ACTIVITY REPORT

CIIMAR 2023

ciimar

Fundação para a Ciência e a Tecnologia

REPÚBLICA PORTUGUESA

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ACTIVITY REPORT

CIIMAR 2023

ciimar

CIIMAR

WORKING AT THE FRONTIER OF OCEAN KNOWLEDGE AND INNOVATION

INDEX

MESSAGE FROM THE BOARD

THE PRESIDENT OF THE BOARD OF DIRECTORS OF CIIMAR:
VÍTOR VASCONCELOS

The year of 2023 was the year of return to the new normality after the end of the covid19 pandemic, with home working increasingly becoming an option, both for researchers and administrative staff, allowing work to be better compatible with family life. In 2023, we gained the equal pay seal from the commission for labor and employment equality, maintained ISO9001 certification and continued to implement the gender equality plan and the social and environmental responsibility plan. With the application of Decree-Law No. 120 of 2020, we promoted 6 assistant researchers to principal researchers, after an evaluation process.

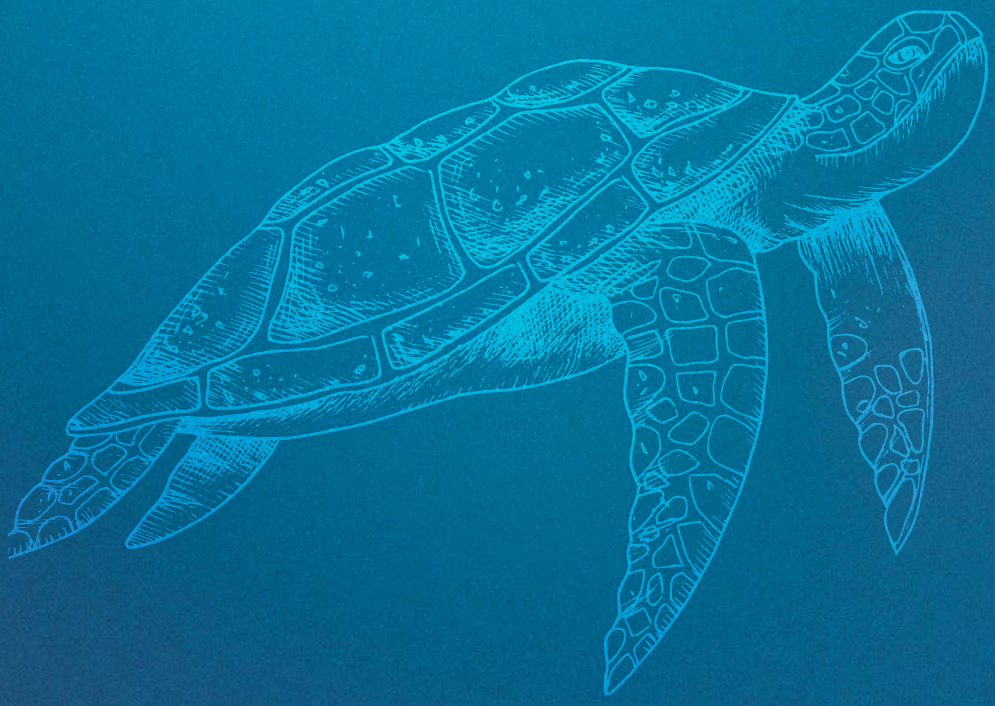
In 2023, we recorded the implementation of 52 international projects, 22 of which were funded by the Horizon 2020 and Horizon Europe programs, 1 by the Life program, 10 by EEA Grants, 3 by Interreg Atlantic Area and POCTEP, among others. We also recorded the implementation of 3 projects funded by the PRR, totaling 107 projects and 28.2 M EUR. CIIMAR coordinates, in the Blue Bioeconomy Pact, funded by the PRR, the creation of the Portuguese Blue Biobank, a national network of marine biobanks, including in this network CIIMAR's Biobanco Azul, constituted to date by three collections, LEGE_CC, CM2C and DeepBiobank, which will have new facilities in 2024/25 in the basement of the Cruise Terminal building, funded by HUB AZUL. We continued to increase the organization of advanced courses such as CalAqua, R courses, ecological modeling, proteomics among others. CIIMAR members were present in a significant number of organizing and scientific committees of national and international conferences, with a special reference to the 4th edition of the Blue Think Conference organized by the PhD students of CIIMAR and of the International Conference of Marine Biotechnology organized in the framework of the ERA Chair BlueBio4Future.

CIIMAR members published 565 papers in internationally peer-reviewed journals and successfully contributed to the graduation of 22 PhD and 105 MSc students. In 2023, 6 provisional patents were submitted, of a total of 25 active patents submitted by CIIMAR members, reflecting 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 505 news (online, TV, radio, press), 292 visits to CIIMAR and CMIAS Matosinhos/Vila do Conde and the Open day in September, with an overall impact on more than 120.000 people during 2023.

CIIMAR in 2024 will strengthen the relationship with the University of Porto and the Polytechnic of Porto as well as with other public and private stakeholders to establish a legal status that will allow an even better cooperation among all institutions taken into account all the challenges that are expected in the near future. CIIMAR is working together with the Municipality of Matosinhos and the University of Porto to create the opportunity to establish a new headquarters building that will hold the current and growing CIIMAR community and the upcoming spinoffs. We hope that the results of the coming evaluation process will boost CIIMAR to continue its path toward excellence.

ABOUT CIIMAR

CIIMAR ACTIVITY
REPORT 2023



ABOUT CIIMAR

WORKING AT THE FRONTIER OF OCEAN KNOWLEDGE AND INNOVATION

CIIMAR - Interdisciplinary Centre of Marine and Environmental Research - is a leading research and advanced training institution of the University of Porto, working at the frontier of Ocean Knowledge and Innovation.

CIIMAR fosters an integrated approach to Ocean and coastal areas promoting the understanding and knowledge on physical, chemical and biological dynamics of these environments and the impact of natural and human disturbances, aiming to unravel links between these processes, grasp Ocean and ecosystems functioning and responses to global changes.

CIIMAR uses this knowledge-base to promote the natural capital and the sustained management of marine resources through monitoring of ecosystems health, optimization of aquaculture, and biotechnological exploitation of the resources for environmental and human health applications.

CIIMAR provides innovative solutions and products responding to actual economic and societal challenges. Among them are the demand for high-quality seafood, new drugs and marine products for industrial and medicinal needs, water quality, sustainable fisheries, preparedness for and mitigation of oil and HNS spills, environmental monitoring & risk assessment, preservation of ecosystems services, ocean & coastal management and Ocean Literacy.

HEADQUARTERS

CIIMAR's state-of-the-art facilities for research, training and services are located at the heart of the maritime industry and services in the Northern region of Portugal (Leixões harbour). The Centre features well-equipped laboratories for marine and maritime research, technological core platforms, large scale micro and macroalgae cultivation and animal experimental facilities for freshwater and marine organisms approved by the Portuguese Veterinary Authority.

Besides its headquarters, CIIMAR comprises other partner facilities at five Units from U. Porto - ICBAS and Faculties of Sciences, Engineering, Pharmacy and Law – and at Polytechnic of Porto, Regional Secretariat for Agriculture and Fisheries (RG Madeira) and Portuguese Institute of Sea and Atmosphere (IPMA).

Together with the Algarve Centre of Marine Sciences (CCMAR-Algarve), CIIMAR constitutes the Associated Laboratory CIMAR.

OUR MISSION

Promotion of 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. Create innovative ideas for the sustainability of the Ocean, finding solutions for the future needs of our society.

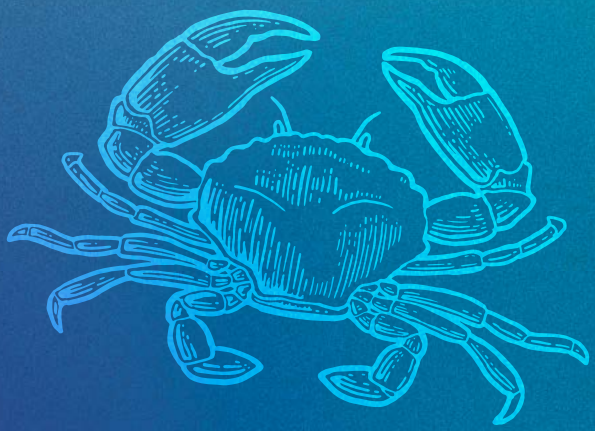
OUR VISION

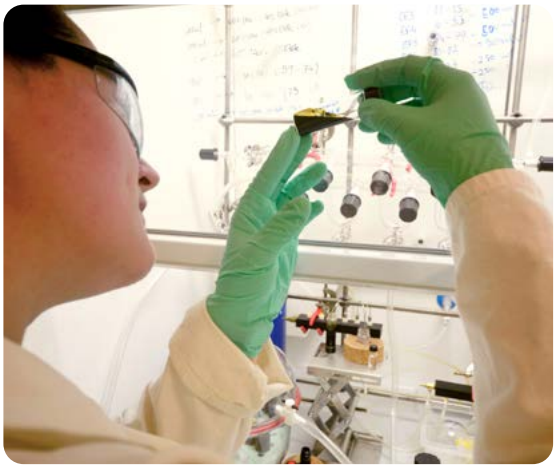
CIIMAR aims to be an international reference centre for knowledge and sustainability of the Ocean and the environment on a regional, national and international scale, in close connection with higher education institutions, research centres, industry, foundations, research networks, public and private institutions.

OUR VALUES

- **EXCELLENCE**
- **INNOVATION**
- **PARTNERSHIPS AND INTERNATIONALIZATION**
- **PUBLIC PARTICIPATION**
- **SUSTAINABILITY**
- **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.





INNOVATION AND TECHNOLOGY TRANSFER

CIIMAR supports the development of a sustainable blue economy, while tackling important societal challenges. The Centre follows an innovation-based strategy to foster the development and transfer of technologies, promoting market-oriented research, industry liaison, unravelling opportunities for new products and services with a strong technology and innovation component.

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

CIIMAR participates in National and European Knowledge and Innovation Networks – e.g. EuroMarine, European Marine Board, Fórum Oceano, BLUEBIO ALLIANCE, and B2E CoLAB – Collaborative Laboratory for Blue Economy.

CIIMAR Technology Platforms are integrated in relevant National and European research infrastructures, such as European Marine Biological Resource Centre (EMBRC-ERIC), European Multidisciplinary Sea Floor and Water Column Observatory (EMSO-ERIC), MIRRI-ERIC, ELIXIR and EU-OPENSCREEN, as part of the technology transfer strategy of the Centre fostering collaborations with the industry.

SCIENCE AND SOCIETY

CIIMAR is dedicated to enhancing science communication, reaching over 123679 individuals in 2023, including students, educators, and diverse audiences. We focus on engaging schools through tailored activities and collaborations with “Clubes Ciência Viva”. Media engagement, including press and social media, amplifies awareness of CIIMAR’s research.

CIIMAR hosts weekly seminars, public lectures, and debates, often in partnership with organizations like Serralves Foundation and Parque Biológico de Gaia to further disseminate scientific knowledge. CIIMAR participates in public events like Mostra UP, facilitating direct contact with various sectors of society. In 2023, CIIMAR hosted the TREC expedition in Porto, fostering collaboration and organizing public activities such as school events and a “TREC in the City” exhibition.

Additionally, CIIMAR manages two Centres for Monitoring and Environmental Interpretation through cooperative agreements with Vila do Conde and Matosinhos City Councils, promoting environmental stewardship and understanding of marine ecosystems, thereby bridging the gap between research and society.

SOCIAL ORGANS

THE CURRENT SOCIAL ORGANS:

GENERAL ASSEMBLY

PRESIDENT

Eduardo Rocha

CHAIRS

Aires Oliva Teles
Carlos Vale
Francisco Taveira Pinto
Susana Moreira

BOARD

PRESIDENT

Vítor Vasconcelos

BOARD MEMBERS

Ana Paula Mucha
Isabel Sousa Pinto
Luísa Valente
Rodrigo Ozorio

FISCAL COUNCIL

PRESIDENT

Luísa Bastos

MEMBERS

Helena Peres
Paulo Rosa Santos

CORPORATE MEMBERS

ADMINISTRAÇÃO DOS PORTOS DO DOURO, LEIXÕES E VIANA DO CASTELO (APDL)

ALGAPLUS | ALLMICROALGAE - NATURAL PRODUCTS, S.A.

ECOINSIDE | FLATANTIC - ATIVIDADES PISCÍCOLAS, S.A. | HYDROMOD

INSTITUTO POLITÉCNICO DO PORTO (IPP) - ESCOLA SUPERIOR DE SAÚDE

OCEANO FRESCO, S.A. | MCRETAIL, SGPS, S.A.

NGC | RIASEARCH, LDA. | TINTEX | SONAE MC

SOJA DE PORTUGAL, S.A. | UNIVERSIDADE DO PORTO (UPORTO)

RESEARCH

THE CENTRE IS SCIENTIFICALLY ORGANIZED IN THREE MAIN RESEARCH LINES

MARINE BIOTECHNOLOGY

CIIMAR research topics include the investigation of the richness of Ocean resources for the discovery and characterization of 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 ECOSYSTEMS 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. Lúcia Guilhermino

BIOLOGY, AQUACULTURE AND SEAFOOD QUALITY

CIIMAR promotes sustainable aquaculture and innovating sea food extraction 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, benefiting industries and consumers alike.

P.I. Luísa Valente

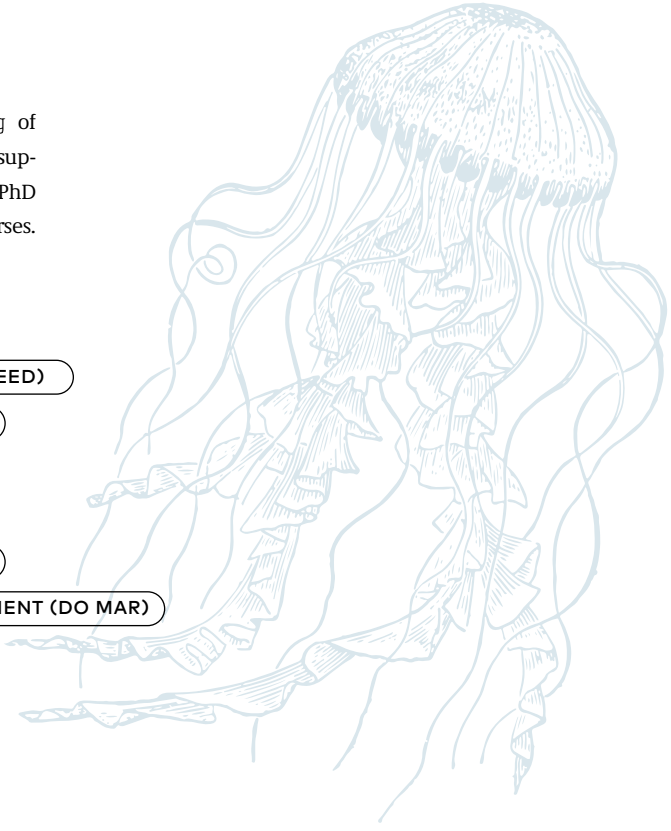
RESEARCH LINE	RESEARCH TEAMS
MARINE BIOTECHNOLOGY	BIODISCOVERY FOR HEALTH
	BIOREMEDIATION AND MICROBES FOR SUSTAINABILITY
	BLUE BIOTECHNOLOGY, ENVIRONMENT AND HEALTH
	CYANOBACTERIAL NATURAL PRODUCTS
	EMERGING BIOTECHNOLOGY AND SEAFOOD PROCESSING
	ENVIRONMENTAL CHEMISTRY AND RECOVERY
	EVOLUTIONARY GENOMICS AND BIOINFORMATICS
	MARINE NATURAL PRODUCTS AND MEDICINAL CHEMISTRY
	MICROBIAL BIODEGRADATION AND BIOPROSPECTING
GLOBAL CHANGES AND ECOSYSTEMS SERVICES	AQUATIC ECOLOGY AND EVOLUTION
	AQUATIC ECOTOXICOLOGY AND ONE HEALTH
	BENTHIC ECOLOGY AND ENVIRONMENTAL SOLUTIONS
	COASTAL BIODIVERSITY
	CONTAMINANT PATHWAYS IN MARINE ENVIRONMENT
	DEEP-SEA BIODIVERSITY AND CONSERVATION
	ECOSYSTEM MONITORING AND SUSTAINABILITY
	ENDOCRINE DISRUPTORS AND EMERGING CONTAMINANTS
	FISH ECOLOGY AND SUSTAINABILITY
	HYDROBIOLOGY
	LAND-OCEAN-ATMOSPHERE INTERACTIONS
	MARINE ECOSYSTEM MODELLING
	MARINE ENERGY AND HYDRAULIC STRUCTURES
	MICROBIOME ECOLOGY AND BIOGEOCHEMISTRY
	RIVERS AND COASTAL ECOLOGY
	SOCIAL AND EDUCATIONAL INNOVATION
	SOIL/WATER CONTAMINATION AND INTERACTIONS
BIOLOGY, AQUACULTURE AND SEAFOOD QUALITY	ANIMAL GENETICS AND EVOLUTION
	ANIMAL MORPHOLOGY AND TOXICOLOGY
	ANIMAL PARASITOLOGY AND PATHOLOGY
	AQUATIC ANIMAL HEALTH
	FEED AND SEAFOOD QUALITY
	FISH BIOLOGY AND FISHERIES
	FISH NUTRITION AND WELFARE
	SEAFOOD SAFETY AND PROCESSING

TECHNOLOGY PLATFORMS

CIIMAR Platforms developed under various European Research Infrastructure Networks (e.g. EMBRC, EMSO, MIRRI, EU-OPENSREEN, ELIXIR) represent a new strategic axis of the Centre to grant access to other institutions in the European Research Area and companies. These Platforms provide access and offer support and expertise to wide range of experimental services and equipment.

ADVANCED TRAINING

CIIMAR is a renowned centre for advanced training of researchers in Marine and Environmental Sciences, supporting several national and European Master and PhD programmes, undergraduate studies and advanced courses.



PHD PROGRAMMES

- ANIMAL SCIENCE (INDUSTRIAL SETTING – SANFEED)
- AQUATIC SCIENCES – BIOLOGY AND ECOLOGY
- BIOLOGY
- ENVIRONMENTAL TOXICOLOGY AN ECOLOGY
- MARINE BIOTECHNOLOGY AND AQUACULTURE
- MARINE SCIENCE, TECHNOLOGY AND MANAGEMENT (DO MAR)

CAL-AQUA

LABORATORY ANIMAL SCIENCES COURSE – AQUATIC ORGANISMS

The CAL-AQUA course is aimed at teachers, researchers, students and technicians who need to acquire training in Science in Aquatic Laboratory Animals, with a particular focus on aquatic vertebrates. The course is in accordance with the criteria established by the General Directorate of Food and Veterinary and FELASA (6 ECTS; Category B, functions (a), (c) and (d) defined by Directive 2010/63/EU).

BYT

BLUE YOUNG TALENT

A pre (BYT) and two post-graduate (BYTplus, BYTPhD) programs aim to attract talents to research areas such as marine biotechnologies, global changes, ecosystem services, conservation, aquaculture and nutrition, providing to the best students of the first, second and third cycles a stimulating and excellent scientific environment training, in partnership with industry and SMEs.

