ciimar

ACTIVITY REPORT
2019

INDEX

MESSAGE FROM THE BOARD

In 2019, CIIMAR attained the rating of EXCELLENT amongst Portuguese research centers as the results of the international evaluation process that started early in 2018. Although the overall funding is not significantly different from the previous one, it will allow the hiring of three new researchers and the assignment of 15 PhD grants funded by FCT.

CIIMAR continued the implementation of two large Mobilizing Program projects led by industry – MARVALOR and MOBFOOD and, in 2019, a new one started ALGAVALOR - also led by industry. In 2019, we kept the trend of attracting national and international funds from the approval of new projects including 3 H2020 (AQUACOMBINE, TOXICROP, FutureMARES). In 2019, the sum of the projects in implementation in CIIMAR raised to 21.4 million euros.

CIIMAR members published 448 papers in internationally peer-reviewed journals and successfully contributed to the graduation of 19 PhD and 78 MSc students.

In 2019, four international patents were submitted, reflecting the increasing impact of our research and the success of the implementation of the measures to increase the technology transfer.

The Collaborative Laboratory for the Blue Economy (B2E) whose application was led by CIIMAR, was officially funded in 2019. CIIMAR outreach activities, both indoors and outdoors impacted more than 65 000 people.

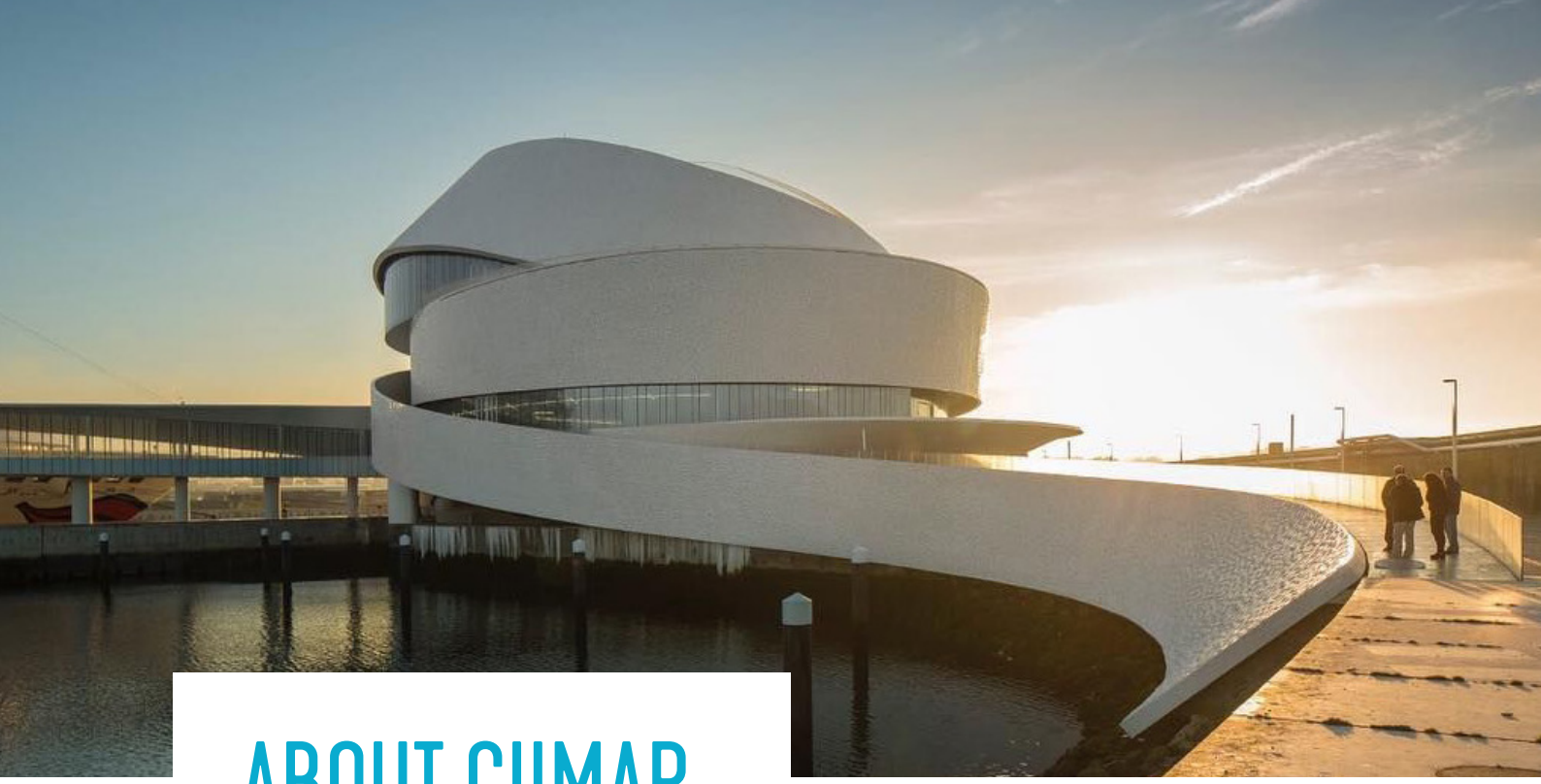
In September 2019 CIIMAR launched the BlueBioEconomy Roadmap for Portugal with the endorsement and presence of the minister of the Sea Ana Paula Vitorino. This was the end point of the H2020 Twinning action BLUEandGREEN but at the same time it became its legacy.

A new collective associate joined CIIMAR in 2019, the Porto Polytechnic through the High School of Health, which will allow an increased collaboration and allocation of resources (human and space) between both institutions.

CIIMAR aims in 2020 to strengthen the relationships with the University of Porto so as to establish a legal status that will allow an even better cooperation between both institutions taken into account all the challenges that are expected in the near future.

The director of the Board of CIIMAR

Vitor Vasconcelos



ABOUT CIIMAR

CIIMAR is a leading research and advanced training institution of the University of Porto, working at the frontiers 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.

Social Organs

The current social organs initiated their mandate in January 2019 and are composed as follows:

GENERAL ASSEMBLY	BOARD	FISCAL COUNCIL
President Eduardo Rocha	**President** Vitor Vasconcelos	**President** Luísa Bastos
Chairs › Aires Oliva Teles › Francisco Taveira Pinto › Carlos Vale › Susana Moreira	**Board members** › Ana Paula Mucha › Isabel Sousa Pinto › Luísa Valente › Rodrigo Ozorio	**Members** › José Fernando Gonçalves › Helena Peres

Headquarters

CIIMAR´ s new 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, high 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 - Abel Salazar Biomedical Sciences Institute, and Faculties of Sciences, Engineering, Pharmacy and Law – and at Porto Polytechnic Institute, Regional Secretariat for Agriculture and Fisheries (RG Madeira) and Portuguese Institute of Sea and Atmosphere (IPMA).

CIIMAR is an integral research Centre of CIMAR - Associated Laboratory, together with CCMAR - University of Algarve.

Innovation and Technology Transfer

CIIMAR supports the development of a sustainable blue economy, while tackling important societal challenges. Through the implementation of Large Scale Mobilizing R&TD Programs,

R&D projects in co-promotion with companies and the CIIMAR's Blue Business Development Platform, the Centre promotes the transfer of knowledge, fostering the development of new technologies, products and services with a strong technology and innovation component.

Disruptive ideas and technologies are driven to business acceleration programmes, such as Blue Bio Value, enabling knowledge value creation through entrepreneurship.

CIIMAR is a founding member of the National Maritime Cluster – Forum Oceano, the BLUEBIO ALLIANCE, and more recently, the B2E CoLAB – Collaborative Laboratory for Blue Economy.

Science and Society

CIIMAR has an extensive Outreach Program addressed to all society sectors. In 2019 CIIMAR started "Clubes Ciência Viva" Protocols with 4 schools, received the visit of 31 school groups, and performed 29 indoor and 23 outdoor activities with schools. The Communication and Outreach Office coordinated several science dissemination campaigns, such as the Ocean Action and Ponds with Life, and traveling exhibitions ("Plastic Sea", "Marine Monsters", "Amphibians: a paw on land, another on earth"). CIIMAR also participated in numerous public events and science communication displays aimed to promote the dissemination of CIIMAR's research to society. CIIMAR Open Day, coinciding with Leixões Port Day at 21 September 2019, constituted a major dissemination event, with over 11.000 visitors.

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

RESEARCH LINES

Marine Biotechnology

Top research is also 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 STRUCTURE

RESEARCH LINES	RESEARCH GROUPS	RESEARCH TEAMS
MARINE BIOTECHNOLOGY	EVOLUTIONARY GENOMICS AND BLUE BIOTECHNOLOGY	EVOLUTIONARY GENOMICS
		BLUE BIOTECHNOLOGY AND ECOTOXICOLOGY
		EMERGENT BIOTECHNOLOGIES AND SEAFOOD PROCESSING
		CYANOBACTERIAL NATURAL PRODUCTS
	NATURAL PRODUCTS AND MEDICINAL CHEMISTRY	CHEMISTRY AND BIOLOGICAL ACTIVITY OF MARINE NATURAL PRODUCTS
		MEDICINAL CHEMISTRY: DRUG DISCOVERY AND DRUG DESIGN
	BIOREMEDIATION PROCESSES	BIOREMEDIATION AND ECOSYSTEMS FUNCTIONING
GLOBAL CHANGES & ECOSYSTEMS SERVICES	CONTAMINATION PATHWAYS AND MECHANISMS OF TOXICITY	CONTAMINANT PATHWAYS AND INTERACTIONS WITH MARINE ORGANISMS
		ENDOCRINE DISRUPTORS AND EMERGENT CONTAMINANTS
		SOIL/WATER INTERACTIONS
		MARINE AND COASTAL ENVIRONMENTAL TOXICOLOGY
		ECOTOXICOLOGY, STRESS ECOLOGY AND ENVIRONMENTAL HEALTH
	AQUATIC BIODIVERSITY AND CONSERVATION	HYDROBIOLOGY
		ESTUARINE ECOLOGY AND BIOLOGICAL INVASIONS
		AQUATIC ECOLOGY AND EVOLUTION
		COASTAL BIODIVERSITY
		BENTHIC ECOLOGY
	OCEAN DYNAMICS, COASTAL AND WATER SYSTEMS	COASTAL AND OCEAN DYNAMICS
		COASTAL MONITORING AND MANAGEMENT
		MARINE ENERGY
		WATER RESOURCES SYSTEMS
	LAW OF THE SEA	LAW OF THE SEA
BIOLOGY, AQUACULTURE & SEAFOOD QUALITY	AQUACULTURE AND SEAFOOD SAFETY	NUTRITION, GROWTH AND QUALITY OF FISH
		SAFE AND HEALTHY SEAFOOD AND SUSTAINABLE CONSUMPTION
	ANIMAL NUTRITION AND HEALTH	NUTRITION AND IMMUNOBIOLOGY
		ANIMAL PATHOLOGY
		ANIMAL HEALTH AND AQUACULTURE
	ANIMAL PHYSIOLOGY AND FUNCTIONAL GENOMICS	ANIMAL GENETICS AND EVOLUTION
		HISTOMORPHOLOGY, PHYSIOPATHOLOGY AND APPLIED TOXICOLOGY
		MOLECULAR PHYSIOLOGY
		ECOPHYSIOLOGY

TECHNOLOGY PLATFORMS

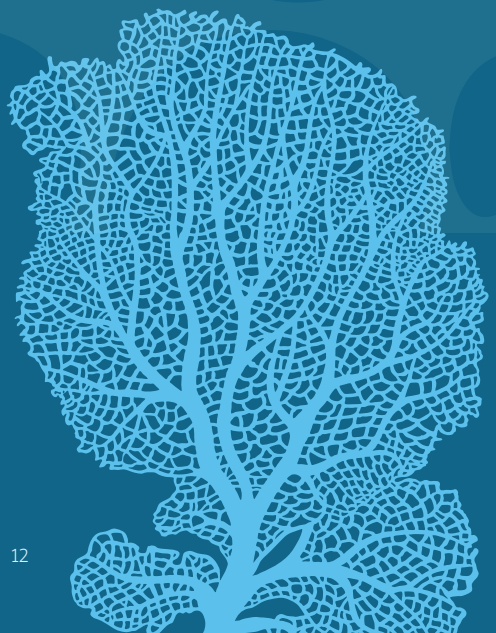
CIIMAR Platforms developed under various European Marine Sciences Infrastructure Networks (e.g. EMBRC and EMSO) represent a new strategic axis of the Centre to grant access from other institutions in the European Research Area and companies. These Platforms provide access and offer support and expertise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

B2E: COLLABORATIVE LABORATORY FOR BLUE BIOECONOMY

Inspired by the Ocean
Driven by the Market
Powered by Knowledge

The Collaborative Laboratory for the Blue Economy (B2E) whose application was coordinated by CIIMAR, was officially registered in 2019 as a non-profit private association, with CIIMAR as a board member. The main objective of the B2E CoLAB is to create highly-skilled jobs and increase economic and social value through the development of knowledge-based activities supported by the implementation of research and innovation agendas. The B2E CoLAB is complementing and reinforcing the current landscape of R&D units, already part of the present consortium, by stimulating an active participation of scientific/academic, business and public communities in the analysis and solution of large scale and complex problems sustainably associated with the use of marine bio-resources. This challenge will be successfully addressed through a multidisciplinary, interdisciplinary and multi-institutional approach to address the following goals and priorities:

- Creation of highly-skilled jobs to enhance the economic and social value of two of the Blue Growth sectors with the highest potential: Biotechnology and Aquaculture;
- Stablish synergies and multi-/interdisciplinary activities among complementary partners acting in the sustainable use of marine bio-resources to improve the technological intensity level and knowledge of the goods and services produced;
- Contribute to policy making on the strategic management of wild marine species harvest assuring marine ecosystem health;
- Fostering marine biorefinery frameworks securing full valorisation of biological resources.



BIORESOURCES AND BIOECONOMY

SUSTAINABLE AQUACULTURE 4.0

TOOLS FOR SEAFOOD SAFETY AND CERTIFICATION

CIRCULAR ECONOMY AND BLUE GROWTH

HIGHLY-SKILLED JOBS IN BLUE BIOECONOMY

B2E CoLAB
Major Research Fields

NATURAL RESOURCES

New uses and valorisation;

MARINE BIOTECHNOLOGY

Sustainability and new products;

SUSTAINABLE AQUACULTURE

Species diversification and enabling technologies.

B2E CoLAB
Participating Entities

Universities, R&D centres & Associate Laboratories

- **CIIMAR**
- University of Aveiro - CESAM
- University of Minho - ICVS/3B's
- University of Porto - UP

Technology Interface Centre

- INESC TEC

Sea Economy Cluster

- Fórum Oceano

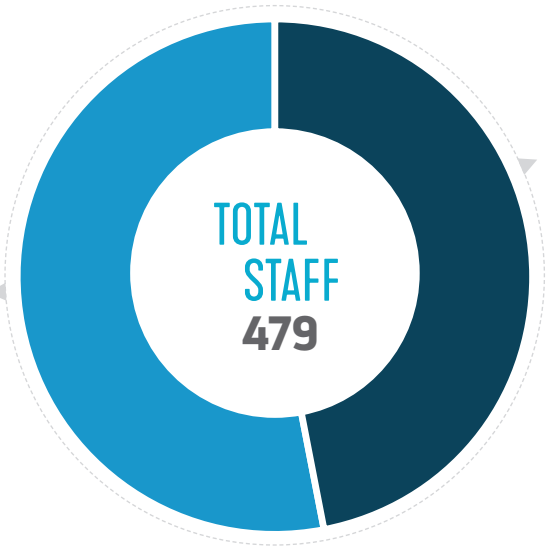
Private Companies

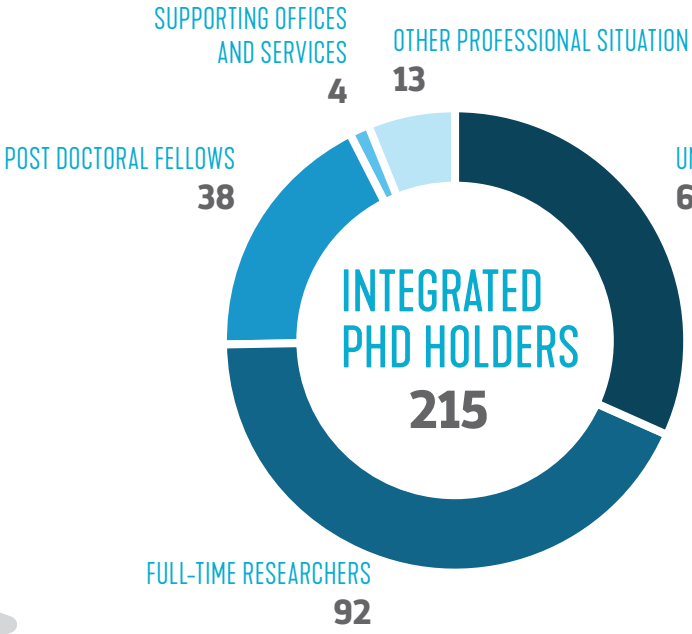
- A2O
- Ingredient Odyssey
- SAVINOR
- SAFISTELA
- SONAE MC
- SORGAL
- SPAROS

