalFoods Platform
- 12th World Sponge Conference co-organised by CIIMAR
- CIIMAR hosted the visit of the External Advisory Committee
- CIIMAR Annual Meeting
- “New Horizons” Conference - a highlight of CIIMAR 25th anniversary
- Blue Think Conference
- CIIMAR Open Day

OCTOBER

- - Marma Detox Project supported by the United Nations Decade of the Oceans
- Marine Energy: Innovation and Sustainability event
- Vânia Freitas and Elsa Froufe nominated scientific coordinators of CMiAs of Matosinhos and Vila do Conde
- Secretary of State for Science and Innovation visited CIIMAR
- CIIMAR project led the Roadmap for Monitoring the National Network of Marine Protected Areas

NOVEMBER

- - XII Iberian Symposium on the Minho River Basin co-organised by CIIMAR
- ENAQUA 25 – National Aquaculture Meeting
- Luísa Valente chairs the International Society of Aquaculture Nutrition
- 10th Meeting of GelAvista citizen project

DECEMBER

- - 1st CIIMAR Open Day for Higher Education
- AlgaBiotec project awarded 3rd place in the 929 Challenge 2025
- GluMAR Project won 2nd place in the BluAct competition
- BYT-PhD Programme launched new edition to support excellence in doctoral research



SCIENCE STORIES

HERE IS A SHORT SELECTION OF SCIENCE STORIES DEVELOPED IN 2025.



CIIMAR DEVELOPS MOLECULAR TOOLS TO IDENTIFY BEES IN BRAZIL'S CAATINGA BIOME

Researchers from Ecosystem Monitoring and Sustainability team have advanced methods for identifying bee species in the Caatinga, a unique semi-arid biome in Brazil. By combining traditional morphological analysis with DNA barcoding, the team identified over 75 additional species and 9 new genera compared with previous records. Published in *Molecular Biology Reports*, this paper review highlights how molecular tools can enhance monitoring, support conservation efforts, and track population trends amid climate change. The study provides globally accessible resources for researchers, reinforcing the ecological and economic importance of pollinators in food production, plant reproduction, and ecosystem resilience.

CIIMAR PROPOSES TRYPTOPHAN SUPPLEMENT TO BOOST FARMED FISH WELFARE

Diogo Peixoto from Aquatic Animal Health team showed that supplementing farmed fish diets with tryptophan, a precursor of serotonin, can reduce stress and strengthen the immune system. The study based on his PhD research demonstrated that tryptophan helps fish maintain energy balance and cope with handling, transport, and high-density conditions common in aquaculture. While not a “happiness hormone” in the human sense, serotonin-related metabolites improve well-being and resilience. This functional feed approach offers a preventive and therapeutic strategy to support fish health, reduce disease risk, and enhance survival, aligning aquaculture practices with animal welfare and sustainable production.



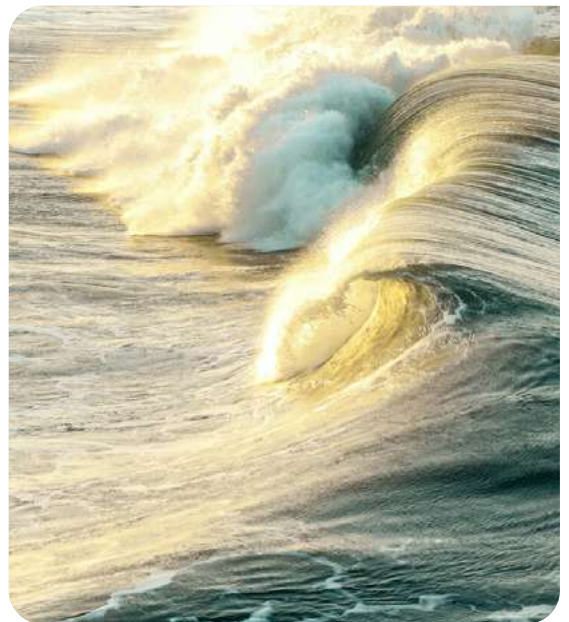


AI TOOL HELPED SCIENTISTS UNCOVER RARE MICROORGANISMS IN ECOSYSTEMS

An international team led by Catarina Magalhães from Microbiome Ecology and Biogeochemistry team developed ulrb, a machine learning based tool that automatically identifies rare microorganisms in microbiome datasets. Published in Communications Biology, the software addresses a major challenge in microbial ecology: distinguishing the low-abundance “rare biosphere” from the dominant species. Rare microbes, though few, hold immense genetic diversity and provide resilience to ecosystems under environmental stress. By learning patterns from sequencing data without supervision, ulrb allows rapid, reliable detection of these organisms and can be applied to diverse ecological and environmental datasets. The tool is open source, supporting research on microbial diversity, ecosystem stability, and even species at risk.

CIIMAR EXPLORED WAVE ENERGY PARKS AS TOOLS FOR COASTAL PROTECTION AND GREEN ELECTRICITY

Daniel Clemente and the Marine Energy and Hydraulic Structures team evaluated a proposed 500 MW wave energy converter park off Esposende, combining renewable energy production with coastal protection. Published in Applied Energy, the study shows that carefully positioned wave energy structures could reduce wave height by over 25% along the coast while generating enough electricity to power more than 100,000 residents. This dual-purpose approach demonstrated that energy harnessing can complement coastal management, mitigating erosion and flooding without conflicting with other maritime activities. The study highlighted multifunctional solutions for Portugal’s green energy transition and opened new avenues for innovative applications along exposed shorelines around the world.



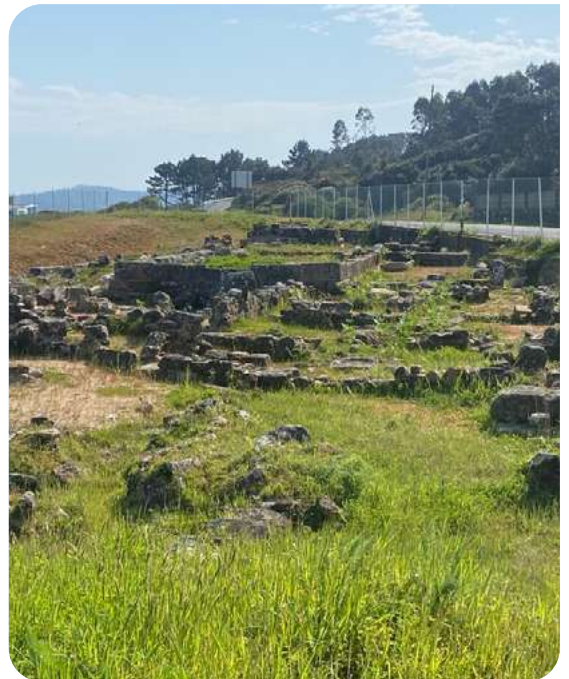


CIIMAR MAPPED THE ROLE OF ATMOSPHERIC RIVERS IN ANTARCTICA'S CHANGING CLIMATE

Irina Gorodetskaya from the Land-Ocean-Atmosphere Interactions team co-led a compilation of a decade of data on atmospheric rivers, narrow, moisture-rich air currents that transport heat and water from the tropics to the poles, and their impact on Antarctica. Published in *Nature Reviews Earth & Environment*, the study showed that these rivers can both build ice through heavy snowfall and trigger melting and instability, influencing the Antarctic ice sheet mass and global sea level. The review highlighted key drivers, including tropical convection and local winds, and emphasises the uncertainties linked to climate change, underlining the need for ongoing observation and modelling to predict Antarctica's future role in the global climate system.

ANCIENT DNA REVEALS WHAT ROMANS REALLY ATE FROM THE SEA

At a Roman fish-salting site on the Atlantic coast of Spain, traces of ancient DNA have survived where no one expected. A multidisciplinary team led by Paula Campos from Palaeogenomics and Biodiversity Conservation group successfully extracted and sequenced DNA from heavily processed fish remains found in fermentation vats at the Roman settlement of Adro Vello in Spain. Published in *Antiquity*, the study shows that European sardine was the main ingredient used to produce fish sauces such as garum, a staple of Roman diets and trade. By developing a method capable of identifying species from crushed and fermented remains, the researchers opened a new window into everyday food practices of the Roman Empire. The findings also revealed genetic continuity between ancient sardines and those living in the region today, linking past consumption habits with present-day marine ecosystems.





KELP FORESTS IN NORTHERN PORTUGAL EMERGED AS NATURAL ALLIES AGAINST CLIMATE CHANGE

Along the northern coast of Portugal, underwater forests of kelp are quietly storing carbon at remarkable rates. A study led Francisco Arenas from Benthic Ecology and Environmental Solutions team, together with researchers from MARE, showed that these marine forests capture and retain significant amounts of carbon, placing them among the country's most efficient blue carbon habitats. Focusing on the dominant kelp species *Laminaria hyperborea* and *Saccorhiza polyschides*, the team quantified for the first time the carbon stock held by these ecosystems. Published in Scientific Reports, the findings revealed that kelp forests account for a substantial share of Portugal's blue carbon, despite covering a limited area. The study highlights their dual role as climate regulators and biodiversity hotspots, reinforcing the need to protect and restore these vulnerable marine habitats.

FROM PROTECTED ON PAPER TO PROTECTED IN PRACTICE: PORTUGAL MAPS HOW TO MONITOR ITS MARINE RESERVES

In October 2025, Portugal presented its first national roadmap dedicated to monitoring marine protected areas, setting out 15 concrete actions to be implemented by 2030. Developed under the INDIMAR project and led by CIIMAR, the roadmap responds to a central problem: protected areas without monitoring are not enough to protect biodiversity. Built with contributions from public authorities, researchers, and NGOs, this roadmap proposes a coordinated, science-based system with shared indicators, stable funding, and permanent technical teams. The document transforms political ambition into an operational plan, aiming to ensure that Portugal's marine protected areas are measured, compared, and managed effectively over time.



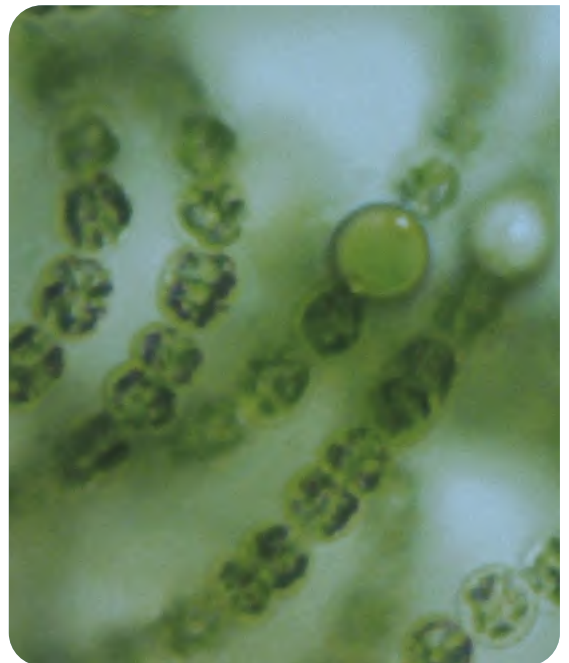


CIIMAR RESEARCHER MEASURES GIANT INTERNAL OCEAN WAVES FROM SPACE

Jorge Magalhães from Land-Ocean-Atmosphere Interactions group co-lead a study that, for the first time, precisely measured the height of massive internal ocean waves - “hidden giants” that travel beneath the surface -, using the KaRIn sensor aboard NASA and CNES’s SWOT satellite. By combining satellite data with the Dubreil Jacotin Long (DJL) mathematical model, the CIIMAR and FCUP team reconstructed the full structure, size, and currents of these waves, validated with in situ Amazon measurements of waves up to 150 m high. Published in *Science of Remote Sensing*, the study provides a faster, cheaper method to quantify internal wave energy, improving understanding of ocean mixing, heat and nutrient transport, and enhancing climate and ocean circulation models worldwide.

A HIDDEN BIOCHEMICAL SWITCH IN CYANOBACTERIA OPENS NEW PATHS FOR MARINE BIOTECHNOLOGY

For millions of years, cyanobacteria have acted as microscopic chemists, producing molecules that support survival, communication, and competition. A research based on Raquel Castelo Branco’s PhD, from Cyanobacterial Natural Products team, identified an unexpected biochemical feature: an enzyme that adds phosphate groups to cyanobactins, a family of peptides with strong biotechnological potential. This stable form of phosphorylation had never been observed before in these natural compounds. Revealed through genome analysis and validated in the laboratory, the mechanism allows cyanobacteria to produce phosphorylated peptides naturally, without synthetic chemistry. The study was published in *Nature Communications* and the findings points to new opportunities for marine biotechnology and future drug development.



HIGHLIGHTS

CIIMAR CELEBRATED ITS 25TH ANNIVERSARY

In 2025, CIIMAR celebrated its 25th anniversary under the “New Horizons” moto, embracing the unknown that is yet to be explored by the CIIMAR crew in the upcoming years. CIIMAR kicked off the celebrations with a memorable evening, where the spirit of the Roaring Twenties set the stage for its annual gala dinner. Throughout the year CIIMAR community organised several events to mark this anniversary. The 25th Anniversary Commission was composed of Joana Xavier, Filipe Castro and Pedro Leão.



CIIMAR EXPLORED THE DEEP-SEA MYSTERIES OF THE GORRINGE SEAMOUNT

TwinDEEPS project led a multidisciplinary expedition to the Gorringer Seamount, Portugal’s largest and Europe’s most prominent underwater mountain. Using the Luso ROV (Portuguese) aboard the Dutch research vessel RV Pelagia, the team aimed to map biodiversity, study water column microbes, monitor megafauna, and assess human impacts from 500 to 3,000 meters depth. The campaign integrated cutting-edge technology, international collaboration, and advanced training for early-career scientists. By publicly sharing data and samples, this expedition supported national management plans, contributing to the conservation of this deep-sea biodiversity hotspot in the North Atlantic.



CIIMAR PARTICIPATED IN STUDY THAT HIGHLIGHTS ENVIRONMENTAL RISKS OF DEEP-SEA MINING

A four-year project led by Miguel Santos from the Endocrine Disruptors and Emerging Contaminants team, along with other Portuguese research institutions, evaluated the impacts of deep-sea mining on fragile ecosystems. Under the Deep-Risk project the team found that sediment plumes from mining release both particles and dissolved metals, causing harmful or lethal effects on sponges, corals, and bivalves. Using hyperbaric laboratory experiments and coupled hydrodynamic-ecological models, the team developed tools to predict plume behaviour and ecosystem responses, supporting sustainable management. The results underscore the vulnerability of hydrothermal and deep-sea habitats and provide guidance for regulatory frameworks, aiming to mitigate environmental risks while informing future exploration and conservation strategies.