CIIMAR SOCIAL AND ENVIRONMENTAL RESPONSIBILITY

Sustainability is a central value of the organizational culture of CIIMAR, which is a reference centre for the acquisition and dissemination of scientific knowledge and in the training of future generations of researchers and society as a whole. CIIMAR research, mission and scope of action contribute actively to the implementation of the values associated with numerous UN Sustainable Development Goals. CIIMAR's strong commitment to Social and Environmental responsibility lead to important advances in this area during 2023, including:

- The production of the first Social and Environmental Responsibility Plan (2023), and the first Annual Social and Environmental Responsibility Report. In this way, CIIMAR will, on an annual basis, define, implement, monitor and report all actions and perform indicators related with this topic.
- The creation of two new offices related with this area: the Environmental and Social Sustainability Office, which is responsible for the coordination and development of the Environmental and Social responsibility general strategy, Annual Plans and Reports; and the Health and Safety Office, responsible for the coordination of all health and safety actions, including e.g. for the production of CIIMAR's Emergency Plan.

During 2023, CIIMAR GreenLab continued its action to reduce CIIMAR's laboratory ecological footprint, namely focusing on reducing energy and water consumption and recycling urban waste. Under the motto "Sustainability Starts in Our Labs", several campaigns were launched or continued, including the "Precious Racks", where around

10kg/month of unrecyclable micropipette tip plastic racks were collected and transformed into various utility objects for long term use, with the partnership of "Precious Plastic Portugal".

In order to understand CIIMAR community's mobility patterns, CIIMAR GreenLab performed an open mobility survey. The GreenLab also distributed ca. 30 containers in CIIMAR's offices and labs to promote the increase of separation and recycling of waste, and organised the first laboratory flea market and CIIMAR's "Circular Christmas Market" to promote circularity and sustainable consumption behaviours. The Christmas Market had 21 registrants and ca. 200 second hand items, raising a total of €408.5, which was donated to Associação Acreditar (https://acreditar.org.pt) that supports families dealing with childhood cancer.

CIIMAR's new website has now dedicated areas for the Social and Environmental Responsibility and CIIMAR GreenLab information. The campaign "Stop the Plastic Tide!" kept in progress to decrease the use of single-use plastics, namely in the coffee and vending machines. CIIMAR is firmly committed to the principles of research freedom, ethical conduct, recognition of the scientific careers, non-discrimination, gender equality, provision of optimal working conditions and training opportunities, as well as the protection of intellectual property rights. CIIMAR actively promotes a non-discrimination policy, following its "Code of Conduct, Prevention and Combating of Harassment at Work" and "Gender Equality Plan".

CIIMAR promoted several leisure, well-being and sport

activities, including weekly classes of yoga, football and padel groups. CIIMAR Sport organised the participation of CIIMAR teams in the Leixões Port Race, a football tournament and two trails. CIIMAR fosters the professional formation and personal appreciation of all its members, organising in 2023 64 professional formation courses (including lab and biosafety training), and 34 advanced courses. CIIMAR also participated regularly in social solidarity campaigns, e.g. collecting food and other goods for social solidarity institutions. Our Centre also has a strong social commitment to increase environmental literacy and education. CIIMAR promotes a broad educational programme and environmental literacy campaigns, such as the Ocean Action and Ponds with Life, with numerous activities, including lectures and practical activities with schools, beach cleanings, pond creation and exploration, field activities and travelling exhibitions, as well as dedicated seminars, social media campaigns and a strong relationship with the media press.

ABOUT CMIAS

CIIMAR coordinates two regional Centres for Monitoring and Environmental Interpretation (CMIA) in Matosinhos and Vila do Conde through a protocol with both City Councils. These partnerships aim to establish two local centers dedicated to scientific dissemination and environmental education with a focus on the ocean and the environment.

Operating with an integrated scientific approach, both CMIA emphasize the importance of understanding the ocean and the environment for effective management and conservation and conveys a message of solidarity with future generations. Their recreational, educational, and dissemination activities underscore the crucial role ordinary citizens play in shaping the future of the sea and the environment. With their intersecting areas of activity, both CMIA also engage in water quality monitoring and research activities, such as studying intertidal fauna and flora. Additionally, they offer an extensive programme of pedagogical initiatives, including themed exhibitions, educational materials, lectures, workshops, field trips, and training activities in schools. Their multifaceted area of action fosters a collective responsibility and serves as a benchmark for excellence in environmental and Ocean literacy.

CMIA MATOSINHOS

LEAD BY THE CIIMAR RESEARCHER SANDRA RAMOS

CMIA Matosinhos is a center for scientific dissemination and environmental education in the area of the sea that focuses its activities on four complementary areas: environmental monitoring, promoting Ocean literacy, raising environmental awareness and disseminating science. In order to achieve its objectives, CMIA Matosinhos develops and promotes educational and recreational activities indoors and outdoors, scientific exhibitions, training sessions and lectures.

As Matosinhos is a coastal area and believing that it is through knowledge that behavior can be changed, the CMIA tries to show the municipality's citizens, and the school community in particular, adapted educational content so that they can better understand marine ecosystems and their biodiversity, alerting them to the environmental problems they face.

CMIA VILA DO CONDE

LEAD BY THE CIIMAR RESEARCHER CRISTINA CALHEIROS

CMIA Vila do Conde main objectives include monitoring environmental descriptors and consequently disseminating environmental values, resources and issues, contributing to the development of environmental awareness and education actions, promoting the improvement of environmental quality, particularly at regional level.

This CMIA focuses its activities on four complementary areas, such as scientific research, environmental monitoring, environmental education and scientific dissemination, contributing to a change in behavior by always promoting the most environmentally friendly options and environmentally sustainable attitudes.

Exhibition "Vamos perguntar à natureza?"
CMIA de Matosinhos

APR

Launch of "Erosão Costeira" exhibition
CMIA Vila do Conde

OCT

2023 AT A GLANCE

JAN

CIIMAR at Task Force Meeting of European Commission Atlantic Strategy

OceanCare and GreenNanoVax project teams receive support from BIP PROOF program

CIIMAR's Educational and Science Communication Program at the 1st International Conference on Ocean Education and Training 2023

Fykia Biotech signs Spinoff contract with CIIMAR

CIIMAR scientific photography competition opening

FEB

Mission in Antarctica by project APMAR2

Launch of "9 agendas mobilizadoras" at Serralves Foundation

EuroMarine Open Science Day

MAR

Last workshop of CetAMBICion project

1st Edition of the Blue Woman Talent Award

CMIA Vila do Conde 16th anniversary

CIIMAR 23rd anniversary celebration

APR

CIIMAR at Mostra UP 2023

Vitor Vasconcelos at FCT Scientific Council

Launch of "Vamos perguntar à natureza?" exhibition at CMIA de Matosinhos

CIIMAR enters Centro Regional Português de Formação da Ocean Teacher Global Academy OTGA/IOC/UNESCO/IODE

MAY

Guia Michelin visits CIIMAR

EMERTOX sampling mission in Cape Verde

CIIMAR signs protocol with Cell4Food

CIIMAR coordinates Biobanco Azul Português

14 CIIMAR researchers in the ranking Research.com

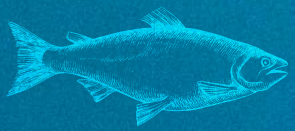
JUN

OCEAN3R final event

CIIMAR researcher Miguel Semedo at Octoodyssey expedition

2022 Activity Report Launch

Bycicle Day at CIIMAR



JUL

Closing session of the 9th edition of Blue Young Talent program

EMERTOX mission in Cape Verde

CIIMAR at FCT's Encontro Ciência 2023

Mission Arctic Ocean 2023

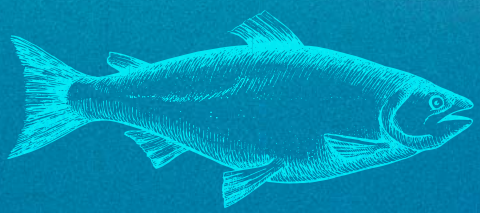
CIIMAR Family day

CIIMAR researcher Pedro Leão wins ERC consolidator Grant

AUG

ATLANTIDA project Campaign

"Monstros Marinhos" e "Mar de Plásticos" Exhibitions at Planetário do Porto



SEP

1st CIIMAR Social and Environmental Sustainability Report

CIIMAR Open Day 2023

CIIMAR researcher David Barros at PORCUPINE23 oceanographic expedition

International Conference of Marine Biotechnology

Blue Think Conference

CIIMAR Annual Meeting

CIIMAR researcher Miguel Santos awarded the "Planas Lecture" at the XIV Congress of the Iberian Association of Comparative Endocrinology (AIEC)

CIIMAR signs protocol with Direcção Regional do Mar

OCT

TREC expedition visits CIIMAR

Fykia Biotech wins 3rd place of the 929 Challenge

CIIMAR ate the Horizon Europe annual meeting

Maelstrom wins Atlantic Project Awards

CIIMAR wins Prémio Navegantes XXI at the Portugal Digital Summit

Launch of "Erosão Costeira" exhibition at CMIA Vila do Conde

CIIMAR researchers among the most cited in the world in 2022

NOV

MAELSTROM Blue Bubble Barrier launch at Rio Ave

CIIMAR at Expo One Health at ICBAS

CIIMAR researcher Leandro Pereira wins Google Cloud Platform Grant

CIIMAR researchers Verónica Nogueira and Rafaela Santos selected by the University of Porto's BIP Proof program

XI Iberian Symposium on the Minho River Basin

Wave energy converter by CIIMAR researcher Gianmaria Giannini wons BluAct 2023

CIIMAR researcher Lúcia Guilhermino recognized by Clarivate as one of the world's most influential scientists

CIIMAR distinguished by CITE

DEC

New CIIMAR website launch

CIIMAR at COP28

Aquaimprove 7th edition

Fishinsight projects wins 4th edition of Blue Bio Value

HIGHLIGHTS

FYKIA BIOTECH WINS 3RD PLACE OF THE 929 CHALLENGE

CIIMAR spin-off Fykia Biotech won the 3rd place in the Startups category of the 929 Challenge competition and received the “Best Connection with China and PSC” award.

CIIMAR COORDINATES BIOBANCO AZUL PORTUGUÊS

CIIMAR coordinates the new Portuguese Blue Biobank project. This project aims to make collections of marine resources available in open format for research and industry.

BIOBANCO AZUL
PORTUGUÊS

CIIMAR AT COP28

CIIMAR joined the United Nations Framework Convention on Climate Change as an observer at COP 28 in Dubai represented by the researcher Irina Gorodetskaya.

TREC EXPEDITION VISITS CIIMAR

CIIMAR hosted the Traversing European Coastlines (TREC) international expedition, from October 13 to November 10, 2023. TREC is an initiative of the European Molecular Biology Laboratory (EMBL) to explore European coastal ecosystems.

AWARDS

VITOR VASCONCELOS AT FCT SCIENTIFIC COUNCIL

Vítor Vasconcelos has been appointed by the President of the Foundation for Science and Technology as a member of the Scientific Council for Natural and Environmental Sciences since April 2023, having been a member of this FCT Scientific Council between 2013 and 2016.

MIGUEL SANTOS AWARDED THE "PLANAS LECTURE" AT THE XIV CONGRESS OF THE IBERIAN ASSOCIATION OF COMPARATIVE ENDOCRINOLOGY (AIEC)

The CIIMAR researcher Miguel Santos was awarded the "Planas Lecture" at the XIV Congress of the Iberian Association of Comparative Endocrinology (AIEC), held in Bilbao, Spain.

CIIMAR RESEARCHER PEDRO LEÃO WINS ERC CONSOLIDATOR GRANTS

Pedro Leão wins an ERC Consolidator Grants, worth 2 million euros. The grant awarded by the European Research Council (ERC) will be used by Pedro Leão to find biocatalysts with industrial potential from cyanobacteria.

MAELSTROM WINS ATLANTIC PROJECT AWARDS

MAELSTROM project has received the Atlantic Project Award in the category Healthy Oceans and Resilient Coasts. The Atlantic Project Awards feature outstanding initiatives, successful collaborations and achievements relevant to the implementation of the Atlantic Action Plan 2.0.

CIIMAR WINS PRÉMIO NAVEGANTES XXI AT THE PORTUGAL DIGITAL SUMMIT

CIIMAR was honored with the Navegantes XXI Award in the Blue Digital Economy category during the Portugal Digital Summit 2023.
The Navegantes XXI Awards, promoted by the Portuguese Digital Economy Association (ACEPI), acknowledges excellence in Portugal's digital economy and society across various domains.

CIIMAR RESEARCHER LÚCIA GUILHERMINO RECOGNIZED BY CLARIVATE AS ONE OF THE WORLD'S MOST INFLUENTIAL SCIENTISTS

CIIMAR researcher Lúcia Guilhermino not only made it to the "World´s Top 2% Scientist list", but also secured a spot on Clarivate's prestigious list of the most influential scientists globally.

14 CIIMAR RESEARCHERS IN THE RANKING RESEARCH.COM

The CIIMAR scientists honored by this ranking are spread across areas ranging from animal sciences to biology, including environmental sciences. The list of researchers includes Carlos Azevedo and Jorge Eiras in Veterinary and Animal Sciences; Lúcia Guilhermino, Vítor Vasconcelos, Aires Oliva-Teles, Maria Leonor Nunes, Agostinho Antunes and Luísa Valente in Biology and Biochemistry; Madalena Pinto in Chemistry; Adriano Bordalo in Earth Sciences; and Carlos Vale, Miguel Caetano, Sara Antunes, Marisa Almeida and again Lúcia Guilhermino in Environmental Sciences.

FACTS & FIGURES

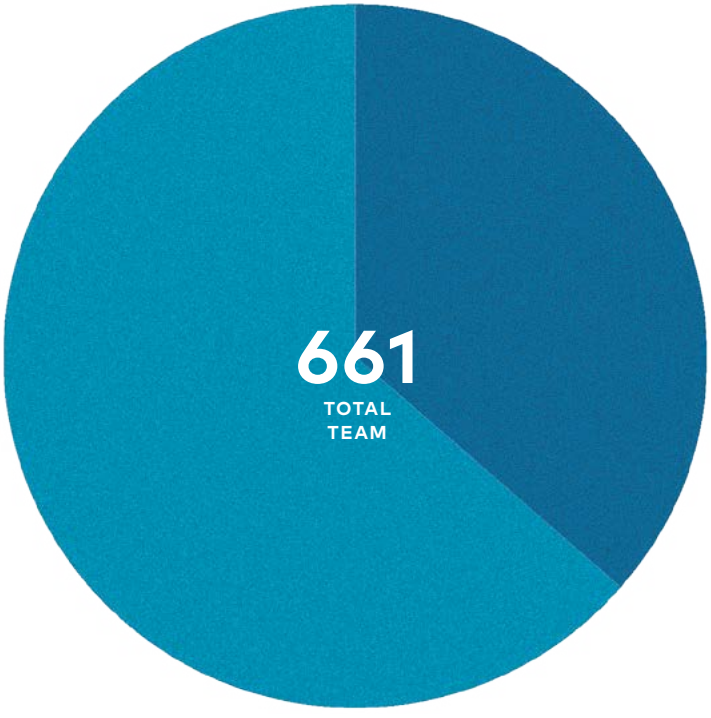
CIIMAR ACTIVITY
REPORT 2023

OUR TEAM

CIIMAR 2023

241 Integrated PhD holders

420 Non-PhD holders



Integrated PhD holders

Researchers
142

Professors
64

Post Doctoral Fellows
6

Supporting Offices and Services
6

Lab Technicians
14

Other Professional Situations
9

Non PhD holders

PhD Students
168

MSc Students
91

Research Fellows
36

Supporting Offices and Services
35

Lab Technicians
27

Other Professional Situations
63

268
Male

393
Female

32
Nationalities

35
Supporting offices and services

SCIENTIFIC PUBLICATIONS

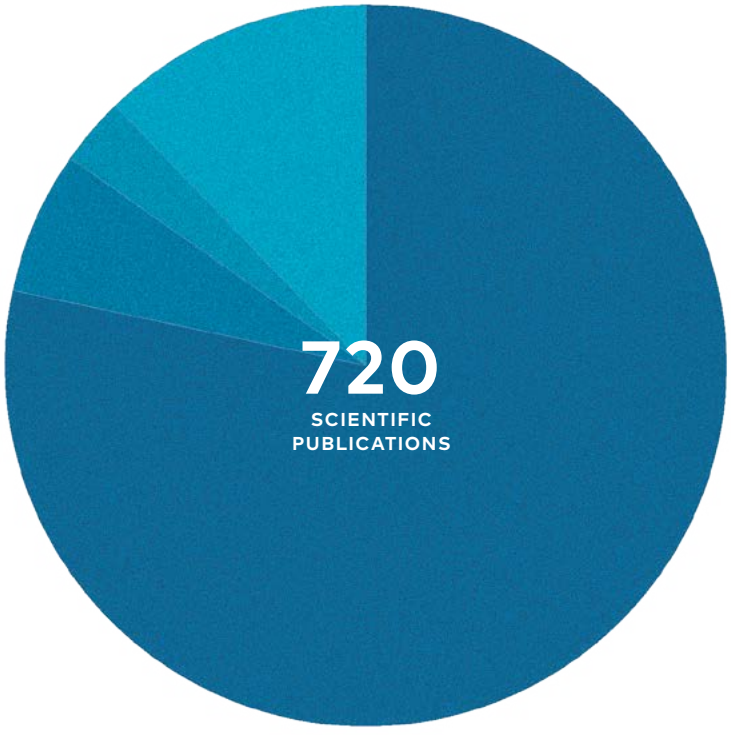
CIIMAR 2023

565 Publications in peer reviewed journals

46 Edited special issues of journals

22 Books and Book chapters

87 Other publications



22 Completed PhD theses

105 Completed MSc theses

61 Completed BSc theses

23 Universities

8 Nationalities

2023 Milestones

6 Provisional patent applications

2 European patent application

1 International patent applications

4 Granted patents applications

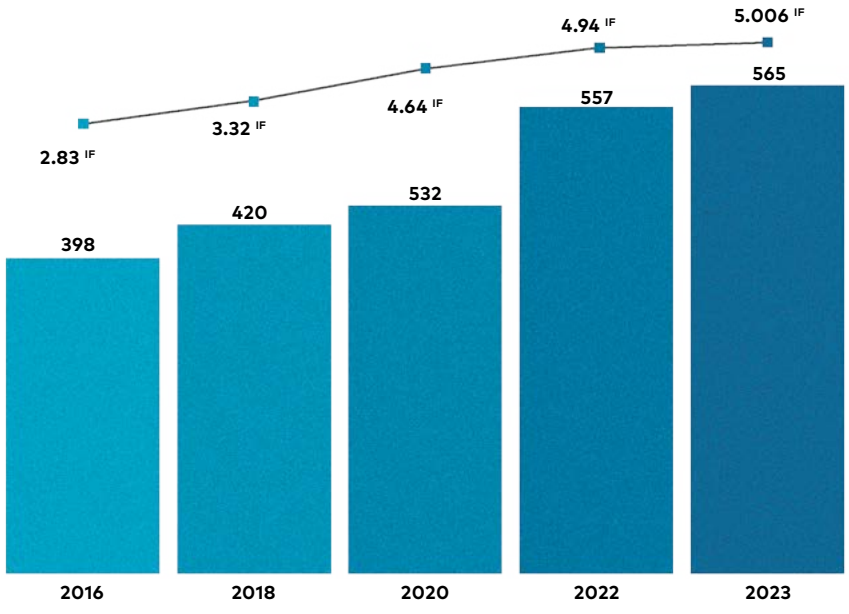
25 Active patents

PUBLICATIONS

CIIMAR 2023

Nr. of publications in peer reviewed journals

IF Average Impact Factor



R&D PROJECTS

CIIMAR 2023

23 10.69 M€ — **A** **European Funds** — Horizon 2020 / Horizon Europe

29 2.70 M€ — **B** **Other European Funds** — EEA GRANTS, INTERREG, La Caixa, Others