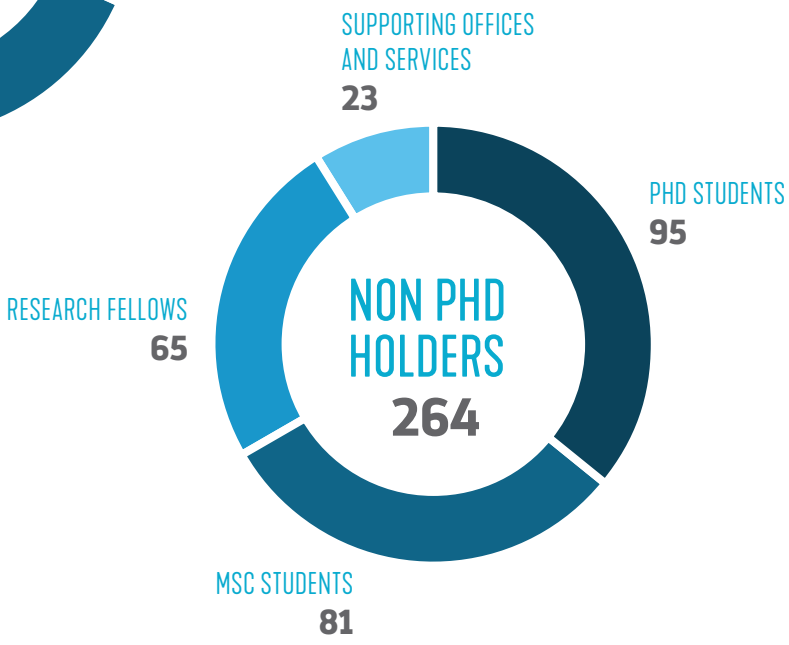

JAN
FEB

FACTS & FIGURES

TEAM







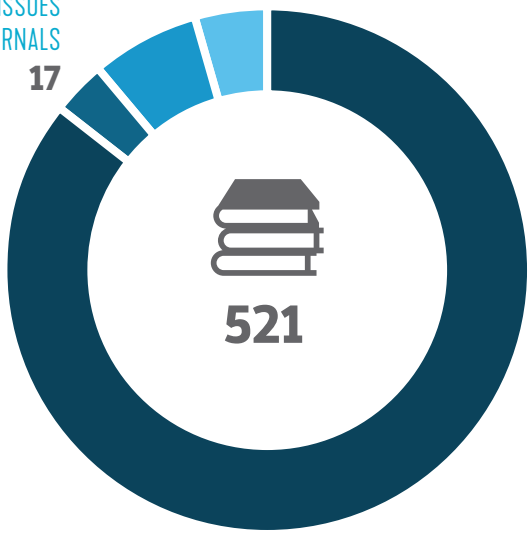
27 SUPPORTING OFFICES AND SERVICES

38 INTERNATIONAL VISITING RESEARCHERS

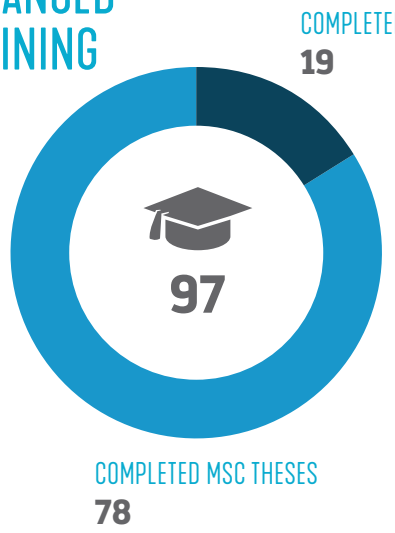
>30 NATIONALITIES

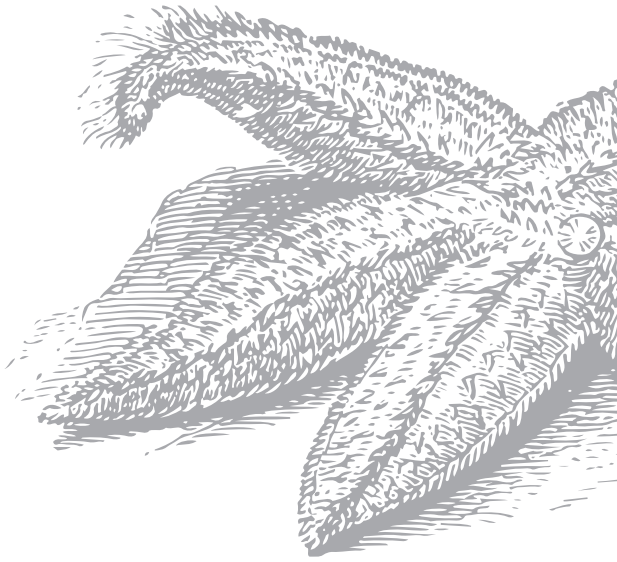
SCIENTIFIC PRODUCTIVITY

SCIENTIFIC PUBLICATIONS



ADVANCED TRAINING





3
SOFTWARE, MODELS, PROTOTYPES

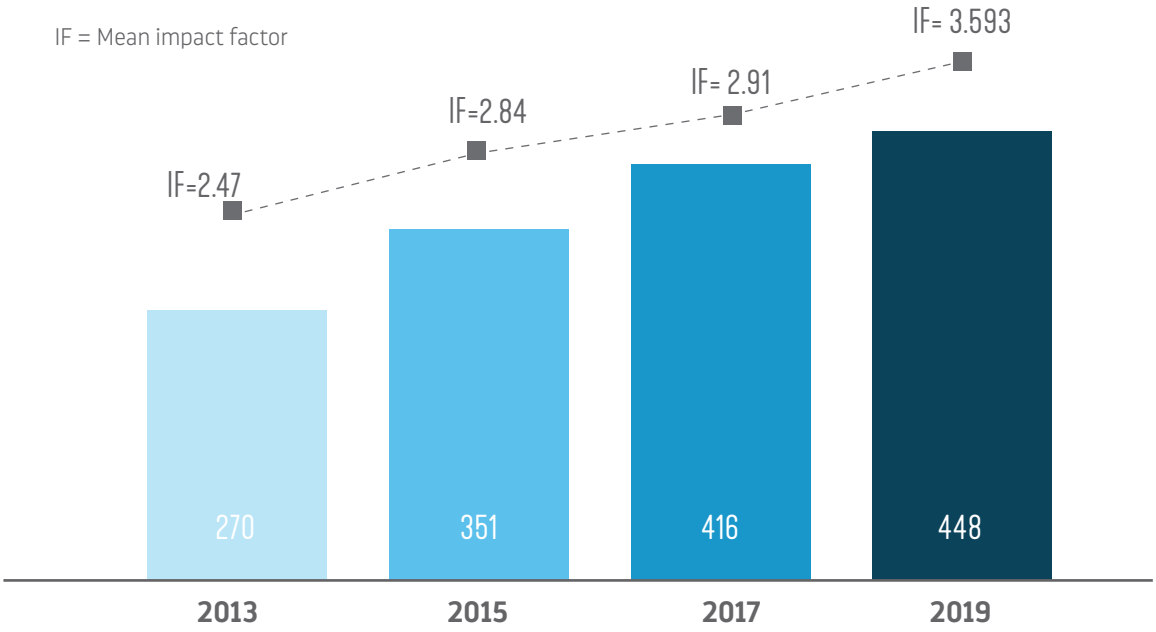
13
PATENTS

2019 MILESTONES

- 4 PROVISIONAL PATENT APPLICATIONS
- 4 INTERNATIONAL PATENT APPLICATIONS
- 1 GRANTED US PATENT
- 1 GRANTED EU PATENT

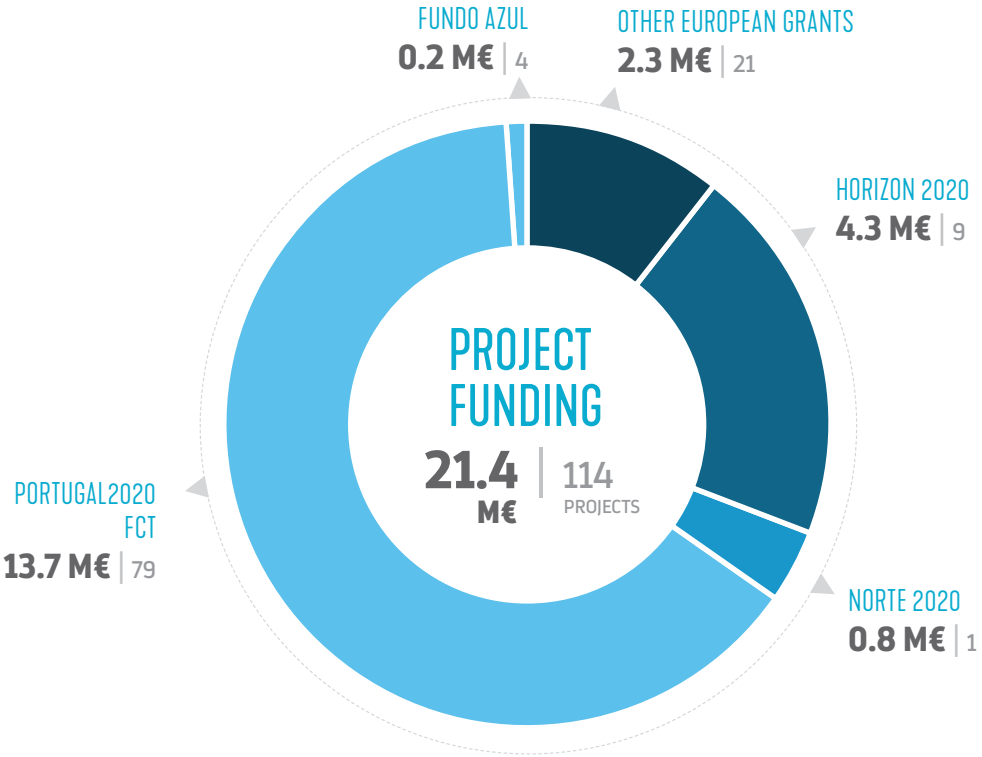
NR OF PUBLICATIONS IN PEER REVIEWED JOURNALS [2013-2019]

IF = Mean impact factor

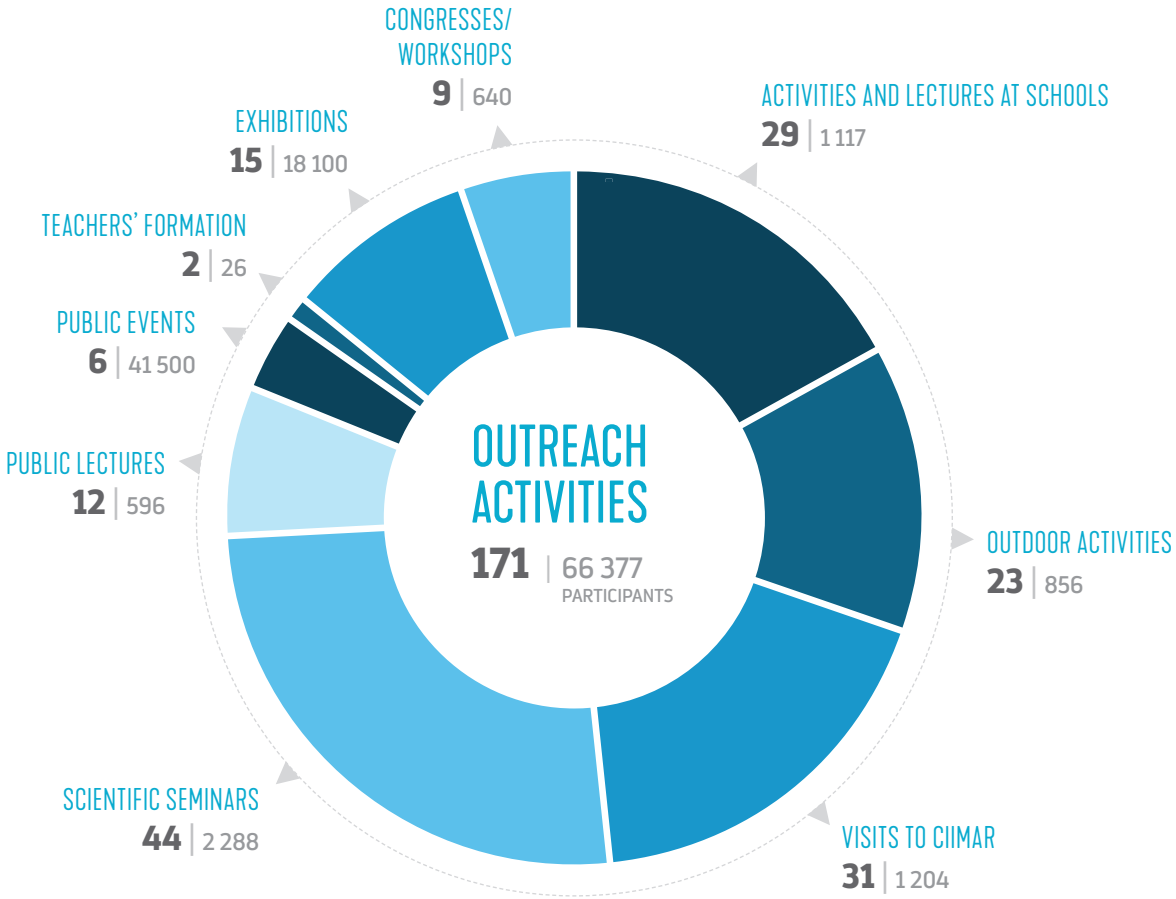


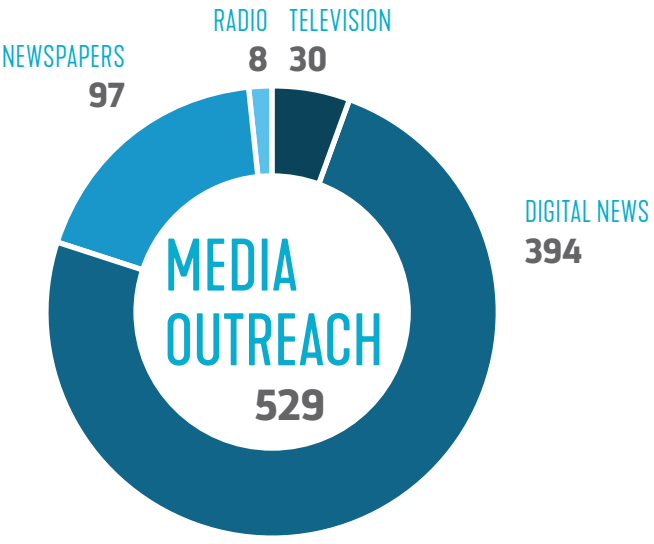
COMPETITIVE R&D PROJECT FUNDING

Competitive funding attributed to CIIMAR in R&D projects in execution during 2019



OUTREACH ACTIVITIES





2019 AT A GLANCE

JAN

New Board of Directors of CIIMAR for the 2019-2021 triennium

European Marine Biological Resource Centre Biobank meeting at CIIMAR

Workshop "Litoral Norte Natural Park: what futures?" co-organization

CIIMAR research on the genetic basis of cetaceans sleep published at Genes

FEB

Launch of the **Blue Bioeconomy Collaborative Laboratory** (B2E)

Eric Kandel (Nobel Prize in Medicine) visits CIIMAR

Workshop on Molecular Gastronomy Techniques applied to Mackerel

CIIMAR work on the white shark genome published at PNAS

MAR

Algavalor project approved

CIIMAR 19th Anniversary

Toxicrop and NetTag kickoff meetings

SpilLess project workshop

JUL

Launch of the **6th edition of Blue Young Talent** (BYT) and **1st edition of BYTplus**

GEO BON work meeting at CIIMAR

CIIMAR participates in Junior University (UPorto)

Stop the Plastic Tide campaign launched to reduce disposable plastics at CIIMAR

AUG

CIIMAR researchers Catarina Magalhães and Maria Paola Tomasino **expedition to the Arctic** for monitoring microbiological communities

BlueBioLab project Kick Off Meeting

SEP

CIIMAR Annual Meeting

CIIMAR Open Day

Programming With R For Biological Sciences Advanced Course

Plastic Sea exhibition at the CEI Leiria

APR

Blue Bioeconomy Roadmap Launch Event at CIIMAR

CIIMAR at **Mostra UP** 2019

Vitor Vasconcelos elected **Executive Director of BLUEBIO ALLIANCE**

International Symposium of the AtlantOS project

Plastic Sea exhibition at SeaLife Porto

MAY

Minister of Fisheries from Nova Scotia (Canada) visited CIIMAR

CAL-Aqua advanced course

Digital launch of the Blue Bioeconomy Roadmap for Portugal

New cyanobacteria anti-obesity metabolites discover published at Marine Drugs

JUN

CIIMAR obtained the **FCT grade of "Excellent"**

Vitor Vasconcelos on the **scientific board of the Natural History Museum of France**