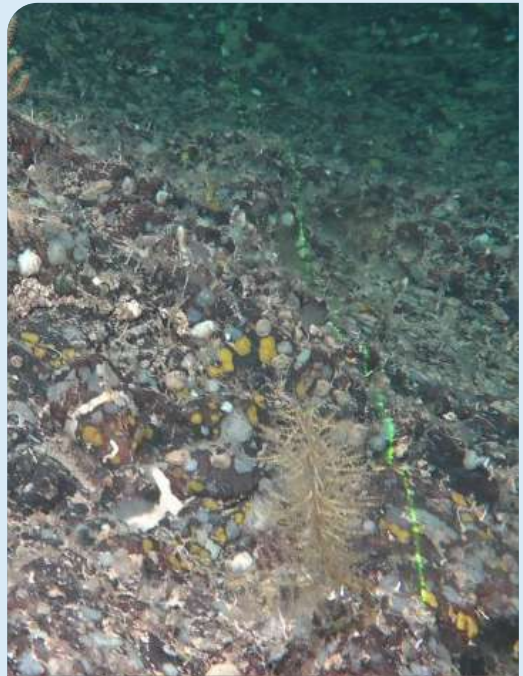


Photo credits: EMEPC

CIIMAR SCIENCE AT THE OCEAN RACE EUROPE 2025

In a new partnership established with the Ocean Race, CIIMAR curated the Sea and Science Pavillion at the Ocean Race Europe Fly-by Matosinhos, that took place in August at the Porto Cruise Terminal. Activities were designed to promote ocean literacy and raise awareness of marine sustainability. Visitors engaged in these topics through educational games and workshops, exhibitions, talks and a movie lounge.



CIIMAR RATED EXCELLENT IN THE FCT EVALUATION OF THE R&D UNITS

CIIMAR received the rating of Excellent in the latest national assessment of R&D Units by the Fundação para a Ciência e a Tecnologia (FCT). Thanks to the ongoing commitment of its researchers, technical staff, and students, CIIMAR continues to stand out as a leading centre in marine and environmental science.



CIIMAR LAUNCHED “25 TONS DE AZUL” SERIES

A new series of videos titled “25 tons de azul” was launched as part of CIIMAR 25th anniversary celebration. The history of CIIMAR, its thematic lines, key achievements, projects, values and mission are being addressed in 25 episodes.



NEW HORIZONS CONFERENCE

As part of the 25th anniversary celebrations, the “New Horizons” conference celebrated the scientific achievements of CIIMAR and looked to the future by bringing together the scientific community in a debate on major global challenges and the role of marine and environmental sciences in a sustainable future.



CIMAR-LA RESEARCHERS WELCOMED AT THE MINISTRY OF ENVIRONMENT AND ENERGY

Researchers from CIMAR-LA were received by the Minister for the Environment and Energy, Maria da Graça Carvalho, with the aim of presenting the open letter – “For a national restoration plan that does not leave the sea behind”, launched and signed by hundreds of subscribers since November 2024. During the hearing, the researchers conveyed to the Minister the importance of the sea playing a central role in the national restoration plan appropriate to the size of the national maritime space, the strategic importance of the sea for the country, and the urgent need to protect marine biodiversity.



SECRETARY OF STATE FOR SCIENCE AND INNOVATION VISITED CIIMAR

On 15 October, CIIMAR welcomed Helena Canhão, Secretary of State for Science and Innovation. The visit provided an opportunity to learn more about the three thematic areas that guide the Centre’s research. The tour included the laboratories located at CIIMAR headquarters and the bioterium. Topics such as blue biotechnology and bioprospecting, ecology and conservation, animal health, public policy, and the internationalisation of research were discussed.



FIRST OPEN DAY FOR HIGHER EDUCATION

CIIMAR invited higher education students, from universities and polytechnic institutes, to take part in its first Open Day for Higher Education, dedicated to exploring scientific research in the fields of marine and environmental sciences.



PRIZES AND HONOURS

A SELECTION OF PRIZES AND HONOURS ATTRIBUTED TO CIIMAR MEMBERS IN 2025:



THREE CIIMAR SCIENTISTS DISTINGUISHED IN CIÊNCIA VIVA'S "WOMEN IN SCIENCE" PROJECT

Fátima Carvalho, Joana Xavier and Madalena Pinto were selected to integrate the book "Women in Science", a project from Ciência Viva national agency. This project pays tribute to Portuguese female scientists for their important contribution to scientific advancements in a wide range of fields. Launched on the International Women's Day, this is the fifth volume of this series of books.

VÍTOR VASCONCELOS IN THE ADVISORY BOARD OF BLUEBIO ALLIANCE

Vítor Vasconcelos, CIIMAR Director, was invited to take part of the Advisory Board of BlueBio Alliance, the Portuguese Network for Marine Bioresources and Biotech. BlueBio Alliance is a national network that includes all subsectors of the marine bioresources value chain in Portugal.



THE MAELSTROM PROJECT WON THE BLUE RIVERS & LAKES AWARD

The MAELSTROM project, coordinated at CIIMAR by Isabel Sousa Pinto, was awarded the Blue Rivers & Lakes prize in the Innovation category during the European Ocean Days event. The award, established by BlueMissionMed in collaboration with the European Commission, honours initiatives that protect small and medium-sized river basins, aligning with the European Union's mission to restore the Ocean and waters. The distinction was given for the work carried out in implementing the Bubble Barrier on the Ave River in Vila do Conde.



AGOSTINHO ANTUNES ELECTED PRESIDENT OF THE NORTHERN DELEGATION OF THE ORDER OF BIOLOGISTS

Agostinho Antunes was elected President of the Board of Directors of the Northern Regional Delegation of the Order of Biologists for the next four years. The taking over ceremony took place on 23 April at the Instituto Nacional de Saúde Doutor Ricardo Jorge in Lisbon. CIIMAR researcher António Paulo Carvalho is also a member of the social organs of this board.

CIIMAR RESEARCHER AWARDED EU GRANT TO ADVANCE WAVE ENERGY TECHNOLOGY

Gianmaria Giannini, researcher at Marine Energy and Hydraulic Structures group, received a €200,000 Marie Skłodowska-Curie fellowship to develop a 3D-printed wave energy converter (WEC) that transforms ocean wave motion into electricity. Supported under Horizon Europe, the WEC-Pro project aims to simplify production, reduce costs, and enable large-scale, automated manufacturing of wave energy devices. By integrating design and manufacturing constraints early, the project promises more efficient and economically viable converters. Giannini will carry out the research at the Marine Offshore Renewable Energy Lab in Turin, Italy, in collaboration with industrial 3D-printing partners, bringing new tools and knowledge to advance marine renewable energy in Europe.



JOANA XAVIER RECEIVED THE MUNICIPAL MEDAL OF MERIT FROM VILA DO CONDE CITY COUNCIL

Vila do Conde City Council granted the municipal medal of merit to CIIMAR researcher Joana Xavier as a recognition for her research work. The municipal medals of merit acknowledge “the work and commitment of citizens and institutions that have excelled in their fields, contributing to the enhancement of Vila do Conde”. The public ceremony took place at the Vila do Conde Municipal Theatre on 24 June. These medals represent recognition of the work and commitment of citizens and institutions that have excelled in their fields, contributing to the enhancement of Vila do Conde.



Photo credits: Vila do Conde City Council



Photo credits: Gondomar City Council

MADALENA PINTO RECEIVED THE MUNICIPAL MEDAL OF MERIT FROM GONDOMAR CITY COUNCIL

During the celebrations of the 25th of April, Gondomar City Council granted the municipal medal of merit to Madalena Pinto, for “her personal and professional achievements as Full Professor at Faculty of Pharmacy, University of Porto”. This distinction aims to recognise individuals who have distinguished themselves through their services in the literary, artistic, scientific or professional fields.

SIXTEEN CIIMAR SCIENTISTS IN THE WORLD'S BEST SCIENTISTS 2025

The researchers Lúcia Guilhermino, Vitor Vasconcelos, Aires Oliva-Teles, Agostinho Antunes, Luísa M.P. Valente, Carlos Azevedo, Jorge C. Eiras, Carlos Vale, C. Marisa R. Almeida, Sara C. Antunes, Ana P. Mucha, Adriano A. Bordalo, Francisco Arenas, Elsa Froufe, Marina Dolbeth and Madalena Pinto were included in the list of the world’s best scientists, according to Research.com’s latest “World’s Best Scientists 2025” ranking. The selection recognises the researchers with the greatest scientific impact at a global level, based on the frequency and relevance of citations of their publications.



LUÍSA VALENTE CHAIRS THE INTERNATIONAL SOCIETY OF AQUACULTURE NUTRITION

Luísa Valente, group leader, Principal Investigator of the Biology, Aquaculture and Fish Quality research line and member of the CIIMAR board, was elected as the first President of the International Society of Aquaculture Nutrition (ISAN). This appointment represents a significant milestone for aquaculture science at an international level and an important recognition for Portugal and CIIMAR.





Photo credits: 929 Challenge

ALGABIOTEC PROJECT AWARDED 3RD PLACE IN THE 929 CHALLENGE 2025

The AlgaBiotec project, originated at CIIMAR, won the 3rd place in the 2025 edition of the 929 Challenge, held in Macau. The team, composed of Isabel Oliveira and Isabel Cunha (CIIMAR), Raquel Vaz (Iberian Nanotechnology Laboratory), and Paulo Patrício (manager), also received an Honourable Mention for “Most Impactful Project”, standing out among international initiatives focused on innovation and sustainability.

GLUMAR PROJECT WON 2ND PLACE IN THE BLUACT COMPETITION

Graciliana Lopes (CIIMAR), together with Fátima Fernandes, Mariana Barbosa (UCIBIO/NOVA FCT), and Ricardo Cardoso (FEUP), won the 2nd place in the BluAct competition, organised by the Matosinhos City Council and UPTEC, with the project GluMAR – Innovative Marine Supplement for Glucose Control. This project uses macroalgae to create a supplement that helps control blood glucose levels.



Photo credits: Matosinhos City Council



18 CIIMAR RESEARCHERS AMONG THE MOST CITED IN THE WORLD IN 2024

CIIMAR once again stands out in global science, with 18 of its researchers included in the latest edition of the “World’s Top 2% Scientists list”, which annually identifies the most cited scientists in the world based on data from SCOPUS, the largest international scientific database. The list included Aires Oliva Teles, Alberto Teodorico Correia, Anake Kijjoa, Benjamin Costas, Carlos Azevedo, Carlos Vale, Emília Sousa, Eugénia Pinto, Francisco Taveira Pinto, Graciliana Lopes, Helena Peres, Jorge Eiras, Lúcia Guilhermino, Luís Gabriel Barboza, Luísa Valente, Madalena Pinto, Paula Enes and Vítor Vasconcelos.

CIIMAR AS PART OF CIMAR-LA IN 2025

The CIMAR Associated Laboratory (CIMAR-LA) brings together CIIMAR and CCMAR, two leading institutions in marine and environmental research. During 2025, CIIMAR researchers and supporting offices worked within the frame of CIMAR-LA, contributing to the implementation of various initiatives of the associated laboratory.

Several scientific publications were produced in 2025 as result of the collaboration between researchers from both institutions that compose CIMAR-LA in key areas such as biodiversity, global change, circular economy, blue growth, and open science.

The strategic activity of CIMAR-LA continued to be strengthened by the action of nine working groups: Aquaculture, Advanced Training, Business and Innovation, Collaboration and Internationalisation, Marine Biotechnology, Monitoring Programmes, Open Science, Communication, and Public Policies for biodiversity preservation, marine protected areas and ecosystem restoration. In May 2025, these working groups presented their main goals, achievements and future directions at the general CIMAR-LA meeting, this year hosted by CCMAR.

Highlights of the CIMAR-LA initiatives in 2025 include a series of joint CIMAR-LA seminars, bringing together scientists from both institutions to present and discuss work on a particular topic, in a total of 7 seminars.

The 6th edition of the Blue Think Conference, an event organised by the CIIMAR PhD committee, was held this year, for the first time, together with CCMAR PhD students. This event took place in September at CIIMAR and was part of CIIMAR's 25th anniversary celebrations. CIMAR-LA organised ENAQUA 2025, the first National Aquaculture Meeting, bringing together the scientific community, industry, and associations that work in aquaculture to share knowledge, foster collaboration, and discuss the future of sustainable aquaculture in Portugal. The first edition of ENAQUA took place in November at the University of Algarve.

CIMAR-LA researchers have also been working together to contribute to science policies. They published an open letter to the Minister for the Environment and Energy calling for a National Restoration Plan that does not leave the ocean behind. As a result, the Minister invited the CIMAR-LA researchers to a formal audience and requested that CIMAR-LA prepares a pre-proposal for a national programme dedicated to mapping priority marine habitats. The public policies working group submitted a National Programme for Mapping Priority Marine Habitats, which is currently under assessment by the government.

The digital presence of CIMAR-LA gained a new dimension on National Sea Day, with the launch of a new website that enhances visibility on the activity developed by the associated laboratory.



Photo credits: CCMAR



RESEARCH



RESEARCH

CIIMAR IS SCIENTIFICALLY ORGANISED IN THREE MAIN RESEARCH LINES.

MARINE BIOTECHNOLOGY

CIIMAR research focuses on exploring the richness of ocean resources to discover and characterise new bioactive compounds with ecological, pharmaceutical or other industrial applications. The study of emerging toxins, development of biosensors for early detection systems, and development of bioremediation and phytoremediation tools for ecosystem recovery are other main goals of this research line.

P.I. Pedro Leão



GLOBAL CHANGES AND ECOSYSTEM SERVICES

CIIMAR provides basic knowledge and tools to support the protection and management of marine, estuarine and freshwater ecosystems. Sustainable exploitation of ocean resources with production of valuable goods and services is fostered through this research line. This work is done in close collaboration with SMEs, international and local authorities, and stakeholders.

P.I. Catarina Magalhães



BIOLOGY, AQUACULTURE AND SEAFOOD QUALITY

CIIMAR promotes sustainable aquaculture and innovating sea food extraction, which are vital for tackling nutrition and seafood quality issues. Understanding the diverse traits and needs of key aquatic species, along with their susceptibility to disease, is crucial. Significant scientific advancements and innovation stem from both basic and applied research, benefitting industries and consumers alike.

