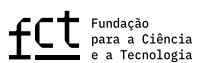


ACTIVITY REPORT

CIIMAR 2022





Fundação
para a Ciência
e a Tecnologia



REPÚBLICA
PORTUGUESA

This research was partially supported by
the Strategic Funding UIDB/04423/2020
and UIDP/04423/2020 through national
funds provided by FCT.

ACTIVITY REPORT

CIIMAR 2022



CIIMAR

WORKING AT THE FRONTIER OF OCEAN
KNOWLEDGE AND INNOVATION



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MESSAGE FROM THE BOARD

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



The year of 2022 was a turning point in relation to the covid19 pandemic.

The board of CIIMAR wants to thank all of our members for the outstanding behaviour during this period that allowed us to keep our laboratories, technical and administrative services working all the time and no outbreak was registered in CIIMAR premises.

In 2022, we increased the trend of attracting national and international funds from the approval of new projects, including a major success in the new Horizon Europe programme with 12 projects approved with a total budget of 4.4M euros, being CIIMAR the lead institution of 4 of them. In 2022, the sum of the 125 projects in implementation in CIIMAR raised to 33.1M euros, excluding the strategic FCT funding of CIIMAR and CIMAR-LA. CIIMAR achieved a good success in terms of the PRR call, being part of a major consortium – Blue Bioeconomy Pact led by INOVAMAR S.A., with a total of 83 entities from the academic, scientific and industry fields with a total budget of 6.3M euros to CIIMAR.

We continued to increase the organization of advanced courses such as Cal-Aqua, R courses, underwater photography, ecological modelling, 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 3rd edition of the Blue Think Conference organized by the PhD students of CIIMAR.

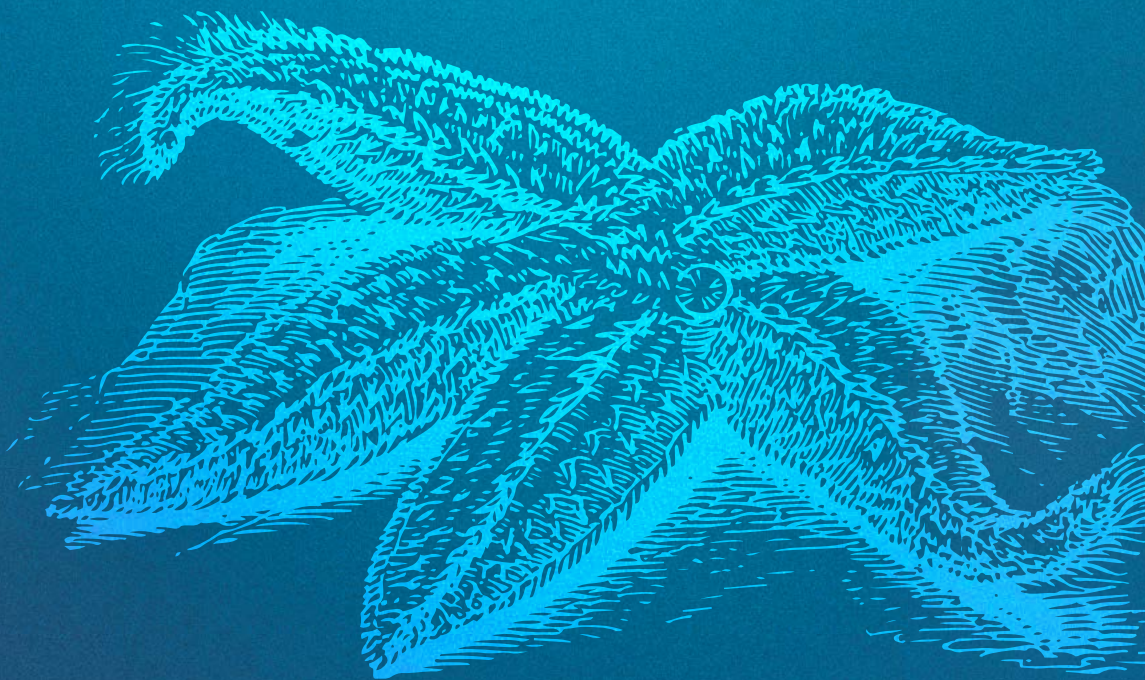
CIIMAR members published 557 papers in internationally peer-reviewed journals and successfully contributed to the graduation of 24 PhD and 88 MSc students. In 2022, 3 provisional patent applications were submitted, of a total of 23 patents submitted by CIIMAR members in the last 7 years, reflecting the increasing impact of our research and the success of the implementation of the measures to increase the technology transfer.

CIIMAR outreach activities in 2022 were highly significant and impactful, achieving their highest numbers since the creation of the Centre. We received coverage in 568 news items (online, TV, radio, and print), and welcomed 69 visits to our facilities, including the Open Day in September. In total, these efforts reached more than 150,000 people, demonstrating the broad reach and impact of our work.

CIIMAR in 2023 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 taking 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.

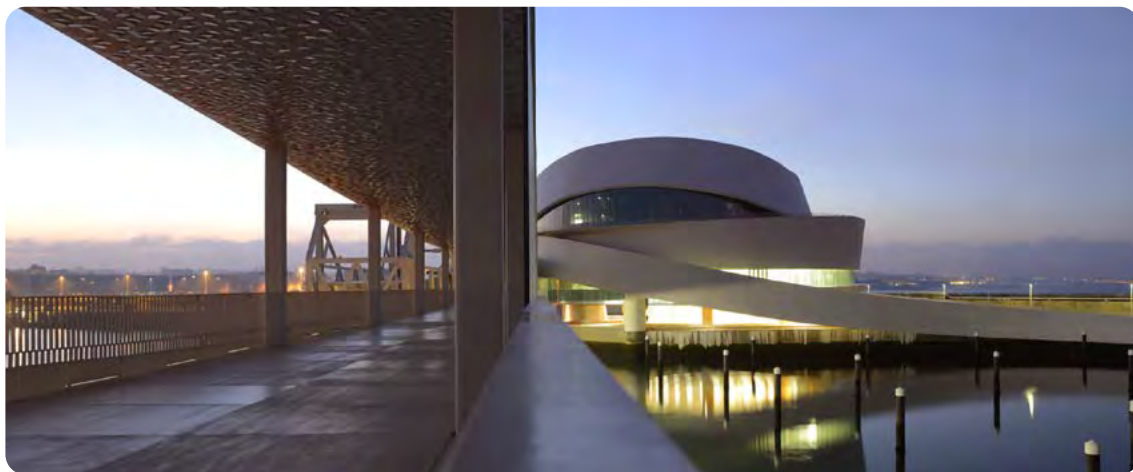
ABOUT CIIMAR

CIIMAR ACTIVITY
REPORT 2022



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 (EMBRG-ERIC), European Multidisciplinary Sea Floor and Water Column Observatory (EMSO-ERIC), MIRRI-PT, BioData.PT and OPENSREEN-PT, as part of the technology transfer strategy of the Centre fostering collaborations with the industry.



SCIENCE AND SOCIETY

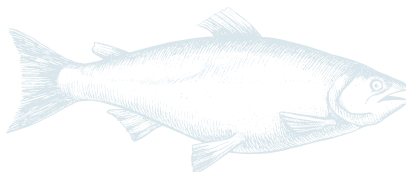
CIIMAR has an extensive Science Communication Programme addressed to all society sectors. In 2022, CIIMAR outreach activities had a direct impact on more than 150,000 people, including students from various educational levels, teachers and other audiences. CIIMAR developed a range of activities mostly dedicated to schools, with a special emphasis to the collaboration protocols with “Clubes Ciência Viva”. In addition, CIIMAR continuously developed weekly seminars dedicated to science dissemination and provided a number of public lectures and debates, in particular under the Serralves Foundation Protocol. CIIMAR enriched communication with society by an extensive media outreach through the main media channels, including press and social media.

The exhibition “Marine Monsters”, made in collaboration with the artist Ricardo NicDealm, together with the traveling exhibition “Plastic Sea”, about Ocean plastic pollution, were presented in Sintra, Gondomar and Vila do Conde.

CIIMAR is also responsible for the scientific management of two Environmental Monitoring and Interpretation Centres (CMIA) through cooperation protocols with the City Councils of Vila do Conde and Matosinhos.

SOCIAL ORGANS

THE CURRENT SOCIAL ORGANS:



GENERAL ASSEMBLY



PRESIDENT
Eduardo Rocha

CHAIRS

Aires Oliva Teles
Francisco Taveira Pinto
Carlos Vale
Susana Moreira

BOARD



PRESIDENT
Vítor Vasconcelos

BOARD MEMBERS

Ana Paula Mucha
Isabel Sousa Pinto
Luísa Valente
Rodrigo Ozorio

FISCAL COUNCIL



PRESIDENT
Luísa Bastos

MEMBERS

Paulo Rosa Santos
Helena Peres

RESEARCH

THE CENTRE IS SCIENTIFICALLY ORGANIZED
IN THREE MAIN RESEARCH LINES



MARINE BIOTECHNOLOGY

Research is focused on the exploration of a wealth 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. Vitor Vasconcelos



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. Work is done in close collaboration with SMEs, international and local authorities, and stakeholders.

P.I. Lúcia Guilhermino



BIOLOGY, AQUACULTURE AND SEAFOOD QUALITY

Development of new aquaculture species, products, and innovative culture methods are central approaches to tackle societal challenges related to human nutrition and seafood quality. High impact scientific knowledge and innovation in these areas are provided through basic and applied research and transferred to end-users and the industry.

P.I. Luísa Valente



RESEARCH LINE

RESEARCH TEAMS

MARINE BIOTECHNOLOGY

BIOREMEDIATION AND ECOSYSTEMS FUNCTIONING

BLUE BIOTECHNOLOGY AND ECOTOXICOLOGY

CHEMISTRY AND BIOLOGICAL ACTIVITY OF MARINE NATURAL PRODUCTS

CYANOBACTERIAL NATURAL PRODUCTS

EMERGENT BIOTECHNOLOGIES AND SEAFOOD PROCESSING

ENVIRONMENTAL CHEMISTRY AND RECOVERY

EVOLUTIONARY GENOMICS AND BIOINFORMATICS

MEDICINAL CHEMISTRY: DRUG DISCOVERY AND DRUG DESIGN

MICROBIAL BIODEGRADATION AND BIOPROSPECTION

**GLOBAL CHANGES
AND ECOSYSTEMS SERVICES**

AQUATIC ECOLOGY AND EVOLUTION

BENTHIC ECOLOGY

COASTAL AND OCEAN DYNAMICS

COASTAL MARINE ENVIRONMENTAL TOXICOLOGY

COASTAL BIODIVERSITY

COASTAL MONITORING AND MANAGEMENT

CONTAMINANT PATHWAYS AND INTERACTIONS WITH MARINE ORGANISMS

DEEP SEA BIODIVERSITY AND CONSERVATION

ECOTOXICOLOGY, STRESS ECOLOGY AND ENVIRONMENTAL HEALTH

ENDOCRINE DISRUPTORS AND EMERGING CONTAMINANTS

ESTUARINE ECOLOGY AND BIOLOGICAL INVASIONS

HYDROBIOLOGY

LAW OF THE SEA

MARINE ECOSYSTEM MODELLING

MARINE ENERGY

MICROBIOME ECOLOGY AND BIOGEOCHEMISTRY

SOIL/WATER INTERACTIONS

SUSTAINABILITY AND SOCIAL AND EDUCATIONAL INNOVATION

WATER RESOURCES SYSTEMS

**BIOLOGY, AQUACULTURE
AND SEAFOOD QUALITY**

ANIMAL GENETICS AND EVOLUTION

ANIMAL HEALTH AND AQUACULTURE

ANIMAL PATHOLOGY

ECOPHYSIOLOGY

HISTOMORPHOLOGY, PATHOPHYSIOLOGY AND APPLIED TOXICOLOGY

NUTRITION AND IMMUNOBIOLOGY

NUTRITION, GROWTH AND QUALITY OF FISH

SAFE AND HEALTHY SEAFOOD AND SUSTAINABLE CONSUMPTION

TECHNOLOGY PLATFORMS



CIIMAR Platforms developed under various European Research Infrastructure Networks (e.g. EMBRC, EMSO, MIR-RI-PT, OPENSREEN-PT, Bio.Data) 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)

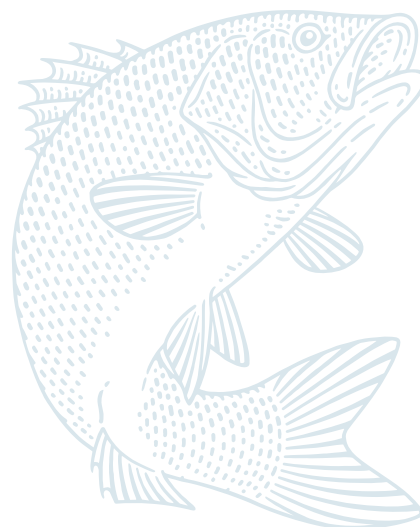
AQUATIC SCIENCES – BIOLOGY AND ECOLOGY

BIOLOGY

ENVIRONMENTAL TOXICOLOGY AND 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



The CIIMAR mission and scope of action are in line with several UN Sustainable Development Goals, by developing advanced and applied research in many key societal areas, in particular:



The adoption of environmental and social responsibility best practices allows the improvement of CIIMAR performance and obtain different benefits, such as:

- Operational optimization and efficiency
- Dematerialization of processes
- Reduction of natural resources consumption, and of its cost
- Pollution and environmental impact decrease
- Reinforced culture of environmental responsibility
- Motivation of employees
- Appreciation by the local community and other stakeholders.

ENVIRONMENTAL RESPONSIBILITY

In 2022 CIIMAR GreenLab initiative was created with the objective of raising awareness and improve the sustainability among CIIMAR and its members.