CIIMAR at the **European Maritime Day**, Lisbon

Blue Bio Value Roadshow at CIIMAR

CIIMAR student wins the Idea Challenge Portugal 2019

OCT

APAA Conference 2019 at CIIMAR

CIIMAR at **Aquaporto 2019**

The Out-Of-The-Box Creative Price for CIIMAR project

CIIMAR at the Ocean Film Tour at Cinema Trindade

CIIMAR teams participates in Blue Bio Value 2019

NOV

DEEPbaseline project wins **Ocean Conservation Fund**

CIIMAR at **Business2Sea** and **BioMarine 2019**

Aquaimprove Workshop

Plastic Sea exhibition at Sea Museum, Cascais

DEC

Benthic Ecology and **Animal Health & Aquaculture** new Research Teams

Porto Polytechnic Health School joins CIIMAR

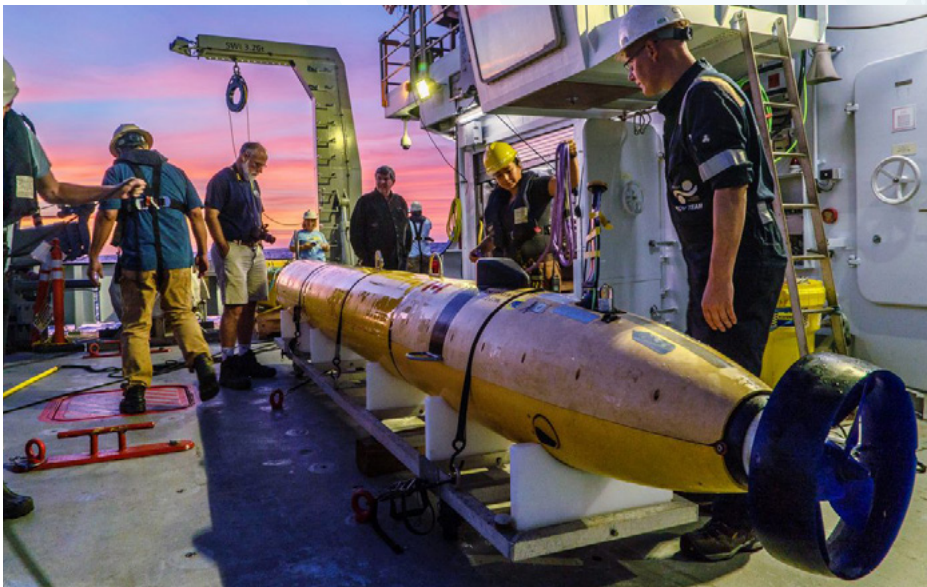
Launching of the "Ocean" multimedia educational Package with Lusoinfo

CalAqua advanced course

Sherpa do Mar Workshop at UPTEC


ROTEIRO DA BIOECONOMIA AZUL PARA PORTUGAL
CERIMÓNIA DE ABERTURA
ANA PAULA VITORINO
MINISTRA DO MAR


ciimar
Ocean Knowledge
& Sustainability
BLUE BIOLAB
GLOBAL CHANGES AND ECOSYSTEMS SERVICES
MARINE BIOTECHNOLOGY
WWW.CIIMAR.UP.PT



HIGHLIGHTS

LAUNCH EVENT OF BLUE BIOECONOMY ROADMAP

The Blue Bioeconomics Roadmap for Portugal was launched at the Porto Cruise Terminal on March 2019, with the endorsement and presence of the minister of the Sea Ana Paula Vitorino. The Blue Bioeconomics Roadmap is an important result of three-year work by the BLUEandGREEN project, approved under the TWINNING projects of the Horizon 2020 program, and resulted from a joint work of CIIMAR, BlueBio Alliance and Fundação Oceano Azul.

Roadmap file available at: http://blueandgreen.ciimar.up.pt/

CIIMAR OPEN DAY

On September 21st CIIMAR opened its doors to the community, integrated with the 11th edition of the 'Leixões Port Day', with activities for all the age groups. More than 30 scientific and pedagogical activities, games, show cooking and storytelling moments aimed to help demonstrating CIIMAR's extensive research and the importance of marine ecosystems. Despite the adverse weather conditions of the day the Cruise Terminal received more than 11.000 visitors at this event.

TWO NEW RESEARCH TEAMS AT CIIMAR

Benthic Ecology (BET) and Animal Health and Aquaculture (A2S) Research Teams integrated CIIMAR during 2019. The BET team aims to explore the extensive sea bottom from the most accessible to the most remote areas, unravelling biodiversity patterns on marine benthic communities across space and time, while A2S team will explore innovative and sustainable solutions to improve the health condition of farmed animals, including nutritional approaches, host-pathogen and neuro-endocrine/immune interactions.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PROJECT HIGHLIGHTS

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

PRINCIPAL INVESTIGATOR AT CIIMAR
Benjamin Costas

LEADER INSTITUTION
Aalborg Universitet

WEBSITE
www.aquacombine.eu

Funded by the European Union

One of the most important challenges of the 21st century is to meet the world's demand for sustainably produced biomass for both food and the growing bio-products sector. Increased use of fresh water for agriculture and loss of farmland due to salinity are related concerns. *Salicornia europaea* (*S. europaea*) is grown commercially in the EU for its edible fresh tips. 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 food product residue 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 (e.g. 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 – ASSOCIATION OF EUROPEAN MARINE BIOLOGICAL LABORATORIES EXPANDED

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 i of the project s to stimulate European fundamental and applied research excellence n 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.

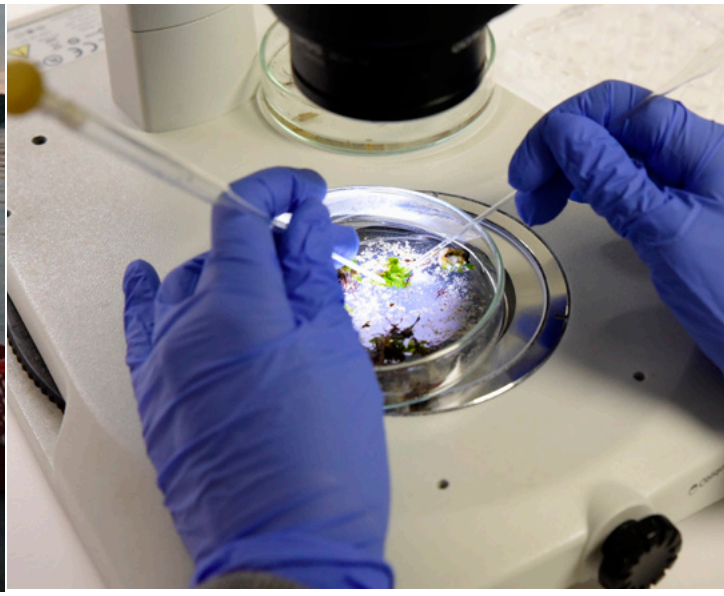
The sum of the actions envisaged in ASSEMBLE Plus, including Access, Networking and Research will ultimately increase the number of users of marine biological stations and shape novel strategic development perspectives of the partners, to be based on effective integration and efficient complementarities,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

PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
UPMC

WEBSITE
www.assembleplus.eu

Funded by the European Union



ATLANTOS – OPTIMISING AND ENHANCING THE INTEGRATED ATLANTIC OCEAN OBSERVING SYSTEMS

PRINCIPAL INVESTIGATOR AT CIIMAR
Isabel Sousa Pinto

LEADER INSTITUTION
GEOMAR - Helmholtz Centre for Ocean Research Kiel

WEBSITE
www.atlantos-h2020.eu

FACEBOOK
/AtlantOSH2020

Funded by the European Union

The overarching objective of AtlantOS is to achieve a transition from a loosely-coordinated set of existing ocean observing activities producing fragmented, often monodisciplinary data, to a sustainable, efficient, and fitfor-purpose Integrated Atlantic Ocean Observing System (IAOOS). This will be achieved through research and innovation activities focused on: defining requirements and systems design, improving the readiness of observing networks and data systems, engaging stakeholders around the Atlantic, as well as strengthening Europe's contribution to the Global Ocean Observing System (GOOS), a major component of the Group on Earth Observations (GEO), its Global Earth Observation System of Systems (GEOSS), and specifically on its emerging "Oceans and Society: Blue Planet" initiative.

AtlantOS contributes to blue growth by merging new information needs relevant to key sectors such as transport, tourism, fisheries, marine biotech, resource extraction and energy with existing requirements. AtlantOS significantly contributes to trans-Atlantic cooperation by integrating existing observing activities established by European, North and South American, and African countries and by filling existing gaps to reach an agile, flexible IAOOS and associated ocean information systems around the Atlantic.

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

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:

- 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);
- to develop innovative approaches to sample, and analyze the producing organisms and their toxins by chemical and biological methods including immunoassays and sensors;
- to estimate different future scenarios based on molecular data (routes of dispersion) and modelling.

PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://emertox.eu/

Funded by the European Union

FATTYCYANOS - FATTY ACID INCORPORATION AND MODIFICATION IN CYANOBACTERIAL NATURAL PRODUCTS

PRINCIPAL INVESTIGATOR AT CIIMAR
Pedro Leão

LEADER INSTITUTION
CIIMAR-UP

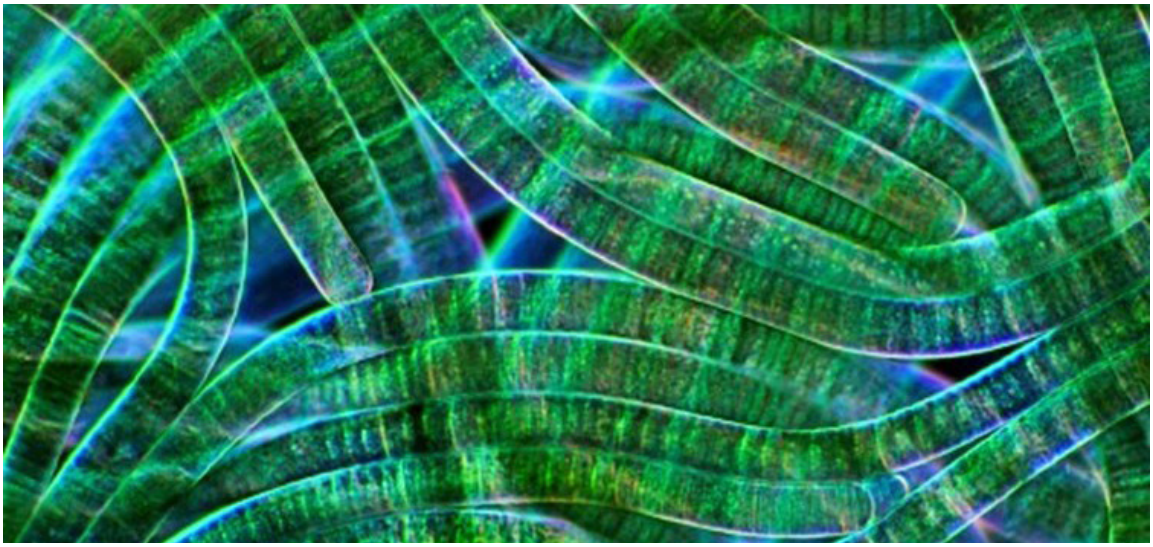
Funded by the European Union

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.



GENIALG – GENETIC DIVERSITY EXPLOITATION FOR INNOVATIVE MACRO-ALGAL BIOREFINERY

Seaweed, or "macro-algae", has long been recognised as a valuable source of diverse bioactive compounds and has great potential to be used in pharmaceuticals, nutraceuticals and functional foods. However, until now, seaweed has been underexploited in Europe due to the challenges of expanding seaweed biomass production: costs need to be reduced, scales of production need to be increased, quality improved, and seaweed biomass needs to be successfully refined into multiple useful products. If these issues can be addressed, seaweed biomass production could become more economically and environmentally sustainable.

The overall objective of the GENIALG project is to boost the European Blue Economy by designing high-yielding seaweed cultivation systems. GENIALG aims to increase the production and sustainable exploitation of two high biomass yielding species of European seaweed: the brown algae (or sugar kelp) *Saccharina latissima* and the green seaweed (or sea lettuce) *Ulva rigida*. GENIALG is the first industry-driven project bringing together pioneering companies in large-scale integrated European biorefineries and experts in seaweed cultivation, genetics and metabolomics to boost the seaweed industry. GENIALG will combine available knowledge in seaweed biotechnology with reliable eco-friendly tools and methods to scale up current small cultivation seaweed operations.

Two pilot pre-industrial seaweed biorefinery plants will provide vital seaweed compounds for a wide range of products such as cosmetics, pharmaceuticals, food and feed ingredients, fine and specialty chemicals, additives and blends such as gels, as well as precursors for biodegradable plastics. GENIALG will help lead the way in the Blue Biotechnology sector in Europe, while addressing social acceptability and competition for maritime space.

PRINCIPAL INVESTIGATOR AT CIIMAR
Isabel Sousa Pinto

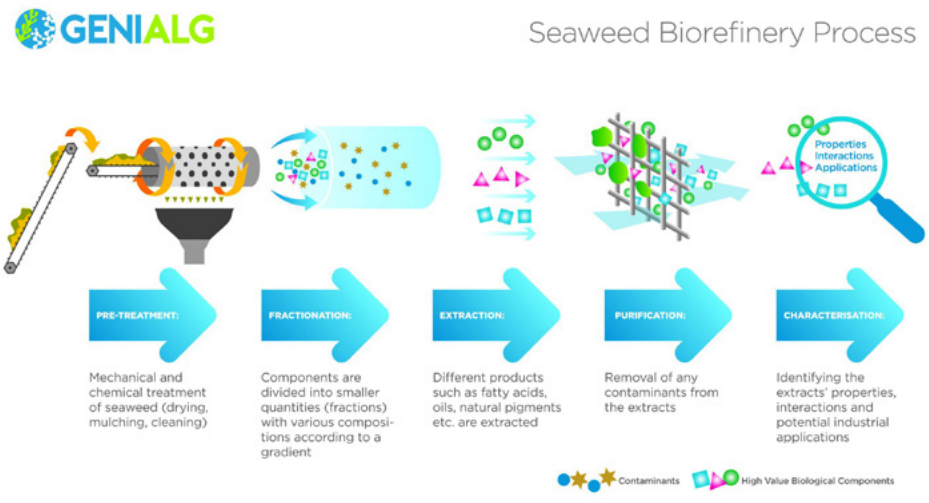
LEADER INSTITUTION
Centre National de la Recherche Scientifique

WEBSITE
http://genialgproject.eu

FACEBOOK
/GENIALGproject

TWITTER
Genialg_eu

Funded by the European Union



IGNITE – COMPARATIVE GENOMICS OF NON-MODEL INVERTEBRATES

PRINCIPAL INVESTIGATOR AT CIIMAR
Agostinho Antunes

LEADER INSTITUTION
Ludwig-Maximilians – Munich University

WEBSITE
http://www.itn-ignite.eu/

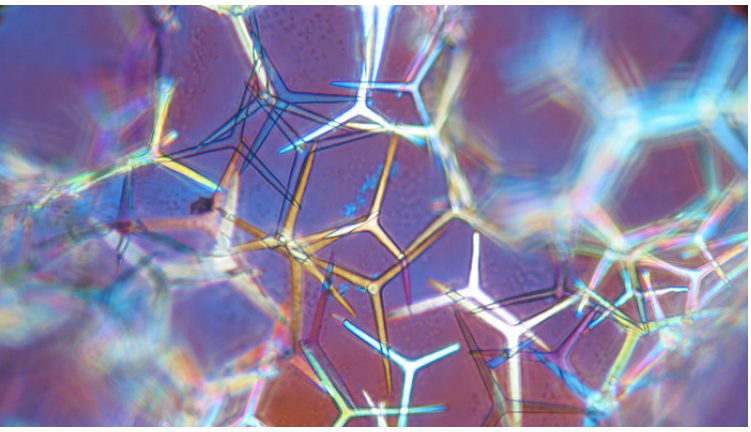
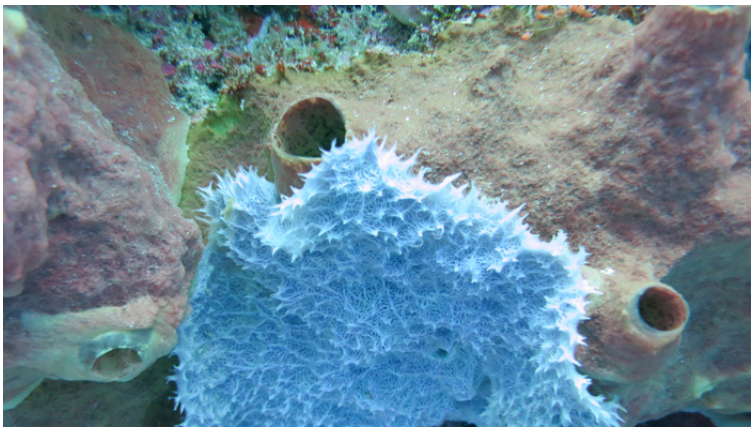
FACEBOOK
itnignite/

Funded by the European Union

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.