P.I. Luísa Valente



RESEARCH LINES

GLOBAL CHANGES AND ECOSYSTEM SERVICES

RESEARCH GROUPS

GROUP LEADERS

Aquatic Ecology and Evolution

Elsa Froufe

Aquatic Ecotoxicology and One Health

Lúcia Guilhermino

Benthic Ecology and Environmental Solutions

Francisco Arenas

Coastal Biodiversity

Isabel Sousa Pinto

Contaminant Pathways in Marine Environment

Miguel Caetano

Deep-Sea Biodiversity and Conservation

Joana Xavier

Ecosystem Monitoring and Sustainability

Laura Guimarães

Endocrine Disruptors and Emerging Contaminants

Miguel Santos

Fish Ecology and Sustainability

Sandra Ramos

Hydrobiology

Adriano Bordalo e Sá

Land-Ocean-Atmosphere Interactions

Ana Bio

Marine Ecosystem Modelling

Irene Martins

Marine Energy and Hydraulic Structures

Francisco Taveira Pinto

Microbiome Ecology and Biogeochemistry

Catarina Magalhães

Palaeogenomics and Biodiversity Conservation

Paula Campos

Rivers and Coastal Ecology

Carlos Antunes

Social and Educational Innovation

Clara Vasconcelos

Soil/Water Contamination and Interactions

Natividade Vieira

BIOLOGY, AQUACULTURE & SEAFOOD QUALITY

Animal Genetic and Evolution

Filipe Castro

Animal Morphology and Toxicology

Eduardo Rocha

Animal Parasitology and Pathology

Maria João Santos

Aquatic Animal Health

Benjamin Costas Refojos

Feed and Seafood Quality

Luísa Valente

Fish Biology and Fisheries

Alberto Correia

Fish Nutrition and Welfare

Aires Oliva Teles

Microbiology and Biotechnology in Aquaculture

Cláudia Reis Serra

Seafood Safety and Processing

Maria Leonor Nunes

RESEARCH LINES

MARINE BIOTECHNOLOGY

RESEARCH GROUPS

Biodiscovery for health

Bioinspired Ocean Interfaces

Bioremediation and Microbes for Sustainability

Blue Biotechnology, Environment and Health

Cyanobacterial Natural Products

Emerging Biotechnology and Seafood Processing

Environmental Chemistry and Recovery

Evolutionary Genomics and Bioinformatics

Marine Natural Products and Medicinal Chemistry

Microbial Biodegradation and Bioprospecting

GROUP LEADERS

Ralph Urbatzka

Joana Reis de Almeida

Ana Paula Mucha

Vitor Vasconcelos

Pedro Leão

Narcisa Bandarra

Marisa Almeida

Agostinho Antunes

Madalena Pinto

Maria de Fátima Carvalho



CIIMAR WATCH

In 2025, CIIMAR continued the consolidation of CIIMAR Watch, a strategic long-term environmental monitoring programme focused on coastal and estuarine ecosystems in northern Portugal. The initiative brings together nine CIIMAR research teams and 37 researchers, with institutional financial and logistical support ensuring standardised and continuous data collection and management.

CIIMAR Watch operates across two main monitoring regions, VIANA Observatory (Viana do Castelo) and PORTO Observatory (Porto), integrating long-term historical datasets with newly acquired data. Monitoring activities cover coastal, intertidal, subtidal and estuarine environments, including the Douro and Lima estuaries, addressing key challenges related to climate change, pollution and biodiversity loss.

During 2025, the programme maintained 14 monitoring stations and carried out 26 field campaigns across all seasons. More than 30 physical, chemical and biological parameters were monitored, including water column properties, chemical contaminants, hydrodynamics, underwater soundscapes and molecular biodiversity using environmental DNA (eDNA).

Biological monitoring included plankton, fish larvae, microplastics, macrobenthos, intertidal

and subtidal communities, kelp forests, and cetacean occurrence through visual surveys, photo-identification and bioacoustics.

2025 marked the first operational year of field campaigns using Unoccupied Aerial Systems (UAS) and Acoustic Doppler Current Profilers (ADCP), enhancing spatial coverage and hydrodynamic characterisation. CIIMAR Watch also contributed to training and capacity building, involving 18 undergraduate and graduate students across 2024–2025, and initiated preparatory work for the deployment of oceanographic buoys, planned for full implementation in 2026.

- Research teams: 9
- Researchers: 37
- Monitoring regions: 2 (VIANA Observatory, PORTO Observatory)
- Stations: 14
- Field campaigns: 26
- Students trained (2024–2025): 18
- Parameters monitored: >30 (physical, chemical, biological)
- New technologies implemented: 2 (UAS and ADCP)
- Outputs: talks, posters, 1 Master's thesis, news/videos



RESEARCH PROJECTS THAT ENDED IN 2025

GRINNAQUA

GREEN INNOVATION STRATEGIES FOR ANIMAL HEALTH MANAGEMENT: TOWARDS SUSTAINABLE AQUACULTURE



European project



GRINNAQUA aimed to enhance CIIMAR Aquaculture line through collaborations with top institutes in Europe to improve widening institution technical skills and improve scientific quality of research.

GRINNAQUA was conceived in compliance with the Farm to Fork Strategy and focused on capacitating CIIMAR to raise staff research profile and increase its innovation capacity positioning the institution among the main actors in the area of aquaculture. Recognised leaders in R&D within European aquaculture with a solid background in relevant areas partnered with CIIMAR, which expertise encouraged CIIMAR towards scientific excellence and competitiveness. Clear strategies were defined to raise staff research profile and excellence by implementing training workshops and Summer schools led by the partners. Several visits of CIIMAR staff to partners facilities were executed, targeting senior

research, technical and administrative training, allowing the exchange of knowledge and good practices. A research project, integrating all partners scientific and technical strengths, was executed and focused on prophylactic tailored nutrition against important viral and ectoparasitic diseases in aquaculture, such as haemorrhagic septicaemia virus in rainbow trout, and the sea lice parasite in Atlantic salmon.

GRINNAQUA also outlined strategies to increase stakeholder interaction and its mobilization towards scientific achievements, strengthening CIIMAR market-driven research and innovation capacity to increase its competitiveness at national and international levels. GRINNAQUA was instrumental to improve CIIMAR innovation capacity to become a leading institute for the blue revolution. A long-lasting collaboration is foreseen, contributing to strengthen a more sustainable aquaculture in Europe.

Principal Investigator at CIIMAR: **Benjamin Costas**
Leader Institution: **CIIMAR**
Website: <https://grinnaqua.eu/>



COAST

CONSERVATION OF MARINE ECOSYSTEMS AROUND SANTO ANTÃO, CABO VERDE: IMPLICATIONS FOR POLICY AND SOCIETY



European project



The COAST project proposed to contribute to understanding the status and functioning of the marine ecosystems around Santo Antão island in Cabo Verde, as its contribution to the country's economy. The project aimed to achieve 5 main objectives: a) to characterise and map pelagic and benthic habitats, as well as anthropogenic pressures of Santo Antão, b) to estimate patterns of diversity in marine communities in relation to habitat features, c) to assess the vulnerability of the studied communities to both environmental and anthropogenic pressures, through the application of climate vulnerability models, d) to identify best conservation measures and restoration protocols for selected habitats/ecosystems based on the results of the first three objectives, e) to provide baseline data that inform policymakers, authorities, institutions and practitioners towards effective marine conservation and restoration in these habitats and demonstrate the repeatability of the proposed approach in other regions.

COAST activities were organised around five overarching objectives, implemented through coordinated contributions from all partners: UA, CIIMAR, GEOMAR, CSIC, UB, UAc, UBO, and UnderWater eXperience, with local stakeholders

including fishers, NGOs (Biosfera, TERRIMAR, Project Biodiversity), and with support from local diving centres: New Blue Ecoturismo e Conservação and Green Turtle Diving Centre, municipal authorities, the Coast Guard, and educational institutions. Dedicated scientific surveys were conducted to collect data from the marine ecosystems around Santo Antão under a transdisciplinary and integrated framework, with a specific focus on selected areas of interest. We applied state-of-the-art technology combined with visual and acoustic observations, physical sampling, modelling, and remote sensing. CIIMAR contributed to 1) mapping benthic intertidal and coastal habitats, including habitat-forming species, 2) estimating benthic invertebrate and pelagic fish diversity in relation to habitat features, 3) assessing patterns of connectivity around the archipelago, and 4) assessing the vulnerability of marine communities to environmental and anthropogenic pressures, 5) to implement conservation and restoration actions for selected coral habitats, and 6) to implement capacity-building actions for students and teachers to promote ocean literacy. Overall, we published 3 publications and have currently 2 ready to submit and 3 still in preparation. Our work was also presented in national and international meetings, and we made a press release and several social media posts.

BASSINCELLS



DEVELOPING IN VITRO INTESTINAL MODELS FOR EUROPEAN SEABASS

FCT project



The primary objective of BASSinCELLS was to establish and validate the first two-dimensional (2D) intestinal cell culture model for European seabass (*Dicentrarchus labrax*). The project focused on creating a high-fidelity platform to investigate immune-based responses at the intestinal level, which is a critical site for nutrient absorption and disease defense. By developing these cell lines, the project aimed to characterise the specific cell populations involved in the fish immune response and host-pathogen interactions. Furthermore, a major goal was to provide a reliable alternative to live fish trials, thereby reducing the economic costs and the number of animals required for long-term experimental research in aquaculture.

BASSinCELLS addressed the growing need for rapid, ethical, and cost-effective screening tools in the aquaculture industry. As farming practices for European seabass intensify, the sector faces

increased pressure from stress-related disease outbreaks. Traditional methods for studying these issues require raising fish for extended periods, which is both expensive and ethically demanding.

Led by researchers from CIIMAR in collaboration with Nord University (Norway), the project utilised advanced cell biology techniques to create stable intestinal models. These “cells-in-a-dish” allows scientists to test the safety and efficacy of new functional feed ingredients or immunostimulants in a controlled environment before moving to full-scale animal trials. By aligning with the 3Rs principle (Replacement, Reduction, and Refinement), BASSinCELLS provided a sustainable technological platform that supports the health, welfare, and commercial viability of European seabass farming.

CONVERSION OF DIETARY TRIBUTYRIN IN RAINBOW TROUT

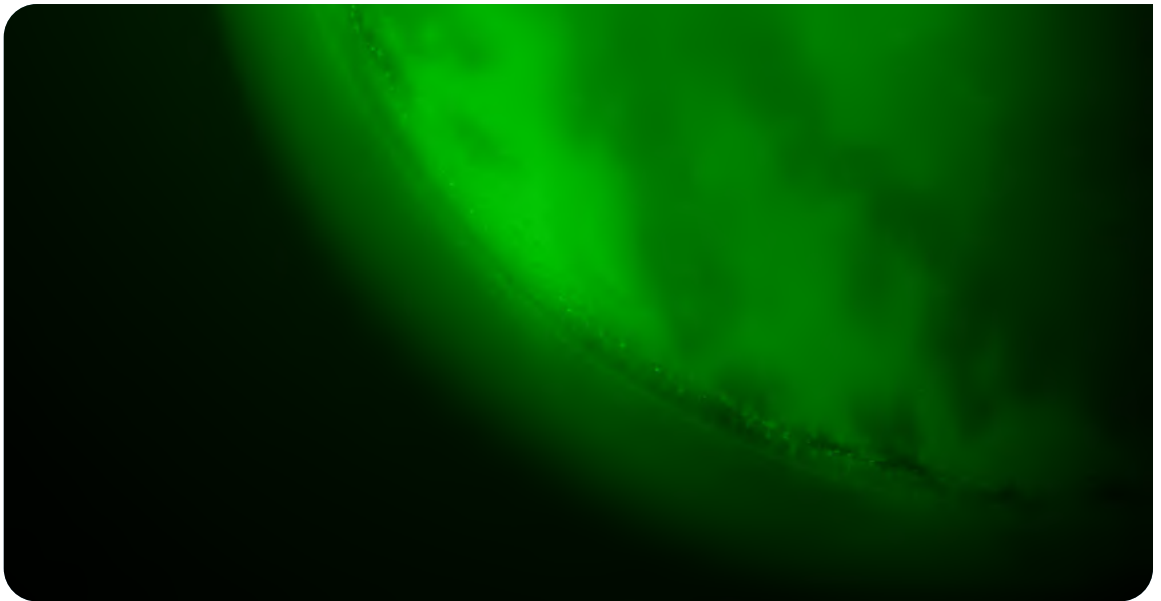


The primary objective of the ConTribuT project was to investigate the metabolic fate and physiological benefits of tributyrin—a precursor of butyric acid—as a functional feed additive for Rainbow Trout (*Oncorhynchus mykiss*). The project sought to determine how dietary tributyrin is converted and utilized at the cellular level, specifically focusing on its role in improving energy metabolism and gut health. Using advanced Nuclear Magnetic Resonance (NMR) spectroscopy and stable isotope tracers (such as deuterated water), the research aimed to quantify the contribution of tributyrin to lipid synthesis and glucose production. Ultimately, the project intended to validate tributyrin as a tool to enhance growth performance and resilience in carnivorous fish, supporting the development of more efficient and sustainable aquafeeds.

ConTribuT addressed a critical challenge in modern aquaculture: the need for functional ingredients that can mitigate the metabolic stresses

associated with plant-based or alternative diets. Tributyrin is a unique molecule known for its ability to release butyrate in the intestine, which serves as a primary energy source for colonocytes and acts as an anti-inflammatory agent. By combining traditional growth trials with cutting-edge NMR-based metabolomics, Dr. Viegas and his team at the University of Coimbra provide a detailed map of how this additive influenced the “intermediary metabolism” of the fish.

The project was highly collaborative, involving partnerships with CIIMAR, the University of Aveiro, and the University of Porto. By integrating these results into the broader AQUAEXCEL3.0 framework, ConTribuT contributed to a larger European effort to move toward a circular bioeconomy. The findings help fish feed manufacturers design “precision diets” that not only promote growth but also strengthen the biological robustness of farmed species through targeted nutritional intervention.



The main goal of LEGATEE was to investigate if transgenerational training of fish immunity and delivery of immunostimulants directly to fish eggs can increase disease resistance of newly hatched larvae. Also, the project aimed to identify the different molecular mechanisms that determine the establishment of transgenerational immunity in fish.