Under this initiative, CIIMAR collected and delivered a total of 594,50 kg of residual cardboard to the Portuguese Federation of Food Banks Against Hunger. The value obtained from the sale to recycling systems allowed to purchase basic food products (3kg of canned tuna, 7 l of olive oil; 23 l of milk), distributed locally to the Association of Retired Fishermen of the Port of Leixões.

Driven by the fact that plastic from the lab cannot be recycled, CIIMAR GreenLab initiated a campaign with Precious Plastic Portugal, where around 10 kg of plastic boxes for micropipettes tips were used to produce various plastic objects for long term use at CIIMAR labs, such as clipboards for use during fieldtrips.

CIIMAR switched the defective bathrooms taps with a more effective option. The older taps wasted around 3 l of water per click, while the new taps use only around 0,5 l per click, allowing to save thousands of litres of water per year.

CIIMAR keeps in progress the campaign “Stop the Plastic Tide!” to decrease the use of single-use plastics in the common spaces, office space and in the laboratories.

CIIMAR also has a strong social commitment to increase environmental literacy and education. CIIMAR promotes a broad educational programme and campaigns, such as the Ocean Action and Ponds with Life, with numerous

activities, including scientific lectures and practical activities with schools, beach cleanings, pond creation, field activities and travelling exhibitions, as well as dedicated social media campaigns, seminars, a science communication podcast and a strong relationship with the media press.

SOCIAL RESPONSIBILITY

In addition to complying with the applicable general legislation, CIIMAR adheres to fundamental ethical practices and principles recognized and appropriate to its area of activity such as the European Code of Conduct for Research Integrity and ISO 9001/2015 certification – quality management system.

CIIMAR is a signatory to the Transparency Agreement on Animal Research in Portugal and complies with the legal and animal welfare standards for the use of animals for experimental or educational purposes, reviewed by ORBEA and the Directorate General for Food and Veterinary Medicine.

CIIMAR actively promotes a non-discrimination policy, producing in 2022 the “Code of Conduct, Prevention and Combating of Harassment at Work” and the “Gender Equality Plan”.

CIIMAR also fosters the professional and personal appreciation of all its members and participates regularly in social solidarity campaigns, e.g. collecting food and other goods for social solidarity institutions.



2022 AT A GLANCE

Premiere of the podcast
"Sem Espinhas"

Expedition to study deep
sea habitats off Sierra
Leone coast

New season of
"Conversations with Science"
with Serralves Foundation

Launch of Aquacell project

Board of CIIMAR starts
a new 3 year cycle

CIIMAR 22nd anniversary event

"Mangroves: a coastal
treasure" exhibition at
CMIA Vila do Conde

Two CIIMAR awards at Ideias
Hidrodinâmicas competition

Seven CIIMAR researchers at
research.com scientist ranking

CIIMAR at National Science
Show 2022

Inclita Seaweed Solutions:
the first spin-off from CIIMAR

Participation in the pollution
combat exercise "ATLANTIC
POLEX.PT 2022", by the National
Maritime Authority

CIIMAR student (Patrícia Cunha)
distinguished at the IJUP 2022

Marine Energy Team awarded
with a Halcrow Prize

BLUEFORESTING project kick-off

"Marine Monsters" and "Plastic
Sea" exhibitions at CEA Gondomar

Two new CIIMAR teams: Marine
Ecosystem Modelling and Microbial
Biodegradation and Bioprospection

JAN

MAR

MAY

FEB

APR

JUN

Launch of the 1st CIIMAR
Scientific Photo Contest

Launch of BIOSYSMO project

CIIMAR team decodes the
Mackerel genome

BlueBioLab final event

Tiago Ferradosa wins JMSE
Young Investigator award

CIIMAR expedition to the
Chichonal volcano in Mexico

HIPERSEA campaign tests
at deep sea

Course "Video editing: the
art of telling a story"

Ponds with Life teachers
training course

Launch of Leixões Blue Hub

OCEAN3R Meeting

Ocean Action Project received
an Honorable Mention at the
Green Awards

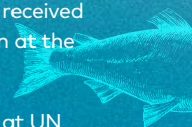
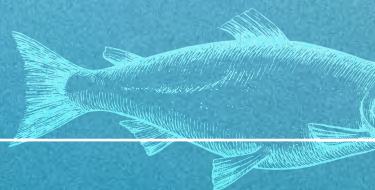
CIIMAR participation at UN
Ocean Conference and One
Sustainable Ocean

PROAQUA awarded by
BIP PROOF

"Wiki Loves Earth" exhibition
at Cascais Seawall and Porto
Botanical Garden

UNESCO Chair awarded on
Ocean Research and Literacy

Launch of Gender Equality
Plan of CIIMAR



Diogo Alexandrino wins
Alfredo da Silva Research
Award

FEEDMI Project Final
Workshop

Six CIIMAR researchers
distinguished by the Mirpuri
Foundation Ocean Award

Catarina Guedes wins Impact
Hub Lisbon 2022

Launch of the 9th edition BYT
(Blue Young Talent) and 4th
edition BYTplus

CIIMAR team in the 3th place
of BIP (Business Ignition
Program)

CIIMAR External Advisory
Committee visit

CIIMAR Open Day 2022

Launch of CIIMAR's
Educational Offer 2022/2023

CIIMAR Annual Meeting

3rd Edition of the Blue Think
Conference

World Clean-up day
celebrated with a beach
cleaning (Maelstrom)

CIIMAR researchers
among the most cited in
the world in 2021

Atlantida Project Meeting

SAFE and GRINNAQUA
projects kick-off

Poster awarded at ICWS2022

CIIMAR at Blackseconnect |
Marine Litter Action Forum

Launch of Code of good
conduct for preventing and
combating harassment at
work

JUL

SEP

NOV

AGO

OCT

DEZ

CIIMAR researcher aboard
of NOAA Okeanos Explorer

CIIMAR GreenLab
collaboration with Precious
Plastic Portugal

Impact of heat waves in
the Mediterranean Sea
biodiversity highlighted by
CIIMAR researchers

Annual Conference of
UTAUSTIN Portugal at CIIMAR

Inclita Seaweed Solutions
Spin-off awarded at BluAct
competition

FutureMARES project kick-off

Two CIIMAR teams at the
#BlueBioValueIdeation

7th GelAvista Meeting

New CIIMAR team: Microbiome
Ecology and Biogeochemistry

II LIPOR BioBlitz organized
by CIIMAR

1st Edition of the Underwater
Photography Course

IGNITION project kick-off

21st CAL-AQUA - Laboratory
Aquatic Animal Science
Course



HIGHLIGHTS

INCLITA SPIN OFF

ISS - Inclita Seaweed Solutions is the first spin-off of CIIMAR, a marine biotechnology company dedicated to the development of functional ingredients based on seaweed extracts for the cosmetic, nutraceutical and petceutical industries. In 2022, ISS won Impact Hub Lisbon and the 2nd prize in the #BluAct program.



UNESCO OCEAN EXPERT CHAIR

The Chair “Ocean Expert - Science Education of Children for Ocean Stewardship: in Support of the Sustainable Ocean Economy” was awarded to the University of Porto, following an application submitted by CIIMAR. The chair acts as a partnership tool with UNESCO to promote an integrated system of research, training, information and documentation on Ocean science education, Ocean literacy and sustainable economy of marine resources.



UN OCEAN CONFERENCE

CIIMAR representatives joined the United Nations Ocean Conference under the slogan “Save the Oceans, Protect the Future”, where scientists, policy makers, NGOs, companies and activists from around the world gathered in Lisbon for a week-long conference that called for action for the oceans and urged world leaders for solutions to reverse the decline in ocean health.

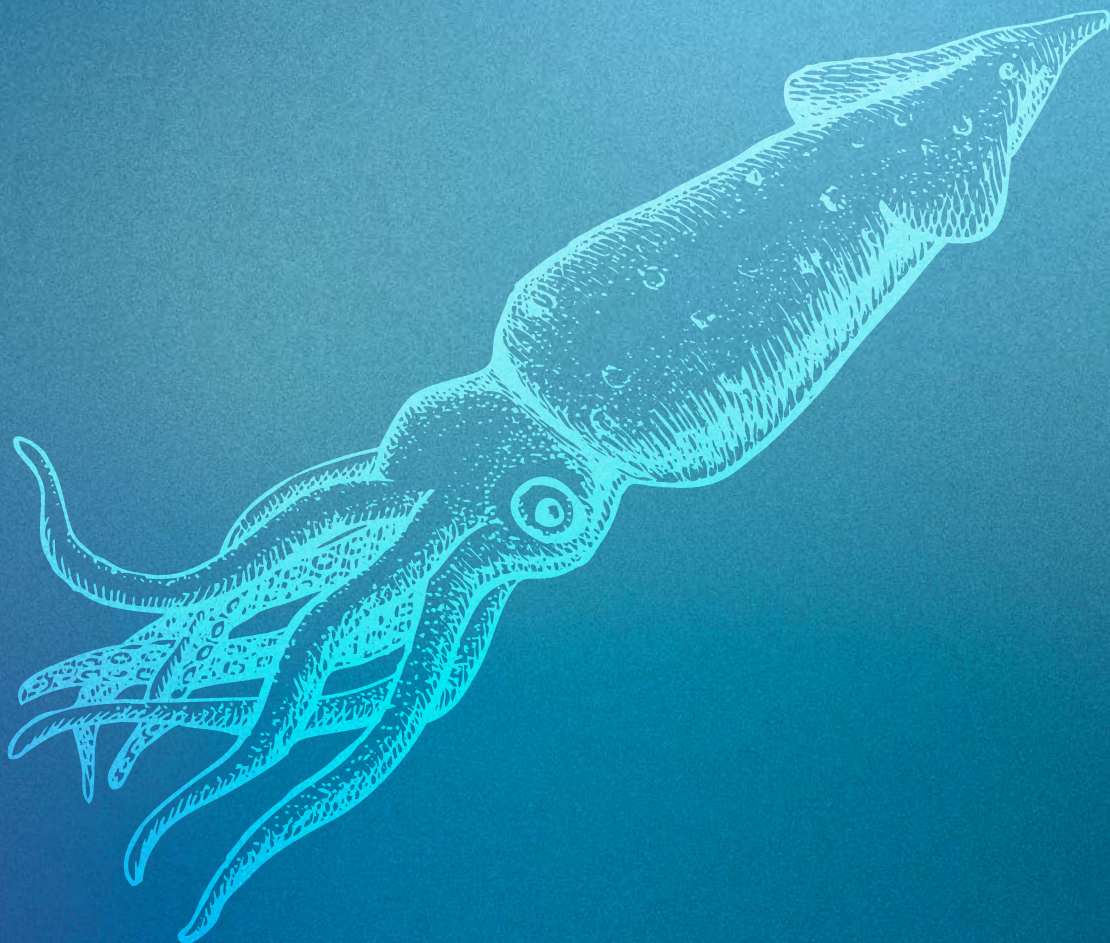
WIKI LOVES EARTH EXHIBITION

CIIMAR was part of the organization of the photographic contest “Wiki Loves Portugal” and the exhibition “Wiki Loves Earth”, which celebrates the biodiversity of Portugal and the planet. The exhibition was displayed in large format photographs in different public spaces (Cascais Seawall, Porto Botanical Garden and Leixões Cruise Terminal Seawall) with more than 75,000 visitors.