NOMORFILM – NOVEL MARINE MOLECULES AGAINST BIOFILM: APPLICATION TO MEDICAL DEVICES

NoMorFilm

In the last decades, an increasing number of antibiotic resistant bacterial pathogens have become an important problem worldwide. This includes also biofilm-associated pathogens, causing prosthetic devices infections, and requiring costly implant replacement. Biofilm formation is especially important in infections related to implants and catheters, once they can promote an immune reaction giving rise to inflammation at underlying tissue. This finally causes a release of the implant, requiring surgical interventions, which entail an increase in antibiotic consumption, together with healthy cost of about 50,000-90,000 per episode.

Taking both problems in account, the search of new antimicrobial agents that will be effective against bacteria in their two stages of life (planktonic and biofilm), is a priority need in the clinical practice. Overall objective of this project is to search for such bioactive compounds from EU microalgae collections, which will be useful in the treatment of these kinds of infections and will be incorporated in the manufacturing of medical prosthetic devices.

The NOMORFILM project combines the two major antibiofilm strategies in use: high throughput screening and coating. NOMORFILM makes use of microalgae as the source of compound libraries. 6,800 Microalgae species coming from different ecosystems and continents will be screened and cultured in order to maximize their potential for production of antibiofilm molecules. Thus, each microalgae species will act as a natural multireactor producing a large number of compounds, and the high microalgae biodiversity will increase significantly the degree of structural diversity of the different families of compounds.

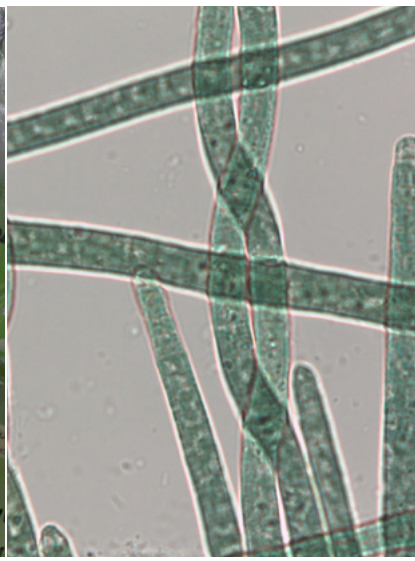
The new lead compounds discovered will be incorporated into functionalized nanoparticles and applied for coating prosthetic devices. These novel bionanomaterials will certainly make a breakthrough to the infection control and thus will make a great impact in the growing field of nanomedicine.

PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
IS Global (Barcelona)

WEBSITE
www.nomorfilm.eu

Funded by the European Union



SEAFOODTOMORROW – NUTRITIOUS, SAFE AND SUSTAINABLE SEAFOOD FOR CONSUMERS OF TOMORROW

PRINCIPAL INVESTIGATOR AT CIIMAR
Maria Leonor Nunes

LEADER INSTITUTION
IPMA

WEBSITE
www.seafoodtomorrow.eu

Funded by the European Union

SEAFOODTOMORROW aims to strengthen the European seafood production and processing industry by providing validated, commercially viable, and eco-innovative solutions that will improve seafood quality and safety, minimise environmental impacts, and drive socioeconomic development within the seafood industry.

Meeting the growing market need for safe, sustainable seafood is a formidable challenge for the European seafood industry. With European seafood imports presently reaching almost 70%, and global food demands projected to increase by 80-100% by 2050, it is vital to source and validate environmentally friendly and innovative seafood production and processing methods that will reduce European dependency on imports. Such solutions need to underpin seafood security in-line with market demand, whilst maintaining quality and traceability throughout the value chain to support consumer confidence.

Expected Results:

- Validation of nutritional and safety aspects of eco-innovative seafood solutions through certified methodologies carried out by independent partners.
- Easily-accessible database with seafood innovative products validation data for the implementation of a digital traceability tool linked to quality labels.
- Improved understanding of market acceptance of eco-innovative seafood solutions in different European regions and demographics.
- Validation of sustainable solutions from economic and environmental perspectives.
- Benchmark for certification schemes of seafood quality and traceability for industry to strengthen consumer confidence and trust in European seafood.
- Reduction of public health risks and promotion seafood consumption through transparent and responsible communication, dissemination, knowledge transfer and exploitation of the outcomes to the different stakeholders.

SponGES - DEEP-SEA SPONGE GROUNDS ECOSYSTEMS OF THE NORTH ATLANTIC: AN INTEGRATED APPROACH TOWARDS THEIR PRESERVATION AND SUSTAINABLE EXPLOITATION

The objective of SponGES is to develop an integrated ecosystem-based approach to preserve and sustainably use vulnerable sponge ecosystems of the North Atlantic. The SponGES consortium, an international and interdisciplinary collaboration of research institutions, environmental non-governmental and intergovernmental organizations, will focus on one of the most diverse, ecologically and biologically important and vulnerable marine ecosystems of the deep-sea - sponge grounds – that to date have received very little research and conservation attention. Our approach will address the scope and challenges of EC's Blue Growth Call by strengthening the knowledge base, improving innovation, predicting changes, and providing decision support tools for management and sustainable use of marine resources.

SponGES will fill knowledge gaps on vulnerable sponge ecosystems and provide guidelines for their preservation and sustainable exploitation. North Atlantic deep-sea sponge grounds will be mapped and characterized, and a geographical information system on sponge grounds will be developed to determine drivers of past and present distribution. Diversity, biogeographic and connectivity patterns will be investigated through a genomic approach. Function of sponge ecosystems and the goods and services they provide, e.g. in habitat provision, bentho-pelagic coupling and biogeochemical cycling will be identified and quantified. This project will further unlock the potential of sponge grounds for innovative blue biotechnology namely towards drug discovery and tissue engineering. It will improve predictive capacities by quantifying threats related to fishing, climate change, and local disturbances.

SponGES outputs will form the basis for modeling and predicting future ecosystem dynamics under environmental changes. SponGES will develop an adaptive ecosystem-based management plan that enables conservation and good governance of these marine resources on regional and international levels.

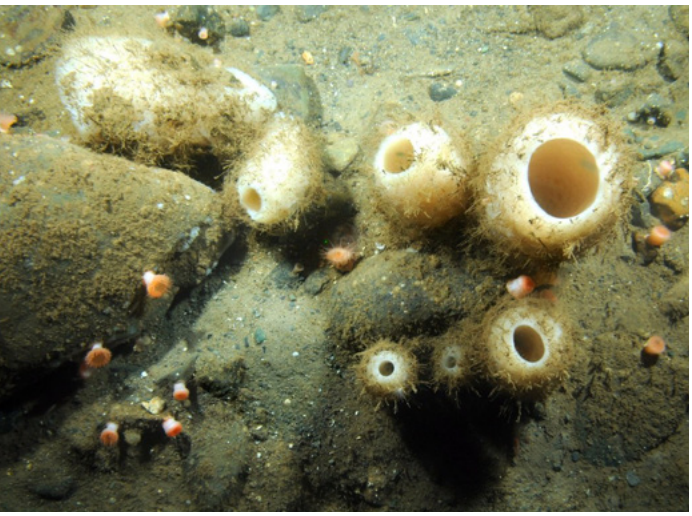
PRINCIPAL INVESTIGATOR AT CIIMAR
Joana Xavier

LEADER INSTITUTION
University of Bergen

WEBSITE
www.deepseasponges.org

FACEBOOK
/DeepSeaSponges

Funded by the European Union



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

PRINCIPAL INVESTIGATOR AT CIIMAR
Alexandre Campos

LEADER INSTITUTION
CIIMAR-UP

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

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:

- 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.
- By enabling onshore production.
- 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.

PRINCIPAL INVESTIGATOR AT CIIMAR
Rodrigo Ozorio

LEADER INSTITUTION
CEEI Bahía de Cadiz

WEBSITE
http://access2sea.eu

TWITTER
Access2Sea

BLUEBIOLAB – TRANSBOUNDARY MARINE BIOTECHNOLOGY LABORATORY

PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
University of Vigo

WEBSITE
http://bluebiolab.eu

FACEBOOK
/Bluebiolab-111326677038437

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+i 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:

- Support the consolidation of biotechnology as a fundamental tool for the study and valorization of marine biological resources, and the sustainable exploitation of marine biological resources.
- To pool the existing infrastructures, integrated in the Transboundary Marine Biotechnology Laboratory, in line with the common strategic objectives of the Regions.
- Develop actions to support talent and promote the mobility of researchers, including
- The programming of training activities.
- 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.
- Promote the internationalization and integration of scientific infrastructures linked to marine biotechnology in international R+D+i networks.

Therefore, BLUEBIOLAB aims to establish the resources and mechanisms to strengthen and stimulate internationally strategic research lines for the territory and for the marine productive sector, promoting innovative capacity and territorial competitiveness.

CVMAR+I – INDUSTRIAL INNOVATION UNDER THE CONTEXT OF BIOTECHNOLOGICAL VALORIZATION OF MARINE RESOURCES AND BY-PRODUCTS

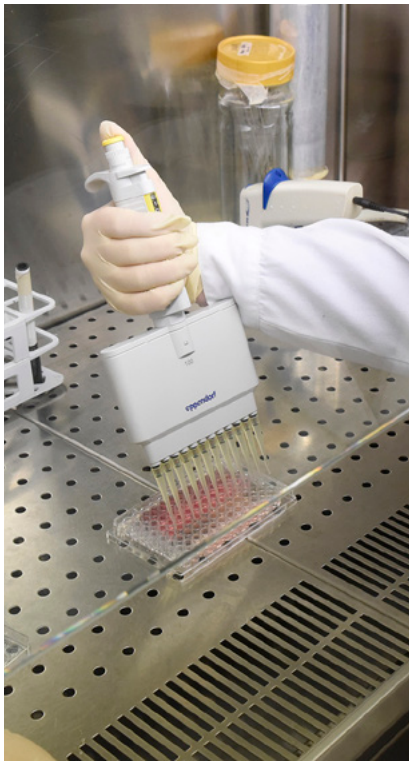
Industrial innovation through specific collaborations between enterprises and research centers in the context of marine biotechnological valorization - CVMar+i aims to promote industrial innovation around marine biotechnology by the proposal of new products based in marine compounds. This will be done by a synergic effort of enterprises and research enters in the transboundary area, benefiting from the complementarity of the partners.

The project will benefit from former POCTEP projects implemented by partners of this Consortium that can now be potentiated and without who's the innovation proposed would not be possible. We will develop tools that allow the enterprises of the region to increase their investment in innovation, reinforcing the role of the region in the Blue Economy. This is in alignment with RIS3T Galicia-North Portugal, developing products based on marine resources and sub-products in the areas of health (tissue regeneration and pharmacology), food and industrial applications.

PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
University of Minho

WEBSITE
http://cvmari.cetmar.org



CYANOBESITY – CYANOBACTERIA AS A SOURCE OF BIOACTIVE COMPOUNDS WITH EFFECTS ON OBESITY-ASSOCIATED MORBIDITIES – SCREENING AND MOLECULAR MECHANISM

PRINCIPAL INVESTIGATOR AT CIIMAR
Ralph Urbatza

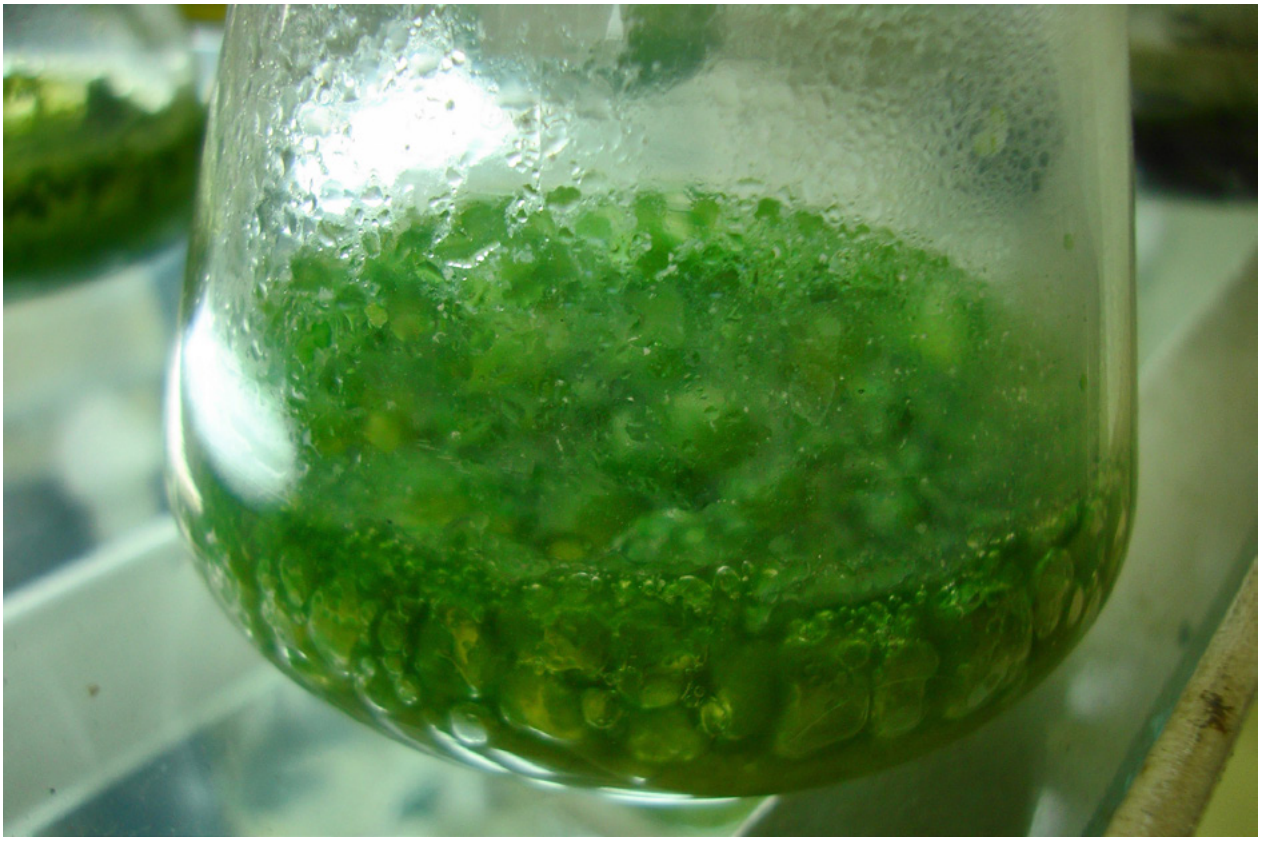
LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://cyanobesity.ciimar.up.pt

An urgent demand for new anti-obesogenic compounds is present, and marine cyanobacteria promise to be an excellent source for natural-derived molecules and novel nutraceuticals. Some strains of cyanobacteria are commercially available for consumption due to their beneficial properties to human health. Preclinical studies have been performed in various animal models and demonstrated hypolipidemic activities in rats and mice, lowering hepatic cholesterol and triglyceride levels.

In the proposed project, marine cyanobacterial strains of a culture collection will be screened for beneficial properties towards obesity and obesity-related comorbidities (obesity, fatty liver disease, diabetes, appetite and hyperlipidaemia) and the chemical structure will be elucidated. By applying an innovative biotechnological platform, the interactions from oral administration to the blood stream will be analyzed, and with different target tissues in vitro. A proof of concept regarding the improvement of metabolism will be performed in a relevant physiological model.

The general aim of the project is to develop novel nutraceuticals that have the potential to improve the quality of life for millions of people worldwide.



EBB – EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE BANK

The coastal regions in Europe through their S3s acknowledge the potential of Marine Biological Resources (MBRs) and especially blue biotechnologies (technological applications that use marine biological systems, living organisms or derivates to make or modify products or processes for specific uses, as defined by the Convention on Biological Diversity) to generate and promote employment, economic and regional development, contributing to growth and cohesion.

MBRs are one of the main services provided by marine ecosystems. Culture collections of MBRs are key to the systematic research of interesting and unique genes, bioactives and biomaterials from the marine environment with potential for commercial development and job creation in coastal regions.

The EMBRC BioBank (EBB) will set the basis for the common operation of the distributed marine biobanking facilities of the European Marine Biological Resource Centre (EMBRC) by:

- Setting up technological tools and common procedures for the ex-situ maintenance of MBRs along the whole phylogenetic tree of life; and:
- The application of best practice guidelines throughout the EBB collections to ensure compliance with regulatory framework that sets the rules on access and benefit sharing (ABS) on the use of marine bioresources for commercial and academic research.
- The development of innovation use cases involving industrial end users and administrations at the national and European level with competence in regulating ABS for the production of a set of best practice guidelines for ABS compliance when using MBRs for innovation purposes.