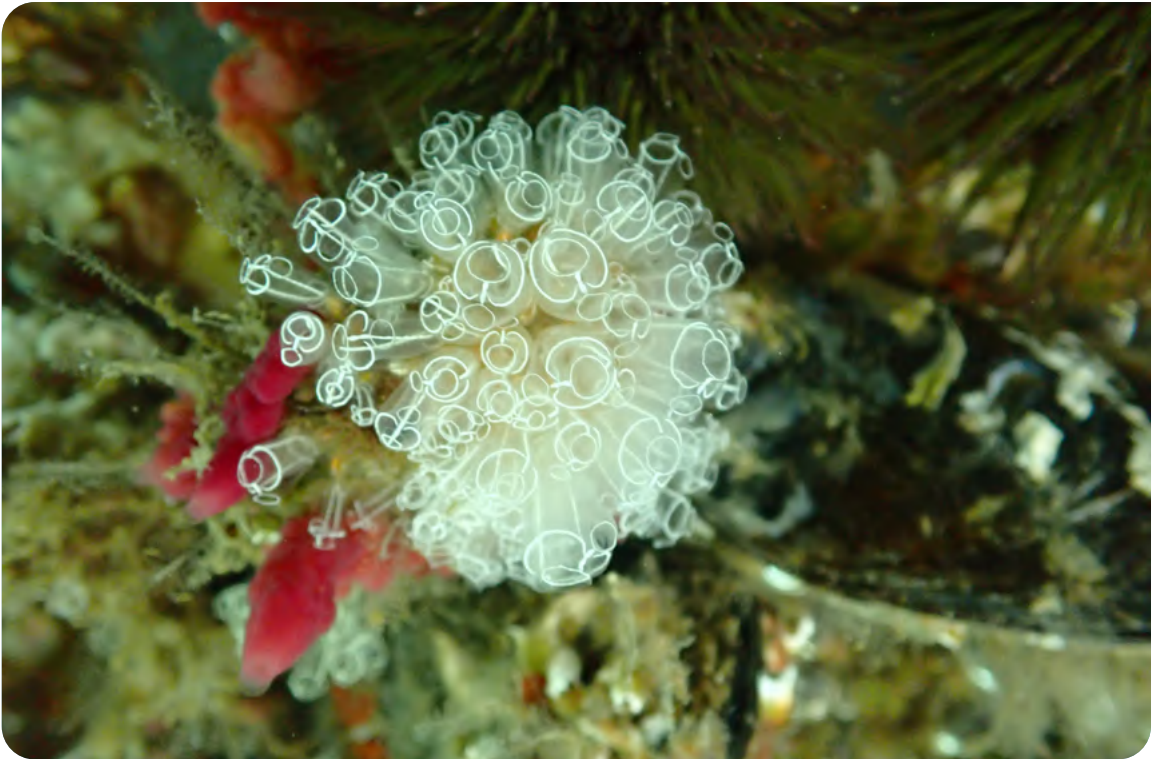
The LEGATEE project set out to explore an ambitious and highly relevant question in aquaculture: whether parental immune training and *in ovo* immunostimulant delivery could improve disease resistance in fish larvae. Despite the clear importance of the topic and considerable effort from the research team, the project ultimately fell short of its central objectives. Bacterial challenge with *Edwardsiella piscicida* used to train the immune system of the parental F0 generation revealed a not yet described sex-biased susceptibility of females to the disease. This limited the number of high-quality spawns, precluding assessment of intergenerational effects on the F1 generation.

Unexpectedly, F2 larvae from infected F0 parents exhibited higher susceptibility to infection rather than enhanced resistance as hypothesised, suggesting the induction of tolerance mechanisms that can be detrimental to pathogen defence. LEGATEE succeeded in producing proteomic data of interest on the repertoire of egg proteome in pathogen exposed fish. Even though the total number of proteins identified surpassed previously reported datasets, only eight proteins were differentially abundant between control and pathogen-challenged groups, potentially reflecting stability of egg proteomes during early development. The modest proteomic changes observed provide an important insight into the resilience of the egg proteome, informing expectations for immunostimulant-based interventions. LEGATEE proceeded successfully, demonstrating proof-of-concept for targeted molecular delivery of CpG-ODN, a known immunostimulant, into fish eggs anticipating an innovation with commercial potential in aquaculture.

MARINA-FORESTS

FCT project

IMPROVING THE ECOLOGICAL STATE OF MARINAS BY USING ANIMAL FORESTS AS NATURE-BASED SOLUTION



The global aim of Marina-Forests project was to improve the ecological state of marinas in the north of Portugal. This was achieved by using animal forests as nature-based solution in mitigation interventions to increase biodiversity and alleviate the impacts of marinas on coastal ecosystems.

Baseline data about the ecological state of 6 marinas in North Portugal were provided. Marinas showed a great abundance and diversity of invertebrates but 24 non-indigenous species were found. According to biocontamination level, 3 marinas revealed a moderate/poor ecological status and the other 3 a high/moderate ecological status.

Artificial substrates were used to facilitate animal forest colonisation to assess its efficacy as nature-based solution.

The mussel *Mytilus galloprovincialis* was the most efficient in colonising substrates. Our findings suggest that mussels were useful to increase biodiversity but their effect depended on environmental conditions.

During sampling, the invasive kelp *Undaria pinnatifida* was noticed in marinas. Although not originally planned in the project, it was also tested if the *Undaria* removal could facilitate native kelp recovery. However, *Undaria* removal resulted in a partial recolonisation by a native kelp.

Project indicators include 4 scientific papers, 2 EurOBIS datasets and 17 congress communications. The project provided room for a PhD (in course) and 2 undergraduate students and contributed to outreach activities, including TV and press news.

MEASUREMENTS AND MODELING OF THE ATMOSPHERIC AND OCEANIC BOUNDARY LAYERS AT THE NORTHERN ANTARCTIC PENINSULA DURING THE YEAR OF POLAR PREDICTION SPECIAL OBSERVING PERIODS



The MAPS project aimed to better understand why the Antarctic Peninsula is warming much faster than the rest of Antarctica and how this warming may affect future snowfall and rainfall. A key focus was on atmospheric rivers—long, narrow weather systems that transport warm, moist air toward the poles—and how they influence temperature, precipitation, and melting in the region. The project examined how these events affect clouds, especially the liquid water they contain, which strongly controls surface warming and the type of precipitation that falls. MAPS also studied how strong winds during atmospheric rivers increase ocean wave breaking and sea spray, and how these processes influence exchanges of heat, gases, and particles between the ocean and the atmosphere. By combining detailed observations and computer modelling from international polar research campaigns, MAPS’ goal was to improve understanding of how the atmosphere and ocean interact during extreme weather events. The project brought together experts from different scientific fields, supported the training of young scientists, and shared its findings with the wider public.

The MAPS project completed successfully. Two challenging Antarctic field campaigns provided rare, high-quality observations that helped uncover how atmospheric rivers drive extreme warming, melting, and changes in clouds and precipitation over the Antarctic Peninsula, leading to several high-impact scientific papers. Moreover, MAPS invested in people: three early-career researchers were trained through dedicated fellowships and thesis work, gaining hands-on experience in polar research. Project results were widely shared, with presentations at 12 national and international meetings, many led by students. MAPS also made a strong effort to bring Antarctic science beyond academia through an expedition blog followed during and after the campaign (King George Antarctica 23), interactive school activities, public demonstrations at CIIMAR Open Day, and a short YouTube video showing Antarctic balloon launches (YOPP-SH Radiosondes). The project and its discoveries were featured in national media, helping raise awareness of rapid climate change in Antarctica (e.g. Público and Observador).

MULTI-CRASH

FCT project

MULTI-DIMENSIONAL ECOLOGICAL CASCADES TRIGGERED BY AN INVASIVE SPECIES IN PRISTINE HABITATS



Biological invasions are responsible for multiple effects on ecosystems, affecting species interactions and various ecological processes. Predicting and managing the impacts of biological invasions on communities and ecosystems depends on the ability to empirically characterise complex biological interactions at appropriate spatial and temporal scales. However, successful predictions of the effects of invasive non-native species depend on our ability to quantify these impacts in terms of biodiversity dynamics and ecosystem functioning, which makes overall assessment very complicated, as data acquisition can be methodologically demanding. In addition, it is rarely known whether non-native species are “drivers” of observed ecological changes over time

or only “transient” in response to other global factors (e.g. climate change, pollution). Finally, increasing evidence suggests that the effects of non-native species may affect other ecosystems not directly invaded (e.g., impacts of aquatic non-native species may spread to adjacent terrestrial ecosystems).

The main goal of this project was to assess the multi-trophic, multi-dimensional ecological impacts mediated by a non-native species in pristine areas.

The results of this project were already published in 22 peer-reviewed publications, and further communicated in national and international meetings.



Antifouling (AF) paints used to prevent biofouling on underwater surfaces, are continuing releasing copper and other biocides to the oceans. As a result, the marine industry is facing rigid environmental regulations on the use of coatings with biocide-releasing mechanism. AF paints that are meant to end up in the oceans cannot be part of a sustainable future. The European Commission has been pushing member states to work harder on finding alternatives to copper-based coatings investing in harmless systems. Under the scope of a previous FCT-funded project, nature-inspired antifoulants (NIAFs) were synthesised and some were chemical immobilised in commercial marine coatings. It was observed that NIAFs did not lose their bioactivity after chemical immobilisation and therefore they may provide new non-toxic bioactive coatings systems able to prevent hard fouling

with minimal release of the bioactive compound into the aquatic environment. These results strongly motivated the team to further explore these NIAFs as viable option to replace copper. A multidisciplinary team was gathered in this project to synergically act to consolidate, strengthen, and increase the international competitiveness of these potential environmentally benign AF products.

The main goals of this project were: a) to optimise the chemical synthesis to improve scalability, sustainability, and greenness of the process; b) to assess environmental and human health impacts; and c) to understand their mode of action.

The results of this project were published in a book and in 34 peer-reviewed publications, and further communicated in national and international meetings.

MERCURY BIOGEOCHEMISTRY, FATE AND IMPACT IN PERMAFROST THAW ECOSYSTEMS



PERMAMERC aimed to quantify Hg methylation and MMHg demethylation rates in permafrost thaw lake sediments and water and investigate their dependence on biotic and abiotic factors. It also aimed to assess the biological and abiotic processes responsible for Hg reduction and oxidation in thaw lakes and their influence on the mercury (and methylmercury) pool. In addition, the project aimed to quantify Hg, MMHg and Hg(0) fluxes across sediment/water and water/atmosphere interfaces and to determine Hg stable isotope fractionation in permafrost systems and investigate the possibility of their use as tracers on hydrological and atmospheric transport.

PERMAMERC combined drone and satellite mapping with field sampling to link thermokarst lake diversity to permafrost conditions, producing ultra-high-resolution maps and a new limnodiversity index. Over 335,000 lakes were classified regionally. Stable-isotope experiments showed strong seasonal and site-specific Hg methylation, with microbial sulfate reducers as key drivers. Genomic tools identified *hgcAB* and *mer* genes, integrating biotic and abiotic controls of MeHg production into conceptual models.

AN OMICS MULTISENSORY PERSPECTIVE, HOW CAN HUMAN ACTIVITIES AFFECT THE SENSORY ORGANS OF DEEP-SEA FISH?



The PerSeaVe project had three main research questions: How did genomic events (gene duplication, pseudogenisation, loss, mutation and sequence divergence) shaped *N. bonaparte* sensory systems? How do these genomic features (genes/metabolic pathways) compare with other fish species? How human activities may disrupt deep-sea demersal fish communities?

The actions related to this project included the participation in the oceanographic campaign Porcupine23 that took place in Irish waters during September-October 2023.

Two outreach activities, one at national level, the Oceanus Seminar Series held at CIIMAR, and a second international during the X Iberian Congress of Ichthyology (Spain) entitled “Tell me how you smell and I’ll tell you who you are. Studying odour mate recognition systems in deep-sea fish (*Notacanthus* sp.)”. The scientific output of the project consisted of three publications in international scientific journals.

ASSESSING PRE-EXPLOITATION BASELINE NUMBERS AND POPULATION DYNAMICS OF THE EUROPEAN SARDINE *SARDINA PILCHARDUS* WALBAUM, 1792 USING PALAEOGENOMICS



Our main goal with this project was to get a more accurate perspective of the effective population size and genetic diversity levels of the species prior to overfishing, invaluable information for stock delimitation and management and definition of fishing effort in the different Food and Agricultural Organization (FAO) fishing areas. To achieve this, we used ancient DNA to characterise Roman sardine populations. This project applied an innovative way of obtaining new genomic information in a broad time frame usually not available to decision makers. One of the most impacted species by overfishing is the European sardine (*Sardina pilchardus*). We used ancient DNA techniques to look at samples that pre-date periods of intensive fishing and

compare those results to the ones obtained from current populations. We attended four national and one international conference on evolutionary biology where we networked and disseminated our preliminary results in two talks and four posters. We published a paper in *Antiquity*: “Roman Atlantic *garum*: DNA confirms sardine use and population continuity in north-western Iberia”, on the use of fish salting vat remains, a material that has been often overlooked, for ancient DNA extraction and sequencing and the windows this type of material will open on the study of the past for the understanding of subsistence economy, culture, and the diet of past populations.

KEY MONITORING REQUIREMENTS FOR EFFECTIVE MANAGEMENT OF THE PORTUGUESE NETWORK OF MARINE PROTECTED AREAS



Despite its central role in conservation, monitoring of Marine Protected Areas (MPAs) in Portugal has proven to be deficient, with poor planning, disjointed efforts, ineffective indicators, short-term programmes and insufficient resources. As a result, information on trends and the conservation status of marine biodiversity and the benefits it generates remains scattered, incomplete, and difficult to apply in practice. Overcoming this situation requires planning monitoring efforts so that they can generate useful information for the adaptive management of MPAs.

The INDIMAR project focused on developing a roadmap for monitoring the future National Network of Marine Protected Areas (NNMPA). Through collaboration between natural and social science researchers, conservation professionals and decision-makers, the INDIMAR project identified priority requirements for the development of a cost-effective NNMPA monitoring plan, based

on the best scientific knowledge and capable of supporting marine conservation management and public policies. The priority requirements identified by the project include a new set of key indicators capable of assessing the performance of the NNMPA in relation to its defined objectives.

In addition to the CIIMAR team led by PI Isabel Sousa Pinto and Co-PI João Rodrigues, experts from various government agencies (DGRM, DRPM, DRAM, EMEPC, ICNF, IFCN, and IPMA), academic marine research institutions (Okeanos, CCMAR, CESAM, and MARE) and NGOs (SPEA and WWF), besides Fundação Oceano Azul participated in the work. They took part in three face-to-face workshops and contributed to the discussion and preparation of the final products: a Roadmap for monitoring the future National Network of Marine Protected Areas, list of indicators, policy brief, press releases and scientific publications in preparation.

CIIMAR SEED AND CIIMAR OUT OF THE BOX

PROJECTS GRANTED IN 2025

CIIMAR has two funding schemes to support the implementation of projects at CIIMAR by young researchers – CIIMAR SEED –, and by more experienced researchers – CIIMAR Out of the Box. In both typologies, it was compulsory to have researchers from more than two teams to push forward inter-laboratorial and interdisciplinary experiences. The second call ran in 2025.