FACTS & FIGURES

CIIMAR ACTIVITY
REPORT 2022

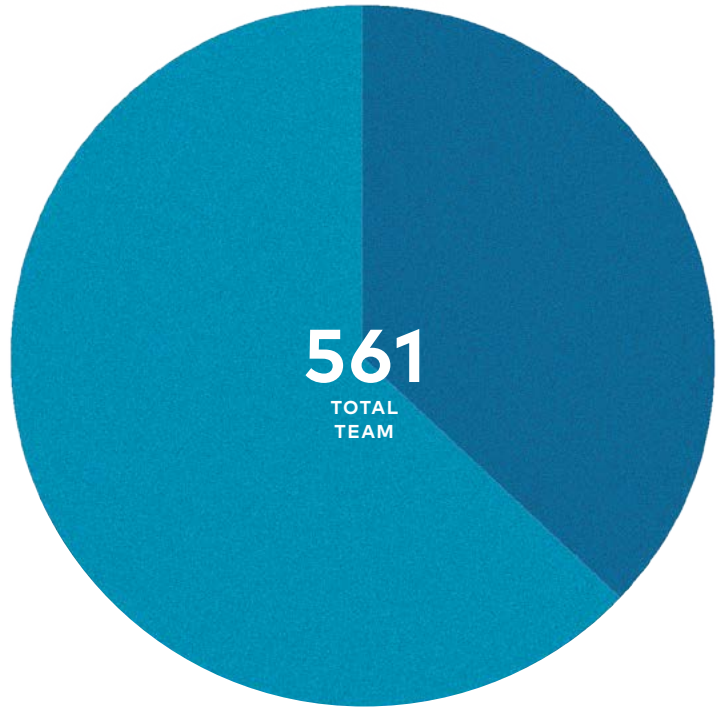


OUR TEAM

CIIMAR 2022

208 Integrated
PhD holders

353 Non-PhD
holders



Integrated PhD holders

Investigators

98

Professors

58

Post Doctoral Fellows

5

Supporting Offices and Services

6

Lab Technicians

6

Other Professional Situations

35

Non PhD holders

PhD Students

144

Msc Students

88

Research Fellows

34

Supporting Offices and Services

32

Lab Technicians

11

Other Professional Situations

44



237

Male



324

Female



32

Nationalities



38

Supporting offices
and services

SCIENTIFIC PUBLICATIONS

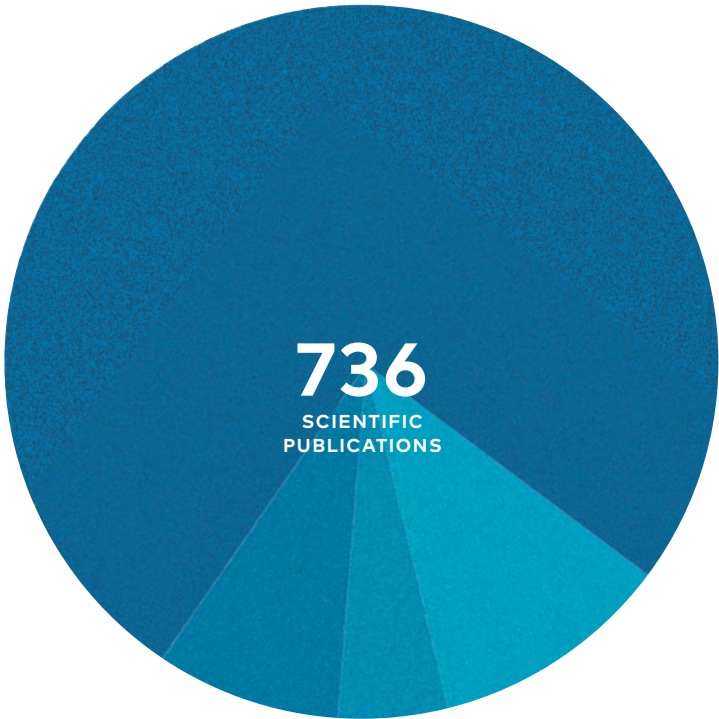
CIIMAR 2022

557 Publications in peer reviewed journals

62 Edited special issues of journals

37 Books and Book chapters

80 Other publications



24 Completed PhD theses

88 Completed MSc theses

2022 Milestones



3

Provisional patent applications



1

National patent application



2

International patent applications



20

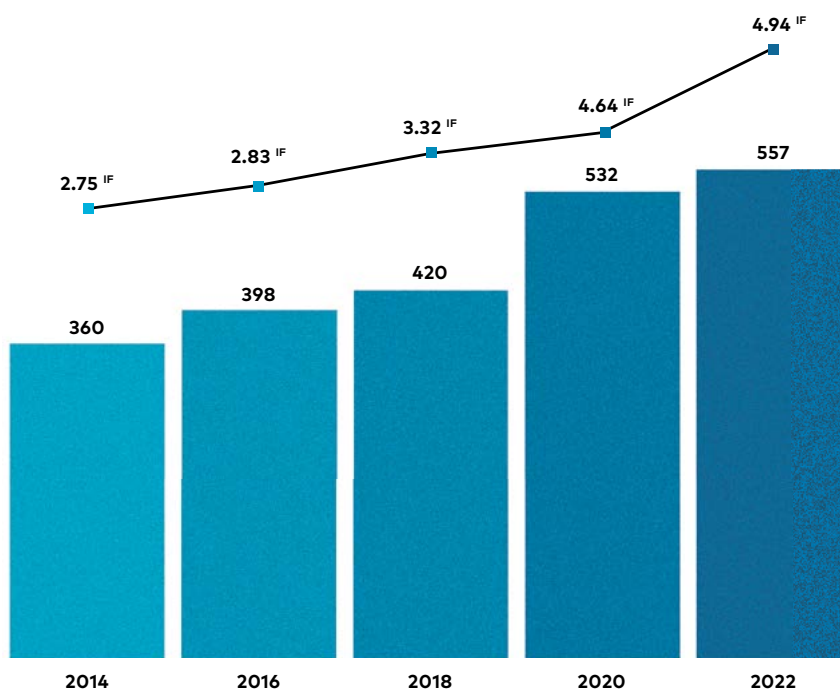
Active patents

PUBLICATIONS

CIIMAR 2022

Nr. of publications in
peer reviewed journals

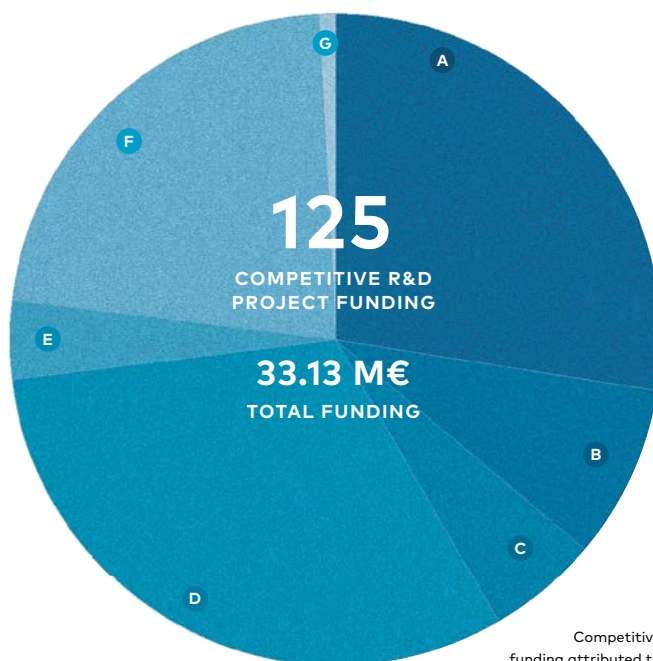
^{IF} Average Impact Factor



R&D PROJECTS

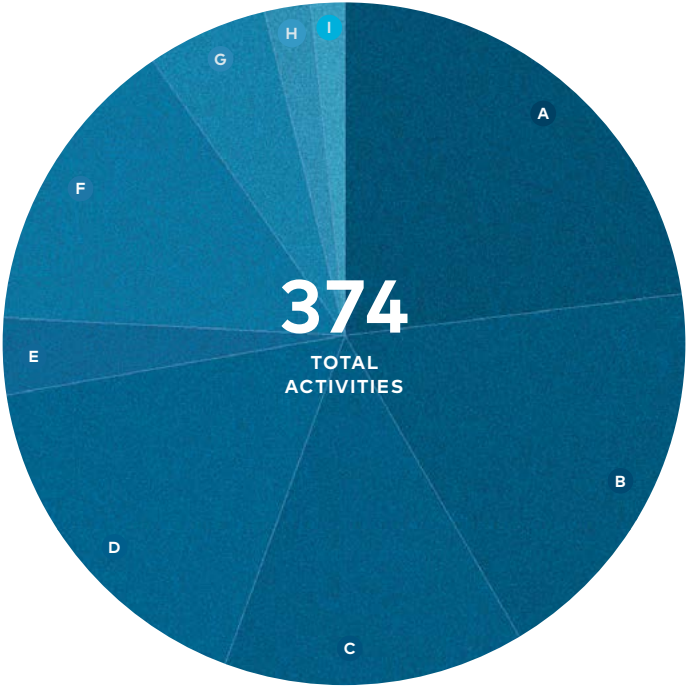
CIIMAR 2022

17	A	European Funds	Horizon 2020 / Horizon Europe
9.19 M€			
30	B	Other European Funds	INTERREG, EEA GRANTS, Others
2.85 M€			
4	C	Regional Funds	Norte2020
1.79 M€			
53	D	National Funds	FCT
10.41 M€			
14	E	National Funds	Portugal2020 ANI, IAPMEI
1.31 M€			
2	F	National Funds	PRR
7.38 M€			
5	G	Other National Funds	
0.20 M€			



Competitive
funding attributed to
CIIMAR in R&D projects
in execution during 2022

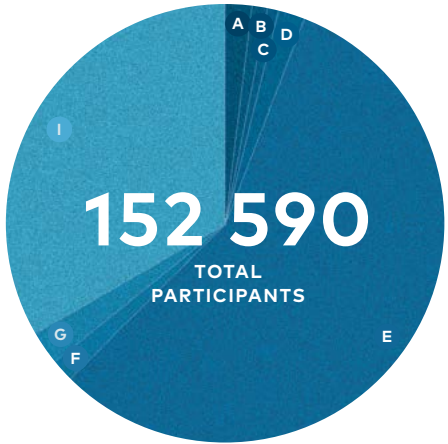
OUTREACH ACTIVITIES



87	A	Activities and lectures at schools
3250		Participants
69	B	Visits and activities at CIIMAR
1783		Participants
52	C	Outdoor activities
1288		Participants
63	D	Public lectures
2697		Participants
13	E	Exhibitions
86352		Participants
54	F	Scientific seminars
2615		Participants
22	G	Workshops
3953		Participants
8	H	Teachers' formation
152		Participants
6	I	Public events
50500		Participants



433	Online news
97	Press
7	Radio
31	TV



666	Twitter
568	Facebook
602	Linkedin
359	Instagram



159
Communications
in international
scientific meetings



151
Communications
in national
scientific meetings

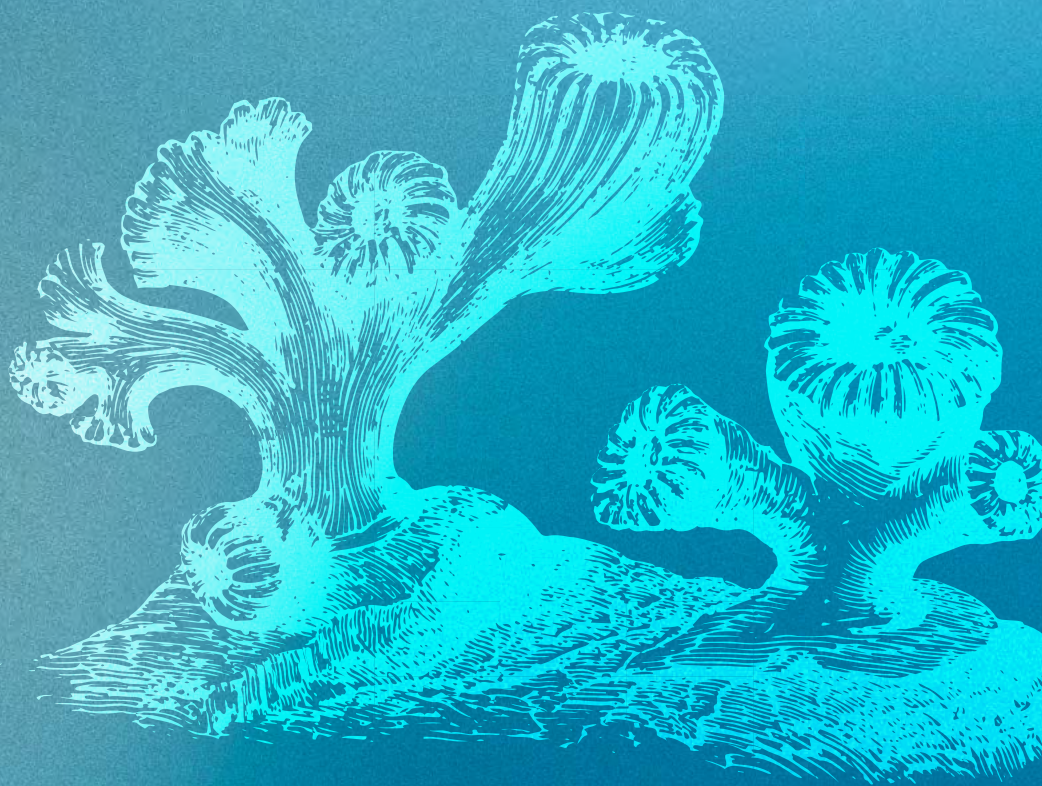


22
Training
courses



PROJECT HIGHLIGHTS

CIIMAR ACTIVITY
REPORT 2022



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



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 stand-alone 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.

GRINNAQUA

HORIZON EUROPE

GREEN INNOVATION STRATEGIES FOR ANIMAL HEALTH MANAGEMENT: TOWARDS SUSTAINABLE AQUACULTURE



Principal Investigator at CIIMAR: **Benjamin Costas**

Leader Institution: **CIIMAR**

Website: **mar2protect.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 competitiveness 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.

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**



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.

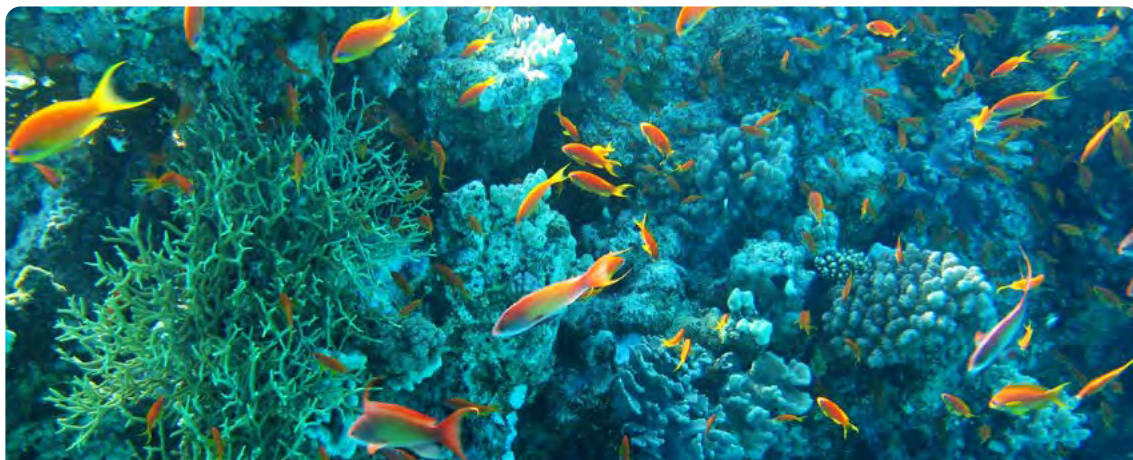
Special emphasis will be given to the study and discovery of new non-invasive biomarkers of health and welfare, which will in turn allow the development of biosensors and disease prediction through machine learning approaches.

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.

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.

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.

SAFE

HORIZON EUROPE

SMARTAQUA4FUTUREPrincipal Investigator at CIIMAR: **Rodrigo Ozório**Leader Institution: **EUROFISH**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 University**
Website: aquacombine.eu



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.