The EBB will ultimately facilitate sustainable access to Atlantic marine biodiversity, its associated data, and extractable products for local and international academia and industry users.

PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
University of Vigo

WEBSITE
www.bluebiobank.eu

MARINAQUA4ALGAE – IMPROVING BIO-UTILISATION OF MARINE ALGAE AS SUSTAINABLE FEED INGREDIENTS TO INCREASE EFFICIENCY AND QUALITY OF AQUACULTURE PRODUCTION

PRINCIPAL INVESTIGATOR AT CIIMAR
Luísa Valente

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://marinalgae4aqua.ciimar.up.pt

Global population growth and increase in living standards will push up the demand for fish-derived protein in the future. However, resource scarcity (feed, water and energy), environmental impacts, and changes in climate and growing conditions can seriously hamper aquaculture that supplies a significant proportion of human food. New sustainable protein and lipid sources and improved technologies to increase bio-availability of existing sources will be needed to ensure adequate supply of aquafeeds to ensure growth of aquaculture. On the other hand, the growth of the industry has caused environmental concerns. Interestingly, aquaculture effluents can be an excellent medium for algal growth, although they are not usually reused since they contain residual organic compounds, minerals and other micro-pollutants. MARINALGAE4aqua is an innovative research project that targets the development of strategies to increase efficiency of important European farmed fish species (Atlantic salmon and European sea bass) and reduce the environmental impact using micro- and macro-algal biomass as feed ingredients by:

- Culturing marine algae under optimized technological processes to remove organic compounds and minerals from fish farm effluents, and producing high value products for aquafeeds while recycling nutrients, thus improving the water body quality and reducing the environmental impact.
- Identifying novel feed additives to improve fish digestive capacity and nutrient metabolism upon using the selected algae.
- Improving fish growth and end product quality, reducing time to slaughter and providing a safe and healthy food item with wide consumer acceptance.

MARINALGAE4aqua aims to tackle the sustainability challenges of the aquafeed industry by developing cost-effective and resource-efficient alternatives to FM and FO. MARINALGAE4aqua is innovative and cutting edge - it adopts a multidisciplinary approach, integrating molecular (genomics, proteomics) and traditional tools to address physiological, nutritional and environmental challenges in modern aquaculture – providing state-of the-art knowledge to identify strategies to increase efficiency of farming important European fish species.



MarRISK – COASTAL ADAPTATION TO CLIMATE CHANGE: KNOWING THE RISKS AND INCREASING RESILIENCE

MarRISK aims to ensure an intelligent and sustainable growth of the Galician and Portuguese coastal zones through evaluation of the coastal risks that are most important in terms of climate change scenarios.

Floods, intensification of extreme events, toxic algae blooms and coastal erosion are examples of the risks that shall be analysed in order to improve the resilience of traditional economic sectors and of other, emerging sectors, like marine renewable energies.

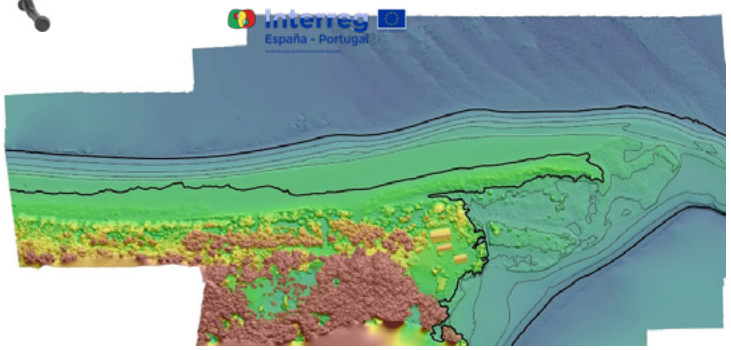
This way, the adaptation of the cooperation region to potential disasters will be improved, and applications and services to guarantee a coordinated response will be developed, given that environmental risks require a cross-border approach.

MarRISK shall evaluate coastal climate evolution, at a better resolution than is presently done, and will enable monitoring and warning systems. MarRISK will deliver decision support tools to public authorities, the productive sector and the general public, to improve coastal management.

PRINCIPAL INVESTIGATOR AT CIIMAR
Ana Bio

LEADER INSTITUTION
Consellería de Medio Ambiente e Ordenación do Territorio. Xunta de Galicia

WEBSITE
www.marnaraia.org/



MIGRAMIÑO-MINHO – PROTECTION AND CONSERVATION OF MIGRATORY FISH IN THE INTERNATIONAL SECTION OF MINHO RIVER AND ITS TRIBUTARIES

PRINCIPAL INVESTIGATOR AT CIIMAR
José Carlos Antunes

LEADER INSTITUTION
Consellería de Medio Ambiente e Ordenación do Territorio. Xunta de Galicia

WEBSITE
www.migraminho.org

FACEBOOK
/MIGRAminho

The MIGRA MIÑO - MINHO project proposes as main challenge to improve the protection and sustainable management of the natural boundary area that forms the sub-basin of the international section of the Minho River

MIGRA MIÑO - MINHO aims to improve the protection and conservation of river habitat of the sub-basin of the river Minho, from the Frieira Dam (province of Ourense) until its mouth, with actions to improve the conservation status of river beds and migratory fish species present in the Minho River and its tributaries.

In addition to the environmental component, this project aims to solve the socio-political aspects of protecting and improving the natural state of the international river Minho, through the conservation of one of the most threatened key elements - the migratory fish species. This will contribute to the preservation and exploitation of traditional fishing activities, as well as the improvement of sustainable socio-economic development of cross-border territory, by of commercial activities such as fishing, tourism or energy sector.






MiningImpact2 – ENVIRONMENTAL IMPACT AND RISKS OF DEEP-SEA MINING

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 km^2 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 MiningImpact 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.

PRINCIPAL INVESTIGATOR AT CIIMAR
Francisco Arenas/Teresa Amaro

LEADER INSTITUTION
GEOMAR

WEBSITE
https://jpio-miningimpact.geomar.de/

MOSES – MARITIME, OCEAN SECTOR AND ECOSYSTEM SUSTAINABILITY: FOSTERING BLUE GROWTH IN ATLANTIC INDUSTRIES

PRINCIPAL INVESTIGATOR AT CIIMAR
João Coimbra

LEADER INSTITUTION
National University of Ireland, Galway

WEBSITE
http://mosesproject.eu/

The MOSES objectives of the MOSES project is to examine the 'blue' growth path for the sustainable development of the major sectors operating in the Atlantic space as envisaged in the Atlantic Action Plan. MOSES will quantify blue growth for key marine sectors and develop a common methodology for the quantitative assessment of sectoral pressures on the marine environment and the vulnerability of marine and coastal areas. The methodology will contribute to the joint implementation of integrated marine industry sustainability assessment toolkits across the Atlantic region.

To achieve these aims the consortium will work on four major blocks:

- Evaluate the evolution of the Atlantic marine sectors using the previous Atlantic Area project MARNET framework;
- Examine the sectoral pressures on the Atlantic marine environment in order to identify best management practices;
- Assess the vulnerability of coastal marine areas/features to marine sector to the identified sectoral pressures;
- Using case studies, develop sustainable transition plans to blue growth for a number of key marine sectors and test policies for how well they manage activities to meet Marine Spatial Planning and Maritime Strategy Framework Directive goals.

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

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.

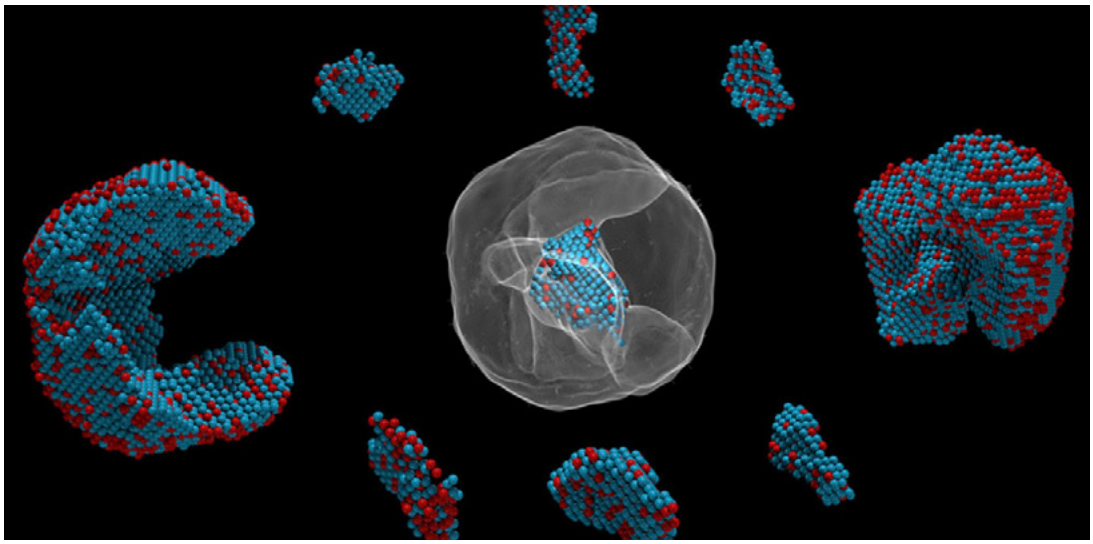
The focus of the project are the aquatic ecosystems related to aquaculture, a sector of high economic relevance in the Atlantic Area, and specifically organisms used for human consumption (cultured fish, mollusks, seaweed, sea urchins, etc.). NANOCULTURE will investigate the effects of ENPs on aquaculture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

PRINCIPAL INVESTIGATOR AT CIIMAR
Alexandre Campos

LEADER INSTITUTION
INL

WEBSITE
http://nanoculture.ciimar.up.pt/



NETTAG – TAGGING FISHING GEARS AND ENHANCING ON BOARD BEST-PRECTICES TO PROMOTE WASTE FREE FISHERIES

PRINCIPAL INVESTIGATOR AT CIIMAR
Marisa Almeida
Sandra Ramos

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
www.net-tag.eu/

FACEBOOK
/NetTagProject

Funded by the European Union

NetTag project aims to reduce and prevent marine litter derived from fisheries, bringing together scientists, engineers and the fisheries industry.

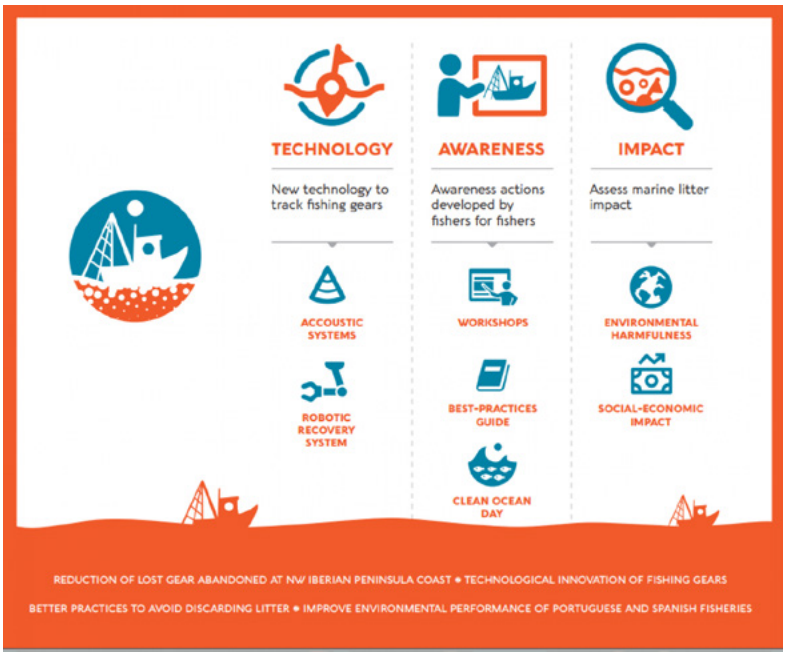
NetTag approach combines two different types of preventive measures:

- new technology to prevent lost gears;
- awareness actions to promote best-practices for on-board waste management

NetTag will develop new technologies to track fishing gears in case gears got lost, fostering a reduction of lost gears. The technology will include low cost, miniature and environmental-friendly acoustic tags and acoustic transceivers for uniquely localization (with fisher's personal ID) of lost gear and an automated-short-range robotic recovery system. Participant fishers will, then, evaluate the new technology in a dedicated demonstrative field action.

Awareness actions, developed by fishers for fishers, will be an innovative strategy to engage the fishing industry, increasing fishers' willingness to act and adopt better practices on-board to reduce marine litter from fishing vessels. In parallel, we will assess the reduction of environmental impact of lost gears as a new pollutant. We will also evaluate the cost-efficiency of the proposed solutions, estimating the economic viability of their implementation for reduction of marine litter derived from fisheries.

The project is based on synergistic activities between fishers and scientists to pilot innovative solutions to tackle the urgent need of reduction and prevention of marine litter.



NOR-WATER – EMERGING POLLUTANTS IN THE WATERS OF GALICIA-NORTHERN PORTUGAL: NEW TOOLS FOR RISK MANAGEMENT

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:

- 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.
- 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.
- 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.
- 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.

PRINCIPAL INVESTIGATOR AT CIIMAR
Miguel Santos
Teresa Neuparth

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://nor-water.eu

FACEBOOK
/proyectonorwater

RASORGMAT

RASORGMAT – DEVELOPING WATER TREATMENT TECHNOLOGY FOR LAND-BASED CLOSED CONTAINMENT SYSTEMS (LBCC-RAS) TO INCREASE EFFICIENCY BY REDUCING THE NEGATIVE EFFECTS OF ORGANIC MATTER

PRINCIPAL INVESTIGATOR AT CIIMAR
Maria Teresa Borges

LEADER INSTITUTION
SINTEF Fisheries and Aquaculture (Norway)

WEBSITE
www.rasorgmat.com

COFASP ERA-net

FCT Fundação para a Ciência e a Tecnologia

REPÚBLICA PORTUGUESA

This project aims to develop strategies and water treatment technology for removal of particulate organic matter (POM) in land-based closed containment recirculation systems for aquaculture (LBCC-RAS). This will increase efficiency by reducing waste products, off-flavour compounds and carrying capacity of bacteria. Removal of POM is the key to improve the production and product quality of fish produced in LBCC-RAS. Organic matter is the determining factor of the amount of heterotrophic bacteria that can be sustained in the LBCC-RAS. Nitrification efficiency of the bio-filter is affected by the competition for space and oxygen with heterotrophic bacteria.

In addition, high amounts of organic matter reduces the efficiency of both UV and ozone disinfection. Heterotrophic bacterial degradation affect the consumption of O_2, the production of CO_2 and ammonia, contribute to water colour and bacteria producing off-flavour compounds, eventually reducing the value of fish and caviar.

The effects of high and low removal efficiency of organic matter on the effects on dissolved CO_2, bacteria and off-flavour prevalence will be investigated. Both tank dynamics and water treatment in the RAS loop will be used to obtain high removal efficiency. Multiple drains with optimized geometry and hydraulics will be designed for early particles collection and to be used as a strategy in combination with techniques such as advanced membrane filtration.The effectiveness of a membrane is dependent on several ambient conditions and fouling is a challenge for membrane performance. We will aim to adapt the membrane technology, optimize the operation and maintenance in a LBCC-RAS. A close collaboration with fish-producing companies safeguard that the project is applicable for commercial aquaculture.

REWATER – SUSTAINABLE AND SAFE WATER MANAGEMENT IN AGRICULTURE: INCREASING THE EFFICIENCY OF WATER REUSE FOR CROP GROWTH WHILE PROTECTING ECOSYSTEMS, SERVICES AND CITIZENS' WELFARE

Water is a natural resource vital for social wellbeing and agriculture economy. Yet, during the past decades, geographic and climatic features, as well as active release of man-made chemicals, have been driving to water depletion and a loss of quality. This creates a major need for water reuse in increasingly situations, such as in agriculture. Wastewater treatment plants (WWTP) are crucial sources for water reuse, since they promote the removal of unwanted substances. However, one of the major challenges restricting wastewater (WW) reuse is the presence of emerging contaminants (ECs), as they are usually not properly managed by conventional treatment technologies. These technologies still need urgent innovative development and integrated solutions, in order to promote sustainable water reuse and safety.

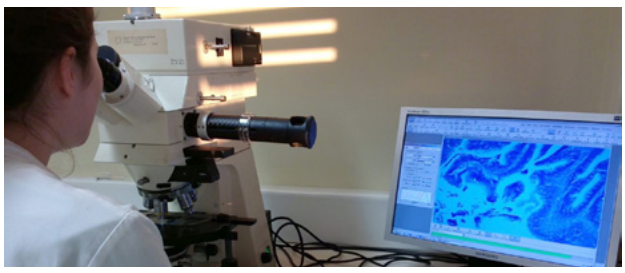
REWATER proposes to develop an innovative joint research and application of technologies producing a final integrated solution for reuse of WW for agricultural purposes, and their economic and environmental evaluation with a Life Cycle Assessment. This systematic approach, inspired in technological, organizational and bio-based economy, will minimize negative impacts of WW reuse in the environment, decreasing the undesirable introduction of ECs in agriculture and aquatic systems and reducing their spread within the food chain.