CIIMAR SEED PROJECTS:

Title	Acronym	Principal Investigator	Research Group
A multi-criteria mapping of Portuguese coastal areas for offshore aquaculture and co-location with marine renewables	AquaMaps	Daniel Clemente	Marine Energy and Hydraulic Structures
ECHOES of evolution: signals of genetic and acoustic variation of the threatened common dolphin (<i>Delphinus delphis</i>)	Echoes	Raul Valente	Coastal Biodiversity
Evolution and functional analysis of fluoroacetate dehalogenases across microbial kingdoms	FluoroGeny	André Santos	Aquatic Ecology and Evolution
Ex vivo as predictive model for optimizing omega-3/omega-6 ratios using black soldier fly larvae oil	OMEGA-X	Sara Moutinho	Feed and Seafood Quality
Exploring diatoms as a green solution for antivirals removal from water samples	DIACLEAN	Pedro Rodrigues	Ecosystem Monitoring and Sustainability
Exploring <i>In silico</i> allergenicity in european seabass (<i>Dicentrarchus labrax</i>): Proteomic insights from experimental diets with different levels of swine hydrolysates	HydroAllergens	Andreia Silva	Feed and Seafood Quality
Exploring natural polybrominated diphenyl ethers (PBDEs) from cyanobacteria	PBDEXPLORE	Eunice Ferreira	Cyanobacterial Natural Products
Forecasting ecosystem responses to management and conservation strategies	ECO-REACT	Johanna Faure	Marine Ecosystem Modelling

Title	Acronym	Principal Investigator	Research Group
Illuminating the biosynthetic dark matter of cyanobacteria		Raquel Castelo Branco	Cyanobacterial Natural Products
Linking sustainable nutrition to neuroendocrine mechanisms in stress resilience on European seabass: The role of black soldier fly larvae oil		Ana Basto	Feed and Seafood Quality
Marine biodiversity-ecosystem services society nexus: a network approach	MARISYN	Jacinto Cunha	Fish Ecology and Sustainability
Metabolite-microbiome interactions mediating antifouling in ascidians	M&M	Ana Matos	Bioinspired Ocean Interfaces
Microplastics as vectors of environmental contaminants	MicroPath	Sabrina Magalhães	Fish Ecology and Sustainability
Nutritional immunology in aquaculture: dietary tryptophan as a modulator of vaccine efficacy, mucosal immunity, and microbiome in rainbow trout		Diogo Peixoto	Aquatic Animal Health
Olive waste extracts obtained with green technologies in alginate film active packaging for fish fillets	OLIPACK	Diogo Filipe	Feed and Seafood Quality
Unravelling novel biosurfactants from deep-sea Actinomycetota		Inês Ribeiro	Microbial Biodegradation and Bioprospecting

CIIMAR OUT OF THE BOX PROJECTS:

Title	Acronym	Principal Investigator	Research Group
A 3D-printed millifluidic platform for fast screening of natural AF compounds activity and their ecotoxicity	MilliBarnacle	Isabel Oliveira	Bioinspired Ocean Interfaces
A master switch to screen <i>Streptomyces</i> secondary metabolism		Marta Mendes	Microbial Biodegradation and Bioprospecting
AI-driven identification of environmental contaminants using nanospacer	AI-NANO	Mário Araújo	Blue Biotechnology Environment and Health
Catch-Salmon-DNA: Paleoenvironmental insights into Northwestern Atlantic salmon (<i>Salmo salar</i> , Linnaeus 1758) populations from sedimentary DNA		Ester Dias	Rivers and Coastal Ecology
Cetaceans and the paradox of 'natural diabetes': an evolutionary medicine approach	CanDi	Raquel Ruivo	Animal Genomics and Evolution
FAIR-CIIMAR: mapping and strengthening FAIR data practices in CIIMAR publications		Martina Illari	Benthic Ecology and Environmental Solutions
From sea to city: algae-based substrates for edible and extensive green roofs		Cristina Calheiros	Benthic Ecology and Environmental Solutions
Hg-INHibiT - CRISPR-based gene inhibition for methylmercury mitigation		Joana Costa	Microbiome Ecology & Biogeochemistry
Immortalized <i>Mytilus galloprovincialis</i> cells as a novel platform for ecotoxicology, shellfish, and antifouling research	ImmoMyt	Ana Sara Gomes	Bioinspired Ocean Interfaces Interfaces
Inheritance of obesity risk: zebrafish as a model for intergenerational metabolic health	ZOMM	Diogo Martins	Biodiscovery for Health
Paleogenomics for the conservation of the precious red coral, <i>Corallium rubrum</i>	aCOR	Jean-Baptiste Ledoux	Evolutionary Genomics and Bioinformatics

RESEARCH PROJECTS STARTING IN 2025

Title	Acronym	Funding Programme	Principal Investigator at CIIMAR	Leader Institution
CyaSafe: Bridging gaps in cyanobacteria supplement safety in aquaculture	CyaSafe	Horizon Europe	Concepción Padial	CIIMAR
Development of oral probiotic-based vaccines for sustainable disease control in aquaculture	PhotoVaccine	Horizon Europe	Jorge García	CIIMAR
Integrative breeding strategies for the transition of EUropean AQUAculture towards sustainable ORGanic production	EUAqua.Org	Horizon Europe	Benjamin Costas	Universita Degli Studi di Padova, Italy
Multi-domain open MALDI spectra archive for identification of microorganisms	MALDIBANK	Horizon Europe	Alexandre Campos	MIRRI-ERIC
Technical assistance and support to communities of actors for the Mission Restore our ocean and waters by 2030 for the Mediterranean basin	TASC-Resto-reMed	Horizon Europe	Isabel Sousa Pinto	Hellenic Centre for Marine Research, Greece
Advancing sampling and creening of extremophile microorganisms for biodiscovery of bioactive compounds from volcanic, desert, and polar ecosystems	XTREMOLIFE	Horizon Europe	Mariana Reis	Wageningen University, Netherlands
Climate Resilience and Adaptation in Aquaculture. Testing innovative technologies and ecosystem-based solutions for the resilience of Atlantic aquaculture to climate change.	CLIRAQUA	Interreg Atlantic Area	Rodrigo Ozorio	University of Coruña, Spain
Desarrollo de estrategias conjuntas para la sostenibilidad de recursos marinos clave en las áreas de cooperación	MAREST	Interreg	Francisco Arenas	University of Coruña, Spain

Title	Acronym	Funding Programme	Principal Investigator at CIIMAR	Leader Institution
Platform to understand effects of the harmful algal bloom holobiont in a changing environment to predict their impact on aquatic ecosystem services	HALOBISE	Water4All 2023 Joint Transnational Call	Aldo Barreiro	Linköping University, Sweden
Reproductive potential of blue sharks in a changing climate	ApexChange	FCT-RESTART	Ester Dias	CIIMAR
FAIRway: A Pathway to Promote Open Science Through Research Data Lifecycle Management	FAIRway	PRR	Maria Paola Tomasino	INESC TEC
Research and Development Unit - equipment - PRR	EQUIPAR+2	PRR	Vitor Vasconcelos	CIIMAR
Research and Development Unit - equipment - PRR	UID_equipamentos PRR	PRR	Vitor Vasconcelos	CIIMAR
A new approach to investigate effects of microplastics on plankton: from organisms to communities and ecosystem functioning	Planktastic	COMPETE 2030	Sandra Ramos	CIIMAR
Adaptability of kelp populations to local conditions: strain selection opportunity for aquaculture and conservation	AKTIONS	COMPETE 2030	Isabel Costa	CIIMAR
Beyond harvest: Ecological benefits of bivalve aquaculture	AQUABENEFIT	COMPETE 2030	Vânia Freitas	CIIMAR
Bioinspired strategies for new sustainable marine antifouling technologies	ECOAT	COMPETE 2030	Joana Almeida	CIIMAR
Blue biotechnology and bio-engineering for the current and future development of a blue bioeconomy in Portugal	BlueBio4Future_Complementar	COMPETE 2030	Pedro Leão	CIIMAR

Title	Acronym	Funding Programme	Principal Investigator at CIIMAR	Leader Institution
<i>Chlorella vulgaris</i> aquafeed supplementation as microbiota-gut-brain modulator in <i>Dicentrarchus labrax</i>	MiMo	COMPETE 2030	Márcia Saraiva	CIIMAR
Coastal flora for mental well-being promotion: Development of food supplements based on dune plant compounds with impact on BDNF-TrkB signalling	NUTRIBRAIN	COMPETE 2030	Graciliana Lopes	REQUIMTE
Combining biotechnology and robotics to prevent and eliminate pollution inside ports	BioPorts	COMPETE 2030	Ana Paula Mucha	CIIMAR
Cutaneous biomarkers: Progress in health and sustainability in salmonid aquaculture	SKINS	COMPETE 2030	Benjamin Costas	RiaSearch
Demonstration of a food fortified with bioactive peptides in reducing the effects of stress in fish	FORTIFISH	COMPETE 2030	Benjamin Costas	Sparos Lda.
Development and molecular characterization of a weight cycling model in zebrafish (<i>Danio rerio</i>) and metabolic effects on the offspring	FinWeightCycle	COMPETE 2030	Diogo Martins	CIIMAR
Discovery of cyanobacterial metal chelators: a multifunctional solution for Alzheimer's disease	CyanoMetAl	COMPETE 2030	Mariana Reis	CIIMAR
Enhancing innate immune responses in fish larvae by <i>in ovo</i> immunostimulation	Deliver2Egg	COMPETE 2030	Ana Santos Rocha	CIIMAR
Exploring titanium dioxide nanoparticles presence, risks and effects in aquatic ecosystems	AQUATIDE	COMPETE 2030	Mário Araújo	CIIMAR
Fish gut probiotics: a tool for improving seaweed utilization and fish health	PROALGAE	COMPETE 2030	Paula Enes	CIIMAR

Title	Acronym	Funding Programme	Principal Investigator at CIIMAR	Leader Institution
GreenOralVax: a Green, sustainable and nano-sized antigen-delivery platform for Oral Vaccination of fish in aquaculture	GreenOralVax	COMPETE 2030	Paulo Oliveira	CIIMAR
HYbrid REMediation solutions for mitigating PER- and poly-fluoroalkyl compounds in aquatic environments	HyPerRem	COMPETE 2030	Diogo Alexandrino	University of Minho
History of small marine pelagic fish exploitation in coastal Iberian and Mediterranean communities using palaeoecogenomics: implications for stock management and baseline number assessment	SEACHANGE	COMPETE 2030	Paula Campos	CIIMAR
Innovative bioreceptive solutions for estuarine resilience and protection	InVert	COMPETE 2030	Isabel Iglesias	CIIMAR
Innovative strategies for mitigating marine toxins in aquaculture: novel depuration procedures and molecular insights into xenophobic sensing in bivalves	INNOVBIVALVES	COMPETE 2030	Alexandre Campos	CIIMAR
Integrating biogeochemical and genomic data to forecast N-cycle changes in the Arctic Ocean	CHANGE	COMPETE 2030	Pedro Duarte Catarina Magalhães	CIIMAR
Investigating the cumulative effects of multiple invasive species on estuarine ecosystems	X-IAS	COMPETE 2030	Martina Ilarri	CIIMAR
Isolation, chemical characterisation and screening for bioactivities of a novel molecule derived from a Planctomycetota bacterium with pharmaceutical applications against breast adenocarcinoma	Alichondri-chlorin	COMPETE 2030	Ana Cavadas	CIIMAR
Metal impacts on deep-sea microbial diversity and nitrogen cycling potential	UnderPressure	COMPETE 2030	Miguel Semedo	CIIMAR

Title	Acronym	Funding Programme	Principal Investigator at CIIMAR	Leader Institution
Microbial pigments for a sustainable and innovative textile industry	InnovColor	COMPETE 2030	Fátima Carvalho	CIIMAR
New generation bio-inspired technologies for marine biofouling prevention	NANOBIOTES-CUDO	COMPETE 2030	Joana Almeida	Smallmatek - Small Materials and Technologies, Lda
North Atlantic coastal observatory in Portugal	Atlântida II	COMPETE 2030	Ana Paula Mucha	University of Porto
Nutraceutical role of methionine in trout and seabass antiviral responses and vaccination efficiency- a look into viperin modulation	VIRALMET	COMPETE 2030	Marina Machado	CIIMAR
Practical tools to diagnose and monitor environmental pollution in support of the green transition	SIGNAL	COMPETE 2030	Laura Guimarães	CIIMAR
Production of dsRNAs targeting viral and bacterial pathogens of shrimps using the green microalga <i>Chlamydomonas reinhardtii</i>	ChlamyR7	COMPETE 2030	Carlos Quinones	CIIMAR
Reshape cellulosic textile waste management through a synergistic integration of organic valorisation and ecodesign principles	TextileWaVE	COMPETE 2030	Marisa Freitas	CIIMAR
Smart sea regional platform	PREMI	COMPETE 2030	Vitor Vasconcelos	CIIMAR
Swarm robotics for the improvement and observation of aquatic resources	REMORA	COMPETE 2030	Ana Bio	Ingeniarius, Lda
Tryptophan in the brain-gut-axis - tackling gut	TRYPinGUT	COMPETE 2030	Rita Azeredo	CIIMAR
Unravelling the functional effects of seaweed loss in a warming ocean for empowering coastal management	FUNSEA	COMPETE 2030	Marina Dolbeth	CIIMAR

Title	Acronym	Funding Programme	Principal Investigator at CIIMAR	Leader Institution
Cyanobacteria biofilms microbiome composition and chemical interactions	CYANOBioMe	FCT	Adriana Rego	CIIMAR
Deciphering Arctic Ocean microbial communities response to climate change using tailor-made machine learning strategies	ArcticMicroML	FCT	Ana Mafalda Baptista	CIIMAR
Discovery of natural products from cyanobacterial orphan biosynthetic gene clusters	CyanOrphan	FCT	Eunice Ferreira	CIIMAR
Exploring bycatch survivability and restoration potential of habitat-forming sponges in Portuguese waters	SpongeREST	FCT	Andreu Santín Muriel	CIIMAR
Fungal single-cell protein from macroalgal waste fermentation: improving sustainability and reducing the carbon footprint of fish aquafeeds	AlFunFeed	FCT	Benjamin Costas	University of Vigo, Spain
Hybrid NATURE-based solutions as BIOdiversity PROMOTers and their implications for emerging contaminants mitigation	NATUREBIO-PROMO	FCT	Patricia Teixeira	CIIMAR
Microbiota-gut-brain axis and appetite regulation in fish: modulating gut microbiota through the use of probiotics	FEEDGU-TBRAIN	FCT	Inês Guerreiro	CIIMAR
Research and Development Unit – core funding	UID	FCT	Vitor Vasconcelos	CIIMAR
Structures of biochar immobilized microorganisms for the removal of pharmaceuticals in wastewater treatment plants	MICROCHAR	FCT	Joana Fernandes	CIIMAR
Toxicological assessment of nitrosamines in urban water cycle: multi omics strategies to elucidate exposure risks for public and environmental health	NITROTOX	FCT	Raquel Chaves	CIIMAR

Title	Acronym	Funding Programme	Principal Investigator at CIIMAR	Leader Institution
Transformation of insect by-products to improve the sustainability of aquafeeds	INSECTAQUA	FCT	Helena Fernandes	CIIMAR
Unlocking the potential of seaweeds and halophytes through biorefinery for enhanced resilience in the aquaculture agri-food and chemical industries	ReSEAlience	FCT	Benjamin Costas	LULEÅ UNIVERSITY OF TECHNOLOGY, Sweden
Unravelling mediterranean aquaculture pathogens: Advancing diagnostic and vaccine-like solutions	AquaMed	FCT	Márcia Saraiva	CIIMAR
Zero-waste Omega-3: A green label solution for sustainable aquaculture feeds.	OmegaGreen23	FCT	Rui Magalhães	CIIMAR



INNOVATION

TECHNOLOGICAL PLATFORMS

ACCESS TO ECOSYSTEMS



CIIMAR Access to ecosystems platform aims to facilitate research activities by sharing its deep and long-term knowledge on the fauna, flora and environmental conditions of the different ecosystems of the North Portuguese coast and by providing logistic facilities and guidance throughout the research activity process. It includes a Scientific Diving Centre, fully equipped to support research at underwater level following European Scientific Diving Standards. CIIMAR ocean research facilities include multi-parametric CTD, underwater deployable light and temperature sensors, water and plankton sampling devices, underwater hydrophone, Van Veen sediment grabs, among other equipment.