ASSEMBLE PLUS

HORIZON 2020

**ASSOCIATION OF EUROPEAN
MARINE BIOLOGICAL
LABORATORIES EXPANDED**



Principal Investigator at CIIMAR: **Vitor Vasconcelos**
Leader Institution: **Sorbonne Universite, France**
Website: assembleplus.eu

Funded by the
European Union



ASSEMBLE Plus will provide scientists from academia, industry and policy with a quality-assured programme of access to the marine biological station facilities and resources. These stations offer a wide variety of services, including access to marine ecosystems, unique marine biological resources, state-of-the-art experimental and analytical facilities with integrated workflows, historical observation data, and advanced training opportunities. The goal of the project is to stimulate European fundamental and applied research excellence in marine biology and ecology, thereby improving our knowledge and technology-base for the European bioeconomy, policy shaping and education.

ASSEMBLE Plus brings together 32 marine stations and institutes with modern research infrastructures and track-records of unique service provision, from 14 European and two associated countries, under the leadership of the European Marine Biological Resource Centre (EMBRC), an ESFRI consortium developed from the previous ASSEMBLE (FP7) partnership.

The sum of the actions envisaged in ASSEMBLE Plus, including Access, Networking and Research will ultimately increase the number of users of marine biological stations and shape novel strategic development perspectives of the partners, to be based on effective integration and efficient complementarities, resulting in a key contribution to their long-term sustainability.

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

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**



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.

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.

IGNITE

HORIZON 2020

COMPARATIVE GENOMICS OF NON-MODEL INVERTEBRATES



Principal Investigator at CIIMAR: **Agostinho Antunes**
 Leader Institution: **Ludwig-Maximilians-Universitaet Muenchen**
 Website: itn-ignite.eu



Invertebrates, i.e., animals without a backbone, represent 95% of animal diversity on earth but are a surprisingly underexplored reservoir of genetic resources. The content and architecture of their genomes remains poorly characterised, but such knowledge is needed to fully appreciate their evolutionary, ecological and socio-economic importance, as well as to leverage the benefits they can provide to human well-being, for example as a source for novel drugs and biomimetic materials.

Europe is home to world-leading expertise in invertebrate genomics and IGNITE will gather together this European excellence to train a new generation of scientists skilled in all aspects of invertebrate genomics. We will considerably enhance our knowledge and understanding of animal

genome knowledge by generating and analysing novel data from undersampled invertebrate lineages and by developing innovative new tools for high-quality genome assembly and analysis.

The well-trained genomicists emerging from IGNITE will be in great demand in universities, research institutions, as well as in software, biomedical, agrofood and pharmaceutical companies. Through their excellent interdisciplinary and intersectoral training spanning from biology and geobiology to bioinformatics and computer science, our graduates will be in a prime position to take up leadership roles in both academia and industry in order to drive the complex changes needed to advance sustainability of our knowledge-based society and economy.

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**



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.

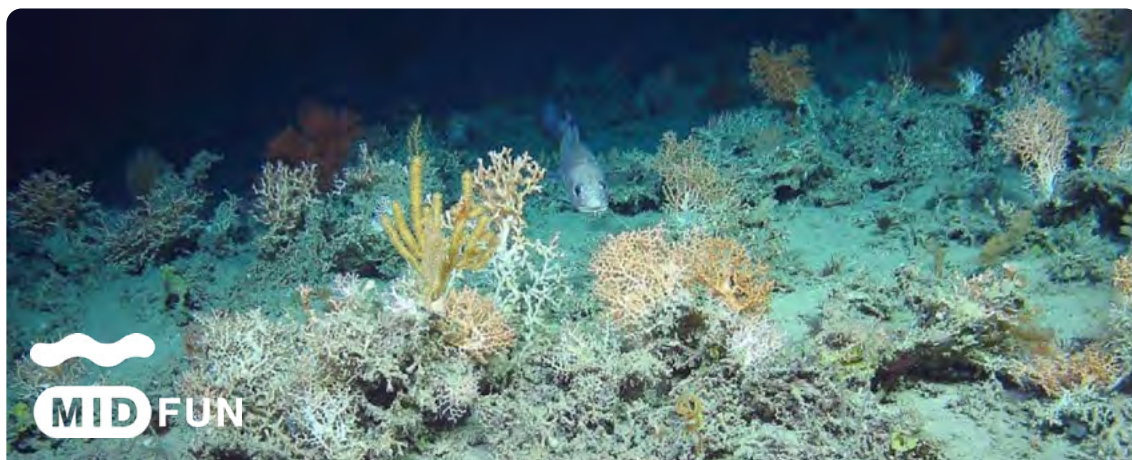
MAELSTROM leverages on the integration of complementary technologies for marine litter removal in different European coastal ecosystems, compounded with full-fledged circular economy and societal oriented solutions. In particular, the project:

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 marine 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

METAL IMPACTS ON DEEP-SEA MICROBIAL COMMUNITIES AND FUNCTION



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



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**



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 pondscares, 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 pondscares.

PONDERFUL will also develop future scenarios for pondscares 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.

ACCESS2SEA

TRANSNATIONAL INNOVATION & TECHNOLOGY

**NEW OPPORTUNITIES FOR MORE
COMPETITIVE AND SUSTAINABLE BLUE
GROWTH IN ATLANTIC AREA**



Principal Investigator at CIIMAR: **Rodrigo Ozório**

Leader Institution: CEEI Bahía de Cádiz

Website: access2sea.eu

FCT
Fundação para a Ciência e a Tecnologia

Interreg
Atlantic Area
European Regional Development Fund



Marine aquaculture (fish, shellfish, algaculture) is a leading sector of the Atlantic Area blue economy that relies on an important tradition in many EU countries and that is economically relevant in many of its coastal areas. As only 10% of Atlantic shore seafood is aquaculture-sourced there is a great opportunity to increase its production in a sustainable way. Access2Sea aims to improve the attractiveness of the Atlantic shore for aquaculture SMEs by enabling and providing an easier access to new business opportunities. Its main objective is to enhance the exploitation and preservation of the Atlantic Area's natural assets:

1. By unlocking the existing barriers (legal/regulatory, technological, existence of suitable areas in costal zones, social acceptance) to provide the industry with technical solutions to give aquaculture businesses access to shore.
2. By enabling onshore production.
3. By disseminating existing and new solutions and providing support to the aquaculture SMEs, to fix them or attract them to the Atlantic Area. This way it is expected to enable SMEs to assess spatial opportunities to settle in the Atlantic shore new aquaculture business, supporting them in exploiting the natural assets in a sustainable way as well as in improving its performance through the improvement of their business model and be better accepted by local communities.

It is also expected that Access2Sea improves the co-operation between stakeholders, business support organisations, research institutes, national and regional administrations and local councils facilitating the innovation and knowledge transfer in Aquaculture sector

ADAPTCHANGE

TRANSNATIONAL INNOVATION & TECHNOLOGY

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

TRANSNATIONAL INNOVATION & TECHNOLOGY

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.

BLUEBIOLAB

TRANSBOUNDARY MARINE BIOTECHNOLOGY LABORATORY

TRANSNATIONAL INNOVATION & TECHNOLOGY



Principal Investigator at CIIMAR: **Vitor Vasconcelos**
 Leader Institution: **Universidade de Vigo - Campus do Mar**
 Website: bluebiolab.eu



The general objective of the BLUEBIOLAB project is the creation of a cross-border laboratory of scientific excellence in the area of marine biotechnology that boosts the capacity to develop excellence in R&D, reinforces and internationalizes the R&D capabilities of the territory, optimize the use of research infrastructures and contribute to achieving the expected results in the RIS3, RIS3T and in the blue growth strategy. In order to achieve this global BlueBioLab aims to:

1. Support the consolidation of biotechnology - an essential facilitating technology - as a fundamental tool for the study and valorization of marine biological resources, and the sustainable exploitation of marine biological resources, areas in which the Euroregion has already reached a critical mass of researchers, and has the potential to be internationally competitive.
2. To pool the existing infrastructures, integrated in the Transboundary Marine Biotechnology Laboratory, in line with the common strategic objectives of the regions (RIS3 Galicia, RIS3 North and RIS3T).

3. Develop actions to support talent and promote the mobility of researchers, including the programming of training activities.
4. Create networks of knowledge and joint work, with actors of the scientific system linked to marine biotechnology on both sides of the border, in order to increase critical mass and scientific excellence.
5. Promote the internationalization and integration of scientific infrastructures linked to marine biotechnology in international R&D&I networks through the Transboundary Marine Biotechnology Laboratory, to achieve the consideration of excellent research centres and international reference.

Therefore, BlueBioLab aims to establish the resources and mechanisms to strengthen, stimulate and project internationally strategic research lines for the territory and for the marine productive sector, promoting innovative capacity and territorial competitiveness through a TFE in which the Euroregion has already demonstrated its ability to be internationally competitive.

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 CO₂ 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 CO₂, while delivering extra benefits for people and nature.

The Blueforests project aims to improve knowledge 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.

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**

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**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 offspring 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: Isabel Sousa Pinto

Leader Institution: CSIC, Spain

Website: cetambicion-project.eu

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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



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 contribu-

tion 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.

FATTYCYANOS

TRANSNATIONAL INNOVATION & TECHNOLOGY

FATTY ACID INCORPORATION AND MODIFICATION IN CYANOBACTERIAL NATURAL PRODUCTS



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

Funded by the
European Union



European Research Council
Established by the European Commission

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

MININGIMPACT2

TRANSNATIONAL INNOVATION & TECHNOLOGY

ENVIRONMENTAL IMPACT AND RISKS OF DEEP-SEA MINING



Principal Investigator at CIIMAR: **Francisco Arenas**

Leader Institution: **GEOMAR Helmholtz Centre for Ocean Research Kiel**

Website: miningimpact.geomar.de



The MiningImpact project gathers 32 partners from 10 different countries and will set up a comprehensive monitoring programme of the impact of an industrial test to harvest manganese nodules in the Clarion Clipperton Zone, by the Belgian contractor DEME-GSR. Polymetallic nodules are mainly composed of manganese and iron oxides, but also contain economically valuable metals, such as nickel, copper, cobalt, lithium, and rare earth elements.

The DEME-GSR collector test intends to harvest nodules in approx. 0.1 km² large areas of the seabed in the Belgian and the German contract areas of the Clarion Clipperton Zone in the Eastern Equatorial Pacific Ocean. Within the lifetime of MiningImpact2 researchers are planning two cruises to the test areas in order to constrain the spatial and temporal dynamics of the sediment plume created by the mining test and impact on the abyssal environment. The project will further study regional connectivity of species in the deep-sea and their resilience to impacts, and the integrated effects on ecosystem functions, such as the benthic food-web and biogeochemical processes. In this context, key objectives of the project are:

- To develop and test monitoring concepts and strategies for deep-sea mining operations
- To develop standardization procedures for monitoring and definitions for indicators of a good environmental status
- To investigate potential mitigation measures, such as spatial management plans of mining operations and means to facilitate ecosystem recovery
- To develop sound methodologies to assess the environmental risks and estimate benefits, costs and risks
- To explore how uncertainties in the knowledge of impacts can be implemented into appropriate regulatory frameworks

MiningImpact will be able to further close existing knowledge gaps and reduce uncertainties on the environmental impacts of deep-sea mining of polymetallic nodules. The project will specifically work towards policy recommendations and has reached out to the International Seabed Authority to become a partner in the project. It will further contribute to the preparation of environmental impact assessments (EIAs) for future European deep-sea pilot mining tests that are requested by the ISA, and to the Horizon2020 technology development projects Blue Atlantis and Blue Nodules.

MODEL RISK

TRANSNATIONAL INNOVATION & TECHNOLOGY

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, MODEL RISK 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 MODEL RISK, 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 MODEL RISK 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

NANOCULTURE

TRANSNATIONAL INNOVATION & TECHNOLOGY

RISK ASSESSMENT AND MITIGATION OF THE PRESENCE OF ENGINEERED NANOMATERIALS IN ATLANTIC AQUACULTURE



Principal Investigator at CIIMAR: **Alexandre Campos**

Leader Institution: **INL**

Website: nanoculture.ciimar.up.pt



The objective of NANOCULTURE is to advance in knowledge, risk assessment and mitigation of environmental presence of the most-used engineered nanoparticles (ENPs) in market products: titanium dioxide (TiO₂) and silver (Ag).

As metallic NPs present important improvements in diverse industrial applications, the frequency of their application is growing exponentially. However, the studies of risks and mitigation of their presence in the environment are lagging far behind the rate of utilization, which represents a critical environmental and safety challenge in the Atlantic Area.

The focus of the project are the aquatic ecosystems related to aquaculture, a sector of high economic relevance in the Atlantic Area, and specifically organisms used for human consumption (cultured fish, mollusks, seaweed, sea urchins, etc.). NANOCULTURE will investigate the effects of ENPs on aquaculture products, their bioaccumulation, and assess its impact on human intake.

In order to carry out this project, collaboration of all the participating centres is essential to ensure a wide range of industrial (aquaculture professionals) and scientific profiles (analytical chemists, physical chemists, molecular biologists), as well as providing infrastructure to run the analysis and deliver real samples from aquaculture plants.

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



jpiamr



JPI OCEANS



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101019719 (Nature-based Solutions)

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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.

NORWATER

TRANSNATIONAL INNOVATION & TECHNOLOGY

EMERGING POLLUTANTS IN THE WATERS OF GALICIA-NORTHERN PORTUGAL: NEW TOOLS FOR RISK MANAGEMENT



Principal Investigator at CIIMAR: **Miguel Santos**

Leader Institution: **CIIMAR**

Website: **nor-water.eu**



This project is aimed at identifying the main emerging pollutants (EPs) and their sources in the hydrographic basins of northern Portugal and Galicia. In addition, it is focused on developing, implementing and harmonizing a set of innovative multidisciplinary tools to minimize the impact of EPs on these water bodies. The project will also contribute to the improvement of water quality and will enhance the implementation of the Water Framework Directive (WFD) in this cross-border area.