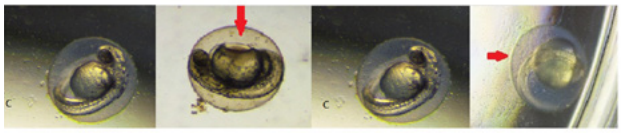
REWATER provides a unique interdisciplinary expertise of consortium scientific partners and SMEs specialized in WW treatment. Work programme will include tuned improvement or development of: 1) biosensors for in-field rapid and selective detection of micropollutants and their corresponding metabolites and/or degradation products (MMDs), 2) treatment processes for MMDs removal through integration of electrochemical and biological technologies, 3) ecotoxicological tools to evaluate treated water for reuse and develop expeditious surveillance, and 4) analytical monitoring, scaling-up and environmental/economic assessment. REWATER will provide tools and solutions contributing to WW reuse, environmental health, and economic and social welfare. Interaction among consortium partners, allied to stakeholders of water industry, will enhance collaborative research and innovation, as well as international cooperation in the water sector, during and beyond REWATER lifespan.

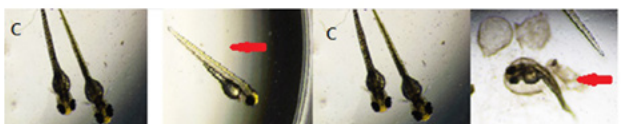
PRINCIPAL INVESTIGATOR AT CIIMAR
Laura Guimarães

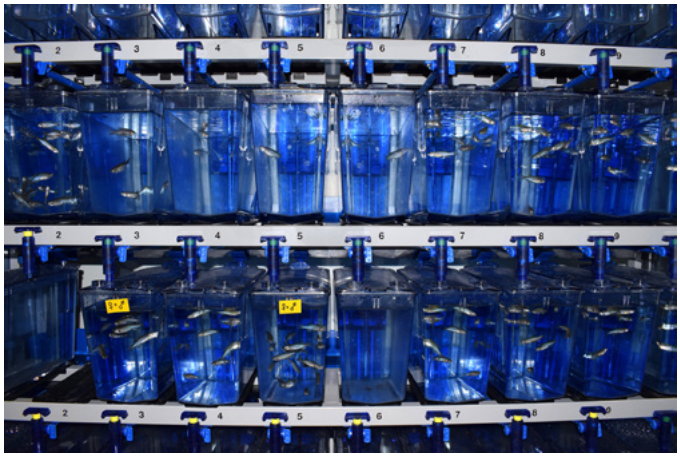
LEADER INSTITUTION
REQUIMTE

WEBSITE
www2.isep.ipp.pt/rewater









SHERPA DO MAR – 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
University of Vigo

WEBSITE
www.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:

- Creation of a transboundary ecosystem of innovative entrepreneurship in the marine-maritime context.
- Creation of companies in the marine-maritime sector with high added value through the enhancement of technological-scientific synergies.
- Improving the competitiveness of pre-existing companies through the drive for innovation.
- 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.

SPILLESS – FIRST LINE RESPONSE TO OIL SPILLS BASED ON NATIVE MICROORGANISMS COOPERATION

SpilLess aims to implement an innovative 'laboratory' (Blue Lab) to pilot new and viable solutions to tackle with one of the most damaging sources of maritime pollution: oil spills. These solutions will be based on the production of native microbial consortia with bioremediation capacity, and the adaptation of unmanned and autonomous vehicles for in-situ release of autochthonous microorganisms (bioaugmentation) and nutrients (biostimulation).

This Blue Lab will have a multidisciplinary profile. It will be established by a team of young scientists, and supported by senior researchers from three institutions (CIIMAR, INESC TEC and the University of Vigo) and experienced business tutors from three private companies (ACSM, Biotrend and MARLO). Besides, the R&D team will be advised and mentored by a stakeholder's platform that includes several public and private entities. SpilLess will be implemented in the region of the Atlantic Ocean, with potential for transferability to other regions facing similar challenges.

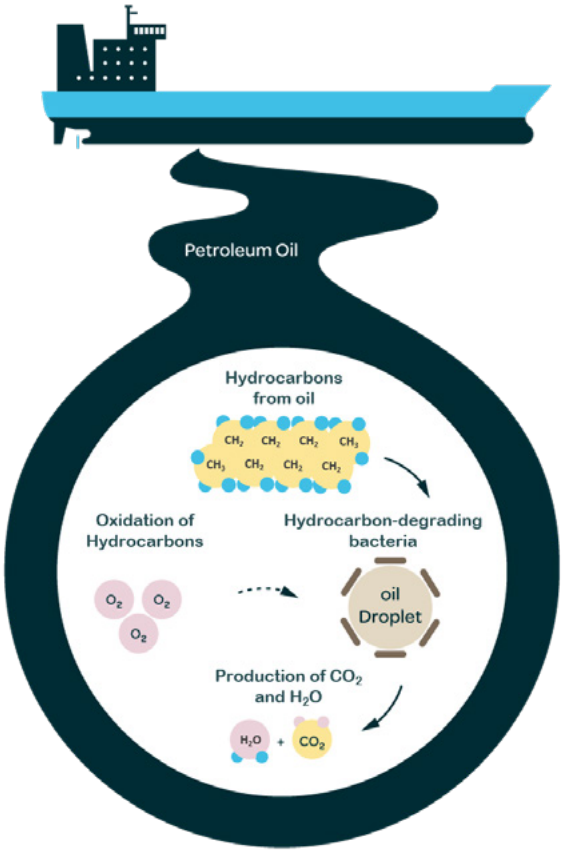
This solution will be environmental-friendly, will be able to act as fast first line response with low time to reaction and mission costs, will set-up holistic pollution combat and will provide environmental monitoring.

PRINCIPAL INVESTIGATOR AT CIIMAR
Ana Paula Mucha

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://spilless.ciimar.up.pt/

FACEBOOK
/spilless



SUDOANG – PROMOVER A GESTÃO CONCERTADA E SUSTENTÁVEL DA ENGUIA NA ÁREA SUDOE

PRINCIPAL INVESTIGATOR AT CIIMAR
José Carlos Antunes

LEADER INSTITUTION
AZTI

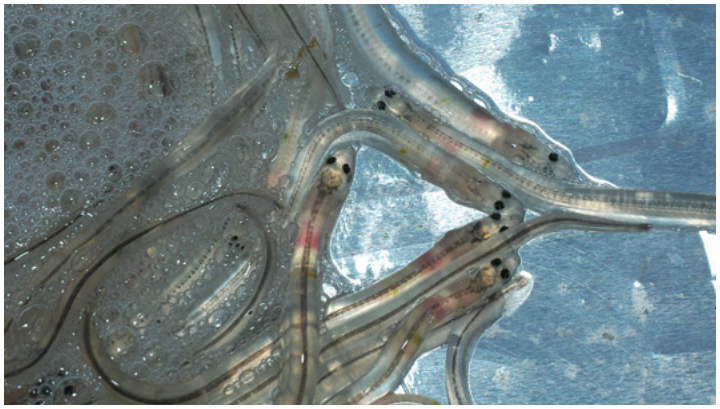
WEBSITE
http://sudoang.eu

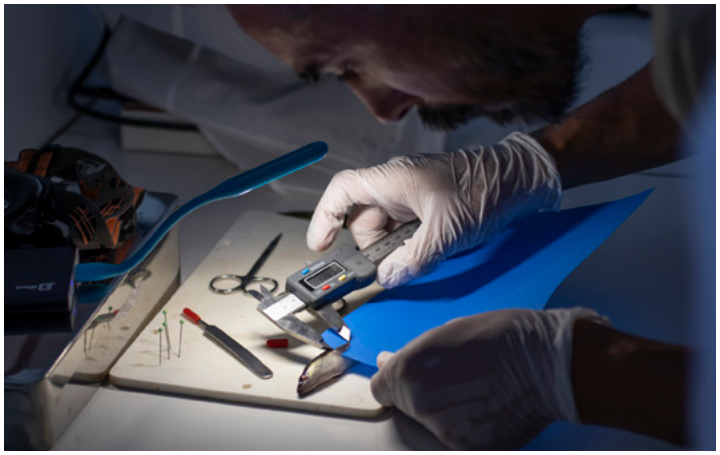
The abundance of the European eel (*Anguilla anguilla*) has been declining in the last 50 years and is outside safe limits. For this reason, the European eel has been included in the IUCN Red List of threatened species.

The SUDOANG project arises to try revert several conditions that restrain the recovery of the eel stock, namely:

- The lack of data and the variability of assessment methods limit the scope and effectiveness of the population monitoring.
- Although the European eel is a single fish stock, it is assessed and managed as separate units.
- There is a lack of dialogue and common strategies between the stakeholders (scientists, managers, fishermen, NGOs) and at different levels local / regional / national).

In order to carry out the project, a partnership has been built that includes the entire value chain related to the management of the eel in the SUDOE area: 10 research centers and 27 associated partners including local, regional and national managers, NGOs and associations of fishermen.





MobFood - MOBILIZING SCIENTIFIC AND TECHNOLOGICAL KNOWLEDGE IN RESPONSE TO THE CHALLENGES OF THE AGRI-FOOD MARKET

MobFood project is the result of an open debate carried out by several agents from the agribusiness that aims to find the right path to promote the competitiveness of the national food industry in an organized and integrated manner. It will be strategically undertaken with a close collaboration between scientific institutions and private companies grounded on economic growth measures based on R&D, innovation and technologies for new products, services and processes achievement with direct effects in all value chain. The principal aim is to make the sector totally sustainable, resilient, open, safer and with an effective utilization of resources being consumer-driven.

The main goals will be attained through the implementation of the solution in three fundamental principles: "Food Safety and Sustainability", "Food for Health and Well-being" and "Safe Food and Quality", embodied in the research and development for several processes, products or services.

The join-venture is composed by 47 entities that represent all Portuguese agribusiness, with participant companies from different agroindustry subsectors. R&D entities participants will bring the ability for a complete approach of the different areas of key knowledge for an acute development of the Portuguese food industry.

The MobFood project is organized in 9 areas of intervention: Emerging Technologies, Resources Valorization, Sustainable Packaging, Nutrition, Health and Well-being, Quality and Food Safety, Authenticity and Traceability of products, Logistics, Consumer and "Coordination, implementation, dissemination and exploitation of results".

PRINCIPAL INVESTIGATOR AT CIIMAR
Luisa Valente

LEADER INSTITUTION
PRIMOR SA

WEBSITE
http://mobfood.pt/

ValorMar – INTEGRAL VALUATION OF MARINE RESOURCES: POTENTIAL, TECHNOLOGICAL INNOVATION AND NEW APPLICATIONS

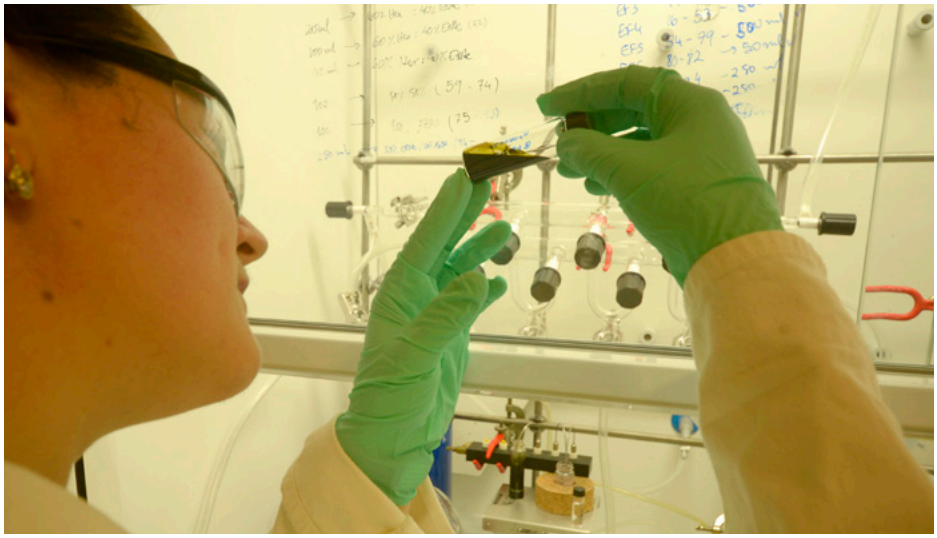
PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
SONAE

WEBSITE
http://valormar.pt

The project ValorMar is leaded by a reference institution – SONAE - and integrates 20 enterprises and 16 Research and Development institutions, being CIIMAR the R&D leader of the project, with a wide national geographical distribution. ValorMar will develop innovative technological solutions that potentiate the valorization and efficient use of marine resources by the integration of the value chains using the circular economy concept and integrating: food industry, biomedical, pharmaceutical, cosmetics and aquaculture.

ValorMar main objective is the valorization of marine resources thorough research, development and demonstration of new products and the improvement of the productive processes, proposing innovative solutions that lead to the creation of new healthy food products using innovative, efficient and sustainable technologies. The products, processes and services will be produced in the framework of a transversal mobilization of human resources with extensive curricula and experience in the development and implementation of R&D projects in the thematic areas of ValorMar.



EMBRC-PT – EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE – PORTUGAL

EMBRC.PT is a distributed research infrastructure with nodes in Faro, Horta, Coimbra and Porto/Matosinhos where CIIMAR headquarters are located. It will allow researchers to study marine biodiversity in its habitat, in tanks and in the laboratory with the latest technologies. It is the national node of the European Marine Biological Resource Centre (EMBRC) and it is expected that the foreseen increased scientific activity will potentiate development of technologies and products with a positive impact in the regional and national economies.

CIIMAR via EMBRC.PT provides services in marine sciences: access to marine ecosystems and biodiversity, microorganism collections and model organisms, scientific diving, "omics", bioinformatics and chemistry platforms. It will also offer access to a variety of aquaria facilities, general laboratories, and marine observatories for long term observations. The present project was designed to significantly improve the EMBRC. PT infrastructure and human resources so as to meet the excellence requirements of the European infrastructure and to remote research, training and knowledge transfer, so as to impact positively in the regional and national economy.

PRINCIPAL INVESTIGATOR AT CIIMAR
Vitor Vasconcelos

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://www.embrc.eu

EMSO-PT – EUROPEAN MULTIDISCIPLINARY SEA FLOOR AND WATER COLUMN OBSERVATORY – PORTUGAL

PRINCIPAL INVESTIGATOR AT CIIMAR
Luisa Bastos

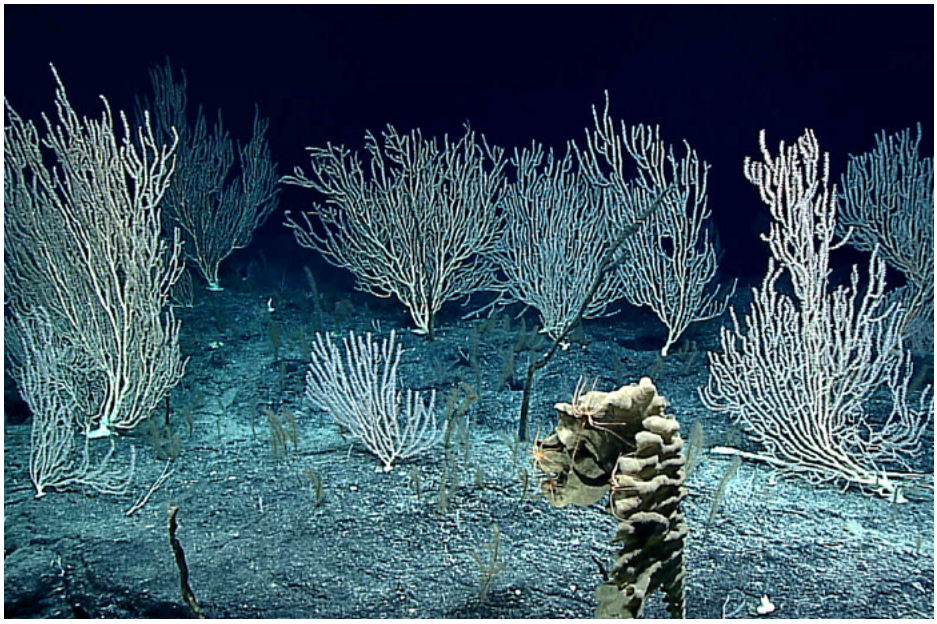
LEADER INSTITUTION
IPMA

WEBSITE
http://emso.eu/

The deep-sea floor ecosystem, one of the largest on the planet, is poorly monitored. Challenges related to direct or indirect anthropogenic actions can only be dealt with if long lasting seafloor and water column observatories networks are deployed. EMSO is a large-scale European Research Infrastructure, of which Portugal is one of its five funding members, established with the objective of real-time, long-term monitoring of environmental processes related to the interaction between the geosphere, biosphere, and hydrosphere. It is a geographically distributed infrastructure at key sites in European waters.