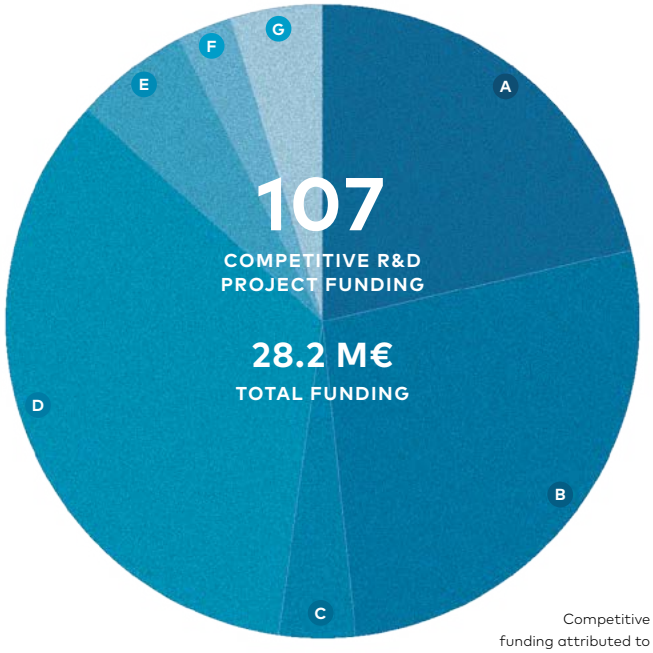
4 1.79 M€ — **C** **Regional Funds** — Norte2020

37 4.29 M€ — **D** **National Funds** — FCT

6 0,74 M€ — **E** **National Funds** — ANI

3 7.79 M€ — **F** **National Funds** — PRR

5 0.20 M€ — **G** **Other National Funds**



Competitive funding attributed to CIIMAR in R&D projects in execution during 2023

OUTREACH ACTIVITIES

412 A **Activities and lectures at schools**
10861 Participants

292 B **Visits and activities at CIIMAR**
6983 Participants

122 C **Outdoor activities**
3250 Participants

90 D **Public lectures**
9138 Participants

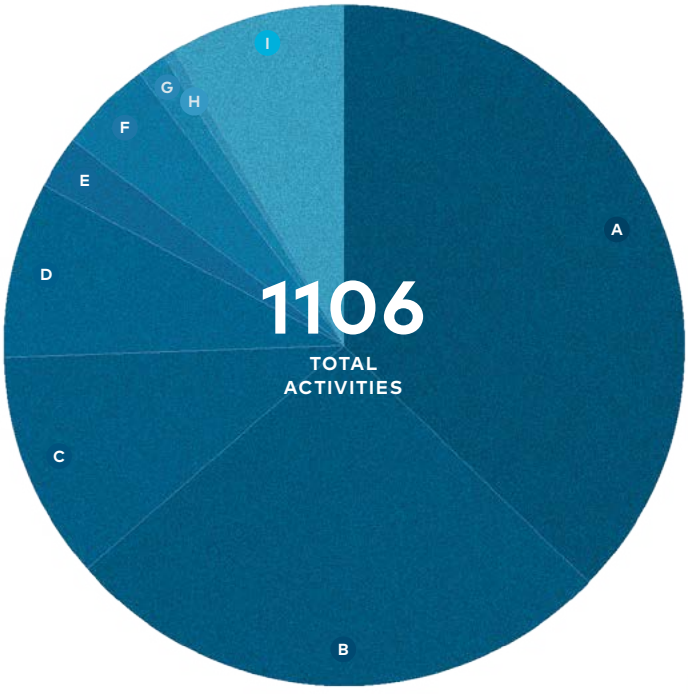
29 E **Exhibitions**
25921 Participants

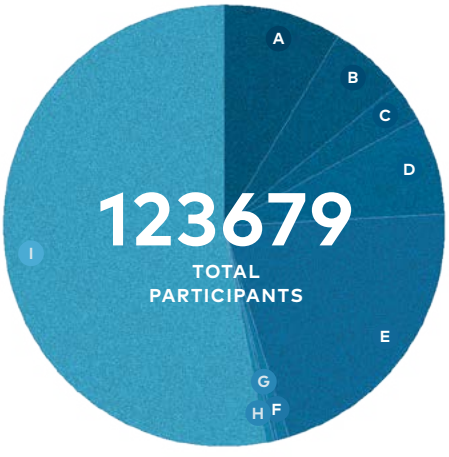
50 F **Scientific seminars**
1146 Participants

13 G **Workshops**
246 Participants

6 H **Teacher's training**
684 Participants

92 I **Public events**
65450 Participants





399 Online news
75 Press
10 Radio
21 TV

468 Twitter
591 Facebook
492 Linkedin
867 Instagram

745
Communications in international scientific meetings

514
Communications in national scientific meetings

34
Training courses

From 2023 on, all the numbers on outreach activities and corresponding participants also include the contribution of all the events from CMIAs from Vila do Conde and Matosinhos

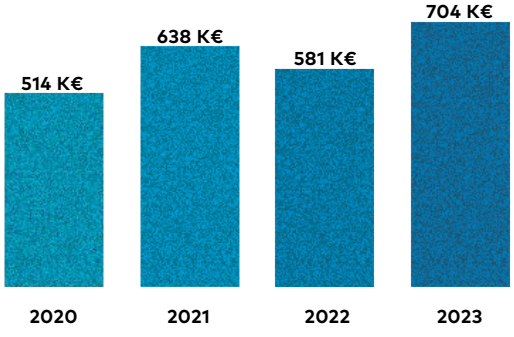
FINANCIAL KEY FIGURES

CIIMAR 2023

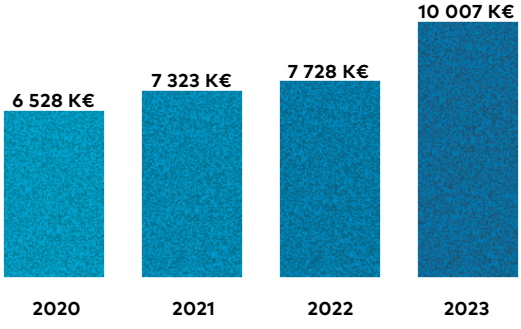
CIIMAR had a good financial performance in the year 2023. This good performance resulted in the recovery of the 2022 results, with positive results being achieved in 2023. Another positive aspect was the increase of about 29% in operating subsidies and 21% in the provision of services. CIIMAR continued to invest, as evidenced by the increase in CAPEX (Capital Expenditure) and the increase in personnel costs. EBITDA (operating profit) had an increase of around 21% and Cash Flow also increased around €870K.

	2022	2023
REVENUES FROM SALES AND RENDERING OF SERVICES	581 K€	704 K€
OPERATING SUBSIDIES	7 728 K€	10 007 K€
OTHER OPERATING INCOME	523 K€	542 K€
SUPPLIES AND SERVICES RENDERED	(2 934) K€	(3 027 266) K€
EMPLOYEE BENEFITS EXPENSES	(5 359) K€	(7 402) K€
OTHER OPERATING EXPENSES	(92) K€	(293) K€
DEPRECIATION AND AMORTIZATION	(457) K€	(495) K€
CASH FLOW	9 K€	869 K€
NET ASSETS	17 498 K€	28 588 K€
EQUITY	1 470 K€	1 511 K€
CAPEX	538 K€	569 K€
NET DEBT	(1 683) K€	(2 852) K€
EBITDA	451 K€	546 K€
PROFIT FOR THE YEAR	(61) K€	46 K€

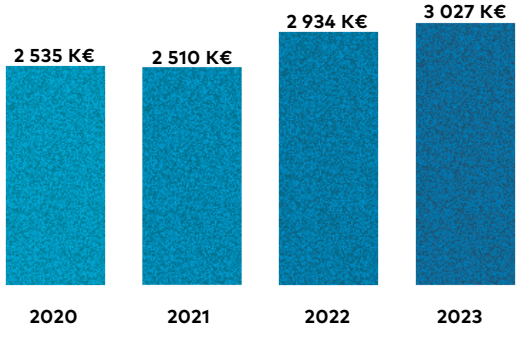
REVENUES FROM SALES AND RENDERING OF SERVICES



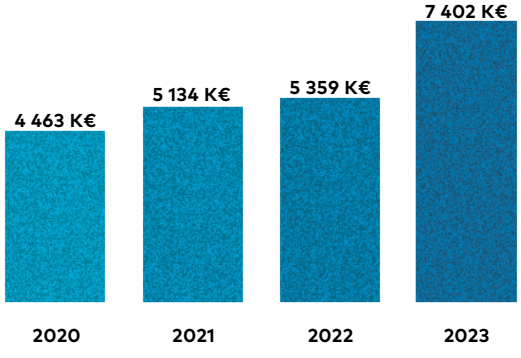
OPERATING SUBSIDIES



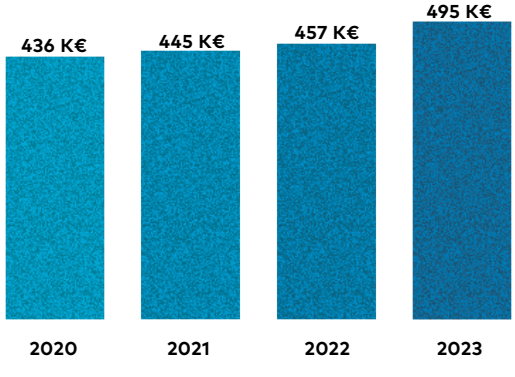
SUPPLIES AND SERVICES RENDERED



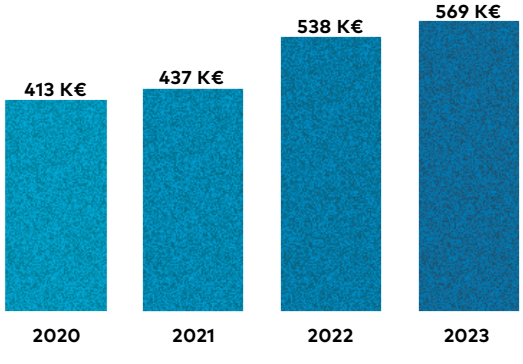
EMPLOYEE BENEFITS EXPENSES



DEPRECIATION AND AMORTIZATION



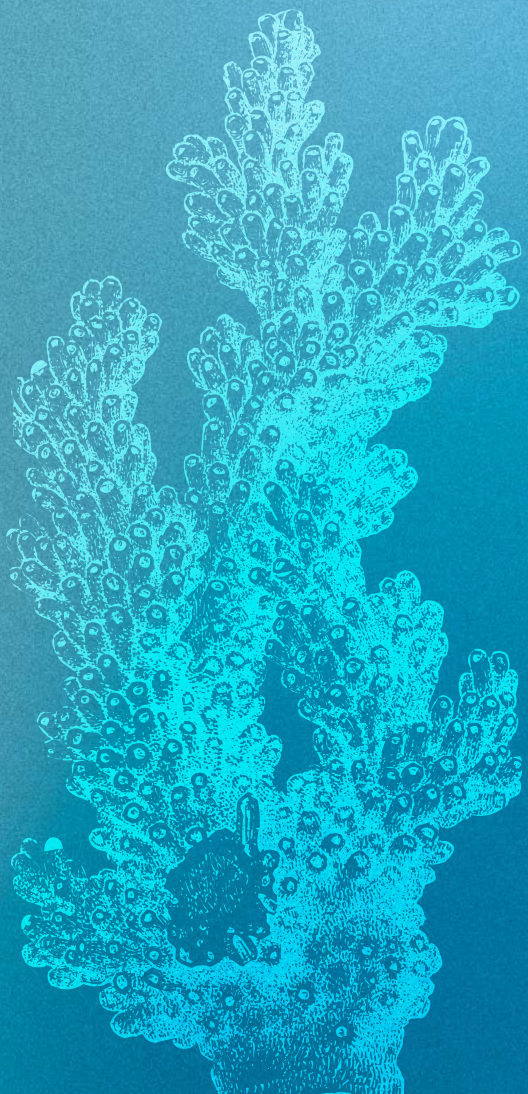
CAPEX




15 ANO

PROJECT HIGHLIGHTS

CIIMAR ACTIVITY
REPORT 2023



ACTNOW

HORIZON EUROPE

ADVANCING UNDERSTANDING OF CUMULATIVE IMPACTS ON EUROPEAN MARINE BIODIVERSITY, ECOSYSTEM FUNCTIONS AND SERVICES FOR HUMAN WELLBEING

Principal Investigator at CIIMAR: **Francisco Arenas**
Leader Institution: **NIOZ**
Website: **actnow-project.eu**

Funded by the European Union

ACTNOW advances the state-of-the-art in understanding and forecasting of the cumulative impacts of climate change and interacting drivers on marine systems. The program provides solutions options to halt the loss of biodiversity, to restore and protect habitats and ecosystem processes, and to safeguard the contributions of marine areas to human well-being.

ACTNOW is co-developed with EU policy stakeholders to deliver: 1) Mechanistic (cause-and-effect) understanding of the impacts of multiple interacting drivers on organisms, communities, habitats and ecosystems from individual-level performance to ecosystem-level stability, resistance, resilience and tipping-points; 2) Improved monitoring and new indicators of marine biodiversity based on state-of-the-art biologging technology, molecular methods and advanced numerical modeling; 3) Enhanced forecasts of European marine biodiversity, ecosystem functioning and services using scenarios (co-created and regionalized with practitioners) of multiple drivers and management settings, as well as integrated impact assessment methods; 4) Fit-for-purpose decision-support tools enabling regulators to deliver regionally-appropriate assessments and actions to restore and maintain Good Environmental Status; 5) Next-generation training for early-career scientists working on solutions to the dual crises of biodiversity loss and climate change and capacity building to enhance public literacy on the One Health concept.

ACTNOW builds predictive capacity of multiple driver effects and performs integrated indicators assessments of biodiversity across 20 Case Studies capturing all European climate zones and regional seas, including pan-European research on key groups in marine food webs.

BIOSYSMO

HORIZON EUROPE

BIOREMEDIATION SYSTEMS EXPLOITING SYNERGIES FOR IMPROVED REMOVAL OF MIXED POLLUTANTS

Principal Investigator at CIIMAR: **Ana Paula Mucha**
Leader Institution: **IDENER, Spain**
Website: **biosysmo.eu**

Funded by the European Union

BIOSYSMO is a 48-month action that will develop a computationally-assisted framework for designing and optimizing synergistic biosystems combining the required pathways and traits to achieve the most efficient degradation and sequestration of pollutant mixtures. These biosystems will comprise combinations of bacteria, fungi and plants containing the natural or engineered pathways required for pollutants degradation and identified based on a computationally-assisted analysis.

BIOSYSMO will take advantage of the high natural microbial diversity by screening samples from polluted sites and locations affected by diffuse pollution to identify natural microorganisms already present and able to metabolize the target pollutants.

The search will be expanded to microorganisms previously identified and characterized by applying data mining tools to genomic and metagenomic data available in public repositories. The construction and optimization of synergistic biosystems will combine approaches based on:

1. enhancing plant-microbe (bacteria, fungi) interactions to achieving combinations with improved pollutant uptake and/or degradation;
2. engineering bacteria, for improved degradation and bioaugmentation, and plants (poplar tree), for improved microbial colonization and pollutant uptake;
3. constructing artificial micro-structured consortia into aggregates and biofilms, containing all the required pathways for pollutant removal; and
4. applying bioelectrochemical systems (BES) as standalone or in hybrid systems.

The different key players will be identified and combined to formulate innovative biosystems with the assistance of genome-scale metabolic (GEM) models for elucidating and simulating the key metabolic pathways. The constructed biosystems will be applied in conventional (phytoremediation, biopile, bioaugmentation) and innovative (BES, hybrid BES-phytoremediation) bioremediation approaches optimized for the treatment of mixtures of pollutants in soil, sediments and water.

BIOTOXDOC

HORIZON EUROPE

SAFE FOOD IN A WORLD OF CHANGING CLIMATE: THE DOCTORAL TRAINING PROGRAMME TO DEVELOP NOVEL CONTROL, MITIGATION AND RISK ASSESSMENT METHODS FOR BIOTOXINS

Principal Investigator at CIIMAR: **Vitor Vasconcelos**
Leader Institution: **Universitaet Fuer Bodenkultur Wien, Austria**
Website: **biotoxdoc.eu**

Funded by the European Union

There is a massive and urgent need to ensure security and safety of the food supply of the growing world population. The ongoing war in Ukraine as well as the energy crisis emphasized this even further. However, agriculture and food industries continue to be vulnerable to problems of contamination with biotoxins produced by plants, algae and particularly by fungi.

Global warming and extreme weather events make the occurrence of these toxic metabolites even less predictable. Alarmingly, the EU currently faces a lack of food safety specialists, as recognised by the European Commission. These challenges lay the foundation for BIOTOXDoc – Safe food in a world of changing climate: The doctoral training programme to develop novel control, mitigation and risk assessment methods for biotoxins.

The objective of BIOTOXDoc is to train doctoral students (PhDs) in a broad range of skills and complementary competencies - necessary to innovate various scientific fields and approaches, so urgently needed to control and mitigate biotoxins - by taking advantage of a multidisciplinary, multi-sectoral team of world-class experts. The training and research will include development of early warning systems and on-site testing by portable mass spectrometry.

PhDs will develop novel detoxification strategies of biotoxins and will assess the combined toxicity of co-occurring biotoxins. Moreover, PhDs will develop much-needed rapid as well as confirmatory tests for biotoxins and aim to close major gaps in our current knowledge of biotoxins. The major common link between all PhDs, working on a wide range of biotoxins at different points along the food and feed chain, is the influence of climate change on biotoxin occurrence and the resulting demand of revised strategies to mitigate its impact on the European population.

BLUESHELLFISH

HORIZON EUROPE

SOLUTIONS TO PREVENT AND MITIGATE THE IMPACTS OF HABS IN AQUACULTURE AND FISHERIES, IN THE CONTEXT OF GLOBAL WARMING

Principal Investigator at CIIMAR: **Alexandre Campos**
Leader Institution: **CIIMAR, Portugal**

Funded by the European Union

Harmful algal blooms (HABs) are considered a threat to the environment and to human health. Major concerns are addressed to the increasing occurrence of these natural events in certain regions of the world, driven by global warming and anthropogenic pressure. Human illnesses related to the intake of contaminated seafood have been attributed to these events. Furthermore, HABs have a significant impact in economic activities such as aquaculture and fisheries.

The occurrence of HABs in natural areas utilized for aquaculture (or harvesting/fishing), can affect species growth and nutritional parameters, or even cause mass mortalities, causing huge losses in the industry. The regulation of toxin levels in seafood and other measures (e.g. forced closures to seafood harvest during the occurrence of HABs) have been contributing to protecting humans from serious intoxications. On the other hand, the impacts on the industry lack mitigation measures.