The four main aims of NOR-WATER are:

1. Identifying the main emerging pollutants (EPs), including fire-related runoff compounds in rivers, as well as their sources and transformation products (TPs), in the hydrographic basins of northern Portugal and Galicia.
2. Developing new analytical methods and ecotoxicological tools, as well as prediction and modeling tools, for those EPs which pose the highest potential risk to ecosystems.
3. Assessing the efficiency of wastewater treatment plants (WWTPs) in removing EPs, as well as developing tools to improve treatment systems and increase their efficiency in EPs removal.
4. Transferring the results to the entities that are responsible for the implementation of the WFD in the management of inland and coastal water bodies, as well as to the technology companies in charge of water treatment. In parallel, cross-border activities focused on environmental education are intended to be carried out, thus contributing to a behavioral change in civil society.

OPTIRAS

TRANSNATIONAL INNOVATION & TECHNOLOGY

OPTIMIZATION OF THE CONTROL OF WATER QUALITY IN RECIRCULATING AQUACULTURE SYSTEMS



Principal Investigator at CIIMAR: **Alexandre Campos**

Leader Institution: **INL**

Website: **optiras.org**

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**Iceland
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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 ($\leq 10\%$ /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 pro-

cess (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

TRANSNATIONAL INNOVATION & TECHNOLOGY

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



Principal Investigator at CIIMAR: **Lúcia Guilhermino**
Leader Institution: **Polytechnic University of Marche**
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REPÚBLICA
PORTUGUESA

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 nano-plastics (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

TRANSNATIONAL INNOVATION & TECHNOLOGY

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: **Luisa 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 101019152



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 ($\geq C20$) polyunsaturated fatty acids ($\omega 3$ LCPUFA) are marine lipids that are abundant in fish oils and fish meals ("marine ingredients").

Use of $\omega 3$ 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 $\omega 3$ 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.

SHERPA DO MAR

TRANSNATIONAL INNOVATION & TECHNOLOGY

EUROREGIONAL PLATFORM TO PROMOTE COMPETITIVENESS IN THE MARITIME AND MARITIME FIELD THROUGH THE PROMOTION OF TECHNOLOGY-BASED COMPANIES



Principal Investigator at CIIMAR: **Susana Moreira**

Leader Institution: **Universidade de Vigo**

Website: **sherpadomar.com**



Sherpa do Mar intends to boost the creation and consolidation of new knowledge-intensive business activities in the marine-maritime environment, favoring job creation and increasing business competitiveness through:

1. Creation of a transboundary ecosystem of innovative entrepreneurship in the marine-maritime context.
2. Creation of companies in the marine-maritime sector with high added value through the enhancement of technological-scientific synergies.
3. Improving the competitiveness of pre-existing companies through the drive for innovation.
4. Sherpa do Mar will implement the following activities:
 - Sectoral diagnosis and identification of the actors that will form the Euro-regional Sherpa do Mar platform.
 - Design of a new methodology for monitoring and boosting innovative technology-based companies: Sherpa Journeys.
 - Scientific-technical monitoring and knowledge transfer promotion program.
 - Implementation of the Sherpa Journeys methodology for valuing innovative technology-based business projects.
 - Selection and enhancement of 12 innovative technology-based business projects in the marine-maritime sector.
 - Itinerary for the improvement of the capacities of 20 companies in the sector, stimulating the link with transfer entities, boosting R+D+i and sustainable growth.

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 ferti-

lizer 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.

UAV4SEA

TRANSNATIONAL INNOVATION & TECHNOLOGY

TECHNOLOGY DEVELOPMENT FOR DRONE-BASED COASTAL OBSERVATIONS



Principal Investigator at CIIMAR: **Débora Borges**
Leader Institution: **CIIMAR**

fct
Fundação
para a Ciência
e a Tecnologia

Iceland
Liechtenstein
Norway grants

This bilateral initiative between CIIMAR and The Norwegian Institute for Water Research (NIVA) has as objectives to strengthen bilateral relations between Portuguese and Norwegian scientists through exchange of experience and knowledge in unmanned aerial vehicles (UAV) remote sensing techniques applied to the mapping of coastal biological communities.

This initiative will also promote future partnerships for joint research projects and disseminate the acquired knowledge to the scientific community and stakeholders involved in the coastal resources management. “Technology development for drone-based coastal observations” will foster cooperation between researchers of both institutions by identifying synergies for advancing knowledge in this field of research. Therefore, it will allow the exchange of experience and technology between both research teams (CIIMAR and NIVA) and will transfer that knowledge to the scientific community and stakeholders involved on the coastal resources management.

The activities to be implemented include technical visits of each team to the partners’ institution and a 3-days training action open to the academic and stakeholders’ community of both countries.

The expected outcomes are the development of new methods and tools for aerial images classification; publication of scientific papers reviewing and comparing these methodologies; and the design of future joint research projects either in the scope of EEA Grants or other programmes.

Additionally, protocols will be developed for planning and implementing missions using drones (UAV’s) for coastal environmental monitoring.

The knowledge and experience acquired during this collaboration will provide the stakeholders with new tools relevant for supporting the management and protection of coastal ecosystems.

CETUS

EDUCATION AND OUTREACH

CETACEAN MONITORING PROJECT IN MACARONESIA



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

CETUS Project is a cetacean monitoring program in the Macaronesian region that aims at collecting whale and dolphin's occurrences to determine their distribution and abundance in this vast region of the Atlantic.

This is possible thanks to a partnership between different research institutions, led by CIIMAR | University of Porto and the company TRANSINSULAR | Grupo ETE. Since 2012, TRANSINSULAR offers its cargo ships to be used as a plat-

forms of opportunity to monitor along routes between Continental Portugal and Madeira, Azores, Canary and Cape Verde islands.

The final research goal is to provide new insights into distribution and abundance of cetaceans, delivering habitat models to map, explore and predict cetacean hotspots in the area, addressing international and European conservation priorities and supporting management decisions.

OCEAN ACTION

EDUCATION AND OUTREACH

MAR DE PLÁSTICO



Principal Investigator at CIIMAR: **José Teixeira**
 Leader Institution: **CIIMAR-UP**
 Website: **oceanaction.pt**

More than 8 million tons of plastic reach annually the ocean, causing very significant negative impacts on marine life, economic activities and human health. Ocean Action Campaign developed different communication tools to raise awareness of school community and general public about the problem of plastic marine debris.

The traveling exhibition “Plastic Sea”, with a combination of art objects, sensory areas, multimedia and roll-up graphic panels, was exhibited so far in 18 localities. The “Marine Monsters” exhibition spread three large sculptures constructed with discarded plastics throughout different public noble spaces of Porto and neighbour cities, depicting different consequences of plastic debris on marine ecosystems. An original theatre piece “Pearl in Plastic Sea” was developed to raise awareness about

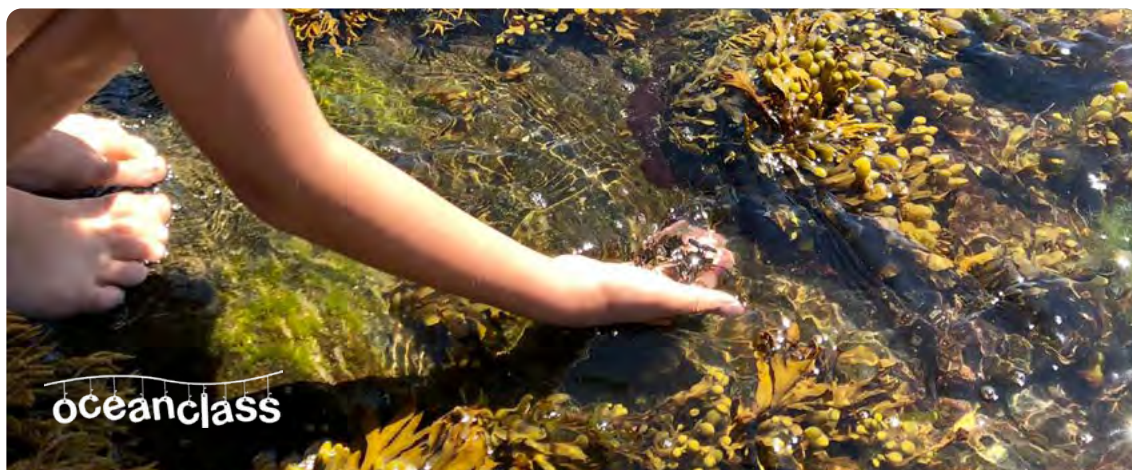
marine litter and its consequences by recreating the story of the little mermaid in an adventure fraught with danger due to the ever increasing garbage that reaches the sea.

Plastic Sea project also included more conventional hands-on science activities and lectures in schools, beach cleaning activities and the production of educational videos. The combination of different communication methods aimed to encourage the critical reflection about this environmental problem of great importance and scientific complexity and the need to adopt environmentally responsible behaviour by the population through the use of complementary, artistic and innovative approaches. This Campaign was awarded in 2016 with the Green Project Award for the best Mobilization Initiative.

OCEANCLASS

EDUCATION AND OUTREACH

DO OCEANO PARA A SALA DE AULA



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.ciimar.up.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
ACTINODEEPSEA	Bioprospecting actinobacteria from Portuguese deep-sea waters for the production of novel secondary metabolites with pharmaceutical and biotechnological applications	 Fátima Carvalho  CIIMAR
ADAPTALENTEJO	Predicting ecosystem-level responses to climate change	 Francisco Arenas  U. Évora
ALGAVALOR	MicroALGAE: integrated production and valuation of biomass and its various applications	 Vitor Vasconcelos  CMP - Secil
ANTIBACFILM	Novel marine biomolecule with antibiofilm activity	 Mariana Reis  CIIMAR
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
BEESSNESS	Diversity and dynamics of Atlantic bee resources in relation to climate and pesticide load: data for pollination management and sustainable agriculture	 Laura Guimarães  CIIMAR
BUSHRISK	Tracking the bushmeat: a molecular framework for tracing the African bushmeat trade and risks of emerging diseases	 Philippe Gaubert  CIIMAR
CAVIAR	Market valorisation of sea urchin gonads through dietary modulation	 Luisa Valente  U. Porto
CHLOROPYLL	Hydroxypheophorbide compounds, methods and uses thereof	 Ralph Urbatza  CIIMAR









PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
CIGUA	The rise of toxic tropical and subtropical marine dinoflagellates <i>Gambierdiscus</i> spp: distribution, ciguatoxins trophic transfer and risk of ciguatera fish poisoning	 Alexandre Campos  IPMA
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
CRAGIAMP	Search for Antimicrobial Peptides in <i>Crassostrea gigas</i> oysters and <i>Paracentrotus lividus</i> sea urchin. Diminution of mortality rate in oyster culture: towards a lower impact of diseases in oyster farms and search for novel compounds	 Sergio Boo  CIIMAR
CY-SENSORS	Biosensor and biomimetic recognition element based devices for detection and separation of cyanobacteria metabolites with ecotoxicological and therapeutical applications	 Isabel Cunha  CIIMAR
CYANCAN	Uncovering the cyanobacterial chemical diversity: the search for novel anticancer compounds	 Mariana Reis  CIIMAR
CYANOBOX	Beta-oxidation in cyanobacteria	 Sandra Figueiredo  CIIMAR
CYANOVACCINE	Cyanobacterial outer membrane vesicles as novel platforms for Vaccine technology	 Cláudia Serra  IBMC
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
DEEPRISK	Deep-sea mining and climate change: new modeling tools in support of Environmental risk management	 Luísa Bastos  FCUP

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
E-IMUNO	Applying elasmobranch immunogenetics to fisheries management and the study of vertebrate adaptive immunity	 Filipe Castro  ICETA-UP
ECOS	New tools to evaluate the ecological status of rocky shores and its relationship with ecosystem services	 Puri Veiga  CIIMAR
EDGEOMICS	Freshwater Bilvalves at the edge: Adaptation genomics under climate-change scenarios	 Elsa Froufe  CIIMAR
ESCO ENSEMBLES	Estuarine and coastal numerical modeling ensembles for anthropogenic, extreme events and climate change scenarios	 Fernando Veloso Gomes  CIIMAR
EVODIS	The Metazoan Endocrine System in the Anthropocene Epoch: from EVOLution to DISruption	 Filipe Castro  CIIMAR
EXTRATOTECA	Microalgae extracts with high added value	 Vitor Vasconcelos  A4F, Alga Fuel, S.A.
FEEDMI	Improvements in disease resistance, stress and environmental sustainability in aquaculture systems through nutritional tools and modulation of microbial communities	 Benjamin Costas  Sparos Lda.
FEEL	Fighting illegal trade of glass-eel, <i>Anguilla anguilla</i> : Chemical weapons	 Carlos Antunes  CIIMAR
FUNG-EYE	A functional approach to unravel the interaction between fungicide pollution and fungi-mediated ecosystem processes	 Sara Antunes  U. Minho
GENIUSAMPLER	Autonomous biosampler to capture in situ aquatic microbiomes	 Catarina Magalhães  CIIMAR
GLOBALED	Impacts of global change on environmentally realistic mixtures of endocrine disruptor compounds on the structure and functioning of coastal ecosystems. Implications for a sustainable environment	 Patricia Teixeira  CIIMAR
HALVERSITY	Genetic and chemical diversity of a novel halogenase class	 Pedro Leão  CIIMAR