EMSO-PT objectives are to create long term, sustainable, deep sea marine observatories integrated in the European EMSO-ERIC and in cooperation with other international similar networks. These aim at promoting long term time series of sea-floor and water column of various abiotic and biotic parameters in order to serve the international community of scientists, students, general society and stakeholders. EMSO identifies eight main scientific questions: 1) Dynamics of tectonic plates; 2) Climate and greenhouse gas cycling; 3) Ocean productivity; 4) Marine mammal and fish stocks; 5) Non-renewable marine resources; 6) Episodes, events and catastrophes; 7) Origins and limits of life; 8) marine ecosystems dynamics. All these topics are dependent on long-term, continuous, observations, able to capture data for significant episodes as they occur.

The ultimate goal of EMSO-PT is to organize the Portuguese contribution to the EMSO network. In the mainland, two sites will be considered, one deep (Cadiz) and another shallow (North Portugal). The site to be developed in North Portugal will be a test bench for emerging monitoring strategies, towards implementing sustainable monitoring operations and setting the basis for the development of new marine products and services.



MALIA- MARINE LITTER AWARENESS THROUGH LEARNING BY DOING TOGETHER

Since Educational systems must change to face present XXI century challenges, teachers and students ought to acquire key competences like learning through experience, spotting opportunities and skills for teamwork and public speaking while working with community organisations and networking. MALIA will promote those competences/skills using marine litter as shared topic within our oceans trash free.

This project has three main objectives:

- First is to enhance integration between four educational centres and four local civil association networks towards enhancing intercultural competences on marine science and community participatory outreach.
- Second, to reinforce teacher role and professional development while providing an opportunity to design open educational materials linking outdoor community actions and acquisition of skills and competences from a holistic approach. Through this objective innovation on a digital era and practical science skills will be build in four countries in different environmental and cultural contexts having marine conservation practices as a common ground to be included on the official curriculum.
- Third, to introduce a systemic approach to reinforce European educational dissemination practices by increasing synergies amongst national and international networks and developing effective and innovative challenge based learning through the use of ICT studying real life cases and outdoor community actions around marine litter and trash free seas.

PRINCIPAL INVESTIGATOR AT CIIMAR
Marisa Almeida

LEADER INSTITUTION
Instituto Enseñanza Secundaria Europa (Spain)

WEBSITE
http://malia.airicerca.org

UNIÃO EUROPEIA
Fundo Europeu de Desenvolvimento Regional

OCEAN ACTION – MAR DE PLÁSTICO

PRINCIPAL INVESTIGATOR AT CIIMAR
José Teixeira

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://oceanaction.pt

FACEBOOK
/OceanActionPortugal

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 neighbor 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 behavior 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.

PONDS WITH LIFE: CHARCOS COM VIDA

"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.

PRINCIPAL INVESTIGATOR AT CIIMAR
José Teixeira

LEADER INSTITUTION
CIIMAR-UP

WEBSITE
http://charcoscomvida.ciimar.up.pt

FACEBOOK
/charcoscomvida

Project	PI at CIIMAR	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
ACTONP53 - Targeting p53 family proteins: on the route to new anticancer agents	Emilia Sousa	ICETA
AdaptAlentejo - Predicting ecosystem-level responses to climate change	Francisco Arenas	U.ÉVORA
ALGAFISH - Inclusion of microalgas in sea bass diets: boosting immunity through nutrition	Ana Isabel Couto	CIIMAR
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
Antiincrustante - Overcoming environmental problems associated with antifouling agents: synthesis of Natureinspired nontoxic biocides and immobilization in polymeric coatings.	Marta Carvalho Guerra	CIIMAR
A&BM - A&BM - The Sea and the Shore, Architecture and Marine Biology: The Impact of Sea Life on the Built Environment	Elsa Froufe	UMINHO
BIOREM - Bioremediation of hydrocarbon pollutants by autochthonous microorganisms in aquatic environment	Ana Paula Mucha	CIIMAR
BUSHRISK - Tracking the bushmeat: a molecular framework for tracing the African bushmeat trade and risks of emerging diseases	Philippe Gaubert	CIIMAR
CanAdapt - Understanding Darwinian cancer evolution at the single-cell level	Miguel Fonseca	CIIMAR
CARDIOFISH - Effects of dietary components and exercise on energy use and oxidative stress in the hearts of fish	Leonardo Magnoni	CIIMAR
Causalities between diversity, ecosystem functions and services in marine ecosystems	Marina Dolbeth	CIIMAR
CAVIAR - Market valorisation of sea urchin gonads through dietary modulation	Luisa Valente	U.PORTO
CIGUA - The rise of toxic tropical and subtropical marine dinoflagellates Gambierdiscus spp: distribution, ciguatoxins trophic transfer and risk of ciguatera fish poisoning	Alexandre Campos	IPMA

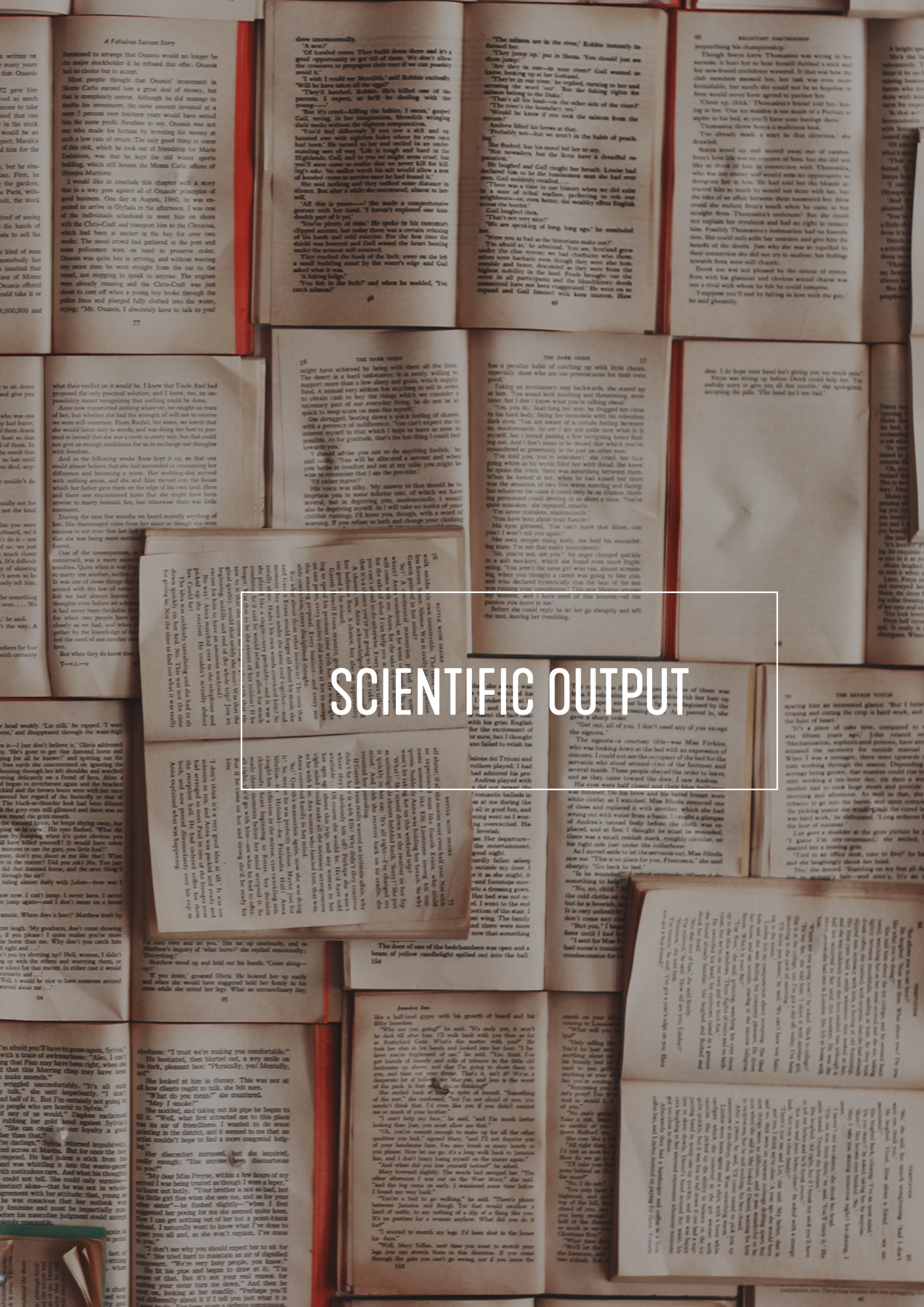
Project	PI at CIIMAR	Leader Institution
ConBiOmics - The missing approach for the Conservation of freshwater Bivalves	Elsa Froufe	CIIMAR
CRAGIAMP - Search for Antimicrobial Peptides in Crassostrea gigas oysters and Paracentrotus lividus sea urchin. Diminution of mortality rate in oyster culture: towards to a lower impact of diseases in oyster farms and search for novel compunds	Sergio Boo	CIIMAR
CYANCAN - Uncovering the cyanobacterial chemical diversity: the search for novel anticancer compounds	Mariana Reis	CIIMAR
CyanoTox - Assessment of cyanobacterial toxins in aquatic systems: environmental impacts and development of new methodologies for their early detection	Cristiana Moreira	CIIMAR
CyanoVaccine - Cyanobacterial outer membrane vesicles as novel platforms for Vaccine technology	Cláudia Serra	IBMC
CY-SENSORS - Biosensor and biomimetic recognition element based devices for detection and separation of cyanobacteria metabolites with ecotoxicological and therapeutical applications	Isabel Cunha	CIIMAR
DINOSSAUR -DINOflagellates for Sustained Supply of Active compoUnds in optimized photobioReactors	Ana Catarina Guedes	FEUP
ECOS - New tools to evaluate the ecological status of rocky shores and its relationship with ecosystem services	Puri Veiga	CIIMAR
EICOBREAM - Effects of fatty acid source (N-6 vs. N-3) on the eicosanoid cascade and intestine inflammation in gilthead sea bream (Sparus aurata)	Aires Oliva Teles	CIIMAR
E-IMUNO - Applying elasmobranch immunogenetics to fisheries management and the study of vertebrate adaptive immunity	Filipe Castro	ICETA
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.

Project	PI at CIIMAR	Leader Institution
FERROCLEAN - Ferrofluidic Extensional Rheological Response for Ocean CLEAN	Laura Guimarães	FEUP
FRESHCO - Multiple implications of invasive species on Freshwater Mussel coextinction processes	Elsa Froufe	I.P.BRAGANÇA
Functional feeds to tackle meagre (Argyrosomus regius) stress: physiological responses under chronic and acute stressful conditions	Ana Couto	CIIMAR
FunG-Eye - A functional approach to unravel the interaction between fungicide pollution and fungi-mediated ecosystem processes	Ana Couto	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
INFLAMMAA - Unraveling neuro-endocrine/immune modulatory roles of tryptophan during inflammation	Benjamin Costas	CIIMAR
JELLYFISHERIES - Towards na integradted approach to enhance predictive accuracy of jellyfish impact on coastal marine ecosystems	Agostinho Antunes	I.P.LEIRIA
LIFELINE - Understanding temporal changes in aquatic biodiversity and their consequences for ecosystem functioning and services	Marina Dolbeth	FCIÊNCIAS.ID
LinguaTox - Bioelectronic Tongue System for the Paralytic Toxins detection in shellfis	Carlos Vale	U.AVEIRO
MicroPlasTox - Microplastics in the marine environment: estimation and assessment of their ecotoxicological effects	Ruth Pereira	U.AVEIRO
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
MYTAG - Microplastics in bivalves: identification of sensitive species in Portugal and assessment of microplastic-toxin aggregates toxicity	Sandra Ramos	U.COIMBRA

Project	PI at CIIMAR	Leader Institution
NANOBINDERS - NANOpartículas polimétricas Biogenéticas funcionalizadas para absorção de metais em aplicações amigas do ambiente:bioREmediação e bioSensores	Ruth Pereira	U. AVEIRO
NanoLegaTox - When old meets new: A novelty study on the human uptake, genotoxicity and immunotoxicity of nanoparticles and legacy contaminants mixtures	Miguel Santos	ISP - U.PORTO
NANOSED - Adsorption of metallic nanoparticles to estuarine sediments: what implication for denitrification?	Ana Mafalda Baptista	CIIMAR
NASCEM - NASCEM - Novel eco-friendly Antifouling Strategies based on Cyanobacterial bioactivE Metabolites	Joana Reis Almeida	CIIMAR
Quimioterápicos - Navigating through marine-derived fungi: bioprospection and synthesis of bioactive secondary metabolites and analogues as chemotherapic agents	Madalena Pinto	CIIMAR
NITROLIMIT - NITROLIMIT Life at the Edge: Define the Boundaries of the Nitrogen Cycle in the Extreme Antarctic Environments	Catarina Magalhaes	CIIMAR
PANDORAA - Unravelling the functional importance of amino acids in the fish neuroendocrine-immune network	Benjamin Costas	CIIMAR
PEIXEROL - Gycerol as na alternative ingredient for fish feed and its potential for aquaculture	Leonardo Magnoni	CNC - U.Coimbra
PLASTICGLOBAL - Assessment of plasticmediated chemicals transfer and effects in food webs of deep, coastal and estuarine ecosystems under global change scenarios	Lúcia Guilhermino	CIIMAR
PROTALGAE - Method for obtaining proteins or a rich-protein extract from algae extracts and uses therefore	Luisa Valente	CIIMAR
PROZYME - Novos probióticos isolados do microbiota do intestino de peixes para melhorar a utilização de matérias-primas vegetais, saúde intestinal e resistência a doenças em peixes carnívoros	Claudia Serra	CIIMAR
QUIMIOCARDIOTOX - Poisoning the heart with anticancer drugs: is metabolic bioactivation or aging promotion the link to the cardiotoxicity of anticancer drugs?	Emilia Sousa	ICETA
ReDEFine - A multi-scale and multi-tiered toolbox for assessing ecosystem quality of freshwater reservoirs: bridging the gaps of the water framework directive approach	Sara Antunes	CIIMAR

Project	PI at CIIMAR	Leader Institution
REEuse - Recovery versus environmental impacts of Rare Earth Elements derived from human activities	Carlos Vale	IPMA
RemediGrass - Seagrass beds as green and blue infrastructures for ecosystem restoration	Marina Dolbeth	U.AVEIRO
ROSM - Robotic Oil Spill Mitigation	Ana Paula Mucha	ISEP
Sea antimicrobials - Antimicrobials from the sea: models for innovative agents to revert multidrug resistance	Maria Emilia Sousa	CIIMAR
Sea Forest - Sea Forest Portugal	Isabel Sousa Pinto	Casulo Unipessoal Lda
SeeingShore - Understanting and predicting the impact of climate change on coastal habitats	Francisco Arenas	CIIMAR
SENSORY-OMICS - Animal sensory diversity: innovative genomic solutions to enhance perception of environmental stimuli	Agostinho Antunes	CIIMAR
SeXomics - Sex and the environment: Genomic decoding and the perpetuation of animal life in a changing world	Agostinho Antunes	CIIMAR
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 - SYMBIOMICS - Omics of marine symbioses: Metabarcoding and metagenomics characterizatio of host-microbe adaptation and novel biosysthetic gene clusters	Parthibaraj Anoop Alex	CIIMAR
Tools4Breed - Challenge tests and genetic markers for Perkinsus as a tool for Ruditapes decussatus' selective breeding	Sergio Boo	Oceano Fresco
TRANSobesogen - Trans-phyletic obesogenic responses: from epigenetic modules to transgenerational environmental impacts	Miguel Santos	CIIMAR
UNNOWN - UNdiscovered Nitrogen micrOrganisms for Wastewater iNoculation: finding efficient microbial seed sludges for wastewater nitrogen removal	Catarina Teixeira	CIIMAR

Project	PI at CIIMAR	Leader Institution
UVNatP - Novel UV protective compounds from natural sources as active ingredients for sun care products	Pedro Leão	CIIMAR
Val-WRACK - 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 Correira da Silva	CIIMAR
Y+Health - Effects of Ygeia+ on the European seabass immune response and disease resistance: New tools and opportunities	Benjamin Costas	CIIMAR
ZEBRALGRE - From zebrafish to meagre: use of macro- and microalgae as functional feeds	Paula Enes	CIIMAR


SCIENTIFIC OUTPUT

SCIENTIFIC OUTPUTS

PUBLICATIONS	
Books and book chapters of international circulation	24
Publications in peer reviewed journals	448
Edited special issues of journals	17
ADVANCED TRAINING	
Completed PhD thesis under the supervision of integrated members	19
Completed Master thesis under the supervision of integrated members	78
OTHER SCIENTIFC OUTPUTS	
Provisional Patent Applications	4
International Patent Applications	4
Granted Patents	2
New materials, devices, products and processes, software, computer codes and algorithms	3

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Vasconcelos C., Ferreira R.A., Calheiros C., Cardoso A., Mota B., Ribeiro T. (Eds). 2019. Livro de Resumos: XVIII ENEC | III ISSE. Educação em Ciências: cruzar caminhos, unir saberes, 5- 7 de setembro de 2019, Porto Portugal. Universidade do Porto. http://dx.doi.org/10.24840/978-989-746-198-9. ISBN: 978-989-746-198-9 (eBook).