This project aims to contribute to the development of solutions for the aquaculture and fisheries sector, through the development of efficient methods for the detection of HABs (early warning), and the development of farming and depuration systems for shellfish to reduce the toxin load. The project also aims to advance in the understanding of regulated and emerging toxins (chemical and toxicological evaluation) and their global expansion, and toxin incidence and persistence in seafood (traditional and non-traditional vectors, species not yet investigated).

For the implementation of the project, an interdisciplinary consortium was built, which brings together specialists from different areas of knowledge and who will develop joint research and innovation activities which, collectively, will contribute to the technological innovation of the aquaculture and fisheries and sustainable growth of this sector and to environmental monitoring.

DTO-BIOFLOW

HORIZON EUROPE

INTEGRATION OF BIODIVERSITY MONITORING DATA INTO THE DIGITAL TWIN OCEAN

Principal Investigator at CIIMAR: **Isabel Sousa Pinto**
Leader Institution: **VLIZ - Vlaams Instituut Voor de Zee, Belgium**
Website: **dto-bioflow.eu**

Funded by the European Union

The ocean and its biodiversity are essential to life on this planet. Comprehensive data on biodiversity, and related human and environmental pressures are crucial to understand its current state and how this may change.

Protecting and restoring biodiversity is one of three objectives of the Horizon Europe Mission to restore our oceans and waters by 2030, enabling the EU to reach its Green Deal and Biodiversity 2030 targets. Identified as one of the Mission "enablers", the EU will build on "a digital knowledge system" to include a Digital Twin of the Ocean (DTO) allowing simulation of 'what if' scenarios, advancing ocean knowledge, informing evidence-based policy and offering a range of societal applications. To effectively replicate the ocean's ecology, the DTO requires sustained flows of data on biodiversity and associated pressures.

Despite myriad actors collecting biodiversity data, and the development of novel cost-effective monitoring technologies, much of these data are inaccessible or unusable for a variety of reasons, hampering the development of the DTO biological component and limiting its efficacy. DTO-BioFlow will activate access to ("sleeping") marine biodiversity data and enable the sustainable integration of existing and new Artificial Intelligence processed and automated data flows from various sources to EMODnet and into the EDITO infrastructure serving the EU DTO. Combining sustained data flows, models and new algorithms, DTO-BioFlow will develop and integrate the biological component of the DTO, including new digital tools and services.

Policy-relevant use cases, will demonstrate the benefit for marine ecosystems of continuous data streams flowing through EMODnet and usable by the EU DTO infrastructures and ultimate end-users. Mobilising the marine biodiversity community towards increasing the availability of biodiversity monitoring data into 2030, DTO-BioFlow and its outputs will support the Mission's actions to protect and restore biodiversity.

GRINNAQUA

HORIZON EUROPE

GREEN INNOVATION STRATEGIES FOR ANIMAL HEALTH MANAGEMENT: TOWARDS SUSTAINABLE AQUACULTURE

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

Funded by the European Union

GRINNAQUA is conceived in compliance with the Farm to Fork Strategy and is focused in capacitating CIIMAR to raise staff's research profile and increase its innovation capacity positioning the institution among the main actors in the area of aquaculture.

Recognized leaders in R&D within European aquaculture with a solid background in relevant areas partnered with CIIMAR. Their profiles make these the ideal partners to push CIIMAR towards scientific excellence and competitiveness. INIA-CSIC (Spain) has significant expertise on the study of fish acquired immune system and vaccination strategies; Roslin Institute - Univ. Edinburg (UEDIN, UK) team has essential know-how in genetics and animal breeding; and Univ. Bergen (Norway) is proficient in the area of animal health and prophylactic strategies.

Clear strategies are defined to raise staff´s research profile and excellence by implementing training workshops and Summer schools led by the partners. Several visits of CIIMAR's staff to partners facilities are planned, targeting senior research, technical and administrative training, allowing the exchange of knowledge and good practices.

The research project, integrating partners scientific and technical strengths, will in focus in the high economic impactful viral and parasitic outbreaks in aquaculture, studying the prophylactic effects of functional diets in rainbow trout against haemorrhagic septicaemia virus, and in Atlantic salmon infected sea lice parasite.

This proposal outlines strategies to increase stakeholder interaction and its mobilization towards scientific achievements, strengthening CIIMAR's market-driven research and innovation capacity to increase its competitivity at national and international levels.

GRINNAQUA will be instrumental to improve CIIMAR innovation capacity to become a leading institute for the blue revolution in aquaculture. A long-lasting collaboration is foreseen, contributing to strengthen a more sustainable aquaculture in Europe.

ICULTURE

HORIZON EUROPE

A DIGITAL BIO-PLATFORM AND CO-CULTURE BIOPROCESS TO PROSPECT AND UTILIZE MACROALGAE RESPONSIBLY AND SUSTAINABLY

Principal Investigator at CIIMAR: **Agostinho Antunes**
Leader Institution: **NTNU, Norway**
Website: **iculture-project.eu**

Funded by the European Union

Over 100 Megatons of seaweed constitute Europe's largest biomass, but less than 0.25% is utilized. Marine industry stakeholders are currently left with 50-70% of residual side-streams sold as low-cost fertilizers. Existing data on more than 10000 macroalgae species could help this industry to improve their processes but the data is too large and manual curation is not feasible. Despite the progression of artificial intelligence (A.I.) and digital instruments, these techniques have barely entered the biobased sector. iCulture is a cross-disciplinary consortium where European expertise on ICT, bioinformatic, biodiversity, biotechnology, synthetic biology and bioprocessing is combined to develop a set of digital toolboxes that can prospect for new species of seaweed, utilize these in microbial fermentation, and understand how to use it responsibly and sustainably.

Over 80 TB of existing seaweed data and 700.000 genes will be mined by machine learning algorithms in an A.I. toolbox to identify macroalgae characteristics: growth, response to environmental conditions, chemical composition and more. These will be used by a predictive Model toolbox, with models for compositional changes, recovery, resilience and Dispersion, to deliver key features that are important for responsible resource management.

A Bioprocess technology toolbox will use this information for a machine learning controlled microbial co-culture, that will convert complex sugar mixtures to catalysts producing high-value antimicrobials. The multiple benefits of this digital platform are 1) boost the prospecting efficiency of new species by using powerful A.I. algorithms 2) help to understand the potential and vulnerability of resources, so that a responsible management strategy can guide the operations of stakeholders, and 3) create a novel value-chain, valorizing European seaweed side-streams into valuable antimicrobials (>$150/kg) for feed, food and pharma, while reducing CO2 footprint more than 20%.

IGNITION

HORIZON EUROPE

IMPROVING GREEN INNOVATION FOR THE BLUE REVOLUTION: NEW TOOLS AND OPPORTUNITIES FOR A MORE SUSTAINABLE ANIMAL FARMING

Principal Investigator at CIIMAR: **Benjamin Costas**
Leader Institution: **CIIMAR**
Website: **ignition-project.eu/**

Funded by the European Union

Animal health and welfare are issues of high research priority for European aquaculture. In particular, improving animal welfare whilst reducing the use of veterinary drugs are current research priorities in line with minimizing the environmental impact of the industry.

Preventing, or reducing the impact of disease is of prime importance for producers, researchers and stakeholders. In addition, public awareness of aquatic animal health and welfare leads to the increased attention of policy-makers, scientific community and the consumers into new methods for disease prevention.

The IGNITION project aims to unveil new knowledge regarding animal welfare in the context of climate change and propose new tools to mitigate the adverse effects of stress. An improvement in animal welfare will translate in higher-quality farmed animals thus improving farming productivity and sustainability performance.

Through IGNITION it is expected to provide new knowledge through genotyping and molecular phenotyping techniques to develop future breeding strategies for fish and shellfish. New innovative tools regarding immunization in fish will also be provided, aiming at improving fish welfare and targeting early life stages. Animal feeds will be formulated to include bioactive compounds extracted from halophytes through a novel upstream cascade salt removal.

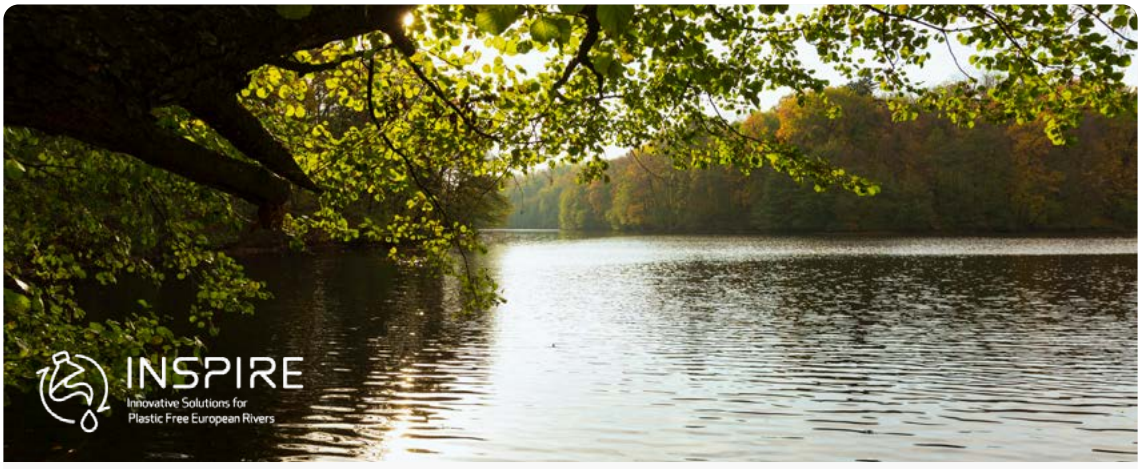
Special emphasis will be given to the study and discovery of new non-invasive biomarkers of health and welfare, which will in turn allow the development of biosensors and disease prediction through machine learning approaches.

The tools developed in IGNITION will be able to avoid the colonization and spread of pathogenic microorganisms, including multi-resistant microorganisms, among farmed animals and the subsequent spread to humans through the food chain.

INSPIRE

HORIZON EUROPE

INNOVATIVE SOLUTIONS FOR PLASTIC FREE EUROPEAN RIVERS



Principal Investigator at CIIMAR: **Isabel Sousa Pinto**
Leader Institution: **VLIZ - Vlaams Instituut Voor de Zee, Belgium**
Website: **https://inspire-europe.org**

Funded by the European Union

INSPIRE's main objective is to contribute to the drastic reduction of litter, macro and microplastics in European rivers in a holistic approach, by bringing together 20 technologies and actions for: DETECTION of the pollution present in the river and at the riverbank, COLLECTION of litter and macroplastics at the river bank and litter, macro and microplastics in the river, PREVENTION of litter, macro and microplastics to enter the river by collecting it from its waste stream before it can enter the river and by developing biodegradable alternatives for currently non-degradable polluting products, to avoid they will further be used and arrive in the river as litter.

Six use case are defined in INSPIRE to install and test the technologies and actions, to model the processes related to the water purification activities, to obtain 7 well defined solutions at detection, collection or prevention level and combinations thereof. The technical feasibility is backboned by a techno-economical analysis with the development of business cases for the solutions, action plans towards upscaling and replication and together with mapping and modelling all elements are brought together to develop a Master Plan for tackling the challenges of the mission and contributing to the objectives of the mission. The INSPIRE project will be very visible due to its well developed dissemination and communication plan and strategy for community engagement.

Apart from the general dissemination and communication tools and activities, specific activities will be setup on festivals, promoting 100% biodegradable products as a result of INSPIRE. INSPIRE's consortium is composed of 26 partners with complementary expertise and a good balance of academia, industry, communication specialists and soft skills organisations is obtained, who all together will work towards the target of having a number of successful solutions that can find their way to the market and put INSPIRE on the radar.

MAR2PROTECT

HORIZON EUROPE

PREVENTING GROUNDWATER CONTAMINATION RELATED TO GLOBAL AND CLIMATE CHANGE THROUGH A HOLISTIC APPROACH ON MANAGED AQUIFER RECHARGE

Principal Investigator at CIIMAR: **Marisa Almeida**
Leader Institution: **NOVA ID FCT**
Website: **mar2protect.eu**

Funded by the European Union

The impact climate and global change (CC and GC) is endangering human health, food security and biodiversity.

Urgent action is needed to achieve 2030 zero pollution goals. MAR2PROTECT will provide a holistic approach to prevent groundwater (GW) contamination from GC and CC impacts based on a new-generation managed aquifer recharge (MAR). The core of the innovative MAR is the M-AI-R DSS that will incorporate technological and societal engagement information using an AI-based evaluation to improve GW quality.

To ensure a high replication potential, M-AI-R DSS will collect information from 5 demo sites in EU (PT, IT, ES, NL) and 2 in nonEU countries (TN, ZA) which were carefully chosen by their degree of maturity from previous successful projects and a wide range of settings in terms of climatic conditions, water sources, type of pollution, MAR scheme and political/societal context.

All technologies will be tested and validated until TRL5. MAR2PROTECT will ensure a strong engagement of civil society in GW prevention actions, up to a SRL equal to 6. The project will involve national and EU policy makers that, in collaboration with a Community of Practice formed by worldwide experts, will guarantee the strengthening EU policy for the prevention of GW contamination.

Thanks to its holistic approach and to the high replicability of its results, MAR2PROTECT will lead to a marked enhancement in GW protection across the EU and beyond, and to the generation of knowledge for the transition to a sustainable water management.

The consortium includes 8 partners and 1 affiliated entity from 6 different EU-countries and Switzerland and 2 international partners from Tunisia and South Africa: 2 Universities (UNIBO, KTU), 7 RTOs (NOVA-COO, CIIMAR, CETAND +AQUA, IHE, IT, ISSBAT, SUWI) and 1 Association (FEUGA). In addition, the inclusion of 3 large water utilities as associated partners and a policy maker from ZA will lead to a relevant enhancement of the project impact.

MARCO-BOLO

HORIZON EUROPE

MARINE COASTAL BIODIVERSITY LONG-TERM OBSERVATIONS

Principal Investigator at CIIMAR: **Isabel Sousa Pinto**
Leader Institution: **EMBRC-ERIC**
Website: **marcobolo-project.eu**

Funded by the European Union

MARCO-BOLO (MBO) aims to structure and strengthen European coastal and marine biodiversity observation capabilities, linking them to global efforts to understand and restore ocean health, hence ensuring that outputs respond to explicit stakeholder needs from policy, planning and industry.

To this end MBO will establish and engage with a Community of Practice (CoP) to determine end-user needs with the aim of optimising marine data flows, knowledge uptake, and improving governance based on biodiversity observations. By exploiting synergies with concurrent projects MBO will develop and demonstrate new autonomous technology for biodiversity mapping and monitoring, and data streams from remote sensing, eDNA, robotics, optical and acoustic observations. Protocols for eDNA-based biodiversity observations are established and validated across applications, taxa and ecosystems.

The sequence of the analytical and technical processes for the different use cases will be incorporated into operational Essential Ocean Variables (EOVs) and Essential Biodiversity Variables (EBVs) and included into online reusable workflows, contributing to the free and open access of EU and global biodiversity information facilities, and to support major EU biodiversity directives and global initiatives.

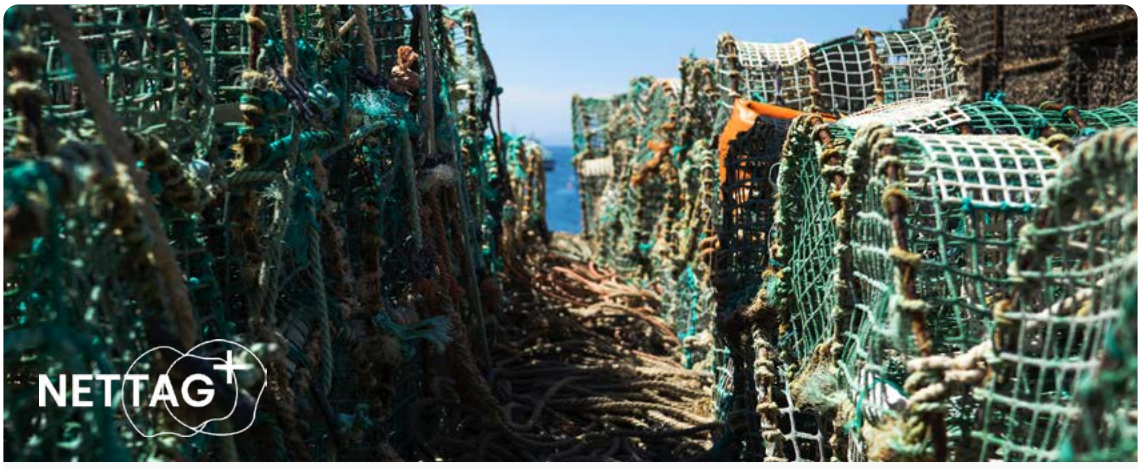
The project partnership will leverage its international activities (MBON, GOOS, OBIS) and participation in UN Ocean Decade Programmes (Marine Life 2030, OBON, ODIS, Ocean Practices for the Decade) to align the MBO work programme to global CoP, ensuring European participation and leadership in global biodiversity monitoring and global science.

MBO results will be designed to build upon existing capability and infrastructures, and to be relevant to existing frameworks so that outputs can be easily integrated into national, regional (EU and adjacent sea basins), and global observation systems, with no delay ensuring the reusability of the investments Europe is already making in data generation.

NETTAGPLUS

HORIZON EUROPE

PREVENTING, AVOIDING AND MITIGATING ENVIRONMENTAL IMPACTS OF FISHING GEARS AND ASSOCIATED MARINE LITTER



Principal Investigator at CIIMAR: **Sandra Ramos**
Leader Institution: **CIIMAR**
Website: **nettagplus.eu**

Funded by the European Union

NETTAG+ aims to provide a portfolio of three suitable innovative smart and sustainable solutions to address the negative impacts of fishing gears on marine life and habitats, in line with the second issue of the call "Environmental impacts of fishing gears".

NETTAG+ will be based on synergistic activities between the fisheries industry, scientists and NGOs to develop three solutions to PREVENT, AVOID and MITIGATE the harmful impacts of fishing gears. We will PREVENT marine litter derived from fisheries activities, AVOID loss of fishing gears, and MITIGATE harmful impact by removing existing ALDFG. These three solutions will jointly contribute to reduce ALDFG and marine pollution, namely by: reducing the introduction of hazardous chemicals and microplastics originated from ALDFG; reducing ghost fishing, bycatch and entanglements of sensitive or endangered species on ALDFG; and improving mapping, tracking and recovery technologies to retrieve ALDFG. NETTAG+ aims to upgrade and upscale the integrative preventive approach started in the previous NetTag project, and replicate it in Mediterranean regions. The three solutions will be developed to maturity (TRL 7-8) by the end of the project, and will be tested, validated and demonstrated in real conditions in Atlantic and Mediterranean countries, namely Portugal (PT), United Kingdom (UK), Spain (SP), Italy (IT), Croatia (HR) and Malta (MT). NETTAG+ ambition is to change the paradigm of the fisheries industry, aspiring to transform the societal perspectives about the role of fishers as Guardians and Cleaners of the Ocean.

NETTAG+ will empower the sector to take active actions to address marine pollution, promoting their role as key-actors to tackle marine pollution, and will will provide the fisheries industry with three smart and environmentally-friendly solutions to reduce ALDFG and prevent the environmental impacts of fishing gears.