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
HIPERSEA	Collection and Life Support in a Hyperbaric system for Deep-Sea Organisms	 João Coimbra  A. Silva Matos Metalomecânica S.A.
IMMUNAA	Methionine and tryptophan as nutraceutical strategies to improve mucosal immunity and vaccine efficiency in fish	 Benjamin Costas Refojos  CIIMAR
INFLAMMAA	Unraveling neuro-endocrine/immune modulatory roles of tryptophan during inflammation	 Benjamin Costas Refojos  CIIMAR
LEGATEE	Parental immune priming and in ovo delivery of immunostimulants applied to aquaculture of fish larvae	 Ana Rocha  CIIMAR
LINGUATOX	Bioelectronic Tongue System for the Paralytic Toxins detection in shellfish	 Carlos Vale  U. Aveiro
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
MICROPLASTOX	Microplastics in the marine environment: estimation and assessment of their ecotoxicological effects	 Ruth Pereira  U. Aveiro
MIRRI-PT-POLO NORTE	Northern node of the Portuguese Microbial Resource Research Infrastructure	 Vitor Vasconcelos  U. Minho
MOREBIVALVES	Molecular strategies to be applied in the depuration of commercial bivalves for elimination of toxic compounds	 Alexandre Campos  CIIMAR
MP-BITOX	Microplastics in bivalves: identification of sensitive species in Portugal and assessment of microplastic-toxin aggregates toxicity	 Carlos Vale  IPMA
MULTI-CRASH	Multi-dimensional ecological cascades triggered by an invasive species in pristine habitats	 Ester Dias  Universidade do Minho

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
NANOLEGATOX	When old meets new: A novelty study on the human uptake, genotoxicity and immunotoxicity of nanoparticles and legacy contaminants mixtures	 Miguel Santos  ISP - UP
NASCEM	Novel eco-friendly Antifouling Strategies based on Cyanobacterial bioactive Metabolites	 Joana Reis Almeida  CIIMAR
NIAF	Sustainable antifouling agents: from grape wastes to the sea with the green chemistry leading the way	 Marta Correia da Silva  CIIMAR
NITROLIMIT	Life at the Edge: Define the Boundaries of the Nitrogen Cycle in the Extreme Antarctic Environments	 Catarina Magalhaes  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
PERMAMERC	Mercury biogeochemistry, fate and impact in permafrost thaw ecosystems	 Catarina Magalhães  IST-ID
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	 Cláudia Serra  CIIMAR
PROTALGAE	Method for obtaining proteins or a rich-protein extract from algae extracts and uses therefore	 Luisa Valente  CIIMAR
PROZYME	New probiotics isolated from fish intestine microbiota to improve vegetable raw material utilization, intestinal health and disease resistance in carnivore fish	 Claudia Serra  CIIMAR

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
PT-OPENSREEN	National Infrastructure for Chemical Biology and Genetics	 Ralph Urbatza  IBMC
REMEDIGRASS	Seagrass beds as green and blue infrastructures for ecosystem restoration	 Marina Dolbeth  U. Aveiro
SEA ANTIMICROBIALS	Pyrazino [1,2-B]Quinazoline-3,6-Diones derivatives, their Production and uses thereof	 Emilia Sousa  CIIMAR
SEA FOREST	Sea Forest Portugal	 Isabel Sousa Pinto  Casúlo Unipessoal Lda
SEEINGSHORE	Understanding and predicting the impact of climate change on coastal habitats	 Francisco Arenas  CIIMAR
SEPI4ENVIRONM	Siderophore efflux pump inhibitors (SEPIs) conjugates: A new concept for environmental problems	 Diana Resende  CIIMAR
SEXOMICS	Sex and the environment: Genomic decoding and the perpetuation of animal life in a changing world	 Agostinho Antunes  U. Minho
SITE	Integrated System of Wastewater Treatment with Macroalgae	 Isabel Azevedo  Aquacria
SPO3	Development of innovative sustainable protein and omega-3 rich feedstuffs for aquafeeds, from local agro-industrial by-products	 Helena Peres  CIIMAR
SWUAV	Mapping the intertidal zone and assessing seaweed biomass using UAV images	 José Alberto Gonçalves  CIIMAR
SYMBIOMICS	Omics of marine symbioses: Metabarcoding and metagenomics characterization of host-microbe adaptation and novel biosynthetic gene clusters	 Parthibaraj Anoop Alex  CIIMAR
TRANSOBESOGEN	Trans-phyletic obesogenic responses: from epigenetic modules to transgenerational environmental impacts	 Miguel Santos  CIIMAR

PROJECT ACRONYM	PROJECT TITLE	PRINCIPAL INVESTIGATOR LEADER INSTITUTION
UVNATP	Novel UV protective compounds from natural sources as active ingredients for sun care products	 Pedro Leão  CIIMAR
VAL-WRACK	Wrack as a high value resource in a global warming scenario. Is it worthy to invest on it?	 Marcos Rubal  CIIMAR
XANTIFOUL	Oxygenated xanthone derivatives as antifouling agents	 Marta Correia da Silva  CIIMAR
	Mites associated with Red Palm Weevil (RPW; <i>Rhynchophorus ferrugineus</i> O.) in Portugal and recombinant anti-RPW endophytic bacteria	 Camilo Pardo  CIIMAR

SCIENTIFIC OUTPUTS

CIIMAR ACTIVITY
REPORT 2022



SCIENTIFIC OUTPUTS

BOOKS AND BOOK CHAPTERS

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Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Francisco Taveira Pinto
Co-supervisor: Paulo Rosa Santos
Date: March 2022

Name: Helena Raquel dos Santos Fernandes
Thesis title: Development of sustainable protein and omega-3-rich feedstuffs for aquafeeds
Doctoral Degree: Biology
University: Faculty of Sciences, University of Porto
Supervisor: Helena Peres
Co-supervisor(s): Aires Oliva Teles; Isabel Belo
Date: July 2022

Name: Inês Paes de Faria Monteiro Montenegro

Thesis title: Phytoremediation of phenolic pollutants in natural and constructed wetlands

Doctoral Programme/Doctoral degree: Environmental Sciences and Technology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Marisa Almeida

Co-supervisor: Ana Paula Mucha; Carlos Rocha Gomes

Date: June 2022

Name: Lúcia Lopes da Rocha

Thesis title: Minimal invasive and aesthetic rehabilitation of maxillary lateral incisor agenesis: chemical and mechanical behaviour

Doctoral Programme/Doctoral degree: Biomedical Sciences

Faculty/University: University Institute of Health Sciences, CESPU

Supervisor: Teresa Pinho

Co-supervisor: Maria Elizabeth Tiritan; Lucas Silva

Date: October 2022

Name: Marco Tourinho Gama

Thesis title: Efficiency and Financial Sustainability of Water Supply and Sanitation Services in Brazilian Municipalities

Doctoral Programme/Doctoral degree: Civil Engineering

Faculty/University: Faculty of Engineering, University of Porto

Supervisor: Paulo Rosa Santos

Co-supervisor: Francisco Taveira Pinto; Ana Maria Camacho

Date: April 2022

Name: Maria João Moura Gonçalves Moutinho de Bessa

Thesis title: Assessing the in vitro toxicity of engineered and airborne nanoceramics - contribution to the safe production and use of nanomaterials in the ceramic industry

Doctoral Programme/Doctoral degree: Biomedical Sciences

Faculty/University: ICBAS, University of Porto

Supervisor: Sónia Fraga

Co-supervisor: Eduardo Rocha; João Teixeira; Blanca Lage Laffon

Date: July 2022

Name: Marta Isabel Póvoas Monteiro

Thesis title: Improvement of meagre culture: zebrafish as a model for the use of micro- and macroalgae as functional feeds

Doctoral Programme/Doctoral degree: Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Patrícia Diaz-Rosales

Co-supervisor: Aires Oliva Teles; Christopher John Secombes

Date: February 2022

Name: Micaela Alexandra Machado Querido

Thesis title: DesinFAST- Self-Disinfecting Paint for Infection Control in Public Spaces

Doctoral Programme/Doctoral degree: Biomedical Sciences

Faculty/University: ICBAS, University of Porto

Supervisor: Cristiana Costa Pereira

Co-supervisor: Eduardo Rocha; João Teixeira; João Carlos Bordalo

Date: September 2022

Name: Pedro Xavier Cunha Ramos

Thesis title: Flow Dynamics at T-Shaped Open-Channel Confluences: Effects of Bed Elevation Discordance

Doctoral Programme/Doctoral degree: Civil Engineering

Faculty/University: University of Ghent

Supervisor: Tom de Mulder

Co-supervisor: João Pedro Pêgo

Date: May 2022

Name: Rafaela Alcina Araújo dos Santos

Thesis title: *Bacillus* spp. as source of bioactive compounds for aquaculture bacterial diseases control

Doctoral Programme/Doctoral degree: Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Maria José Saavedra

Co-supervisor: Cláudia R. Serra; Aires Oliva-Teles

Date: May 2022

Name: Raquel Maria Santos Chaves

Thesis title: Disinfection By-products of Emerging Concern in Drinking Water: Monitoring and Hazard Assessment

Doctoral Programme/Doctoral degree: EnviHealth&Co

Faculty/University: Lisbon School of Medicine, University of Lisbon

Supervisor: Miguel Santos

Co-supervisor: Catarina Guerreiro; Vítor Cardoso

Date: June 2022

Name: Rita Filomena Teixeira Pires

Thesis title: Physical-ecological modelling of the transport, dispersal and connectivity of crustacean larvae in the Gulf of Cadiz and through the Strait of Gibraltar

Doctoral Programme/Doctoral degree: Marine Sciences

Faculty/University: University of Lisbon

Supervisor: Antonina dos Santos

Co-supervisor: Álvaro Peliz

Date: January 2022

Name: Rui Pedro Moreira de Magalhães

Thesis title: Gilthead sea bream (*Sparus aurata*) metabolic and immunological responses to different dietary Arachidonic acid, Eicosapentaenoic acid, and Docosahexaenoic acid levels

Doctoral Degree: Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Aires Oliva-Teles

Co-supervisor: Helena Peres

Date: February 2022

Name: Tomásia Micaela Gomez Fernandes

Thesis title: Exploring *Pavlova pinguis* and Hemiselmiss cf. Andersenii as natural sources of high-value lipids

Doctoral Programme/Doctoral degree: Chemistry

Faculty/University: Faculty of Exact Sciences and Engineering, University of Madeira

Supervisor: Nereida Cordeiro

Date: January 2022

Name: Victor Emmanuel Lopes da Silva
Thesis title: Patterns and processes that drive the dimensions of the diversity of estuarine-coastal fish in the Western Atlantic
Doctoral Programme/Doctoral degree: Biological Diversity and Conservation in the Tropics
Faculty/University: Federal University of Alagoas, Brazil
Supervisor: Nidia Fabr e
Co-supervisor: Marina Dolbeth
Date: March 2022

COMPLETED MSc THESES

Name: Abdulraheem Okehi Anumah
Thesis title: Derivation of soil screening levels for arsenic using a portuguese regosol
Master degree: Erasmus Mundus Joint Master Degree in Environmental Contamination and Toxicology
Faculty/University: Faculty of Sciences, University of Porto and Research Centre for Experimental Marine Biology & Biotechnology, University of the Basque Country
Supervisor: Ruth Pereira
Co-supervisor: Ver nica Nogueira
Date: July 2022

Name: Afshin Abolhasani
Thesis title: Alcanivorax potential capabilities in bioremediation of hydrocarbon-contaminated marine environments
Master degree: Marine Science
Faculty/University: Universit  Degli Studi di Milano - Bicocca, Italy
Supervisor: Andrea Franzetti
Co-supervisor: Maria Paola Tomasino
Date: March 2022

Name: Alberto Rodrigues Antunes
Thesis title: Modulatory effects of methionine dietary supplementation on the European seabass (*Dicentrarchus labrax*) local and systemic immune responses against *Tenacibaculum maritimum*
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Rita Azeredo
Co-supervisor: Marina Machado
Date: December 2022

Name: Alexandre Manuel Calheiros Pereira Gomes
Thesis title: Phenotypic plasticity of habitat use by the European eel, *Anguilla anguilla* (Linnaeus, 1758) in the Minho River
Master degree: Biodiversity, Ecology and Global Change
Faculty/University: University of Minho
Supervisor: Ester Dias
Co-supervisor: Ronaldo Sousa
Date: December 2022

Name: Alexandre Miguel Quelhas de Sousa Marques Branco
Thesis title: Assessing the value of opportunistic and dedicated data to analyse cetacean occurrence and distribution
Master degree: Applied Marine Biology
Faculty/University: University of Aveiro
Supervisor: Henrique Queiroga
Co-Supervisor: Mafalda Correia
Date: December 2022

Name: Alice Candeias de Almeida
Thesis Title: Microbiome Diversity and Distribution in Two Contrasting Arctic Fjords Concerning the Climate Change Impact
Master Degree: Bioinformatics and Computational Biology
Faculty/University: Faculty of Science, University of Porto
Supervisor: Catarina Magalh es
Co-supervisor: Miguel Semedo; Pedro Duarte; Lu s Torgo
Date: December 2022

Name: Ana Azevedo Freire da Silva
Thesis title: Biostimulant and Biofertilizer Activity of Microalgae and Cyanobacteria for Agricultural Purposes
Master degree: Applied Biotechnology and Synthetic Biology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Vitor Vasconcelos
Date: Setembro 2022

Name: Ana Karina e Silva Gomes
Thesis title: Enrichment of the educational offer of Parque das Serras do Porto aimed at the 1st cycle
Master degree: Ecology and Environment
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Sara Cristina Antunes
Co-supervisor: Raquel Viterbo
Date: December 2022

Name: Ana L cia Silva Vieira
Thesis title: Bio-enrichment of plant feedstuffs by *Aspergillus* spp. under Solid-State Fermentation for application to aquafeeds
Master Degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Helena Peres
Co-supervisor: Isabel Belo
Date: November 2022