P.I. Francisco Arenas

ANALYTICAL LABORATORIES



CIIMAR Analytical Laboratories are well equipped with different analytical equipments, including Segmented Flow Analyzers (SFA), Atomic Absorption Spectrometers (AAS), Liquid Chromatography-Mass Spectrometers (LC-MS/MS) and HPLC, Gas Chromatographs with different detectors (Flame Ionization Detection (GC-FID) and Mass spectrometry), Organic Elemental Analyzer-Isotope Ratio Mass Spectrometer (EA-IRMS), that enables the quantification of a vast array of compounds in different matrices with multiple purposes.

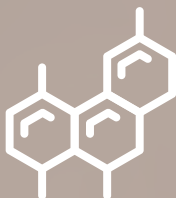
P.I. Marisa Almeida

AQUACULTURE AND ANIMAL EXPERIMENTATION FACILITY



The CIIMAR Aquaculture and animal experimentation facility – Bioterium of Aquatic Organisms (BOGA) - is a fully dedicated and highest standard infrastructure to the experimentation and maintenance of a wide range of aquatic organisms (macro and microalgae, fish, cephalopods and other invertebrates). The facility is licensed and inspected by the Portuguese Authority on the protection of animals used in experimentation with scientific or education purposes (DGAV – Direção Geral de Alimentação e Veterinária).

P.I. Benjamin Costas Refojos



BIODISCOVERY AND OMICS

With an overall goal of providing a sustainable access to the chemical diversity from our ocean, CIIMAR has developed a platform for navigating from biological material to pure compounds. CIIMAR provides large-scale microalgae culture and biomass processing facilities as well as last-generation photobioreactors, a collection of fractionated extracts from marine microorganisms and a growing library of pure compounds. In addition, CIIMAR Biodiscovery and Omics Platform has the ability to carry out natural products isolation in the milligram scale, structural characterisation and medicinal chemistry interactions.

P.I. Pedro Leão



BLUE BIOBANK

The Blue Biobank of CIIMAR is a repository of marine biodiversity that includes biological resources with biotechnological potential deposited at three institutional biobanks: the Blue Biotechnology and Ecotoxicology Culture Collection (LEGE-CC), with around 2000 strains of Cyanobacteria and microalgae, the CIIMAR Microbial Culture Collection (CM2C), with around 400 strains of Bacteria and Fungi isolated from environmental samples, and the DEEP-biobank, with around 400 specimens collected at the deep sea. It provides services to the scientific community and the industry. The Blue Biobank of CIIMAR is part of the Portuguese Blue Biobank, a network of national marine biological collections.

P.I. Vítor Vasconcelos



ECOTOXICOLOGY

CIIMAR Ecotoxicology platform supports research and environmentally sustainable technological development, providing toxicity testing and other ecologically relevant assessments of environmental contamination to researchers, environmental managers, municipalities, wastewater treatment plants and other interested stakeholders. State-of-the-art infrastructures are available for the required testing, which are developed under the guidance of certified personnel.

P.I. Laura Guimarães

TECHNOLOGICAL OFFERS

IN 2025, THE FOLLOWING PATENT APPLICATIONS WERE GRANTED:

METHOD FOR OBTAINING PROTEINS OR A RICH-PROTEIN EXTRACT FROM ALGAE, EXTRACTS AND USES THEREFORE

Algal biomass has strong potential as a sustainable protein source for aquaculture, but its use is often limited by low nutrient accessibility caused by resilient cell-wall structures. This patent overcomes that barrier through a two-step mechanical-enzymatic disruption process. First, algal cells are mechanically disintegrated using vibratory grinding mills equipped with mechanical rings. The resulting material is then subjected to enzymatic hydrolysis with a tailored enzyme cocktail.

Together, these steps produce a disrupted algal suspension enriched in soluble nutrients and bioactive compounds, including free proteins, peptides, amino acids, and other valuable fractions. The products retain high digestibility and nutrient availability, enabling their effective incorporation as food and feed ingredients and supporting more sustainable, efficient aquaculture formulations.

Inventors: Valente, L. M. P., Pintado, M., Batista, S., Futuro, A., Faria, J.

Applicants: CIIMAR, University of Porto, Universidade Católica Portuguesa, New Enzymes, Lda.

Granted in: Europe – ref.: EP 3761802 B1.

SPOREFORMING PROBIOTIC STRAINS, METHODS AND USES THEREOF

Plant-based feedstuffs in aquafeeds can impair digestibility and trigger adverse gut effects due to non-starch polysaccharides (NSP) that fish cannot hydrolyse efficiently. This patent protects novel sporeforming probiotic strains isolated from fish gut microbiota and selected for high NSPase activity. These resilient spores withstand industrial feed processing and storage and, after ingestion, germinate in the intestine to release NSP-hydrolysing enzymes, improving energy

extraction from plant ingredients, reducing faecal waste and organic discharge, and mitigating NSP-related gut impacts. The technology provides probiotic feed additives that support fishmeal replacement, improve environmental performance, and help reduce antibiotic use and disease-related losses in aquaculture.

Inventors: Serra, C., Enes, P., Oliva-Teles, A., Tavares, F.

Applicants: CIIMAR, University of Porto.

Granted in: Chile – ref.: CL 71.822.

ULTRA-VIOLET ABSORBING COMPOUNDS

Ultraviolet (UV) radiation is a harmful and mutagenic component, causing premature skin aging, eye damage, and skin cancer. The patent is related to scytonemin analogs, a novel class of compounds, obtained from natural sources, namely cyanobacteria. These compounds can absorb up to 90% of UV-A radiation and can cover a broader UV to blue light absorption range. The compounds present faint colouration, and some

are even colourless, thus being easily incorporated in formulations for cosmetic products, sunscreens or lenses for sunglasses. Furthermore, some of these molecules present interesting antimicrobial properties, acting as multifunctional ingredients.

Inventors: Martins T., Leão P., Reis M., Vasconcelos V., Ramos V., Hassouani M., Sabour B.

Applicants: CIIMAR, University of Porto, Chouaib Doukkali University.

Granted in: USA – ref.: US 12,233,145 B2.

PYRAZINO [1,2-B]QUINAZOLINE-3,6-DIONES DERIVATIVES, THEIR PRODUCTION AND USES THEREOF.

This patent discloses a novel class of pyrazino[1,2-b]quinazoline-3,6-dione derivatives synthesised through one-pot condensation reactions using inexpensive building blocks derived from amino acids. These compounds demonstrate potent antibacterial activity against multi-resistant pathogens, including *Staphylococcus aureus*, and significant antimalarial activity against *Plasmodium falciparum*, *Trypanosoma brucei*, and *Leishmania infantum* parasites. Critically, these derivatives are non-hemolytic and non-cytotoxic at therapeutic

concentrations, making them promising candidates for developing new treatment options for infectious diseases in contexts of growing antimicrobial resistance and the need for affordable antiparasitic drugs.

Inventors: Sousa, E., Long, S., Pinto, M., Kijjoo, A., Martins da Costa, P., Freitas da Silva, J., Nogueira, F.

Applicants: CIIMAR, University of Porto, Nova Lisbon University.

Granted in: Europe – ref.: EP4017854 B1.

ENZYME-RICH EXTRACT AND USE THEREOF IN PRE-TREATMENT OF PLANT FEEDSTUFF-BASED DIETS.

This patent describes a circular-economy solution that upgrades brewer's spent grain, a low-value by-product of the brewing industry, through solid-state fermentation with *Aspergillus ibericus*. The process produces an enzyme-rich extract with high activities of carbohydrases and proteases.

Applied as a pre-treatment to plant-based aquafeed ingredients, the extract breaks down plant cell-wall fractions and increases nutrient bioavailability by releasing sugars, amino acids,

and other nutrients that are otherwise poorly accessible. In diets for farmed species such as European seabass, this supports better utilisation of plant feedstuffs and enables more efficient formulations with reduced reliance on marine-derived resources.

Inventors: Peres, H., Belo, I., Castro, C., Seara, J., Oliva-Teles, A., Fernandes, H.

Applicants: CIIMAR, University of Porto, University of Minho.

Granted in: Europe – ref.: EP4070666 B1.

ENTREPRENEURSHIP



ALGAplus has been dedicated to the controlled and sustainable cultivation of native marine macroalgae from the Atlantic coast, in a system on land as innovative as it is natural, and with organic certification. Located in Ria de Aveiro, within a Natura 2000 area, we are pioneers in Europe in doing so from a circular blue bioeconomy perspective, by integrating organic-certified fish aquaculture throughout the process.

www.algaplus.pt



Cell4Food kickstarts a Cell-Based Agriculture in Portugal. Cell4Food aims to create a network of businesses that will lead the market in the next decade, driven by technological knowledge on Cell-Based protein production. Our goal is to democratise access to new proteins and fibers with origin in cell-based agriculture production. We find many analogies between conventional agriculture and the production of cultivated meat or fish, so the name, Cellular Agriculture, is used.

www.cell4food.eu



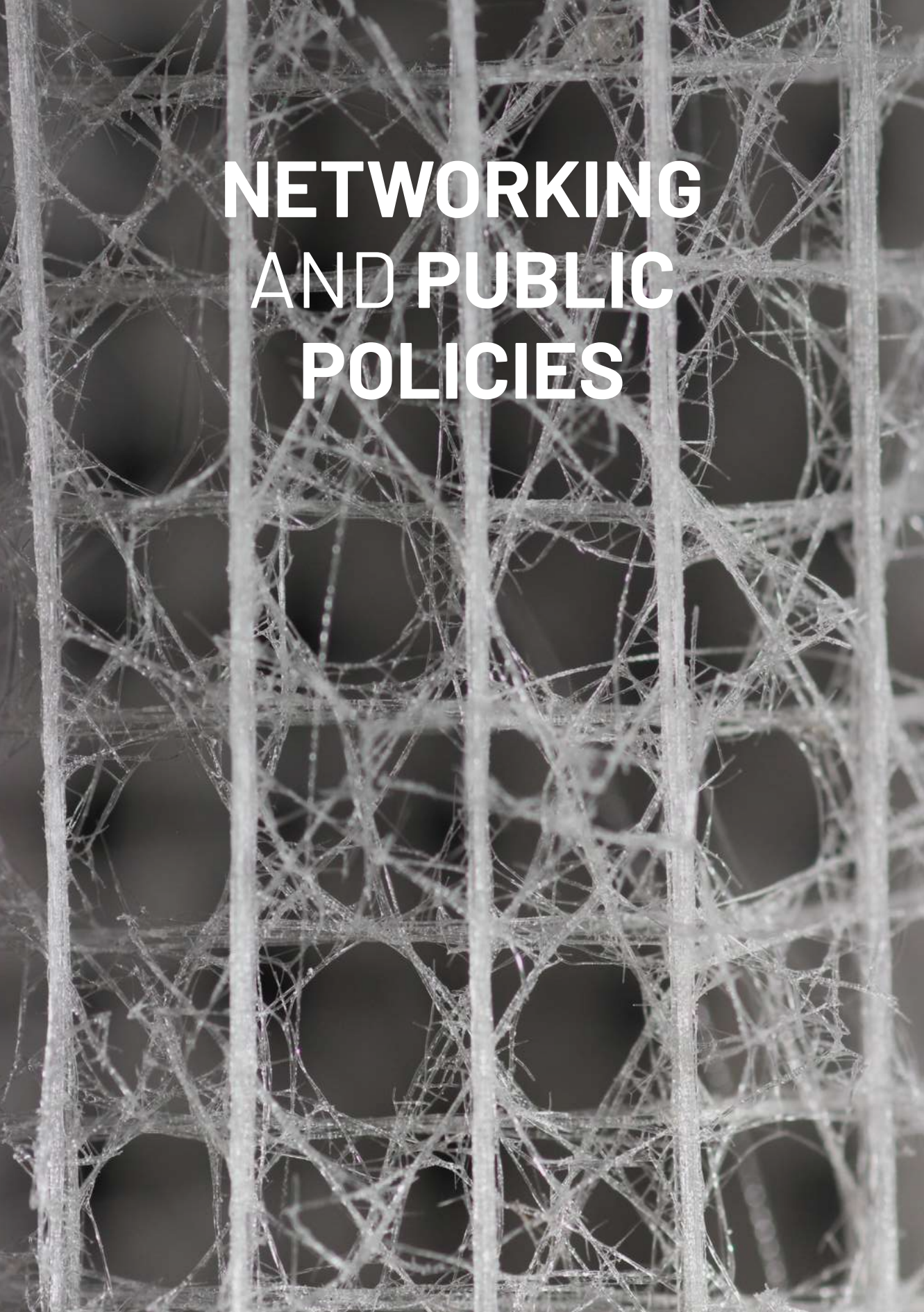
Fykia is a young, research-intensive, microalgae biotechnology start-up that develops innovative solutions, based on exclusive microalgae and proprietary technologies to tackle modern problems in healthcare, skincare and agriculture. Fykia is based at CIIMAR headquarters in the metropolitan area of Porto, Portugal, a bustling hub for algal technology.

www.fykia.pt



Ínclita Seaweed Solutions (ISS) is a Portuguese company that harnesses the power of seaweed to create bioactive ingredients while collaborating with sustainable seaweed producers and applying cutting-edge science to deliver natural and low-carbon products. ISS offers high-quality ingredients to diverse industries such as cosmetic, nutraceutical, petceutical and functional food and beverages.

www.inclitaseaweedsolutions.com



**NETWORKING
AND PUBLIC
POLICIES**

COLLABORATIONS & NETWORKS

CIIMAR IS A MEMBER OF THE FOLLOWING NETWORKS, INFRASTRUCTURES AND ORGANISATIONS:

EUROPEAN RESEARCH INFRASTRUCTURES



ELIXIR is an intergovernmental organisation that brings together life science resources from across Europe, that include databases, software tools, training materials, cloud storage and supercomputers. The goal of ELIXIR is to coordinate these resources so that they form a single infrastructure, making it easier for scientists to find and share data, exchange expertise, and agree on best practices.