SAFE

HORIZON EUROPE

SMARTAQUA4FUTURE

Principal Investigator at CIIMAR: **Rodrigo Ozório**
Leader Institution: **EUROFISH**
Website: **projectsafe.eu/**

Funded by the European Union

The main objective of SAFE project is to reduce the environmental impact and improve the viability of the FW aquaculture by applying circular economy (CE) approaches to the valorisation of solid and liquid wastes from recirculating aquaculture systems (RAS) and integrated multi-trophic aquaculture (IMTA) systems.

The economic viability of FW aquaculture will be improved through major advances in management systems and the integration of waste streams from FW aquaculture systems (FWAS) into the aquaculture feed chain.

SAFE will enable the uptake of these solutions through local and regional scale demonstrations across the EU and will document the necessary management and governance conditions for successful transferability.

The multidisciplinary expertise of the consortium across a wide range of systems, species and geographies will target the enhancement of species of particular biodiversity concerns, such as European native crayfish.

We will improve the sustainability of FW aquaculture production and investigate the feasibility of diversification through the culture of under-represented species (perch) and valuable crayfish species with declining populations. Lastly, we will compare the experiences of EU FW aquaculture to Chinese FWAS and value chains, the largest, fastest-growing and most diverse aquaculture sector in the world, using mutual knowledge sharing to improve the sustainability of aquaculture in China and the EU.

SAFE, through extensive dissemination activities, knowledge transfer programmes, training workshops and collaborative engagement with industry and stakeholders, will support the development of professional skills and competencies of the FW aquaculture both within the EU and partner countries.

AQUACOMBINE

HORIZON 2020

INTEGRATED ON-FARM AQUAPONICS SYSTEMS FOR CO-PRODUCTION OF FISH, HALOPHYTE VEGETABLES, BIOACTIVE COMPOUNDS, AND BIOENERGY

Principal Investigator at CIIMAR: **Benjamin Costas**
Leader Institution: **Aalborg Universitet**
Website: **aquacombine.eu**

Funded by the European Union

One of the most important challenges of the 21st century is to meet the world's demand for sustainably produced biomass for both food and the growing bio-products sector. Increased use of fresh water for agriculture and loss of farmland due to salinity are related concerns.

Salicornia europaea (S. *europaea*) is grown commercially in the EU for its fresh tips, which are edible as salad (marsh samphire). It is a halophyte plant and can grow on saline lands without requiring freshwater for irrigation. When grown as a vegetable only the fresh tips are used while the woody part of the plant is considered a residue.

Today, European farmers are using part of the fibrous residue for soil amendment and drying the fibers to produce herbal salt. However, the amount of residue to food product is large (approximately 80%) and the salt content of the residue is a problem when used for soil amendment, as it returns the salt to the soil.

There is a great wish from Salicornia farmers to increase the value of this fraction in line with the principles of circular economy. The woody residue part of Salicornia has been investigated as a source of pharma- and nutraceutical products due to its high content of phytochemicals e.g. hydroxycinnamic acids (HCA).

To help increase Salicornia farming there is a wish to valorize these residues via biochemicals and bioenergy production. The project will also examine the combination of aquaculture and Salicornia farming creating synergies such as formulation and test of phyto-chemicals rich functional fish feed and formulation and test of protein and lipids rich fish feed.

The outcomes of this study will enable Salicornia farmers and aquaponics farms to utilize all fractions of the produced biomass and produce value added HCAs, functional fish feed, and bioenergy. This will create new circular industries with co-production of food, pharma, and bioenergy from this new sustainable type of crop with very little or no production of waste streams.

BLUEBIO4FUTURE

HORIZON 2020

BLUE BIOTECHNOLOGY AND BIOENGINEERING FOR THE CURRENT AND FUTURE DEVELOPMENT OF A BLUE BIOECONOMY IN PORTUGAL

Principal Investigator at CIIMAR: **Vitor Vasconcelos**
Leader Institution: **CIIMAR**
Website: **bb4f.ciimar.up.pt**

Funded by the European Union

Marine Biotechnology (MB) was identified by the EU Blue Growth Strategy (2012) as an enabling activity of high potential for the bioeconomy of Europe.

Many products from marine biotechnology are already used in global markets for food and feed, cosmetics, aquaculture, agriculture, chemistry and pharmacology. Nevertheless, the potential for new products development is huge since marine biodiversity and in special, the marine microbiome, is far from being known and exploited. For that purpose, the aspects of Bioengineering - bioprocesses, synthetic biology, green chemistry and bioinformatics – are fundamental.

BlueBio4Future aims to enhance CIIMAR research excellence in MB area, in special Bioengineering, contributing to increase attractiveness for outstanding researchers and to establish a long-term impact at regional, national and European levels. The ERA Chair holder will establish a high-performing team in MB at CIIMAR, contributing to increase the knowledge and competitiveness of CIIMAR in the area of MB. This will be done by attracting funds at national and international level, by the supervision of MSc and PhD students, producing high-ranked research outputs, protecting intellectual property and transferring knowledge to stakeholders and contributing to increase literacy in MB.

In order to produce structural changes at CIIMAR in the area of MB, there is a need to attract outstanding researchers in the field of Bioengineering that could implement the framework for strengthening a long-term research and innovation enabling environment in the area of MB.

The establishment of the ERA CHAIR BlueBio4Future will increase the levels of the research activity in the area of bioengineering in CIIMAR, enhance the capability of the CIIMAR to succeed in competitive research funding, contribute to RIS3 strategies and increased interaction with main actors of the innovation ecosystem and will promote institutional changes to comply with ERA priorities.

EMERTOX

HORIZON 2020

EMERGENT MARINE TOXINS IN THE NORTH ATLANTIC AND MEDITERRANEAN: NEW APPROACHES TO ASSESS THEIR OCCURRENCE AND FUTURE SCENARIOS IN THE FRAMEWORK OF GLOBAL ENVIRONMENTAL CHANGES

Principal Investigator at CIIMAR: **Vitor Vasconcelos**
Leader Institution: **CIIMAR**
Website: **emertox.eu**

Funded by the European Union

EMERTOX aims at mapping the actual situation in emergent marine toxins and the producing organisms, developing new approaches to assess their occurrence and predicting the possible future scenarios in the framework of global warming.

The partnership, formed by a multidisciplinary team, will produce a joint research and innovation project that will exploit the complementary expertise of the participants and will create synergies among them.

The main objectives are:

1. to assess the current situation on potentially harmful algae and bacteria and the relevant emerging toxins in 8 countries belonging to different but geographically connected areas (Mediterranean Sea and North Atlantic);
2. to develop innovative approaches to sample, and analyze the producing organisms and their toxins by chemical and biological methods including immunoassays and sensors;
3. to estimate different future scenarios based on molecular data (routes of dispersion) and modelling.

FATTYCYANOS

HORIZON 2020

FATTY ACID INCORPORATION AND MODIFICATION IN CYANOBACTERIAL NATURAL PRODUCTS

Principal Investigator at CIIMAR: **Pedro Leão**
Leader Institution: **CIIMAR**

Funded by the European Union

Known, but mostly novel natural products (NPs) are in high demand – these are used in drugs, cosmetics and agrochemicals and serve also as research tools to probe biological systems. NP structures inspire chemists to develop new syntheses, and NP biosynthetic enzymes add to the metabolic engineer's toolbox.

The advent of next generation DNA-sequencing has revealed a vastly rich pool of NP biosynthetic gene clusters (BGCs) among bacterial genomes, most of which with no corresponding NP. Hence, opportunities abound for the discovery of new chemistry and enzymology that has the potential to push the boundaries of chemical space and enzymatic reactivity.

Still, we cannot reliably predict chemistry from BGCs with unusual organization or encoding unknown functionalities, and, for molecules of unorthodox architecture, it is difficult to anticipate how their BGCs are organized.

It is the valuable, truly novel chemistry and biochemistry that lies on these unexplored connections, that we aim to reveal with this proposal. To achieve it, we will work with a chemically-talented group of organisms – cyanobacteria, and with a specific structural class – fatty acids (FAs) – that is metabolized in a quite peculiar fashion by these organisms, paving the way for NP and enzyme discovery. On one hand, we will exploit the unique FA metabolism of cyanobacteria to develop a feeding strategy that will quickly reveal unprecedented FA-incorporating NPs.

On the other, we will scrutinize the intriguing biosynthesis of three unique classes of metabolites that we have isolated recently and that incorporate and modify FA-moieties. We will find the BGCs for these compounds and dissect the functionality involved in such puzzling modifications to uncover important underlying enzymatic chemistry.

This proposal is a blend of discovery- and hypothesis-driven research at the NP chemistry/biosynthesis interface that draws on the experience of the PI's work on different aspects of cyanobacterial NPs.

FUTUREMARES

HORIZON 2020

CLIMATE CHANGE AND FUTURE MARINE ECOSYSTEM SERVICES AND BIODIVERSITY

Principal Investigator at CIIMAR: **Francisco Arenas**
Leader Institution: **University of Hamburg**
Website: **futuremares.eu**

Funded by the European Union

Marine and transitional ecosystems provide fundamental climate regulation, food provisioning and cultural services. FutureMARES provides socially and economically viable nature-based solutions (NBS) for climate change (CC) adaptation and mitigation to safeguard these ecosystems' natural capital, biodiversity and services.

The program advances understanding of the links between species and community traits, ecological functions and ecosystem services as impacted by CC by analysing the best available data from monitoring programs and conducting targeted experiments and beyond state-of--the-art modelling.

Ensemble physical-biogeochemical projections will identify CC hotspots and refugia. Shifts in the distribution and productivity of keystone, structural and endangered species and the consequences for biodiversity will be projected within different CC-NBS scenarios to reveal potential ecological benefits, feedbacks and trade-offs. Novel, socialecological vulnerability assessments will rank the severity of CC impacts on various ecosystem services and dependent human communities.

Complementary analyses at real-world demonstration sites will inform managers and policy-makers on the economic costs and tradeoffs of NBS. These physical, ecological, social and economic analyses will be integrated to develop three, climate-ready NBS:

1. restoration of habitat-forming species acting as 'climate rescuers' buffering coastal habitats from negative CC effects, improving seawater quality, and sequestering carbon,
2. conservation actions explicitly considering the range of impacts of CC and other hazards on habitat suitability for biota to preserve the integrity of food webs (e.g. marine protected areas) and protect endangered species (e.g. charismatic megafauna), and
3. sustainable, ecosystem-based harvesting (capture and culture) of seafood.

FutureMARES is co-developed with policy-makers and managers to ensure impactful and transformative cost--effective actions.

MAELSTROM

HORIZON 2020

NEW SOLUTIONS FOR THE RECOVERY OF MARINE PLASTICS AND LITTER

Principal Investigator at CIIMAR: **Isabel Sousa Pinto**
Leader Institution: **Consiglio Nazionale delle Ricerche, Italy**
Website: **maelstrom-h2020.eu**

Funded by the European Union

The global marine plastic litter challenge comprises an estimated stock of 83 million tonnes of plastic waste accumulated in oceans. The recovery of plastic materials already in the ocean is an arduous and costly task. This is why innovations are urgently needed. The EU-funded MAELSTROM project is bringing together key stakeholders – from research centres and recycling companies to marine scientists and robotic experts – for the sustainable removal of marine litter in different European coastal ecosystems. The project will design, manufacture and integrate scalable, replicable and automated technologies, co-powered with renewable energy and second-generation fuel, to identify, remove, sort and recycle all types of collected marine litter into valuable raw materials.

MAELSTROM leverages on the integration of complemen-tary technologies for marine litter removal in different European coastal ecosystems, compounded with full-fledged circular economy and societal oriented solutions. In particular, the project:

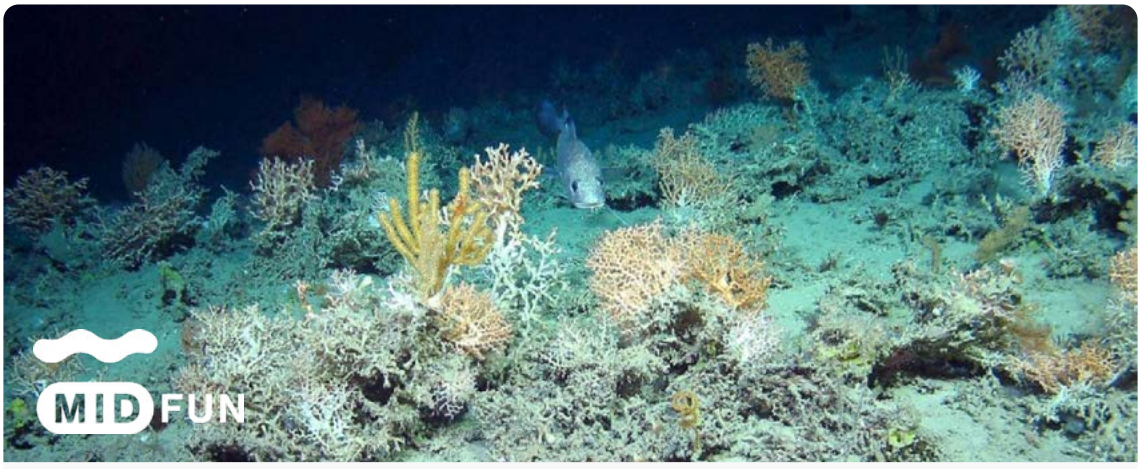
1. sets out a reliable multidisciplinary and scientifically sound approach for the assessment of marine debris distribution and impact on marine life in highly valuable ecosystems and protected areas;
2. designs and manufactures scalable, replicable and automated technologies, co-powered with renewable energy and second generation fuel, to identify, remove and sort marine litter;
3. evaluates over time the effectiveness of marine litter removal devices along with their impact on local ecosystems;
4. integrates different technologies to track, sort and recycle all types of collected marine litter into valuable raw materials for future marketisation;
5. assesses the economic and societal impact of the MAELSTROM solutions providing also a comprehensive life-cycle assessment of the technologies and products; (vi) enhances social awareness about the marine litter issue and engages citizens and stakeholders in MAELSTROM activities;
6. interplays with similar projects to maximize innovation uptake for marine litter removal within and outside the EU.

MAELSTROM consortium is a tight knit group made of research centres and foundations of excellence in ma-rine life, biology and sustainable energy, AI and robotics, recycling companies with certified industrial plants, a market consultancy company, a micro-enterprise and a plastic-focussed NGO.

MIDFUN

HORIZON 2020

METAL IMPACTS ON DEEP-SEA MICROBIAL COMMUNITIES AND FUNCTION



Principal Investigator at CIIMAR: **Miguel Semedo**
Leader Institution: **CIIMAR**

Funded by the European Union

Deep-sea mining of earth minerals is expected to grow in the next decades. The increase in deep-sea mining activities may lead to the release of toxic concentrations of metals into the surrounding seabed. Increased concentrations of heavy metals can disturb important ecosystem services provided by microbial communities, such as growth, nutrient cycling activity, and microbial diversity.

However, the consequences of metal exposure on microbial ecosystem functions in deep-sea conditions are currently unknown. The overarching goal of this project is to evaluate the impacts of heavy metal exposure on microbial growth, metabolism, and diversity in deep-sea conditions. We propose the following specific objectives:

1. Determine the effects of heavy metal exposure on growth and N_2O reduction metabolism in a model bacterial culture, under deep-sea conditions.
2. Examine the effects of heavy metal exposure on the transcriptome of a model bacterial culture, under deep--sea conditions.
3. Determine the impacts of heavy metal exposure on overall N_2O fluxes from deep-sea sediments.
4. Evaluate the impacts of heavy metal exposure on the biological and functional diversity of deep-sea complex microbial communities.

This research will apply a mixed experimental approach in controlled conditions to address the stated objectives. We will combine the use of bacterial axenic cultures with the study of complex microbial communities under deep-sea conditions (low temperature and high hydrostatic pressure). We will use pressurized bioreactors and hyperbaric chambers to test the effects of two representative metals (copper and cadmium) on bacterial growth, metabolic reduction of N_2O, expression of functional genes, and functional diversity. The mining of the deep seafloor is still at an early stage of implementation. This research presents a unique opportunity to assess the environmental risks of an anthropogenic activity before it begins to shape the ecosystem.

PONDERFUL

HORIZON 2020

POND ECOSYSTEMS FOR RESILIENT FUTURE LANDSCAPES IN A CHANGING CLIMATE

Principal Investigator at CIIMAR: **José Teixeira**
Leader Institution: **Fundacio Universitaria Balmes**
Website: **ponderful.eu**

Funded by the European Union

Even the smallest ponds can play a big role in fighting climate change. Largely neglected and generally undervalued, ponds are actually remarkably important for biodiversity conservation. The EU-funded PONDERFUL project will investigate how ponds can be used as Nature-Based Solutions (NBS) for climate change mitigation and adaptation, biodiversity conservation and delivery of ecosystem services. The project aims to generate and integrate biodiversity, ecosystem, social, economic and policy knowledge to:

1. quantify the contribution that networks of ponds, known as pondscapes, can offer to mitigate and adapt to climate change and to deliver important services at local to international scales, both directly, and indirectly through enhancing biodiversity conservation;
2. identify possibilities, cost effectiveness and barriers to implementing pond-based NBS for climate change adaptation and mitigation and other ecosystem services;
3. and generate the social and ecological expertise for the practical implementation of enhanced blue infrastructure through the creation and management of climate-proof pond systems and pondscapes.

PONDERFUL will also develop future scenarios for pondscapes by conducting tests in DEMO-sites in eight countries across Europe and the Community of Latin American and Caribbean States (CELAC), incorporating direct and indirect interactions and using several land uses and pondscape scenarios. The findings of these tests will be used to develop a sustainable finance and investment guide for implementation of the proposed NBS, by delivering a technical handbook targeted to practitioners and a policy guidance document to help stakeholders implement science-based policies for climate change resilience, biodiversity protection and ecosystem services delivery.

TOXICROP

HORIZON 2020

CYANOTOXINS IN IRRIGATION WATERS: SURVEILLANCE, RISK ASSESSMENT, AND INNOVATIVE REMEDIATION PROPOSALS

Principal Investigator at CIIMAR: **Alexandre Campos**
Leader Institution: **CIIMAR**
Website: **toxicrop.com**

Funded by the European Union

Water scarcity and food production are some of the greatest challenges of our times. Fresh water resources in many countries are vulnerable due to their biogeographical and climatic characteristics. Moreover higher water consumption and higher human impacts in the downstream water bodies is leading to a higher eutrophication with increased incidence and intensity of cyanobacteria blooms and their toxins. The scarcity of clean water resources leads to the compulsory use of water containing cyanobacteria and their toxins in agriculture.

This project aims through Research and Innovation Staff Exchange to map agricultural risk areas of cyanotoxin occurrence in consortium member countries, to access the fate of cyanotoxins in crops as also bioaccumulation in crops and food contamination related to the use of eutrophic waters in irrigation.

Environment-friendly, low-cost techniques of water treatment will also be developed, and methods to detect and assess toxicity of cyanotoxins improved.

This project seeks to integrate the activities already developed by the partners, and develop new multidisciplinary activities which could lead to the maximization of the research and foster the creation of knowledge in the domains of water toxicology, food safety and eco-technologies of water treatment.

The main innovation aspect of this project rely on the multidisciplinary approach to the subject under study, which is expected to contribute to the elucidation of the minimum quality requirements applied to the irrigation waters.