Name: Ana Mafalda Ribeiro Vieira
Thesis title: Early colonization of Artificial Reefs: insights on Diatom biofilm composition and development under different scenarios
Master Degree: Ecology and Environment
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Maria Teresa Borges
Date: December 2022

Name: Ana Rita Ferreira da Silva
Thesis title: Design and Demonstration of a Floating Hybrid System for Converting Sun and Wave Energy
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Paulo Rosa Santos
Co-supervisor: Gianmaria Giannini; Sara Isabel Oliveira Pinto
Date: October 2022

Name: Ana Rita Lim o Vieira
Thesis title: Identification of microalgae strains producing high-value compounds
Master degree: Biochemistry
Faculty/University: Faculty of Sciences / ICBAS, University of Porto
Supervisor: Pedro Le o
Co-supervisor: Ralph Urbatzka
Date: December 2022

Name: Ana Sofia da Costa Almeida

Thesis title: Semi-preparative enantioresolution, racemization and enantioselectivity studies with MDPV and binding affinity studies with synthetic cathinones

Master degree: Analytical, Clinical and Forensic Toxicology

Faculty/University: Faculty of Pharmacy, University of Porto

Supervisor: Carla Fernandes

Co-supervisor: Fernando Remião

Date: December 2022

Name: Anabella Massa

Thesis title: Assessment of cyanobacterial biomass as sustainable agricultural fertilizer: soil-experiment with plants in pot

Master degree: Environmental Contamination and Toxicology

Faculty/University: PIE, University of the Basque Country

Supervisor: Marisa Freitas

Co-supervisor: Alexandre Campos

Date: July 2022

Name: Andreia Sofia Oliveira Lopes

Thesis title: Optimization of Biomass Production Processes, Stabilization of Extracts and Formulation of Products Based on Microalgae and Cyanobacteria with Applications in Agriculture

Master degree: Chemistry Engineering

Faculty/University: Faculty of Engineering, University of Porto

Supervisor: Olga Nunes

Co-supervisor: Vitor Vasconcelos

Date: July 2022

Name: Bárbara Alexandra Gaspar Guedes

Thesis title: Microbiological quality and safety of Pacific oyster (*Crassostrea gigas*) ready for consumption

Master degree: Cell and Molecular Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Sandra Quinteira

Co-supervisor: Olga Lage

Date: December 2022

Name: Bárbara Camarinha Resende

Thesis title: Temporal biomass variation and ecophysiology of seaweed native to northern Portugal

Master degree: Biological Aquatic Resources

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Débora Borges

Co-supervisor: Isabel Sousa Pinto; Isabel Costa

Date: November 2022

Name: Bárbara Rêgo e Pires

Thesis title: Exploiting cyanobacterial metabolism to unveil new natural products and inquire about beta-oxidation

Master degree: Functional Biology and Biotechnology of Plants

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Sandra Figueiredo

Co-supervisor: Pedro Leão

Date: November 2022

Name: Beatriz Santos Silva

Thesis title: Dive into the blow microbiome: exploring microbial diversity of the respiratory tract in free ranging cetaceans

Master degree: Biological Aquatic Resources

Faculty/University: Faculty of Science, University of Porto

Supervisor: Maria Paola Tomasino

Co-supervisor: Catarina Magalhães; Mafalda Correia

Date: December 2022

Name: Carlos Filipe Gomes Henriques

Thesis title: Chemical isolation of novel compounds from Spirulina with anti-obesity activity as future nutraceuticals

Master degree: Applied Biotechnology and Synthetic Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Pedro Leão

Co-supervisor: Ralph Urbatzka

Date: July 2022

Name: Cristiano Manuel Araújo Gomes

Thesis title: Enantioselective ecotoxicity of psychoactive substances in *Daphnia magna*

Master degree: Forensic Sciences and Laboratory Techniques

Faculty/University: University Institute of Health Sciences, CESPU

Supervisor: Cláudia Ribeiro

Co-supervisor: Maria Elizabeth Tiritan; João Carrola

Date: May 2022

Name: Daniela Sofia do Carmo Padilha

Thesis title: Evaluation of Macro Litter and Microplastics in the Ave Estuary

Master degree: Ecology and Environment

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Luis R. Vieira

Co-supervisor: Isabel Iglesias

Date: November 2022

Name: Diana Rafaela Reis de Sousa

Thesis title: Culture Independent Discovery of New Cyanobacterial Natural Products

Master degree: Applications in Biotechnology and Synthetic Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Pedro Leão

Date: December 2022

Name: Diogo Carvalho Machado

Thesis title: Risk assessment in the area surrounding the Estarreja Chemical Complex

Master degree: Environmental Sciences and Technology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Anabela Cachada

Co-supervisor: Ruth Pereira

Date: December 2022

Name: Diogo da Silva Ribeiro

Thesis title: Assessing traits and phylogenetic signal to unravel the tempo and mode of phenotypic evolution

Master degree: Bioinformatics and Computational Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Agostinho Antunes

Co-supervisor: Ana Paula Rocha

Date: December 2022

Name: Diogo Luís Filipe Amaral

Thesis title: Effect of novel feed ingredients on the physiological responses of European seabass (*Dicentrarchus labrax*) subjected to different rearing temperatures and salinity oscillation

Master degree: Biological Aquatic Resources

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Rodrigo Ozório

Co-supervisor: Helena Peres

Date: November 2022

Name: Diogo Miguel Santos da Silva
Thesis title: Bacteria-mediated RNA interference in *Rhynchophorus ferrugineus* (Olivier, 1790)
Master degree: Cellular and Molecular Biology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Camilo Ayra Pardo
Co-supervisor: Maria João Santos
Date: December 2022

Name: Elizabeth Bigorra Ferré
Thesis title: In vivo and in vitro study of Toxicological Effects of Titanium Dioxide Nanoparticle with Different Coatings using Zebrafish Embryos and Trout Liver Cell Line
Master degree: Applied Blue Biotechnology
Faculty/University: University of La Rochelle, France
Supervisor: Alexandre Campos
Co-supervisor: Mário Araújo; Elza Fonseca
Date: December 2022

Name: Felipe Jordão Nóbrega
Thesis title: Adaptive Evolution of Mitochondrial Energy Metabolism Genes Associated with the Evolution of the Loss of Flight in Birds
Master degree: Applications in Biotechnology and Synthetic Biology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Tibissay Escalona
Co-supervisor: Agostinho Antunes
Date: December 2022

Name: Filipe da Costa Miranda
Thesis title: Experimental study on scour around foundations for marine energy harvesting technologies in complex soils
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Francisco Taveira Pinto
Co-Supervisor: Paulo Rosa Santos; Tiago Ferradosa
Date: October 2022

Name: Filippo Bonin
Master Degree: Aquaculture
 University: University of Padova, Italy
Thesis title: Effect of short-chain fatty acids inclusion in a plant feedstuffs-based diet on growth, immune response, and disease resistance of European seabass
Supervisor: Angela Trocino
Co-supervisor: Helena Peres
Date: September 2022

Name: Francisca de Freitas Alves
Thesis title: Análise da água residual de uma etar através do estudo de macroinvertebrados
Master degree: Biology and Management of Water Quality
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Natividade Vieira
Date: September 2022

Name: Francisca Gonçalves
Thesis title: Effect of Climate Change on the sedimentary dynamics of sand spit of Douro river
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Paulo Avilez-Valente
Co-supervisor: Isabel Iglesias
Date: September 2022

Name: Francisca Vieira Abrunhosa Branco
Thesis title: Bioprospection of deep-sea Actinobacteria for the discovery of novel natural compounds with pharmaceutical and industrial applications
Master degree: Molecular and Cell Biology
Faculty/University: Faculty of Science, University of Porto
Supervisor: Maria de Fátima Carvalho
Co-supervisor: Ralph Urbatzka
Date: November 2022

Name: Francisco Manuel Ribeiro Cruz
Thesis title: Health promoting effects of *Salicornia ramosissima* biomass in diets for European seabass (*Dicentrarchus labrax*)
Master degree: Aquaculture
Faculty/University: School of Tourism and Maritime Technology , IPL
Supervisor: Marina Machado
Co-supervisor: Teresa Baptista; Rita Azeredo; Benjamín Costas
Date: May 2022

Name: Gwinevere Ogando
Thesis title: Lúgrade-Bacalhau de Coimbra SA sustainability report according to GRI and comparative analysis of best sustainability practices in the sector
Master degree: Environmental Engineering
Faculty/University: NOVA School of Science and Technology
Supervisor: Paula Antunes
Co-supervisor: Cheila Almeida
Date: December 2022

Name: Hugo Bouyer
Thesis title: Impact of fish meal quality on European sea bass, *Dicentrarchus labrax*, nutrient utilisation and growth
Master degree: Applied Blue Biotechnology
Faculty/University: La Rochelle University, France
Supervisor: Stéphanie Bordenave-Juchereau
Co-supervisor: Luisa Valente
Date: June 2022

Name: Hugo da Costa Moreno
Thesis title: Molecular evolution of vertebrate genes involved in mitochondrial biogenesis: unravelling the origins of birds' endothermy
Master degree: Biodiversity, Genetics and Evolution
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Agostinho Antunes
Co-supervisor: Tito Mendes
Date: December 2022

Name: Hugo Ricardo Filipe Amaral

Thesis title: OSMAC approach to identify novel metabolites from *Spirulina* with anti-obesity activity as future nutraceuticals

Master degree: Applied Biotechnology and Synthetic Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Ralph Urbatzka

Co-supervisor: Pedro Leão

Date: December 2022

Name: Ian de Grisi Lapa

Thesis title: Sinergia entre Sentinel-6 e Jason-3: Observações de Ondas Internas em altímetros SAR e convencional

Master degree: Remote Sensing

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Jorge M. Magalhaes

Co-supervisor: José C.B. da Silva

Date: October 2022

Name: Inês da Silva Lito Farias

Thesis title: Investigação e Desenvolvimento de revestimentos inovadores em porcelana utilitária e decorativa

Master degree: Chemistry

Faculty/University: Faculty of Engineering, University of Porto

Supervisor: Carlos Rocha Gomes

Date: November 2022

Name: Isabel Cecília Arada Cardoso

Thesis title: Space-time variability of the Eastern Tropical Atlantic Ocean circulation and its relationship with atmospheric teleconnection patterns

Master degree: Remote Sensing

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Clara Lázaro

Co-supervisor: Isabel Iglesias

Date: November 2022

Name: Ivana Rita da Silva Mendonça

Thesis title: Industrial production of microalgae with microplastic contaminated waters: effects and biosolutions

Master degree: Applied Biochemistry

Faculty/University: Faculty of Exact Sciences and Engineering, University of Madeira

Supervisor: Nereida Cordeiro

Co-supervisor: Manfred Josef Kaufmann

Date: December 2022

Name: João Pedro Costa Sousa

Thesis title: Gammairid Nuclear Receptors: receptor-based tools for endocrine disruption assessment

Master degree: Toxicology and Environmental Contamination

Faculty/University: Faculty of Sciences / ICBAS, University of Porto

Supervisor: Raquel Ruivo

Co-supervisor: Teresa Neuparth

Date: November 2022

Name: José Manuel Ramos Morim

Thesis title: Deciphering the transcriptomics of the *Conus* species' natural venoms

Master degree: Applications in Biotechnology and Synthetic Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Agostinho Antunes

Date: December 2022

Name: Lena Maria Oberdorfer

Thesis title: Ecotoxicological effects of Bis (4-chlorophenyl) sulfone exposure on *Chironomus riparius*

Master degree: Engineering, Technical Environmental Management and Ecotoxicology

Faculty/University: FH University of Applied Sciences Technikum Wien, Austria

Supervisor: Romana Hornek-Gausterer

Co-supervisor: Laura Guimarães

Date: October 2022

Name: Leonor Pizarro Mendes

Thesis title: The effect of cadmium on the net N_2O production of deep-sea bacteria

Master degree: Applied Microbiology

Faculty/University: Faculty of Biotechnology, Catholic University of Portugal

Supervisor: Miguel Semedo

Co-supervisor: Catarina Magalhães; Maria de Fátima Carvalho

Date: December 2022

Name: Leticia dos Santos Alves

Thesis title: Microstructure of otoliths: life cycle of fish in a subtropical coastal ecosystem

Master degree: Aquaculture and Sustainable Development

Faculty/University: Federal University of Paraná, Brazil

Supervisor: André Vaz dos Santos

Co-supervisor: Alberto Teodorico Correia

Date: January 2022

Name: Leticia Loss Lisboa

Thesis title: Alternative methods of treatment of cyanobacterial biomasses to reduce toxin content

Master degree: Environmental Contamination and Toxicology

Faculty/University: Faculty of Sciences / ICBAS, University of Porto

Supervisor: Alexandre Campos

Co-supervisor: Vitor Vasconcelos

Date: December 2022

Name: Libania Fernandes Pinheiro

Thesis title: Developing Kelp Reforestation Methods

Master degree: Biodiversity, Genetics and Evolution

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Isabel Sousa Pinto

Co-supervisor: Tânia Pereira

Date: December 2022

Name: Liliana Mota Gonçalves
Thesis title: Nature-based solution to treat olive oil mill wastewater
Master degree: Biology and Water Quality Management
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Verónica Nogueira
Co-supervisor: Ruth Pereira; Joaquim Silva; Luís Silva
Date: December 2022

Name: Lucas Pereira Gomes Fontes Ribeiro
Thesis title: Analysis of cyanotoxins in water samples: method validation and application to monitoring and assessment of water quality
Master degree: Environmental Contamination and Toxicology
Faculty/University: Faculty of Sciences / ICBAS, University of Porto
Supervisor: Alexandre Campos
Co-supervisor: Vitor Vasconcelos
Date: December 2022

Name: Lucile Le Fresne
Thesis title: Antifouling potential of natural products from cyanobacteria
Master degree: Applied Blue Technology
Faculty/University: University of La Rochelle, France
Supervisor: Joana R. Almeida
Date: June 2022