The European Marine Biological Resource Centre (EMBRC) is Europe's research infrastructure for marine biological resources that provide access to marine resources, as well as cutting-edge services and facilities that allow researchers, from both academia and industry, to study the ocean and develop innovative solutions to tackle societal issues. EMBRC facilitates collaboration between researchers and staff at EMBRC marine stations across Europe.



The European Multidisciplinary Seafloor and water column Observatory (EMSO) is a marine multidisciplinary, distributed Research Infrastructure, with the goal to explore, monitor and better understand the phenomena happening within and below the oceans and their critical impact on the Earth. EMSO brings together diverse and numerous scientific partners, Institutes and Research Centres operating in key sites in European seas.



The Microbial Resource Research Infrastructure – European Research Infrastructure Consortium (MIRRI-ERIC) is the pan-European distributed Research Infrastructure for the preservation, systematic investigation, provision and valorisation of microbial resources and biodiversity. The mission of MIRRI is to serve Bioscience and Bioindustry users by facilitating access to a broad range of high-quality bioresources and data in a legal compliant way.



EU-OPENSREEN is a not-for-profit European Research Infrastructure Consortium (ERIC) for chemical biology and early drug discovery that aims to support the global scientific and economic competitiveness of Europe by delivering public health benefits. EU-OPENSREEN provides open access to the most advanced screening and medicinal chemistry technologies and expertise.

INTERNATIONAL COLLABORATIVE ORGANISATION



The Atlantic International Research Centre is an international collaborative framework to address global challenges and local priorities in the Atlantic Ocean. It promotes an integrative approach to climate and ocean issues in the Atlantic, supported by emerging technological innovations and advances in space, and data science, and through international cooperation.

SCIENCE-POLICY PLATFORMS



The European Marine Board (EMB) is the leading European think tank in marine science policy. It provides a platform to advance marine research and to bridge the gap between science and policy. The EMB facilitates the transfer of the best scientific knowledge available to the core of marine research policy. This is done by interacting directly with decision makers, and steering discussions between scientists and policy makers on a certain topic. EMB represents the European marine scientific community in different events.



EuroMarine is a member-based network of European marine research organisations and research institutes. EuroMarine's mission is to support the identification and initial development of important emerging scientific topics or issues and associated methodologies in marine sciences, as well as to foster new services relevant to the marine scientific community.



The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is an independent intergovernmental body to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development.



The European Platform for Biodiversity Research Strategy is a forum at which natural and social scientists, policy-makers and other stakeholders identify structure and focus the strategically important research that is essential to use the components of biodiversity in a sustainable way; maintain ecosystem functions that provide goods and services; conserve, protect and restore the natural world; and halt biodiversity loss.



The Group on Earth Observations Biodiversity Observation Network (GEO BON) is a global network of researchers dedicated to improving the acquisition, coordination, and delivery of biodiversity information at the global, regional, and national levels. GEO BON and its partners support the monitoring of biodiversity change through the coordination and collaboration among biodiversity observation networks, the generation of Essential Biodiversity and Ecosystem Service Variables, and the development of indicators, forecasts and various information services, making them readily available to all users.



SCIENCE POLICY

CIIMAR has been contributing to science policies related to ocean and environmental conservation, and to the blue bioeconomy. CIIMAR is a member of several international organisations that are deeply involved in the establishment of science policies, with some of CIIMAR members playing key roles in those organisations. Furthermore, some research projects include work packages focusing on science policy, aiming at promoting discussion among policy-makers and stakeholders, and ultimately contributing to better science policies based on the most recent scientific advancements in a certain field. In some cases, this resulted in the local implementation of science-based solutions, addressing societal problems that impact nature.

Examples of activities implemented in 2025 include outputs of projects and participation in meetings by invitation of Government members.

The INDIMAR project's team published the Roadmap for Monitoring Portugal's Network of Marine Protected Areas 2030 (DOI: 10.5281/zenodo.17243028). This strategic document sets out 15 concrete actions to be implemented between 2026 and 2030, with the overarching goal of establishing a robust, coordinated, and scientifically grounded monitoring programme for Portugal's National Network of Marine Protected Areas (RNAMP). The proposed actions are organised around four operational steps: (1) creating a dedicated coordination structure for the network; (2) reformulating the RNAMP's objectives to make them clearer, measurable, and aligned with national and international commitments; (3) developing a national monitoring strategy with harmonised indicators, standardised methods, and common data protocols operating at both the individual MPA and network scales; and (4) securing stable public funding, permanent multidisciplinary technical teams, and adequate logistical and technological resources. Across these steps, the roadmap integrates ecological, socioeconomic, and governance dimensions, and emphasises the active participation of local communities, research centres, NGOs, and other stakeholders. This is the first roadmap published in Portugal dedicated to monitoring a

network of marine protected areas and is among the first of its kind internationally. The roadmap directly addresses a gap identified in the Council of Ministers Resolution nr. 143/2019, which mandated the creation of the RNAMP and its monitoring framework but whose implementation has remained pending. By providing a concrete, time-bound pathway, the roadmap offers the Portuguese Government a ready-to-adopt blueprint for operationalising MPA monitoring ahead of the 2030 deadline set by the Kunming-Montreal Global Biodiversity Framework's 30x30 target and the EU Biodiversity Strategy. The roadmap was developed through a collaborative process involving a working group of 36 experts drawn from a broad range of institutions, including ICNF, DGRM, DGPM, DRPM Açores, IFCN Madeira, DRAM Madeira, IPMA, EMEPC, CCMAR, CESAM, OKEANOS, MARE-Madeira, Fundação Oceano Azul, WWF Portugal, and SPEA.

In parallel, INDIMAR published a policy brief (DOI: 10.5281/zenodo.17252076) presenting actionable recommendations for decision-makers to develop a coherent, cost-effective, and scientifically robust monitoring programme for the RNAMP. The brief is addressed directly to the National Government (Ministry of the Environment and Energy; Ministry of Agriculture and Sea), the Regional Governments of the Azores and Madeira, and the key public agencies with marine conservation mandates (DGPM, ICNF, DGRM, DRPM Azores, IFCN Madeira, DRAM Madeira). Among its key findings, the brief highlights that only 40 of Portugal's 117 MPAs are covered by management plans, that no dedicated monitoring plans or programmes for MPAs are accessible at the national level, and that monitoring responsibilities remain fragmented across multiple institutions. These findings provide the evidence base for a policy shift from designating MPAs to ensuring they are effectively managed and monitored: a prerequisite for Portugal to meet its EU and international reporting obligations under EU's Marine Strategy Framework Directive, Habitats and Birds Directives, the OSPAR Convention, and the Convention on Biological Diversity.

As part of the CIMAR-LA Working Group on Public Policies for Biodiversity Preservation, Marine Protected Areas, and Ecosystem Restoration, CIIMAR researchers published an open letter to the Minister for the Environment and Energy calling for a National Restoration Plan that does not leave the ocean behind. The letter was subscribed by more than 600 signatories, including researchers, representatives of non-governmental organisations, and members of the general public. The letter had a direct policy effect: it led to a formal audience with the Minister, Maria da Graça Carvalho, in September 2025. During that meeting, the Minister explicitly requested that CIMAR-LA representatives prepare a pre-proposal for a national programme dedicated to mapping priority marine habitats (a knowledge gap identified by researchers), in the context of the National Nature Restoration Plan being prepared under the EU Nature Restoration Regulation.

In response, the MAPMAR pre-proposal – Programa Nacional de Mapeamento de Habitats Marinhos Prioritários (National Programme for Mapping Priority Marine Habitats) – was submitted in October 2025 and is currently under assessment by the Government. MAPMAR proposes a ten-year programme (2026–2035), coordinated by CIMAR-LA, to map and assess the ecological condition of priority marine habitats under the EU Nature Restoration Regulation across Portuguese waters down to 1000 metres depth. If adopted, MAPMAR would represent the first systematic, nationwide effort to map marine habitats in Portugal, filling a critical knowledge gap that currently constrains the country’s ability to meet its EU restoration targets.

CIIMAR researchers have also been participating in meetings under the Blue Forest Programme, by invitation of the Office of the Secretary of State for the Environment. These meetings aim at setting up consortia for the preparation and submission of applications to the Environmental Fund, focused on the preservation of national seagrass habitats.

Within Mission Atlantic, an EU Horizon 2020 project, CIIMAR researchers contributed in 2025 to the development of Impact Narratives. Several narratives demonstrate concrete pathways to policy impact, including: deep-sea habitat maps informing the EU Biodiversity Strategy’s 30-by-30 objectives, with engagement through ICES advisory pipelines and presentation at the UN Ocean Conference (Nice, June 2025); input into the Norwegian Integrated Ocean Management Plan, linking project outputs to the Norwegian trans-ministerial assessment process; customisation of a risk assessment framework (ODEMM) for the Environmental Agency of Santa Catarina (Brazil), where the tool was formally transferred to the agency for regional marine management; the establishment of an EU–New Zealand Integrated Ecosystem Assessment (IEA) network in response to a governmental call for operational IEA implementation; delivery of fisheries assessment outputs to the EU Common Fisheries Policy in the context of Sustainable Fisheries Partnership Agreements with West Africa (Senegal); and the development of seabed habitat management options linked to tourism activities in South Africa.

EDUCATION AND TRAINING



BYT- BLUE YOUNG TALENT PROGRAMMES

The Blue Young Talent Programme (BYT) is CIIMAR's talent attraction programme in the field of marine and environmental sciences and biotechnology, developed in partnership with industry and SMEs. The programme has three branches: BYT, aimed at undergraduates, BYT+ for master's students, and BYT PhD for PhD candidates. As part of the programme, selected students carry out their work in a CIIMAR research team, with a research grant, and benefit from the training activities offered by the programme.

The 2024/25 academic year was the 12th edition of the BYT programme, the 7th edition of BYT+, and the final year of the 1st edition of BYT PhD, which began in 2020. Fourteen bachelor's and 53 master's degree proposals were submitted by CIIMAR researchers; of these, 6 BYT and 6 BYT+ internships were selected (with 6 scholarships in each programme).

In the 2024/2025 edition, students had the opportunity to take part in 5 training workshops, namely in Communication and Dissemination,

Working Status, Scientific Writing, Data Management and craft your pitch, and a science dissemination event at Mostra U.Porto. The academic year concluded with each student publicly presenting their research projects at the final BYT event that included representatives of the organisations that funded the grants, namely the Amadeu Dias Foundation and Soja Portugal as well as a representing of the University of Porto.

Since its first edition, the BYT programme hosted 98 students from 7 undergraduate degrees at the University of Porto, 59 students from 23 master's degrees at Portuguese universities, and 15 PhD students from 5 different PhD programmes.



ADVANCED TRAINING AND CAREER

As part of its mission to thrive excellence in science, CIIMAR provides high-quality advanced training in its laboratories and technological platforms.

The Centre is a host institution for Master's and PhD students interested in conducting research programmes in marine and environmental sciences, as well as undergraduate students undertaking Bachelor's thesis projects.

Since 2024, CIIMAR has an Advanced Training and Career Office which develops a training programme based on the identified needs of the community through a structured assessment. The programme is tailored to staff, researchers, PhD students and the general community. The Office's primary objective is to coordinate a diverse portfolio of training events designed to foster the development of both scientific and transversal skills across a broad range of areas. These include Artificial Intelligence, Scientific Illustration, Leadership and Team Management, Inclusive Science, the General Data Protection Regulation, and Scientific Writing, among others.

CIIMAR community is an important key in the Advanced Training programme, with several scientific and technical courses being co-organised and delivered by CIIMAR researchers and support offices. Examples are "Statistics with R for biological sciences", "Complex systems analysis for the sustainability of

marine ecosystems", "Geospatial information systems", "Cal-Aqua", "How to create a data management plan", among others.

In 2025, "Mind Tide", a monthly initiative, was launched to help foster mental health and well-being within the community.

Training activities are delivered in online, hybrid, and in-person formats to ensure broad accessibility and engagement.

To ensure the successful implementation of several initiatives, CIIMAR collaborates with strategic partners, including CCMAR, Turismo de Portugal, Associação Empresarial de Portugal, Universidade do Porto, E2S P.Porto.