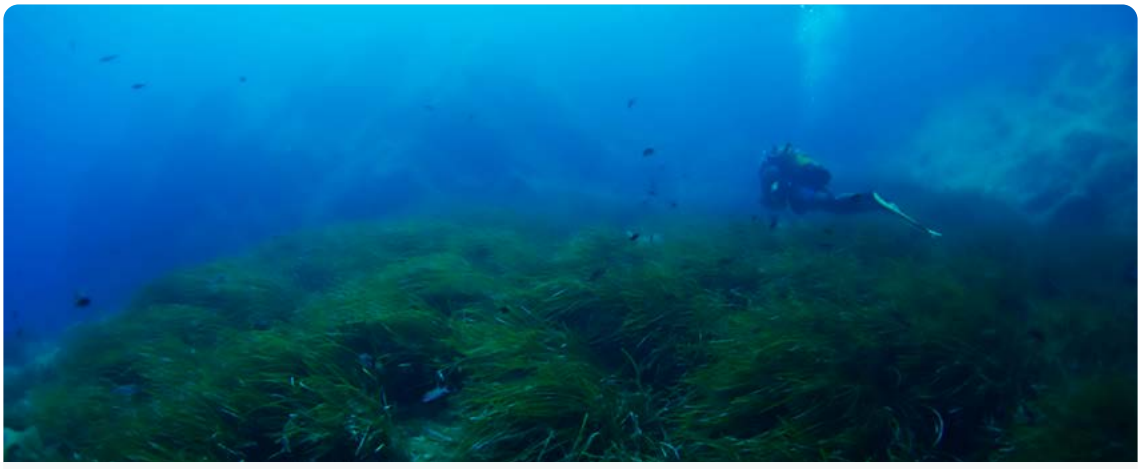
The integration of countries with different weather regimes and agricultural practices in one single project will constitute a unique approach to this subject and to consolidate the transnational collaborations.

The expected results will be delivered as guidelines for water management and treatment and will contribute to the implementation of a more sustainable and safe agriculture in Europe and worldwide.

SEAGRASSRIAWILD

LIFE

MARICULTURE FOR RIA DE AVEIRO SUBTIDAL SEAGRASS REWILDING



Principal Investigator at CIIMAR: **Marina Dolbeth**
Leader Institution: **University of Aveiro**

Co-funded by the European Union

LIFE SeagrassRIAwild aims at taking decisive steps to reverse the current conservation status of *Zostera marina* habitat in Ria de Aveiro and Portugal through the co-development of cost-efficient and policy relevant NbS (Nature-based Solutions). Subtidal seagrass beds are critically endangered at the European Atlantic Coast, and in urgent need of restoration, as stated in the forthcoming EU Nature Restoration Law. Z. marina is presently the most endangered seagrass species in Portugal, facing extinction if measures are not taken to assure the protection of the last remaining populations. In Ria, its presence was not recorded for 10 years, but recently resurged in small intertidal patches, making this the momentum for active restoration measures implementation.

LIFE SeagrassRIAwild proposes a paradigm shift in seagrass restoration, enabling large-scale restoration programs with negligible effects on existing natural meadows, through the development of seagrass mariculture to support the plant and seed needs for rewilding. It follows a transdisciplinary approach involving academia, authorities, management agencies, local administration, end-user associations and citizens in the co-design, prioritization and implementation of restoration actions, at a large scale and using targeted and adaptable Citizen Science initiatives and synergies with other national and EU initiatives.

LIFE SeagrassRIAwild will further explore innovative NbS to potentiate synergistic effects of seagrass conservation efforts and system management needs which, if proven effective, have the potential to become an innovative management service/product for port authorities, private marinas and management agencies. These NbS will potentiate the sustainability of the project, supported by tailor-made capacity building actions and the infrastructure legacy, which will perdure in time and be made available for national restoration programmes, with the supervision of the national competent authorities.

ADAPTCHANGE

TECHNICAL COOPERATION FOR STUDYING ADAPTATION TO ENVIRONMENTAL CHANGE

Principal Investigator at CIIMAR: **Rui Faria**
Leader Institution: **CIIMAR**

Iceland Liechtenstein Norway grants

Understanding the mechanisms of adaptation can provide precious information to improve predictions of species' response to abrupt environmental change.

In particular, the study of the adaptive potential and eco-evolutionary dynamics of intertidal species at two latitudinal extremes of their European range is expected to result in more accurate forecasts on how climate change affects biodiversity.

In this project, we established a collaborative network between institutions involved in research and outreach from Portugal, Iceland and Norway to develop a strategic cooperation program built upon three complementary pillars:

1. technical cooperation – implementation of a research project aiming to assess the mechanisms of adaptation of intertidal species to rapid environmental change;
2. capacity building - organization of technical workshops;
3. science dissemination – sharing good practices on effective science dissemination initiatives in schools and joint organization of a showcase for kids particularly focused on protecting the biodiversity living in our oceans.

AQUACELL

TRANSNATIONAL INNOVATION & TECHNOLOGY

INTESTINAL CELL LINE OF EUROPEAN SEABASS AND ATLANTIC SALMON - APPLICATIONS AND NEEDS

Principal Investigator at CIIMAR: **Sónia Gomes**
Leader Institution: **CIIMAR**

Iceland Liechtenstein Norway grants

In AquaCell, we propose to develop INTESTINAL CELL LINE MODEL for fish. Fish health and welfare relies on the intestinal functions but the wider knowledge-gap of the intestinal immune system of fish compared to mammals poses a barrier to the development of efficient tools to enhance fish immunity.

The target groups of this bilateral initiative include the research teams of CIIMAR and Nord University engaged in ongoing research projects within the topic of fish health and welfare. The goals for this bilateral initiative are:

1. to create synergies between the aquaculture research line of CIIMAR and Nord University through exchange of technical skills and scientific know-how in the scope of the intestinal cell lines development;
2. to disseminate the acquired knowledge in scientific meetings; and
3. to promote future partnerships for joint research projects. The results from this bilateral initiative are expected to contribute to the following expected outcomes:

- development of novel strategies capable of improving fish robustness, thereby reducing the need for antibiotics, while simultaneously increasing commercial production efficiency and aquaculture sector sustainability; and
- reduce the animal-use and associated costs required for in vivo experiments, by taking advantage of the in vitro intestinal cell line that will be developed.

The results obtained herein will provide the knowledge for future applications to research programs and funding bodies essential to pursue the research line. The in vitro cell line model will be used as an effective tool to predict fish health and such technological knowledge can be applied by the aquaculture industry, contributing to the sustainability of the sector.

BIORESET

BIODIVERSITY RESTORATION AND CONSERVATION OF INLAND WATER ECOSYSTEMS FOR ENVIRONMENTAL AND HUMAN WELL-BEING

Principal Investigator at CIIMAR: **Laura Guimarães**
Leader Institution: **REQUIMTE/LAQV**

Pollution is threatening the biodiversity of inland waters that are vital to society and the future of the Earth. A major source of this pollution are effluent discharges from wastewater treatment plants (WWTPs).

Treatment processes used in WWTPs do not efficiently remove emerging contaminants, such as pharmaceuticals and microplastics, which lead to health hazards to non-target species, including humans. This polluting source limits the conservation and restoration of freshwater systems. At the same, there is a need for strategies for up-scaling restoration solutions and for rapid and simple to use methodologies to assess conservation and restoration progress; i.e. assessment strategies anticipating the success of conservation/remediation measures in suitable timescales, ensuring reliable data comparison over time and space, and guiding intervention measures. So, the BioReset project proposes to advance treatment processes (chemical, physical, biological and their combination) to promote ecosystem recovery and conservation and to develop assessment strategies.

Diatoms will be used to model ecosystem conservation and restoration since their communities show high levels of biodiversity. The diatoms will provide an expeditious method to compare different recovery strategies and water treatment processes, allowing to address timescale and key conservation/restoration questions. The full environmental, economic, and social viability of the upgraded and innovative treatment technologies will be assessed using Life Cycle Analysis and SWOT assessments. Based on this knowledge, scale-up studies in geographically different sites (Portugal and Spain) to ascertain the technical and economic feasibility at a larger scale will be performed and recommended action guidelines will be issued.

Furthermore, BioReset also envisages the creation of a representative space-time picture of the presence of emerging contaminants in inland waters and its correlation to effects on diatom communities. For this, powerful analytical techniques, such as gas- and liquid chromatography, will be used.

Besides these methods, and to obtain real-time information, miniaturized analytical platforms that can perform fast and on-site monitoring will also be employed.

BLUE SHUTTLE

TRANSNATIONAL INNOVATION & TECHNOLOGY

ATLANTIC AREA NETWORK FOR ENHANCING INNOVATION IN THE BLUE ECONOMY SECTOR

Principal Investigator at CIIMAR: **Susana Moreira**
Leader Institution: **CEEI Bahía de Cádiz**

Interreg Atlantic Area

Co-funded by the European Union

Blue Shuttle will accelerate the digitalisation of the blue bioeconomy sector in the AA, through a Blue Innovation Network based on a QH approach.

The focus will be on a broad innovation strategy to facilitate the adoption of digital solutions by the Blue Bioeconomy sector to stimulate more efficient and sustainable processes, as well as creative and viable solutions to foster competitiveness and resilience. Specifically, the target sectors will be Marine living resources and Blue biotechnology.

The project will be developed in 3 phases:

- Discovery: identification of stakeholders, good practices and creation of the innovation network

- Analysis: diagnosis of the technological needs and skills of the blue sector to provide specific mentoring and capacity building actions. A digital platform will be created to enable the analysis and development phases

- Development: enhance innovation through open innovation programmes and pilot projects.

BLUEFORESTING

TRANSNATIONAL INNOVATION & TECHNOLOGY

CLIMATE RESILIENT MARINE FORESTS FOR A SUSTAINABLE FUTURE

Principal Investigator at CIIMAR: **Francisco Arenas**
Leader Institution: **CIIMAR**
Website: **blueforesting.com**

Iceland Liechtenstein Norway grants

The ocean provides vital ecosystems services, threatened by anthropogenic and climate pressures. Their undesirable impacts can be mitigated if ecosystem-based management, adaptive marine spatial planning, and habitat restoration strategies were implemented.

BLUEFORESTING builds upon these approaches with the aim to provide climate change ready nature-based solutions (NBS) for successful sustainable management of the most iconic coastal habitats, Marine Seaweed Forests. Although threatened, they are biodiversity rich ecosystems, recognized as cost-effective NBS with potential to mitigate climate change effects. Their capacity to deliver a wide range of key ecosystem services and to support blue growth makes them natural blue infrastructures. Fostering healthy marine forests means promoting regional fisheries, recreational activities, and cultural traditions, but also fighting biodiversity loss and climate change.

In this context, BLUEFORESTING will develop science--based guidance for preserving marine forest functions and services, by assessing baseline information (genetics, processes, functions, services and conditions), by identifying species diversity and sensitivity and climate refugia areas. BLUEFORESTING will develop models and will implement tools for vulnerability assessments by promoting the co-development of effective and climate ready NBS. Expected results are of paramount importance as scientific foundations to support future marine protection and reforestation actions in a cost-effective and sustainable way.

BLUEFORESTING lines up with the EU Blue Growth agenda as it proposes sustainable ecosystem-based management actions that can help to proactively protect and increase the resilience of marine forests under climate change, guaranteeing the provision of associated services. BLUEFORESTING represent an excellent opportunity to prove how science based governance may promote sustainability of marine habitats and services.

The established partnership will promote bilateral knowledge transfer and dissemination, strengthening international cooperation and cooperation in the sector, while increase value creation and sustainable growth in the Portuguese blue economy.

BLUEFORESTS

TRANSNATIONAL INNOVATION & TECHNOLOGY

SEAFORESTS FOR BLUE CARBON - NATURAL CAPITAL FROM NATURE-BASED SOLUTIONS

Principal Investigator at CIIMAR: **Isabel Sousa Pinto**
Leader Institution: **CCMAR**

Iceland Liechtenstein Norway grants

Marine forests formed by seagrasses and macroalgae are important carbon sinks at global scale, with a high capacity for sequestering and storing carbon (known as "blue carbon") in their biomass and sediments. While seagrass meadows are widely known for their ability to remove CO_2 and particulate organic matter from the water and store significant amounts in their sediments, the global importance of macroalgae forests for carbon sequestration remains poorly understood.

In fact, macroalgae generally grow on hard substrata with no carbon burial potential, but they might be important donors of organic matter for the sediments of deeper ocean. Despite their importance, blue carbon forests have experienced a global decline in the past decades, mainly due to the severe exploitation of coastal areas, with a consequent loss of the associated ecosystem services.

Therefore, there is a growing urgency to implement reforestation efforts of blue forests to recover the natural capital, mitigate the effects of climate change by removing CO_2, while delivering extra benefits for people and nature.

The Blueforests project aims to improve knowdledge and test technological innovations to rebuild Portuguese marine forests and, as a result, improve the ecosystem services they provide and contribute to building a sustainable blue economy based on resilient and abundant marine natural capitals. New technologies to restore Portuguese marine forests, including models to reveal the best locations for reforestation and novel techniques of planting will be developed, tested and optimized.

The contribution of Portuguese marine forests to blue carbon sequestration and thus climate mitigation, will also be quantified as well as the economic value of the ecosystem services delivered by them.

The specific objectives of Blueforests are:

1. to test novel technologies to restore Portuguese marine forests, in suitable regions where they have disappeared, such as the production of "green gravel" (i.e. natural gravel seeded with target species) the use of biodegradable meshes to stabilize sediments of seagrass transplants and the use of existing coastal and offshore artificial structures;
2. to assess the contribution of Portuguese marine forests for carbon sequestration, estimating the in-shore blue carbon stocks and burial rates;
3. to quantify the ecosystem services and natural capital provided by Portuguese marine forests, including food provision, carbon sequestration, protection against extreme events, water purification, and cultural services;
4. to maximize the visibility of scientific achievements through the scientific community, policy makers and the general public.

BLUEWWATER

CONTROL, TRATAMIENTO Y REDUCCIÓN DE MICROPLÁSTICOS Y CONTAMINANTES EMERGENTES EN AGUAS RESIDUALES URBANAS Y EN EL MEDIO COSTERO TRANSFRONTERIZO

Principal Investigator at CIIMAR: **Teresa Neuparth**
Leader Institution: **CETMAR - Centro Tecnológico del Mar**

Interreg
España – Portugal

The BlueWWater aims to improve the quality of the water bodies by controlling, monitoring and reducing the emissions of microplastics and contaminants of emerging concern (CECs) to the aquatic environment, through the study of the efficiency of urban wastewater treatment plants (WWTP) in both regions and the environmental risk of these pollutants. Thus, this project will contribute to guarantee sustainable use of water resources and to the implementation of EU regulations.

The proposed revision of the Urban Wastewater Treatment Directive and the Water Framework Directive, pose new challenges regarding the removal of microplastics and CECs in the WWTPs, as well as in the definition of environmental standards. To provide support to administrations in meeting these environmental objectives, the project will develop high-performance automated analytical methodologies (activity 1) that facilitate the monitoring of these contaminants in water bodies. The environmental risk of CECs and microplastics will be studied and the effectiveness of a selection of WWTPs will be evaluated in both regions with and without tertiary/quaternary treatments. For this purpose, chemical and ecotoxicological tools and hydrodynamic and food chain models will be used (activity 3).

Likewise, an environmental evaluation of the tertiary / quaternary treatments will be carried out. BlueWWater will promote and consolidate the NOR-WATER Network (activity 4) which will promote transboundary collaboration of the actors involved in water quality management and will promote the exchange of knowledge in the Cooperation Area. Finally, environmental education activities will be carried out on the risks of these pollutants for school community and the public, which will promote a change of attitude and habits in society (activity 6).

BREEDFLAT

TRANSNATIONAL INNOVATION & TECHNOLOGY

NEW APPROACHES ON THE DIETARY-EFFECTS IN BROODFISH: THE ROLE OF NUTRITION ON SUSTAINABLE PRODUCTION OF FLATFISH

Principal Investigator at CIIMAR: **Benjamin Costas**
Leader Institution: **CCMAR**

Iceland Liechtenstein Norway grants

BREEDFLAT project aims to improve flatfish breeder's performance by enhancing immune system capacity, largely affected during reproductive season, and gamete quality, by providing key-role nutrients for successful reproduction. Innovative approaches on the study of dietary effects will be attained to promote a sustainable competitive production of eggs and larvae.

The consortium includes two Portuguese research teams, CCMAR (promoter) and CIIMAR, and the largest turbot producer, ACUINOVA. The Donor parties, Nord University, Akvaplan-niva, experienced in flatfish reproduction, and Sognaqua firm, will contribute with their experience in Atlantic halibut.

This collaboration will enhance Portuguese centres (CCMAR, CIIMAR) performance with technology transfer from Nord (microRNAs, epigenetics), and strengthen future bilateral collaborations.

The business sector (ACUINOVA) will gain from Norway experienced Aquaculture sector. The project focus in 3 important flatfish species for aquaculture diversification in Europe, Senegalese sole, turbot and Atlantic halibut, along 6 WPs. Specific breeders' feed will be developed, considering each species' nutritional requirements and efforts dedicated to gametogenesis.

A tool-set of parameters will be developed, allowing characterization of reproductive and immune system performance. These tools will be used to evaluate the efficiency of natural feed products supplementation on the enhancement of reproduction and fish resistance.

The final target is to achieve the improvement of off-spring through a better nutrition to breeders. More robust juveniles will contribute to a next generation of breeders developed in captivity. These bases will provide a more sustainable Aquaculture diversification with high price commercial species, creating a benefit for fish farms and feed suppliers in Europe, reducing economic and social disparities between donor and beneficiary states.

CETAMBICION

TRANSNATIONAL INNOVATION & TECHNOLOGY

COORDINATED CETACEAN ASSESSMENT, MONITORING AND MANAGEMENT STRATEGY IN THE BAY OF BISCAY AND IBERIAN COAST SUB-REGION

Principal Investigator at CIIMAR: **Mafalda Correia /Isabel Sousa Pinto**
Leader Institution: **CSIC, Spain**
Website: **cetambicion-project.eu**

Funded by the European Union

This project addresses the urgent need to reduce cetacean bycatch in EU fisheries, consistent with the requirements of the Habitats Directive Marine Strategy Framework Directive and Common Fisheries Policy (Technical Measures Regulation).

In 2019, several NGOs requested that the European Commission introduce emergency fisheries measures to reduce bycatch of common dolphins in the Bay of Biscay and of harbour porpoises in the Baltic Sea. The Commission requested that The International Council for the Exploration of the Sea should evaluate these requests and provide advice on necessary actions.

ICES issued this advice in earlier 2020, supported by work by two of its Working Groups (WGBYC and WGMME) and a Workshop (WKEMBYC). ICES proposed a range of possible measures, and provided information on the expected reduction in bycatch arising from such measures. The Commission has subsequently request that France and Spain take action to address the cetacean bycatch issue in Bay of Biscay. An additional driver for reduction in bycatch of cetaceans is the request by the USA that all nations exporting fishery products to the USA should demonstrate that their management of cetacean bycatch is consistent with the requirements of the US Marine Mammal Protection Act.

The MSFD 2020 call provides an opportunity to develop work on measures to improve bycatch monitoring and mitigation in the Bay of Biscay and adjacent Iberian coastal waters, thus helping to achieve Good Environmental Status (GES) in relation to the descriptor D1 Biodiversity and, specifically, cetacean bycatch (criterion D1C1 and OSPAR common biodiversity indicator M-6). In so doing it will also consider criteria for abundance (D1C2), demographic characteristics (D1C3), distribution pattern and range (D1C4) and habitat (D1C5).