Name: Mafalda Abrantes Araújo Ferreira
Thesis title: Hydrological Modeling for Predicting Flood Phenomena in the Douro River Basin
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Rodrigo Maia
Co-supervisor: Juliana Mendes
Date: September 2022

Name: Maike Kaffenberger
Thesis title: Intertidal assemblages on groynes along a sandy shore in Portugal: exploring the effects of orientation and distance to rocky shores
Master Degree: Master of Ecology
Faculty/University: Faculty of Biology/Chemistry, University of Bremen, Germany
Supervisor: Marcos Rubal
Co-supervisor: Martin Diekmann
Date: June 2022

Name: Maité Lupiac
Thesis title: Statistical analysis of Socio-Economic factors on beach litter distribution In Portugal
Master degree: Fluid Mechanics, Energy, and Environment
Faculty/University: ENSEIHT, France
Supervisor: Isabel Iglesias
Co-supervisor: António Lobo
Date: September 2022

Name: Manuel Ankel
Thesis title: Growth dynamics and sexual reproduction of *Zostera noltei* in Ria de Aveiro Lagoon
Master Degree: Marine Sciences - Marine Resources
Faculty/University: ICBAS, Universidade do Porto.
Co-Supervisor: Marcos Rubal; Puri Veiga
Date: September 2022

Name: Marco André Veludo Sousa
Thesis title: Characterisation of saltmarsh diatoms in the Lima River Estuary: Community composition and Raman Spectroscopy applied for environmental diagnosis
Master degree: Environmental Toxicology and Contamination.
Faculty/University: ICBAS, University of Porto
Supervisor: Luís Filipe Oliva-Teles
Co-supervisor: Laura Guimarães
Date: December 2022

Name: Margo Paris
Thesis title: Visual and acoustic cetacean monitoring in Northern Portugal
Master degree: Dynamics of Aquatic Ecosystems
Faculty/University: University of Pau and Pays de l'Adour
Supervisor: Ana Bio
Date: October 2022

Name: María Del Loreto García López
Thesis title: Methods of production and culture of palletid limpet juvenil *Patella candei* in Madeira
Master degree: Marine Farming
Faculty/University: University of Las Palmas de Gran Canaria, Spain
Supervisor: Diego Castejón Bueno
Co-supervisor: Rafael Ginés Ruiz
Date: June 2022

Name: Maria Inês Barros Matos
Thesis title: Mites and fungi associated with *Rhynchophorus ferrugineus* (Coleoptera: Curculionidae): first report in northern Portugal
Master degree: Ecology
Faculty/University: University of Aveiro
Supervisor: Maria João Santos
Co-supervisor: Camilo Ayra Pardo; Olga Ameixa
Date: September 2022

Name: Miguel Parente Freixo
Thesis title: Adaptation strategies in maritime ports: the case of Leixões Port
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Francisco Taveira Pinto
Co-Supervisor: Paulo Rosa Santos; Luciana das Neves
Date: October 2022

Name: Miriam Isabel Caires

Thesis title: Coastal overtopping risk assessment at Praia Formosa, Madeira, considering climate change scenarios

Master degree: Environmental Engineering

Faculty/University: Faculty of Engineering, University of Porto

Supervisor: Luciana Paiva das Neves

Date: October 2022

Name: Nazaré Coelho

Thesis title: Ecotoxicological effects in fish (*Salmo trutta fario*) exposed to environmentally realistic concentrations of omeprazole using biomarkers of oxidative stress and lipid peroxidation

Master degree: Pharmaceutical Sciences

Faculty/University: Faculty of Health Sciences, University Fernando Pessoa

Supervisor: Alberto Teodorico Correia

Co-supervisor: Bruno Nunes

Date: November 2022

Name: Nerea Miró García

Thesis title: Isolation of new cyanobacterial natural products from *Hapalosiphon* sp. Jm_013

Master degree: Applied Blue Biotechnology

Faculty/University: Faculty of Sciences and Experimental Sciences, Catholic University of Valencia

Supervisor: Pedro Leão

Co-supervisor: Mariana Reis

Date: September 2022

Name: Patrícia Rodrigues da Cunha

Thesis title: Bioremediation as nature based solution for emerging contaminants removal

Master degree: Bioengineering

Faculty/University: Faculty of Engineering, University of Porto

Supervisor: Marisa Almeida

Co-supervisor: Ana Paula Mucha; Joana P. Fernandes

Date: July 2022

Name: Paula Cristina Araújo Teixeira

Thesis title: Improving the histotechnical quality of skin and liver samples from deceased pigs and humans for use in teaching and research on post-mortem interval

Master degree: Forensic Medicine

Faculty/University: ICBAS, University of Porto

Supervisor: Eduardo Rocha

Co-supervisor: Ana Luís

Date: December 2022

Name: Pedro Henrique Dias Arrojado

Thesis title: Implementation of GERE in the sanitation subsystems of Água Longa, Penices, Esposende and Marinhas

Master degree: Biology and Management of Water Quality

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Natividade Vieira

Co-supervisor: Bárbara Cachada Cardoso

Date: November 2022

Name: Pedro José Fernandes do Nascimento

Thesis title: Exploring the allelopathic properties of plants to control harmful algal blooms

Master degree: Plant Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Alexandre Campos

Co-supervisor: Aldo Barreiro

Date: December 2022

Name: Pierre Morange

Thesis title: The bioactivity screening of various microalgae for metabolic diseases (obesity, diabetes, steatosis) using phenotypic assays based on cells and zebrafish

Master degree: Applied Blue Biotechnology

Faculty/University: University of La Rochelle, France

Supervisor: Ralph Urbatzka

Date: June 2022

Name: Rafael Sousa Correia

Thesis title: Study of suspension growth and biofilm formation of *Chlorella vulgaris* SAG 211-12 in Photoautotrophy and Mixotrophy

Master Degree: Ecology and Environment

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Maria Teresa Borges

Date: June 2022

Name: Ricardo André Ferreira Gomes

Thesis title: A strategy to increase the production of extracellular polymeric substances Industrial valorization of *Cyanocohniella Calida* and its application in microplastic removal

Master degree: Applied Biochemistry

Faculty/University: Faculty of Exact Sciences and Engineering, University of Madeira

Supervisor: Nereida Cordeiro

Date: December 2022

Name: Ricardo Queirós

Thesis title: Pathway discovery and eco-physiological relevance of a new enzyme and its products involved in exogenous fatty acid incorporation in cyanobacteria

Master degree: Functional Biology and Biotechnology of Plants

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Amaranta Kahn

Co-supervisor: Pedro Leão

Date: December 2022

Name: Rita Duarte Cortinhas

Thesis title: Novel probiotics isolates from the fish gut for stress mitigation in European sea bass (*Dicentrarchus labrax*) subject to acute stressful conditions

Master degree: Biological Aquatic Resources

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Paula Enes

Co-supervisor: Ana Couto

Date: December 2022

Name: Rita Pereira Faião

Thesis title: Effects of historical contamination on invertebrate's communities from seagrass beds

Master degree: Ecology and Environment

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Marina Dolbeth

Co-supervisor: Daniel Crespo

Date: November 2022

Name: Rodrigo Barbosa Brito Silva

Thesis title: Análise da vulnerabilidade às inundações em pontos críticos da cidade do Porto

Master degree: Civil Engineering

Faculty/University: Faculty of Engineering, University of Porto

Supervisor: João Pedro Pêgo

Co-supervisor: Pedro Fernandes

Date: March 2022

Name: Rodrigo Franco Alves

Thesis title: Xenoestrogenic Modulation of Sex-Steroid Related Targets in Brown Trout Primary Hepatocyte Spheroids

Master degree: Environmental Contamination and Toxicology

Faculty/University: Faculty of Sciences / ICBAS, University of Porto

Supervisor: Tânia Madureira

Co-supervisor: Eduardo Rocha

Date: December 2022

Name: Rosária Catarino Seabra

Thesis title: Effects and mechanisms of action of marine-derived preussin against the triple negative breast cancer cell line MDA-MB-231 and exploiting 2D and 3D cultures

Master degree: Oncology

Faculty/University: ICBAS, University of Porto

Supervisor: Eduardo Rocha

Date: December 2022

Name: Rui Filipe da Costa Ribeiro

Thesis title: Effects of nanoplastics, isolated and in mixture with potassium dichromate, on the growth of the microalgae *Chlorella vulgaris*

Master degree: Environmental Toxicology and Contamination

Faculty/University: Faculty of Sciences / ICBAS, University of Porto

Supervisor: Lúcia Guilhermino

Date: November 2022

Name: Rui Pedro Pereira

Thesis title: Internship in commercial aquaculture Safiestela

Master Degree: Biological Aquatic Resources

University: Faculty of Sciences, University of Porto

Supervisor: Helena Peres

Date: November 2022

Name: Rute Alexandra Duarte Crespo

Thesis title: Antifungal activity of aqueous extracts of *E. globulus* Labill on grapevine pathogenic fungi

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Ruth Pereira

Co-supervisor: Anabela Cachada

Date: December 2022

Name: Sara Sofia Santos Teles

Thesis title: Effect of artificial shading on the incubation of *C. caretta* nests, in the nursery, Boa Vista Island, Cabo Verde

Master degree: Ecology and Environment

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Adolfo Marco

Co-supervisor: Sara Antunes

Date: December 2022

Name: Sara Sousa Moreira

Thesis title: When pathways cross other pathways, that themselves, have met other pathways: crabs responses to cocktails of contaminants

Master degree: Bioinformatics and Computational Biology

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Nuno G. C. Ferreira

Co-supervisor: Laura Guimarães; Pedro Ferreira

Date: December 2022

Name: Simão Matos Conceição Horta

Thesis title: Exploring planktonic microbiome diversity in the coastal ecosystems of the North of Portugal

Master degree: Microbiology

Faculty/University: Higher Technical Institute of Lisbon, , University of Lisbon

Supervisor: Catarina Magalhães

Co-supervisor: Rodrigo da Silva Costa; Maria Paola Tomasino

Date: November 2022

Name: Teresa da Cunha Pacheco

Thesis title: Propagation of macroalgae *Codium tomentosum* for aquaculture production

Master degree: Biological Aquatic Resources

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: Isabel Sousa-Pinto

Co-Supervisor: Gonçalo S. Marinho

Date: November 2022

Name: Tiago Oliveira Novais Leite de Magalhães

Thesis title: The acceptability of compound feed manufacturers in using insect proteins in feed for poultry and pigs in Portugal

Master degree: Environmental Economics and Management

Faculty/University: School of Economics and Management, University of Porto

Supervisor: Cristina Calheiros

Co-supervisor: Manuel Castelo Branco

Date: November 2022

Name: Tomé Oliveira Moreira Azevedo

Thesis title: Identification of cyanotoxins and the biosynthetic potential of microcystin synthetase in the Alqueva reservoirs, and risk analysis

Master degree: Environmental Contamination and Toxicology

Faculty/University: ICBAS, University of Porto

Supervisor: Alexandre Campos

Co-supervisor: Vitor Vasconcelos

Date: December 2022

Name: Yuri Cândido Andrade

Thesis title: Evaluation of UAV positional accuracy with GNSS RTK

Master degree: Remote Sensing

Faculty/University: Faculty of Sciences, University of Porto

Supervisor: José Alberto Gonçalves

OTHER SCIENTIFIC OUTPUTS

PROVISIONAL PATENT APPLICATIONS

Inventors: Oliverira P.M., Cardoso J.A., Lima S., Serra C., Coutinho F., Oliva-Teles A. 2022. PT 117786 – PROTEIN CARRIER SYSTEM BASED ON CYANOBACTERIAL NANO-SIZED EXTRACELLULAR VESICLES. Applicants: Instituto de Biologia Molecular e Celular (IBMC), CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto.

Inventors: Reis M.A., Almeida J.R., Vasconcelos V., Morais J., Ferreira L., Pereira S., Gonçalves C., Neves J. 2022. PT 117824 – BIOACTIVE COMPOUNDS OBTAINED FROM CYANOBACTERIA LEPTOTHOE SP. LEGE 181152. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, Instituto de Engenharia e Ciências do Mar - Universidade Técnica do Atlântico.

Inventors: Pagels F., Almeida C., Vasconcelos V., Guedes A.C. 2022 PT 117951 – COSMETIC INGREDIENT COMPOSITION CONTAINING PIGMENT-TARGETED EXTRACTS. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, Iss Inclita Seaweed Solutions Lda.

EUROPEAN PATENT APPLICATIONS

Inventors: Peres H., Belo I., Castro C., Seara J., Oliva-Teles A., Fernandes H. 2022. EP 4070666 – ENZYME-RICH EXTRACT AND USE THEREOF IN PRE-TREATMENT OF PLANT FEEDSTUFF-BASED DIETS. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, Universidade do Minho.

INTERNATIONAL PATENT APPLICATIONS

Inventors: Correia-da-Silva M., Neves A.R., Almeida J.R., Geraldes E., Sousa E., Mergulhão F., Pinto M., Vasconcelos V., Vilas-Boas C., Gomes L. 2022. PCT/IB2022/059302 – ANTIFOULING COMPOUND, METHOD AND USES THEREOF. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, Faculdade de Ciências da Universidade de Lisboa.

Inventors: Sousa E., Neves A.R., Correia-da-Silva M., Silva J.M.F., Durães F., Martins da Costa P., Pinto E., Geraldes E., Mergulhão F., Gomes M., Santos R. 2022. PCT/IB2022/062027 – CATIONIC STEROID COMPOUNDS, METHOD OF OBTAINING THEREOF, FORMULATIONS COMPRISING THEREOF AND THEIR USES. Applicants: Universidade do Porto, Ciimar - Centro Interdisciplinar de Investigação Marinha e Ambiental, Faculdade de Ciências da Universidade de Lisboa.

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