NUMBER OF TRAINING EVENTS FOR:

Staff

18

Researchers

45*

PhD Students

4

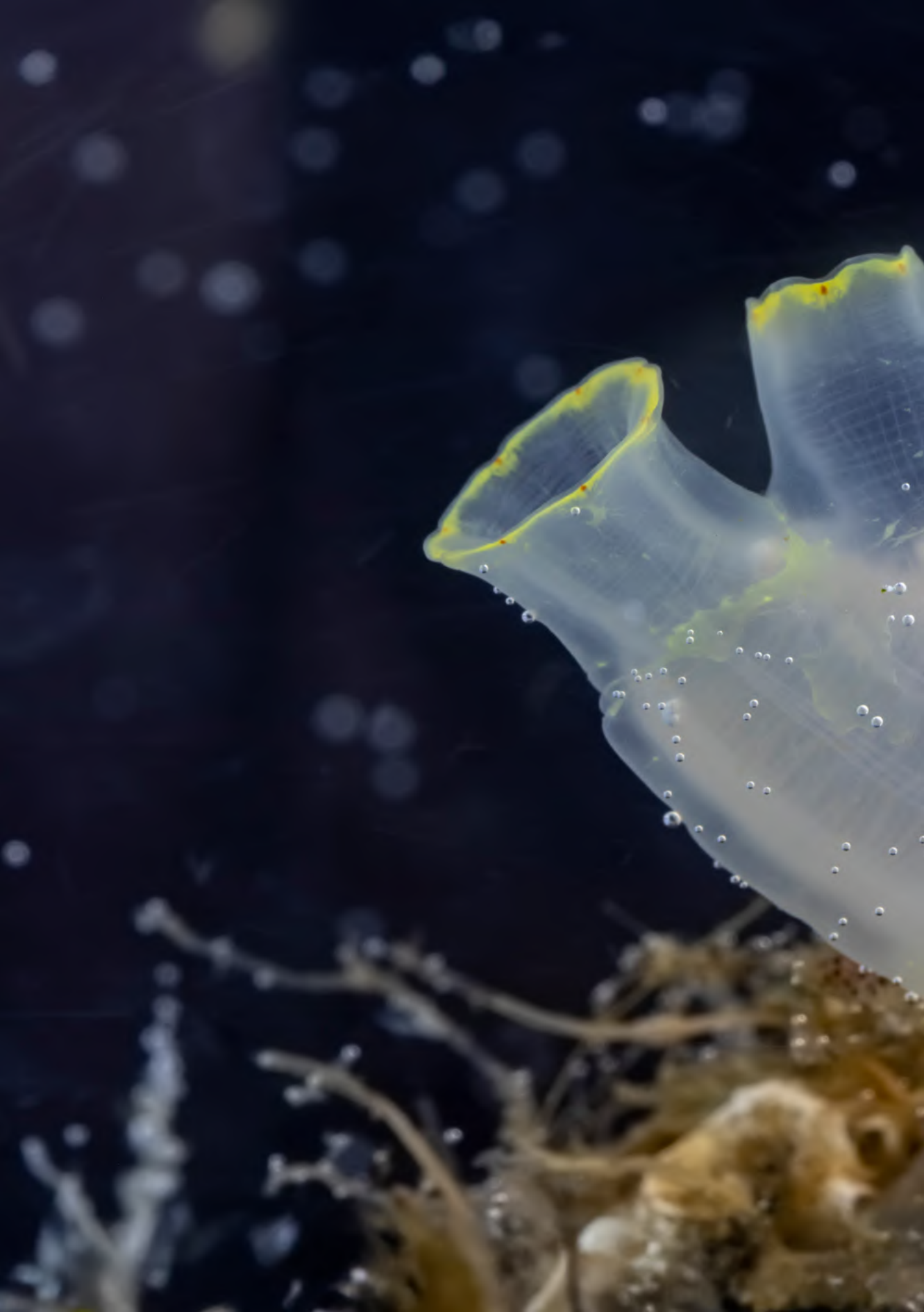
Community

9

*out of which 33 actions developed by Researchers

1926 PARTICIPANTS





SOCIETY



PUBLIC ENGAGEMENT IN SCIENCE

CIIMAR is dedicated to promote Ocean Literacy and public engagement in marine and environmental research-related topics. To achieve this, CIIMAR runs a public engagement programme targeting different audiences. This programme is led by CIIMAR's Image, Communication and Outreach Office, and benefits from a very active community of scientists, who also organise and participate in several science communication and education initiatives, within the scope of their research projects or as part of their mission to promote science in society. Moreover, CIIMAR coordinates two dynamic Environmental Monitoring and Interpretation Centres (CMIA, acronym in Portuguese) in Matosinhos and Vila do Conde, which run independent programmes that further promote science in society.

The Communication Office is responsible for all the institutional communication, including website, press, social media and content production. In 2025, the press office worked closely with the media, launching 19 press releases that resulted in more than 469 news clippings in national and international media. In addition, CIIMAR news were shared daily on our social media channels, which include Facebook, Instagram, LinkedIn, Twitter and Bluesky. New audiovisual content was produced, with emphasis on the "CIIMAR Odysseys", an Instagram series that showcases the work developed by young scientists during scientific expeditions, and "25 tons de azul", a video series created within the frame of CIIMAR 25th anniversary that unveils the history and main achievements of the centre since its foundation. Six episodes of this series were launched in 2025, which can be seen in CIIMAR YouTube channel.

The outreach programme implemented by the Communication Office included initiatives that targeted the educational community, vulnerable communities, sailors, and the general public.

CIIMAR educational programme ran activities for students from primary school to high-school,

which included hands-on experiments and field trips, visits to CIIMAR and scientists going to schools. About 4800 students engaged in CIIMAR educational programme during 2025. CIIMAR has established protocols with Matosinhos City Hall and different schools.

Several online and face-to-face initiatives were held with the general public, from science cafés to public talks and debates, and the organisation and participation in public events. In 2025, we continued our partnership with Serralves Foundation and Parque Biológico de Gaia, we ran another edition of the CIIMAR's Open Day, reaching out to 15 000 visitors, and participated in Mostra UP, Verde Perto Exhibition, held by the Matosinhos City Hall, and European Researchers Night. We initiated a partnership with The Ocean Race, organising the Sea and Science pavilion at The Ocean Race Europe 2025 – Fly-By Matosinhos.

A partnership with Porto Design Biennale created the opportunity to develop a co-creation project with vulnerable communities: female teenagers living in an institution and seniors from a nursing home. The project resulted in a manifest about our relationship with the ocean, from the perspective of the senior community.

Aiming at raising awareness of active citizenship and how marina users can contribute to monitoring and protecting the ocean, CIIMAR held a scientific tour on the World Ocean Day, that counted with the collaboration of 8 sailing boats from Freixo Marina.



CMIAS

CMIA MATOSINHOS

CMIA Matosinhos is a municipal facility coordinated scientifically by CIIMAR, promoting ocean literacy, environmental education, and science outreach. Through exhibitions, workshops, environmental monitoring, and field trips, it connects science, nature, and community under the motto “Know to Protect.”

Scientific Coordinator:

Sandra Ramos (until October)

Vânia Freitas (since October)

	Number of activities	Number of participants
Educational Activities	202	5289
Field Trips	40	789
Environmental monitoring	13	287
Outreach events	13	2312
Exhibitions	121	4444



	Number of activities	Number of participants
Educational Activities	226	8927
Field Trips	18	532
Environmental monitoring	20	45
Outreach events	6	2779
Exhibitions	129	35646
Online Talks	14	1734
Courses and Workshops	4	71

CMIA VILA DO CONDE

The CMIA of Vila do Conde is a municipal facility, with scientific and technical coordination by CIIMAR, dedicated to promoting environmental knowledge and awareness. It operates in the areas of Environmental Education, Environmental Monitoring, Communication and Scientific Dissemination, and the Blue Center.

Scientific Coordinator:

Cristina Calheiros (until October)

Elsa Froufe (since October)

SOCIAL AND ENVIRONMENTAL RESPONSIBILITY

Sustainability is a core pillar of CIIMAR culture, embedded in our research, mission, and actions aligned with multiple UN Sustainable Development Goals. This commitment is formalised through the annual Social & Environmental Sustainability Plan, coordinated by the Social & Environmental Sustainability Office with the support of several CIIMAR offices and informal groups. Sustainability activities are structured around two main dimensions: the social dimension, focused on the wellbeing of the CIIMAR community and its social impact, and the environmental dimension, which promotes sustainable practices at CIIMAR headquarters and through the implementation of biodiversity conservation and outreach programmes with society.

In 2025, several initiatives were implemented to support community wellbeing, including the “Menstrual Care Box” and multiple “Sports Partnerships” and sporting events. The Sustainability Week was also organised in collaboration with CIIMAR Green Lab, bringing together sustainability-focused events that fostered connections with environmentally conscious research centres and encouraged

sustainable habits in both research and daily life. Additionally, annual initiatives such as the “Circular Markets”, “Book Sharing”, “Tea Corner”, “Eco Dishwashing Station” and “World Bicycle Day” promoted circularity and sustainable behaviours.

CIIMAR sustainability efforts further extend to internal campaigns to promote sustainable resource management, education activities with schools and society and through programmes focused on wetlands regenerative practices. The activities developed under the “Charcos com Vida” project reached over 1400 people through nearly 100 activities and led to the creation of two new waterbodies and more than 80 interventions of management or restoration. The Sustainability Office also organised the “Wiki Loves Earth”, “Mar de Plástico” and “Monstros marinhos” exhibitions, raising awareness for the importance of biodiversity conservation and waste reduction.

All sustainability activities are reported annually in CIIMAR Social & Environmental Sustainability Report, available at www.ciimar.up.pt/reports-plans.



HIGHLIGHTS

89 interventions for waterbodies management, restoration and creation

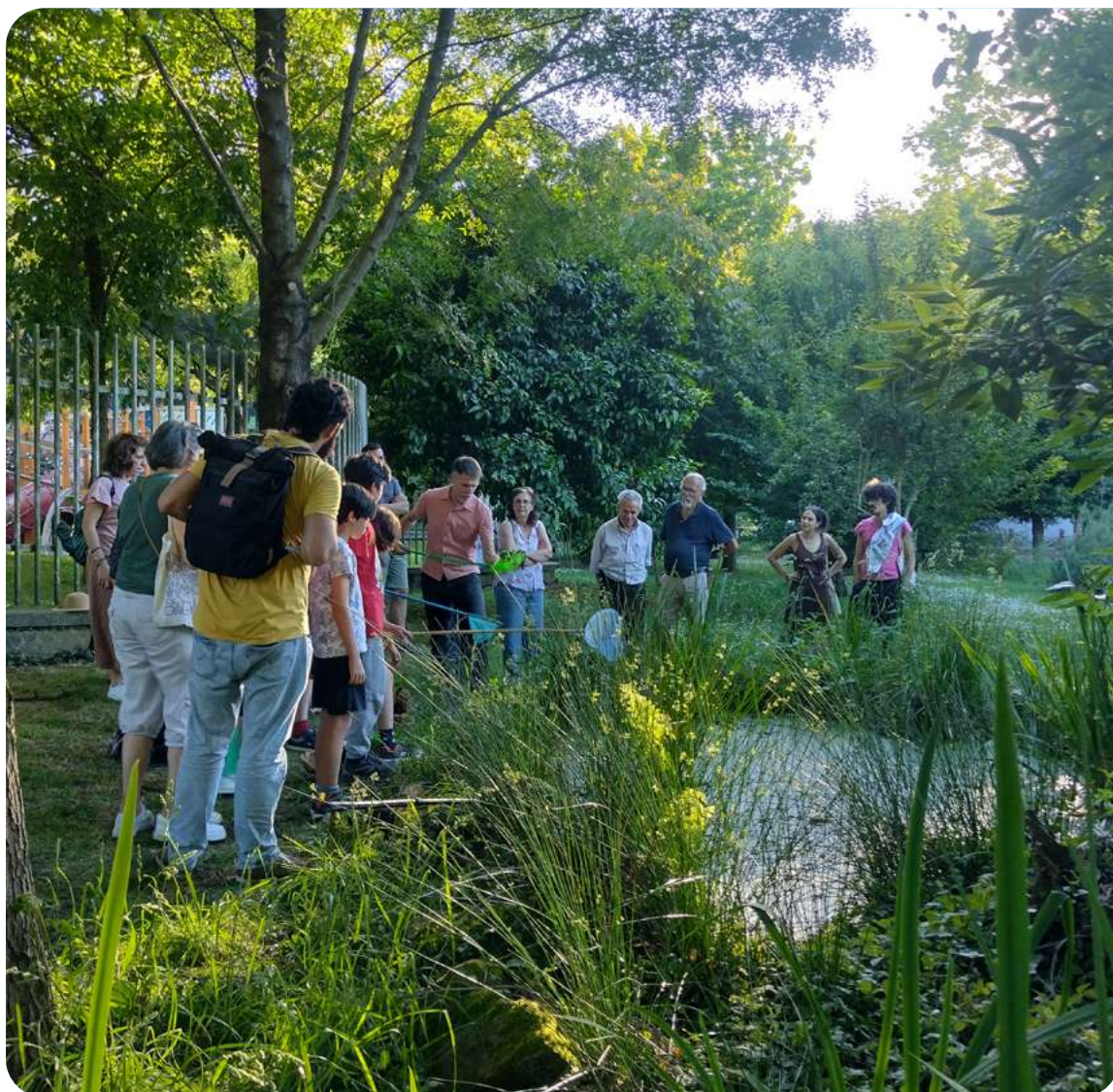
+100kg of pipette tip boxes plastic recycled

450€ donated to two social-support institutions

93 second-hand items circulated within the community

681 items of clothes and essential goods donated to local charities in the “Circular markets”

+130 sports events for the community



ACKNOWLEDGEMENTS

We are grateful to everyone at CIIMAR – researchers, students and staff – who supplied information, text and images used in this report.

COORDINATOR

Ana Mena

EDITORS

Image, Communication and Outreach Office

PROOFREADING

Agnès Marhadour

Ana Mena

Ana Carolina Sousa

Eunice Sousa

Fábio Faria

Marta Correia

Sara Santos

LAYOUT AND DESIGN

Pé de Cabra Agency

PHOTOGRAPHY

Images used in the report's cover and tabs are from the 2024 CIIMAR Scientific Photography Contest:

Cover – “Spicy food” by Harold Casalís

Caption: When collecting algae samples, incidental catches like this *Flabelina nudibranch* often hitch a ride. Despite its delicate appearance, it's well-armed with stolen urticating cells from anemones and hydrozoans, fending off predators or careless herbivores.

Research tab – “Dark Microworld” by Fábio Faria

Caption: Macro photograph of a Petri dish containing a culture of a strain of the bacterium *Micromonospora peuceetia*, belonging to the CM2C collection at CIIMAR. This strain, when grown in this culture medium (GYM medium), initially displays an orange color. Over time, the bacterium sporulates, forming a black mucous mass, creating a strong contrast between its color and that of the culture medium.

Innovation tab – “Pinkish shades of cyanobacteria” by Fábio Faria

Caption: Macro photograph of the inner wall of a collection vial containing the cyanobacterium *Spirulina sp.* LEGE 11439. Strain belonging to the LEGE-CC collection at CIIMAR.

Network and Public Policies tab - “Euplectella” by Daniel Despujols

Caption: A macro shot of the skeleton of the Venus' flower basket (*Euplectella aspergillum*).

Education and Training tab – “Pose-tacular Octopus” by Manuel Nande

Caption: The octopus, part of Rui Rosa's research at Lab da Guia, showcases the remarkable adaptability of these marine creatures. As the photo was taken, the octopus changed its shape, seemingly posing for the camera. CIIMAR-AGE Group studies the genetics and evolution of marine species like octopuses. Cell4Food collaborates with this group to advance marine science and protect ocean ecosystems through innovative approaches, including the development of cell-based octopus products

Society tab - “Out of place” by Harold Casalís

Caption: Biofouling occurs when a community of organisms grows on submerged artificial surfaces such as ship hulls. To prevent it, antifouling paints are applied to these surfaces and tested in real conditions. This Invasive ascidian (*Ciona intesinalis*) grew in one of these tests, inside the Port of Leixões.

Images used in other pages of the report are from the Image, Communication and Outreach Office, and from members of the research groups or of the illustrated research projects.

More information about CIIMAR's activities in:

www.ciimar.up.pt

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