The CetAMBICion project involves 15 partners from the Member States (MS) France, Spain and Portugal, including Ministries as well as public research and conservation bodies, in collaboration with professionals and NGOs.

COAST

TRANSNATIONAL INNOVATION & TECHNOLOGY

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

Principal Investigator at CIIMAR: **Marina Dolbeth**
Leader Institution: **University of Aveiro**
Website: **coastcv.eu**

The Republic of Cabo Verde is an African archipelago that depends mainly on marine resources. Their coastal areas ensure human wellbeing through resources availability (e.g. food) and jobs. However, coastal regions in Cabo Verde are highly exposed to natural hazards and multiple pressures associated with anthropogenic activities, including reclamation of wetlands for agriculture, water contamination and plastic pollution. They are, thus, in an enormous need for sustainable development of activity sectors linked to the sea, i.e. Blue Growth.

Cabo Verde is a country where Blue Growth can help contribute to solutions for current issues, such as high poverty rates, while building on the long tradition of local economic use of the marine environment. However, no valuable baseline knowledge on the environmental status of their marine ecosystems is available, hampering the development of measures ensuring their sustainable use, management, conservation and restoration. Information on marine habitats for this Archipelago is scarce, and there is no integrated evaluation of marine resources to support knowledge-based regulations and guidelines for their sustainable use, in line with the national development trends. Santo Antão has the highest poverty rate of the Archipelago and income inequalities and is highly vulnerable to extreme natural phenomena.

The COAST project will significantly contribute to understanding the status and functioning of the ocean system around Santo Antão island in Cabo Verde, as its contribution to the country's economy. The project aims to achieve five main objectives:

1. to characterize and map pelagic and benthic habitats, as well as anthropogenic pressures of Santo Antão,
2. to estimate patterns of diversity in marine communities relative to habitat features,
3. to assess the vulnerability of the studied communities to both environmental and anthropogenic pressures, through the application of risk assessment models,
4. to implement conservation and restoration actions for selected habitats/ecosystems based on the results of the first three objectives,
5. 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.

Dedicated scientific surveys will be conducted to collect data from the marine ecosystems around Santo Antão under a transdisciplinary and integrated framework, focusing on selected areas of interest. We will apply state-of-the-art technology, combining visual and acoustic observations with physical sampling, modelling and remote sensing. COAST expects to improve current knowledge on the marine habitats of Santo Antão island and provide efficient management recommendations for their sustainable development, along with mitigation plans for the effects of global changes, in line with the needs of stakeholders and local communities.

FREE-LITTERAT

TRANSNATIONAL INNOVATION & TECHNOLOGY

ADVANCING TOWARDS LITTER-FREE ATLANTIC COASTAL COMMUNITIES BY PREVENTING AND REDUCING MACRO AND MICRO LITTER

Principal Investigator at CIIMAR: **Marisa Almeida**
Leader Institution: **CETMAR**

Interreg Atlantic Area

Co-funded by the European Union

Free-LitterAT will achieve litter-free coastal communities by combining knowledge, tools and technology with pilot actions with multi-stakeholder engagement. It tackles marine litter, a transnational challenge demanding an integral approach involving prevention, monitoring and removal when feasible of the already accumulated marine litter.

The overall objective is to protect biodiversity by implementing innovative approaches to prevent and reduce marine litter, with special emphasis on ALDFG and microplastics.

Free LitterAt will contribute to reducing inputs, locate sources and hotspots, enhance monitoring capabilities and raise awareness.

Main outputs include guidance, tools and joint solutions for waste management, marine litter monitoring, modelling, clean-up and removal as well as action plans transferred to the competent authorities and maritime stakeholders. The project will build on previous results and alliances, developing new solutions to be implemented through pilot actions.

MICROBOOST

TRANSNATIONAL INNOVATION & TECHNOLOGY

MICROALGAE AS FISH HEALTH BOOSTERS VIA AQUAFEEDS

Principal Investigator at CIIMAR: **Benjamin Costas**
Leader Institution: **CIIMAR**
Website: **microboost.pt/en/**

Iceland Liechtenstein Norway grants

MICROBOOST project aims to develop innovative research on microalgae functionality and understand their bioactivity on fish immune performance. At least four products will be developed: a new microalgae biomass (Euglena gracilis), a new blend (E. gracilis and Nannochloropsis sp.) and two bioactive aquafeed supplements for aquaculture applications derived from these microalgae.

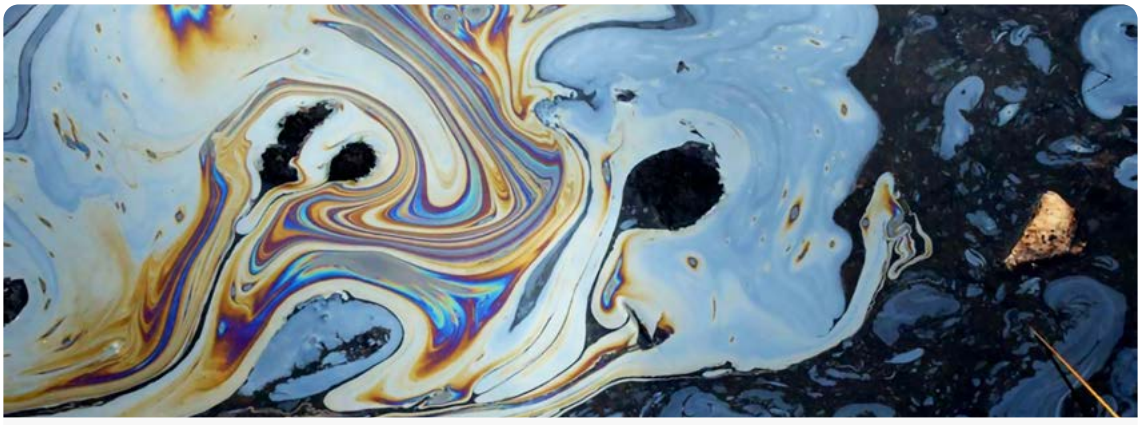
MICROBOOST is led by Allmicroalgae Natural Products SA, a large industry located in Portugal. Allmicroalgae provides excellence in microalgae cultivation and is considered an European reference for microalgae industrial production. Allmicroalgae's mission is rooted in the desire to cultivate sustainable, global, green solutions, and to develop commodities by boosting microalgae's natural intrinsic features and capabilities.

MICROBOOST will develop tight cooperation between the following partners: Allmicroalgae: one of the largest European producers of microalgae, NIVA: Norway's leading institute for fundamental and applied research on marine and fresh waters, SPAROS: a science and technology company specialized in nutritional solutions for aquaculture, GreenCoLab: a collaborative platform which bridges algae research and industry to drive algal biotechnology solutions, CIIMAR: a leading research and advanced training institution focused on ocean knowledge and innovation, and UiBergen: a Marine research reference with solid aquaculture knowledge.

The new products proposed in MICROBOOST will compete in the aquaculture market, backed with a solid scientific and technical immunomodulating activity.

MODELRISK

ECOSYSTEM MODELS TO SUPPORT ENVIRONMENTAL RISK ASSESSMENT OF MARINE ECOSYSTEMS UNDER HNS SPILLS



Principal Investigator at CIIMAR: **Irene Martins**
Leader Institution: **CIIMAR**

Alongside the increasing trend on maritime transport, the number of ships carrying Hazardous and Noxious Substances (HNS) is growing steadily with more than 200 million tonnes of chemicals traded annually by tankers. Nonetheless, knowledge regarding ecological hazards caused by HNS is scarce, narrowing preparedness and suitable responses in case of accidents with HNS cargoes at sea. Bearing this in mind, MODELRISK numerical framework aims at developing end-to-end models of marine ecosystems, supported by ocean circulation models, capable of predicting ecological hazards caused by HNS maritime spills. Within MODELRISK, ecosystem models will be developed by incorporating physical characteristics, biogeochemical processes, and food web interactions of the habitats under study.

The existing HNS database will be augmented to include ecotoxicological dose descriptors for benthic organisms, as well as derived predicted no-effect concentrations (PNEC) for sediments. To derive the physical parameters and the HNS concentrations needed for the ecosystem models, an oceanographic circulation model will be implemented for the specific areas under study and, after the proper characterization of the hydrodynamic patterns, the circulation model solutions for the targeted domains will be extracted. These solutions will offline force a Lagrangian model to represent the main HNS transport patterns providing plumes' behaviour and maps of potential hotspots of accumulation. The interconnection between the three tools will allow to retrieve the relevant information regarding HNS characteristics and effects from the online HNS database, which will be used by the HNS dispersion models, which in turn will force the ecosystem models.

Due to their economic and ecological importance, seamounts and hydrothermal vents of the Azores Mid-Atlantic Region (NE Atlantic) will be selected as test case studies to implement and calibrate the MODELRISK framework. Several HNS spill scenarios will be run to account for Environmental Risk Assessment of the targeted ecosystems with the ultimate goal of providing support for decision-making and management by the competent authorities.

NATURE

TRANSNATIONAL INNOVATION & TECHNOLOGY

NATURE-BASED SOLUTIONS TO REDUCE ANTIBIOTICS, PATHOGENS AND ANTIMICROBIAL RESISTANCE IN AQUATIC ECOSYSTEMS

Principal Investigator at CIIMAR: **Marisa Almeida**
Leader Institution: **CSIC, Spain**
Website: **natureproject.eu**

This project will assess nature-based solutions (NBS) as management option for water treatment on the catchment scale.

An array of NBS including conventional and high-end constructed wetlands, river re-naturalization, and restoration of wetlands will cover the continuum from urban sources to coastal biota in estuaries.

We propose a comprehensive quantification of the fate of ABs, pathogens, and AMR in these systems together with ecotoxicological and human health assessments. NBS performance will be analyzed using multivariate modelling techniques to identify parameters with the greatest empirical influence on the attenuation of targeted pollutants.

The NATURE project will encompass three interconnected phases: An experimental phase in which the reduction of aquatic pollutants will be evaluated in NBS and compared with reference sites. In a data modelling phase, diagnostic indicators (indicative parameters from the first phase) will be identified for cost-effective future monitoring. In a risk assessment phase, the effect of aquatic pollutants on environment and human health will be evaluated, estimating its reduction due to NBS implementation.

The unique combination of advanced approaches from analytical chemistry, molecular microbiology, modelling and ecotoxicology will be of paramount importance for an accurate evaluation of NBS treatment performance. NATURE's key objective is to promote the sustainable and green attenuation of aquatic pollutants.

OPTIRAS

OPTIMIZATION OF THE CONTROL OF WATER QUALITY IN RECIRCULATING AQUACULTURE SYSTEMS

Principal Investigator at CIIMAR: **Alexandre Campos**
Leader Institution: **INL**
Website: **optiras.org**

Iceland Liechtenstein Norway grants

Recirculating aquaculture systems (RAS) have been developed for land-based production of sea and freshwater species. These systems are designed to provide high biomass production while reducing resource usage and maximizing control of operational parameters.

Therefore, Optimizing control and management of water treatment in RAS is of paramount importance as water is renewed at very low rates (≤10%/day). Removal of organic matter, microorganisms and problematic chemical species such as nitrite is performed by applying different steps of filtration, fatty acids or protein skimming, biological treatment and, sometimes, oxidation processes.

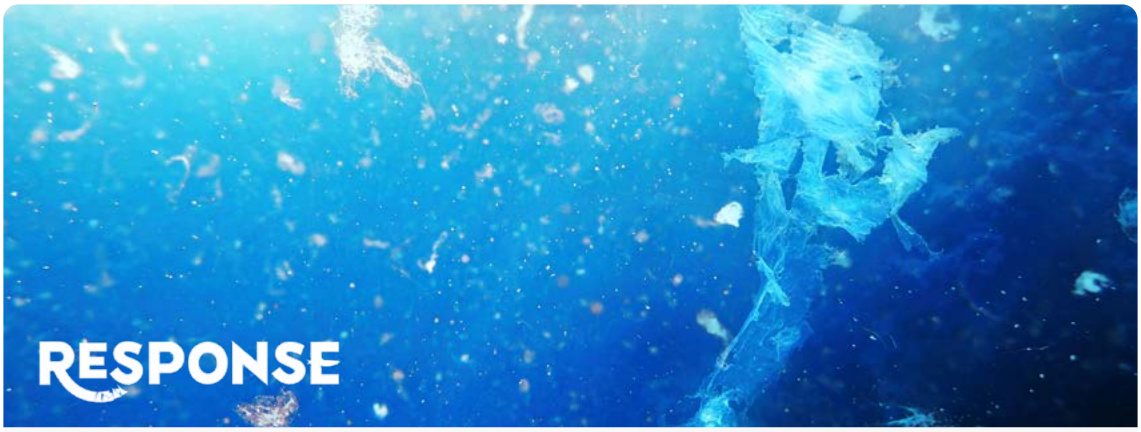
Among the later, application of ozone has been extensively used as a method to improve water quality to avoid the undesired effect of chemotherapeutants in aquaculture. However, residual ozone can affect various water chemistry parameters (formation of disinfection by-products from halogen anions present in seawater; iodide, chloride and, bromide) and other steps in the water treatment process (mainly biological treatment by disturbing microbial populations in biofilters) with important impacts on fish health and welfare.

The OPTIRAS project will tackle this issue in RAS systems, being the main objectives:

1. Investigate the changes in water chemical parameters, microbiome and physiology of fish in RAS;
2. Develop and deploy online monitoring systems for water chemical parameters relevant for the control of the water quality and the ozone demand;
3. Test the adequacy and impact of alternative water treatment processes on fish welfare status and water quality and
4. Demonstrate novel water quality control system in RAS pilots and improved cultivation protocols for diverse fish farming stages and species.

RESPONSE

TOWARD A RISK-BASE ASSESSMENT OF MICROPLASTIC POLLUTION IN MARINE ECOSYSTEMS



Principal Investigator at CIIMAR: **Lúcia Guilhermino**
Leader Institution: **Polytechnic University of Marche**
Website: **response-jpioceans.eu**

RESPONSE integrates expertise on oceanography, environmental chemistry, ecotoxicology, experimental ecology and modelling to answer key research questions on fate and biological effects of microplastics (MPs) and nanoplastics (NPs) in marine ecosystems.

Hydrological transport dynamics will identify possible accumulation zones in European coastal ecosystems, while characterization of vertical distribution of MPs and NPs in the water column and sediments will optimise practical monitoring and sampling efforts.

Links between oceanographic conditions, environmental distribution of MPs and NPs, trophic transfer and impact to pelagic food webs and benthic communities will be addressed by analysing their abundance and typologies in representative marine species, as well as relevant ecosystem functions and services. Innovative mesocosm and laboratory studies will validate weighting factors and toxicological thresholds for MPs and NPs.

The approach will assess the role of size, shape and other polymer characteristics in modulating biological effects of particles, both alone and in combination with other environmental stressors. A technological Smart Hub, combining complementary instrumental facilities and expertise of some partners and external companies, will support analytical needs of the consortium and further methodological developments.

The overall aim of RESPONSE is to develop a quantitative Weight Of Evidence (WOE) model for MPs and NPs in the marine environment. The model will be designed to integrate and differentially weight data from a suite of lines of evidence, including:

1. the presence of MPs and NPs in water column and sediments;
2. their bioavailability and bioaccumulation in key indicator species from benthic and planktonic communities;
3. sublethal effects measured via biomarkers;
4. the onset of chronic adverse effects at the organism level, and;
5. ecological functioning.

The results will provide support for development of MSFD monitoring strategies.

SIDESTREAM

SECONDARY BIO-PRODUCTION OF LOW TROPHIC ORGANISMS UTILIZING SIDE STREAMS FROM THE BLUE AND GREEN SECTORS TO PRODUCE NOVEL FEED INGREDIENTS

Principal Investigator at CIIMAR: **Luísa Valente**
Leader Institution: **Sintef - Fisheries and Aquaculture, Norway**
Website: **sidestream.info**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 817992.

To what extent is it possible to process and use nutrients from aquaculture and agriculture waste?

Which novel organisms and approaches are best suited?

Can these organisms serve as ingredients for feed stuff?

How suitable and safe are feed ingredients produced on waste?

What is the market potential and economic feasibility of feed ingredients produced following sustainable circular principles?

SIDESTREAM addresses these questions to push forward the frontier for production of high value compounds by utilization of low trophic marine invertebrates and bacteria, which will be reared on waste streams, following circular principles.

Several industries are in demand for high value compounds such as marineoriginated lipids, proteins and pigments such as astaxanthin. Omega-3 long-chain (≥C20) polyunsaturated fatty acids (ω3 LCPUFA) are marine lipids that are abundant in fish oils and fish meals ("marine ingredients").

Use of ω3 LC-PUFA in aquafeeds ensures both growth and health of farmed species and their nutritional value for consumers.

Aquaculture is by far the largest consumer of marine ingredients thus requiring novel high nutritional quality ingredients to critically ensure sustainable expansion. Additionally, there is a trend towards natural bioactive compounds such as astaxanthin as a natural bioactive stimulant (nutraceutical), which adds value to the resulting feed. SIDESTREAM partners have shown that polychaetes and crustaceans can produce ω3 LC-PUFA de novo. Such striking capacity will be exploited in SIDESTREAM.

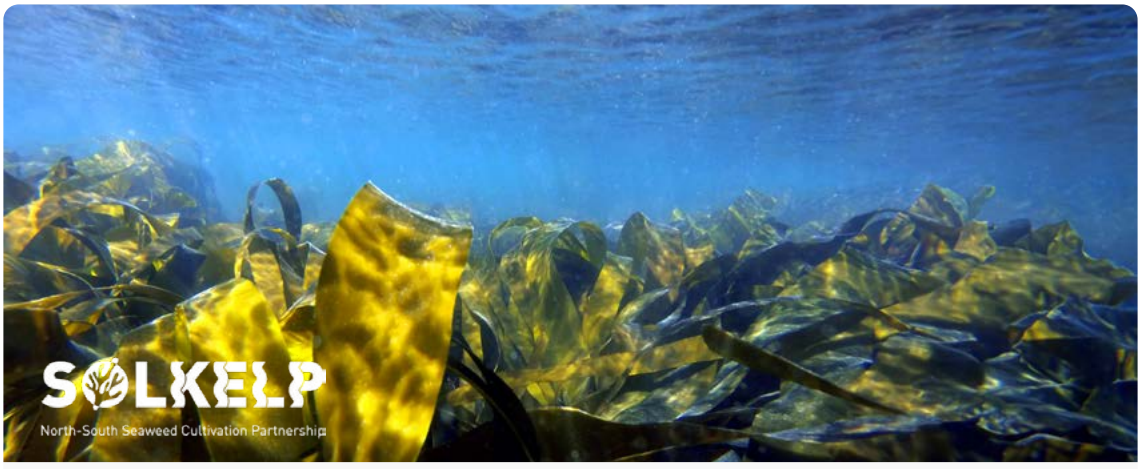
We will take side streams from aquaculture, agriculture and biogas sectors, and produce polychaetes and gammarids on the solid phase and bacterial astaxanthin on the liquid phase. Biomasses will be processed and tested as feed ingredients for fish and shrimp during all life stages.

SIDESTREAM cutting-edge approach will enable value creation from resources hitherto considered as waste, allowing for innovation and sustainable use in aquaculture.

SØLKELP

TRANSNATIONAL INNOVATION & TECHNOLOGY

NORTH-SOUTH SEAWEED CULTIVATION PARTNERSHIP



Principal Investigator at CIIMAR: **Isabel Sousa Pinto**
Leader Institution: **Algaplus**
Website: **solkelp.net**

Iceland Liechtenstein Norway grants

The cultivation of seaweed for food, fertiliser and as a raw material for the chemical industry has been a significant industry worth €9.3bn annually, with 30Mton of production volume in 2015 (half of which was used for human consumption). Production in Europe has been very low, while Asian countries produce currently 99% of the global annual production of this valuable resource. At the same time, efforts in improving the footprint of agriculture and promoting sustainable, healthy food production becomes increasingly important on the European policy agenda, which is reflected in particular through the Green Deal calls by the end of Horizon 2020, as well as the Horizon Europe work programme.

The highly sustainable and commercially promising low-trophic aquaculture in sea water, which does neither consume significant amounts of fresh water, nor fertilizer or feed, faces challenges with respect to economic feasibility and species and location availability for the expected massive growth in future.

The SølKelp project develops and implements innovative cultivation strategies with mutual relevance for both geographic ends and their leading SMEs, who can unlock a commercial head-start and sustained competitive advantage by jointly implementing the project. It therefore directly responds to the main call objective to “increase competitiveness and sustainability for Portuguese companies within the focus area of Blue Growth”.

SølKelp further aims to develop, apply, and commercialize innovative products and technologies, and fulfils the bilateral objective, by enhancing cooperation between Portuguese SME and R&D entities and a Norwegian SME.

SPONBIODIV

MARINE SPONGE BIODIVERSITY FROM GENES TO ECOSYSTEMS: DELIVERING KNOWLEDGE AND TOOLS FOR SUSTAINABLE MANAGEMENT AND CONSERVATION

Principal Investigator at CIIMAR: **Joana Xavier**
Leader Institution: **CIIMAR**
Website: **sponbiodiv.org/**

biodiversa+ European Biodiversity Partnership
Co-funded by the European Union
fct Fundação para a Ciência e a Tecnologia

Sponges (phylum Porifera) are widely distributed across the oceans and form highly-structured habitats (sponge grounds, gardens and reefs) that play key functional roles and deliver numerous ecosystems goods and services. They serve as habitat and nursery to numerous other species including commercially exploited fish, and bath sponges have been harvested for centuries for commercialization of their spongin skeleton, thus supporting local communities' livelihoods. They are also recognised as prolific sources of compounds with pharmacological potential, thereby providing additional societal and economic benefits to humankind. However, sponges and their habitats are increasingly threatened by human activities (e.g. fisheries, climate change, deep-sea mining, general pollution) in areas within and beyond national jurisdictions (EEZs, ABNJs). Despite significant advances in recent years, knowledge of their biodiversity, distribution, biology and ecology is still sparse and largely fragmentary. This gap in knowledge integration hampers their inclusion in conservation frameworks, compromising the establishment of ecologically representative, interconnected and resilient networks of protected areas, and consequently the achieving of biodiversity targets and commitments. SponBIODIV will use an interdisciplinary approach to build a common and enhanced knowledge base on the biodiversity, biogeography and connectivity patterns of sponges and sponge habitats across the Atlantic Ocean and Mediterranean Sea. The project is anchored on the establishment of a trans-European and pan-Atlantic network of research organizations that will engage with key stakeholders to co-produce, analyse, synthesise and co-deliver data, knowledge and tools in support of evidence-based policies for management and conservation of marine biodiversity, from coastal areas to open ocean and deep-sea ecosystems. Legacy samples and data available at partner institutions will be complemented with new ones collected through a multi-national survey on case study areas, selected along both environmental and spatial protection gradients, and further integrated with data available in public repositories. Using the latest biophysical and species distribution modelling techniques and genomic sequencing technologies, hotspots of sponge biodiversity, from genes to ecosystems, will be identified and the most significant ecological and evolutionary drivers of their distribution uncovered. Generated knowledge and tools will allow the design of conservation and monitoring strategies, and support the implementation of agreements and policies that will ensure a better management and protection of marine biodiversity, from national to European scales and beyond, in line with the global agenda for sustainable development and conservation of biodiversity.

CETUS

EDUCATION AND OUTREACH

CETACEAN MONITORING PROGRAMME IN THE EASTERN NORTH ATLANTIC

Principal Investigator at CIIMAR: **Mafalda Correia /Isabel Sousa Pinto**
Leader Institution: **CIIMAR**

CETUS Project started in 2012 with the aim of collecting cetacean occurrence data in the Eastern North Atlantic to study their distribution and habitat. At the moment, it is constituted by a small team of young researchers, each of them specialising in a topic of cetacean ecology but working together to produce integrated analyses and valuable results for cetacean conservation. Over time, CETUS Project has built solid collaborations from which they are eager to learn, apply their expertise in the CETUS study area, and investigate novel approaches to cetacean ecology.

Within CETUS, the following monitoring activities are ongoing:

- Visual monitoring, along long-transect routes, onboard large vessels used as platforms of opportunity. This is possible thanks to CETUS collaborations with Transinsular (a Portuguese shipping company), the Hydrographic Institute of the Portuguese Navy, and the Portuguese Institute for Sea and Atmosphere – IPMA. These collaborations allow the collection of cetacean occurrence data in a wide range area, between principalland Portugal and the Macaronesian archipelagos, covering offshore waters.

- "Botos da Foz": a visual land-based monitoring programme at the mouth of Douro River (Porto, Portugal), in which the focus species is the endangered harbour porpoise (Phocoena phocoena).

The CETUS team also participates in dedicated cetacean monitoring campaigns, in the scope of other CIIMAR projects, during which data on cetacean occurrence, photo-ID, blow samples, biopsies, environmental DNA and acoustic recordings are collected off the northern coast of Continental Portugal. Furthermore, CETUS Project assumes an active role in environmental education by giving talks in schools and universities, organising cetacean-related workshops/courses, supervising students (bachelor's, master's and doctoral degrees) and integrating them in monitoring activities, providing hands-on experience to the interns.

OCEANCLASS

EDUCATION AND OUTREACH

FROM THE OCEAN TO THE CLASSROOM

Principal Investigator at CIIMAR: **Laura Guimarães**
Leader Institution: **CIIMAR**

Iceland Liechtenstein Norway grants

Increasing Ocean Literacy (OL) was identified as essential to enable ocean protection, in the short and long term, reversing its accelerated degradation and stimulating the blue economy. In Portugal, the Blue School is an OL program of Ministry of the Sea, which encourages schools and their teachers to work the Ocean in a formal (classroom) and non-formal context. However, the blue schools show a tendency to work the ocean outside the classroom, in approaches little focused on scientific knowledge about the ocean.

There is also a very limited work of the ocean in the classroom by basic schools in general, including those in the countryside (with less adherence to the Blue School). This stems from the lack of up-to-date scientific knowledge by teachers and resources they can easily fit into students' curricular needs.

The OceanClass project aims to develop a handbook of scientific contents about the ocean and practical activities to support teachers in the classroom.

The handbook is aimed at teachers from the Blue Schools and basic education in general, covering the first three basic learning cycles.

The project team is composed of researchers with experience in training for OL, and will develop the OceanClass with teachers and students from three Northern Portuguese schools.

The project includes holding training workshops on OL for teachers and students and ocean science days for the public. For its objectives, OceanClass contributes to UNESCO's SDG 4 (Quality Education), SDG 14 (Protect Marine Life) and SDG 17 (Partnerships for the Goals).

PONDS WITH LIFE

EDUCATION AND OUTREACH

CHARCOS COM VIDA

Principal Investigator at CIIMAR: **José Teixeira**
Leader Institution: **CIIMAR**
Website: **charcoscomvida.pt**

"Ponds with Life" ("Charcos com Vida") is a science communication and pond conservation campaign that aims to contribute to raise public awareness about these important and threatened freshwater habitats, and to promote the observation and contact with its unknown biodiversity.

Different entities are able to join the campaign, such as schools (from primary to high schools), NGO's, environmental education centres, municipalities, scouts organizations and other public and private institutions.

The campaign encourages the inventory, adoption, construction, conservation and pedagogical exploration of ponds and its biodiversity.

Our team develop numerous activities in school upon requesting, such as pond construction and exploration or talks, but entities are also inspired to perform autonomous activities using the available resources at our website.

The website contains relevant information regarding the project functioning, proposed pedagogical activities, species information and identification (aquatic plants, macro invertebrates, amphibians, reptiles, birds and mammals species most probable to find near ponds).

There is also valuable information for pond creation, designing, planning, construction and management.

OTHER NATIONAL R&D PROJECTS

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
ADAPTALENTEJO	Predicting ecosystem-level responses to climate change	Francisco Arenas U. Évora
AQUAVIP	Unraveling the role of viperin in the trout and turbot antiviral responses	Marina Machado CIIMAR
ATLANTIDA	Platform for the monitoring of the North Atlantic ocean and tools for the sustainable exploitation of the marine resources	Vitor Vasconcelos U. Porto
BASSINCELLS	European seaBASS immune intestinal CELLS - development of in vitro cell culture model for evaluation of phagocytic and immune activity of intestinal cells	Sónia Gomes CIIMAR
BEESNESS	Diversity and dynamics of Atlantic bee resources in relation to climate and pesticide load: data for pollination management and sustainable agriculture	Laura Guimarães CIIMAR
CHLOROPYLL	Hydroxypheophorbide compounds, methods and uses thereof	Ralph Urbatza CIIMAR
CONNECT2OCEANS	Connecting Atlantic and Arctic Oceans to decipher climate change impact on plankton microbiome functions	Catarina Magalhães CIIMAR
CONTRIBUT	Conversion of dietary tributyrin in rainbow trout	Leonardo Magnoni U. Coimbra
CYAMOEBA	Chemical-mediated interactions between cyanobacteria and amoebae	Ana Rebelo Vieira CIIMAR
CYANOBOX	Beta-oxidation in cyanobacteria	Sandra Figueiredo CIIMAR

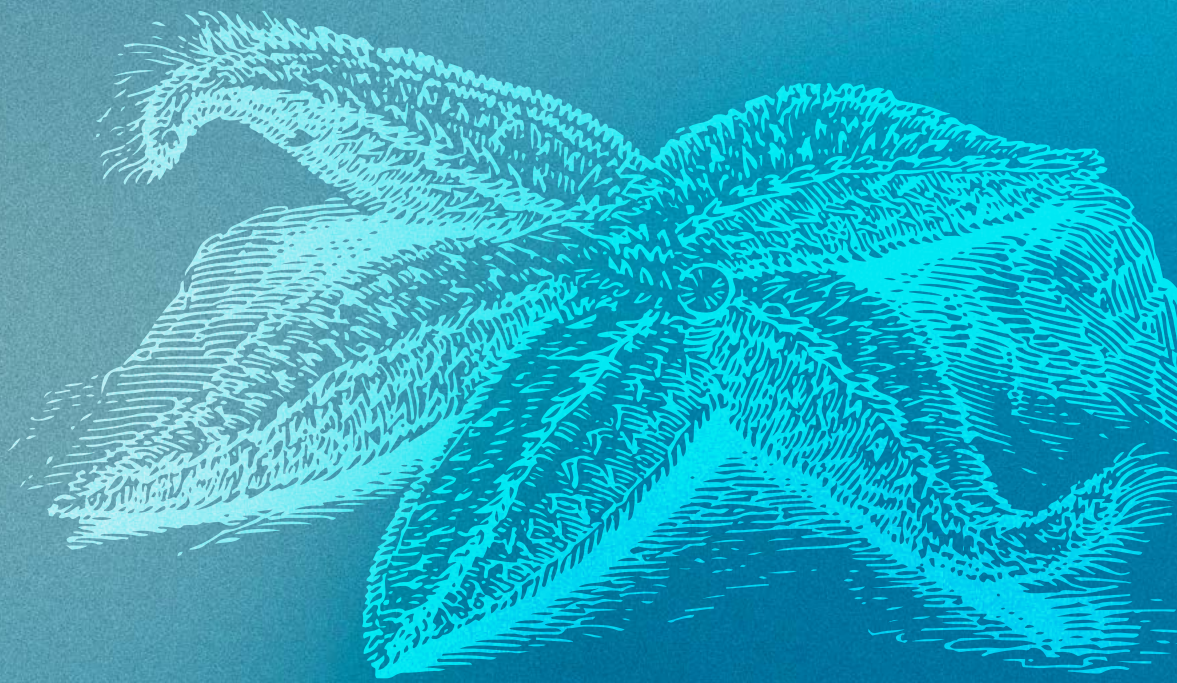
PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
DEEPBASELINE	Co-creating a knowledge baseline on the diversity and distribution of sponge and coral vulnerable marine ecosystems of the Portuguese continental shelf	Joana Xavier CIIMAR
DEEPRESIST	Metal impacts on the resistance and denitrification transcriptome of deep-sea model bacteria	Miguel Semedo CIIMAR
DEEPRISK	Deep-sea mining and climate change: new modeling tools in support of Environmental risk management	Luísa Bastos FCUP
EDGEOMICS	Freshwater Bilvalves at the edge: Adaptation genomics under climate-change scenarios	Elsa Froufe CIIMAR
EMINENT	Emergent interactive effects of climate change and contaminants	Miguel Santos IPMA
EXTRATOTECA	Microalgae extracts with high added value	Vitor Vasconcelos A4F, Alga Fuel, S.A.
FEEL	Fighting illegal trade of glass-eel, *Anguilla anguilla*: Chemical weapons	Carlos Antunes CIIMAR
IMMUNAA	Methionine and tryptophan as nutraceutical strategies to improve mucosal immunity and vaccine efficiency in fish	Benjamin Costas Refojos CIIMAR
IMMUNOSENS	Biomarkers of health and performance in aquacultured fish: the application of antibody based biosensors	Gregorio Molés CIIMAR
INSECTERA	The age of the insect industry	Luísa Valente INGREDIENT ODYSSEY, S.A.
LEGATEE	Parental immune priming and in ovo delivery of immunostimulants applied to aquaculture of fish larvae	Ana Rocha CIIMAR
MAGAL	Magal Constellation - Setting the cornerstone of a future ocean and climate change monitoring constellation, based on radar altimeter data combined with gravity and ocean temperature and salinity measurements	Clara Lázaro EFACEC Energia

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
MAPS	Measurements and modeling of the atmospheric and oceanic boundary layers at the northern Antarctic Peninsula during the Year of Polar Prediction Special observing periods	Irina Gorodetskaya CIIMAR
MARINA-FORESTS	Improving the ecological state of marinas by using animal forests as nature-based solution	Purificación Veiga CIIMAR
MB4AQUA	Macroalgae Biorefinery: a novel approach to produce sustainable feedstuffs and functional additives towards low carbon footprint aquafeeds	Helena Peres CIIMAR
MIRRI-PT-POLO NORTE	Northern node of the Portuguese Microbial Resource Research Infrastructure	Vitor Vasconcelos U. Minho
MIWAVES	Modelling Internal solitary WAVES off the Portuguese coast	Jorge Magalhães CIIMAR
MULTI-CRASH	Multi-dimensional ecological cascades triggered by an invasive species in pristine habitats	Ester Dias U. Minho
N-MICROARCTIC	Nitrogen Microbiome in the Changing Arctic	Catarina Magalhães CIIMAR
NANOPLANET	Nanoplastics toxicity assessment: from gene to personality	Alexandre Campos U. Aveiro
NIAF	Sustainable antifouling agents: from grape wastes to the sea with the green chemistry leading the way	Marta Correira da Silva CIIMAR
NOSTRESS	Novel functional foods for reducing stress effects in aquaculture	Benjamin Costas Refojos Sparos Lda.
OCEAN3R	Reduce pressures, restore and regenerate the NW-Portuguese ocean and waters	Ana Paula Mucha CIIMAR
OCEANLOG	Atlantic-wide long-term collaborative temperature and biodiversity observation network	Francisco Arenas Associação BIOPOLIS

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
PBA	Blue Bioeconomy Pact	Vitor Vasconcelos INOVAMAR, S.A.
PERMAMERC	Mercury biogeochemistry, fate and impact in permafrost thaw ecosystems	Catarina Magalhães IST-ID
PERSEAVE	An omics multisensory perspective, how can human activities affect the sensory organs of deep-sea fish?	David Barros CIIMAR
POSEIDON	Damage prediction and design of scour protections in complex foundations for marine renewable energy	Tiago Ferradosa CIIMAR
PROBIOVACCINE	Probiotics as novel platforms of oral vaccines for Aquaculture	Cláudia Serra CIIMAR
PROPELLER	Investigation of a new class of beta-propeller enzymes	Pedro Leão CIIMAR
PROZYME	Novel probiotics isolated from fish gut microbiota for improving insect meal utilization, gut health and disease resistance of carnivorous fish species	Paula Enes CIIMAR
PT-OPENSCREEN	National Infrastructure for Chemical Biology and Genetics	Ralph Urbatza IBMC
SARDINOMICS	Assessing pre-exploitation baseline numbers and population dynamics of the European sardine *Sardina pilchardus Walbaum*, 1792 using palaeogenomics	Paula Campos CIIMAR
SEA ANTIMICROBIALS	Pyrazino [1,2-B]Quinazoline-3,6-Diones derivatives, their Production and uses thereof	Emília Sousa CIIMAR
SEPIS4ENVIRONM	Siderophore efflux pump inhibitors (SEPIs) conjugates: A new concept for environmental problems	Diana Resende CIIMAR
TRANSEPIC	Exploring Transgenerational Epigenetic Inheritance: New Methods and Strategies to Improve Environmental Hazard and Risk Assessment of Key Contaminants of Emerging Concern (CECs)	Teresa Neuparth CIIMAR
	Mites associated with Red Palm Weevil (RPW; *Rhynchophorus ferrugineus* O.) in Portugal and recombinant anti-RPW endophytic bacteria	Camilo Pardo CIIMAR

NETWORKING AND ENTREPRENEURSHIP

CIIMAR ACTIVITY
REPORT 2023



COLLABORATIVE & NETWORKS

CIIMAR 2023

AIR CENTRE

The scope is large – the whole Atlantic Basin – and the ambition is high: promote the voice of the Atlantic by the fair cooperation between national and regional organizations that share a common commitment to the Ocean and to their communities.

elixir

ELIXIR is an European intergovernmental organisation that brings together life science resources from across Europe. These resources include databases, software tools, training materials, cloud storage and supercomputers.

EMBRC EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

The European Marine Biological Resource Centre (EMBRC) is Europe's 'research infrastructure' for marine biological resources. We 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.

emso® ERIC

The European Multidisciplinary Seafloor and water column Observatory (EMSO) aims to explore the oceans, to gain a better understanding of phenomena happening within and below them, and to explain the critical role that these phenomena play in the broader Earth systems.

MIRRI MICROBIAL RESOURCE RESEARCH INFRASTRUCTURE ERIC
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

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.

eu:openscreen

EU-OPENSCREEN integrates high-capacity screening platforms throughout Europe. These platforms use several specially selected EU-OPENSCREEN compound collections, which are centrally stored and managed at the EU-OPENSCREEN laboratory facility on the Research-Campus Berlin-Buch (Germany).

ENTREPRENEURSHIP

CIIMAR 2023

ALGAplus has been dedicated since 2012 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 the 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.

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 technical knowledge on Cell-Based protein production. Our goal is to democratize access to new proteins and fibres 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.

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's headquarters in the metropolitan area of Porto, Portugal, a bustling hub for algal technology.

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

inclitaseaweedsolutions.com

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