Vasconcelos C., Lima A., Brilha J., Calheiros C., Ribeiro T., Cardoso A. (Eds). 2019. Geoethics' Syllabus and Geoethics in Georesources and Geoparks. Abstract Book, 14-18th January 2019, Porto, Portugal. Universidade do Porto. ISBN: 978-989-746-195-8.

Vasconcelos V., Moreira-Silva J., Moreira S. (eds) 2019. Portugal Blue Bioeconomy Roadmap – BLUE and GREEN, CIIMAR, Matosinhos, 68pp. ISBN: 978-989-54077-7-4.

Veloso-Gomes F.V., Fiúza A., Botelho C., Malheiros L.F., Vila M.C., Ramos V. (Editors). 2019. Book of Abstracts of the Symposium on Environmental Engineering, DCE19 – Doctoral Congress in Engineering. FEUP Edições, Porto. ISBN: 978-972-752-251-4.

Veloso-Gomes, F. 2019. A marginal do estuário do Douro entre o Jardim de Sobreiras - Cantareira e a Foz. Sebentas d'Obra #19, Bárbara Carvalho (Editor), Edições Afrontamento. ISBN: 978-972-244-6.

Xavier J.R., Carreiro-Silva M., Colaço A., Le Bris N., Levin L. 2019. Vulnerabilities: invertebrate taxa (VME indicators). In: Levin L., Baker M., Thompson T. (Eds.). Deep-ocean climate change impacts on habitat, fish and fisheries. FAO Fisheries and Aquaculture Technical Paper No. 638, Rome, FAO. 186 pp.

Completed PhD Thesis

Name: Adriana Alvizu Gómez
Thesis title: Taxonomy and phylogeny of calcaronean sponges (Porifera: Calcarea)
Doctoral Programme/Doctoral Degree: Biology
Faculty/University: Department of Biological Sciences, University of Bergen (Norway)
Supervisor: Hans Tore Rapp
Co-Supervisor: Joana Xavier
Date: May 2019

Name: Aline Marculino de Alcântara
Thesis title: Larvicultura do pirarucu: Ontogenia da capacidade digestiva, desempenho zootécnico e crescimento muscular durante o desmame
Doctoral Programme/Doctoral Degree: Programa de Pós-Graduação em Aquicultura
Faculty/University: Universidade Nilton Lins and Instituto Nacional de Pesquisas da Amazônia
Supervisor: Ligia Uribe Gonçalves
Co-Supervisor: Luísa Valente
Date: August 2019

Name: Ana Sara Gomes
Thesis title: New anticancer drug candidates by targeting p53/p73: structural studies and nanodelivery systems
Doctoral Programme/Doctoral Degree: Molecular and Cellular Biotechnology Applied to Health Sciences
Faculty/University: ICBAS, University of Porto
Supervisor: Lucília Saraiva
Co-Supervisor: Emília Sousa and Salette Reis
Date: September 2019

Name: Carolina Machado Malheiro Rodrigues
Thesis title: Contribution of biochemical tools for the assessment of the ecological quality of fluvial ecosystems
Doctoral Programme/Doctoral Degree: Biology
Faculty/University: Biology
Supervisor: Maria da Natividade Vieira

Co-Supervisor: Ruth Pereira
Date: January 2019

Name: Cláudia Vinhas Ranhada Mendes
Thesis title: Factors affecting early life patterns of the european flounder Platichthys flesus in a nursery habitat
Doctoral Programme/Doctoral Degree: Animal Sciences
Faculty/University: ICBAS, University of Porto
Supervisor: Adriano A. Bordalo
Co-Supervisor: Sandra Ramos
Date: February 2019

Name: Élia Maria Raposo Fernandes
Thesis title: Biogeochemical nutrient budgets in a temperate estuary (Lima, NW Portugal)
Doctoral Programme/Doctoral Degree: Biomedical Sciences
Faculty/University: ICBAS, University of Porto
Supervisor: Adriano A. Bordalo
Co-Supervisor: Catarina Teixeira
Date: October 2019

Name: Gonçalo Abreu Prista
Thesis title: Effect of major Cenozoic palaeoceanographic events on coccolithophore morphotypes: climatically induced changes in C. pelagicus s. l. (CliMorph)
Doctoral Programme/Doctoral Degree: Marine Sciences
Faculty/University: Faculty of Sciences, University of Lisbon
Supervisor: Mário Cachão
Co-Supervisor: Manfred Kaufmann and Áurea Narciso
Date: April 2019

Name: Inês Gomes Campos
Thesis title: Processed animal by-products as sustainable ingredients in diets for European seabass (Dicentrarchus labrax)
Doctoral Programme/Doctoral Degree: Animal Sciences
Faculty/University: ICBAS, University of Porto
Supervisor: Luísa Valente
Co-Supervisor: Elisabete Matos
Date: July 2019

Name: Joana Azevedo
Thesis title: Natural antifouling strategies: from cyanobacteria to big ships hulls
Doctoral Programme/Doctoral Degree: Environmental Science and Technology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Pedro Leão
Co-Supervisor: Vitor Vasconcelos
Date: September 2019

Name: João Garcia Rodrigues
Thesis title: Human well-being in a changing marine social-ecological system: a participatory and interdisciplinary analysis using the ecosystem services concept
Doctoral Programme/Doctoral Degree: Sea
Faculty/University: University of Santiago de Compustela
Supervisor: Sebastian Villasante
Co-Supervisor: Isabel Sousa Pinto
Date: October 2019

Name: Johnatas Adelir-Alves
Thesis title: Assinaturas químicas elementares, isótopos estáveis e forma de otólitos como ferramentas para avaliar a estrutura populacional de Abudefduf saxatilis Linnaeus, 1758 (Pisces: Pomacentridae) na costa brasileira
Doctoral Programme/Doctoral Degree: Federal University of Paraná, Brazil
Faculty/University: Alberto Teodorico Correia
Supervisor: Henry Louis Spach
Co-Supervisor: Luís Metello
Date: March 2019

Name: Jorge Antunes
Thesis title: Marine Biofilms: targets of cyanobacteria bioactive compounds towards a natural antifouling strategy
Doctoral Programme/Doctoral Degree: Biology
Faculty/University: Faculty of Sciences of University of Porto
Supervisor: Pedro Leão
Co-Supervisor: Vitor Vasconcelos
Date: October 2019

Name: Karen Roberta Tancredo
Thesis title: Specificity dynamics of *Monogenea dactylogirídeos* parasites in their hosts and efficacy of formalin against *Dactylogyrus minutus*
Doctoral Programme/Doctoral Degree: Aquaculture
Faculty/University: Aquaculture Department, Federal University of Santa Catarina
Supervisor: Maurício Laterça Martins
Co-Supervisor: Maria João Santos
Date: 2019

Name: Luís Gabriel Antão Barboza
Thesis title: Effects of microplastics on marine organisms and implications to animal, environmental and human health
Doctoral Programme/Doctoral Degree: Biomedical Sciences
Faculty/University: ICBAS, University of Porto
Supervisor: Lúcia Guilhermino
Date: May 2019

Name: Marcelo Soeth
Thesis title: Population structure and migratory patterns of *Chaetodipterus faber* (Broussonet 1782) in the South Atlantic Ocean
Doctoral Programme/Doctoral Degree: Coastal and Oceanic Systems
Faculty/University: Federal University of Paraná
Supervisor: Alberto Teodorico Correia
Co-Supervisor: Henry Louis Spach
Date: March 2019

Name: Rebeca Cruz
Thesis title: Fishery products safety and health risk assessment: a survey on novel persistent toxic substances in the Portuguese market
Doctoral Programme/Doctoral Degree: Pharmaceutical Sciences
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Sara Cristina da Silva Cunha
Co-Supervisor: Susana Isabel Pereira Casal Vicente and António Manuel Barros Marques
Date: November 2019

Name: Solida Long
Thesis title: Synthesis and biological evaluation of indole alkaloid derivatives based on natural products
Doctoral Programme/Doctoral degree: Pharmaceutical Sciences
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Emília Sousa
Co-supervisor: Madalena Pinto
Date: June 2019

Name: Sónia Raquel Oliveira Rocha
Thesis title: Biodiversity and phylogeny of myxosporean parasites (Cnidaria, Myxozoa) infecting fishes and annelids in Portuguese estuaries
Doctoral Programme/Doctoral degree: Biomedical Sciences
Faculty/University: ICBAS, University of Porto
Supervisor: Graça Casal
Co-supervisor: Carlos Azevedo and Pedro Rodrigues
Date: September 2019

Name: Ye Zaw Phyo
Thesis title: Chiral Stationary Phases for Liquid Chromatography.: Development, Enantioseparation and Molecular Recognition Mechanism Studies
Doctoral Programme/Doctoral degree: Biomedical Sciences
Faculty/University: ICBAS, University of Porto
Supervisor: Carla Fernandes
Co-Supervisor: Anake Kijjoa
Date: July 2019

Completed Master Thesis

Name: Alberto Jorge Nunes Martins Ramalho
Thesis title: BComposições e Comportamentos de Betões em Ambiente Marítimos
Master degree: Civil Engineering
Faculty/University: FEUP, University of Porto
Supervisor: Fernando Veloso Gomes
Date: February 2019

Name: Alexandra Cristina Dinis Santos
Thesis title: Contribution of northern Portugal estuaries to global warming
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Adriano A. Bordalo
Co-supervisor: Catarina Teixeira
Date: December 2019

Name: Ana Carolina Carneiro
Thesis title: Response of denitrifying microorganisms to the increase of nanoparticles: case study of the Douro estuary
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Mafalda Baptista
Co-supervisor: Catarina Magalhães
Date: Dezembro 2019

Name: Ana Catarina Fernandes Pereira Rebelo de Macedo
Thesis title: Anticancer activity of seaweed compounds, alone and in combination with chemotherapy drugs, in breast cancer cell lines using 2D and 3D cell culture models
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Alice Ramos
Co-supervisor: Eduardo Rocha
Date: November 2019

Name: Ana Catarina Fonseca
Thesis title: Diversity and bioactive potential of actinomycetes isolated from the marine sponge Hymeniacidon perlevis
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Fátima Carvalho
Co-supervisor: Pedro Leão
Date: Novembro 2019

Name: Ana Catarina Rebelo Lopes de Moura
Thesis title: Population structure, habitat connectivity and migration patterns of Atlantic Mackerel (Scomber scombrus) in the North Atlantic using otolith chemical and shape analyses
Master degree: Aquaculture and Fisheries
Faculty/University: University of Algarve
Supervisor: Alberto Teodorico Correia
Co-supervisor: Jorge Gonçalves
Date: March 2019

Name: Ana Isabel Moreira Jesus
Thesis title: Haloaryl secondary metabolites from macroalgae as models for the synthesis of brominated chalcones and their derivatives
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Honorina Cidade
Co-supervisor: Carlos Afonso
Date: October 2019

Name: Ana João Alves
Thesis title: Bioactive secondary metabolites from the culture of the marine sponge-associated fungus Acremonium persicinum KUFA 1007
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Anake Kijjoa
Co-supervisor: Madalena Pinto
Date: July 2019

Name: Ana Margarida Monteiro
Thesis title: Internship at Riasearch - Effect of fasting on energy and protein losses of ongrowing Penaeus vannamei
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Helena Peres
Co-supervisor: André Barreto
Date: December 2019

Name: Ariana Isabel Pérez Pereira
Thesis title: Ketamine and Norketamine: Enantioseparation, Enantioselective Ecotoxicity and Biodegradation Studies
Master degree: Forensic Laboratory Sciences and Techniques
Faculty/University: University Institute of Health Sciences, CESPU
Supervisor: Maria Elizabeth Tiritan
Co-supervisor: Cláudia Ribeiro
Date: March 2019

Name: Beatriz Assunção Pereira Antunes
Thesis title: Evaluation of *Hermetia illucens* flour as a substitute for fish meal in corvine (Argyrosomus regius) diets: Growth, digestibility, body composition and consumer acceptance of the final product
Master degree: Consumer Sciences and Nutrition
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Paula Enes
Co-supervisor: Luís Miguel Cunha
Date: December 2019

Name: Bruna Lopes Tavares da Silva
Thesis title: Cyanobacteria from Cape Verde Islands: a contribution to the diversity and biotechnological potential
Master degree: Biology and Water Quality Management
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Vitor Vasconcelos
Co-supervisor: Maria do Rosário Martins
Date: November 2019

Name: Bruna Ruschel Pires
Thesis title: Macroalgae in the border region: Viana do Castelo
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Marina Dolbeth
Co-supervisor: Ricardo Jorge Carvalhido
Date: December 2019

Name: Carla Larissa Fonseca da Silva
Thesis title: Planos de Monitorização da Qualidade da Água das Albufeiras da EDP-Produção
Master degree: Environmental Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Anabela Peres
Co-supervisor: Rodrigo Maia
Date: October 2019

Name: Carlos Vila Franca
Thesis title: Internship at Safiestela - Improvement strategies for Senegalese sole (Solea senegalensis) artificial reproduction
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Helena Peres
Date: December 2019

Name: Catarina Isabel Soares Gonçalves
Thesis title: In vivo, in vitro, and in silico studies of new antifouling compounds obtained by synthesis
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Marta Correia da Silva
Co-supervisor: Joana R. Almeida
Date: September 2019

Name: Cláudia Barrocas
Thesis title: Espécies exóticas invasoras no rio Minho: sensibilização de setores económicos primários, através da ilustração científica
Master degree: Applied Biology
Faculty/University: University of Aveiro
Supervisor: Fernando Correia
Co-supervisor: Carlos Antunes
Date: December 2019

Name: Cláudia Santos Tomé
Thesis title: Preliminary tests aiming in vitro skin penetration studies of a new water-soluble resveratrol derivative
Master degree: Quality Control
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Isabel Filipa Almeida
Co-supervisor: Marta Correia da Silva
Date: October 2019

Name: Cláudia Teixeira
Thesis title: Evaluating effects of dietary tryptophan on growth performance, feed utilization, biochemical parameters, gene expression and behavior of zebrafish juveniles
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: António Paulo Carvalho
Co-supervisor: Helena Peres
Date: December 2019

Name: Daniel Salvaterra Fonseca
Thesis title: Optimization of a cyanobacteria-based production as source of antioxidant compounds
Master degree: Functional Biology and Plant Biotechnology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Helena M. Amaro
Co-supervisor: Ana Catarina Guedes
Date: November 2019

Name: Daniela Fonseca Costa Rebelo
Thesis title: Effects of the acute and chronic exposures of Danio rerio to simvastatin and clofibric acid
Master degree: Marine Biology
Faculty/University: University of Aveiro
Supervisor: Alberto Teodorico Correia
Date: December 2019

Name: Diogo Filipe Dias de Sousa
Thesis title: Viabilidade de Aplicação de um Modelo Tarifário de Águas Pluviais
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Cristina Monteiro dos Santos
Co-supervisor: Francisco Taveira Pinto
Date: February 2019

Name: Diogo Moreira Filipe
Thesis title: Optimization of solid-state fermentation of winery and olive mill by-products to produce enzymatic and phenolic value-added products - its application to aquafeed
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Helena Peres
Co-supervisor: Carolina Castro
Date: November 2019

Name: Estibali Milagros Wilkie Wilson
Thesis title: Evaluation of water quality in Panama rivers, using zebrafish (Danio rerio) embryo bioassays and chemical characterization of emerging contaminants (EC´s)
Master degree: Biology and Water Quality Management
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Miguel Santos
Co-supervisor: Maria da Natividade Vieira
Date: December 2019

Name: Fernando Rodrigues
Thesis title: Contribuição para a caracterização molecular e histológica de Lymnaea stagnalis
Master degree: Cell and Molecular Biology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Laura Guimarães
Co-supervisor: Aurélia Saraiva and António Paulo Carvalho
Date: December 2019

Name: Filipa Daniela Freitas Barbosa
Thesis title: Aminothioxanthone derivatives: synthesis and study of antifungal synergistic effects
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Emília Sousa
Co-supervisor: Eugénia Pinto
Date: September 2019

Name: Flávio Hihepavali Marcelino Kukeingue
Thesis title: Influência de microplásticos sobre a diversidade de fitoplâncton na Albufeira de Crestuma-Lever
Master degree: Biology and Water Quality Management
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Maria da Natividade Vieira
Co-Supervisor: Uira Siqueira de Oliveira
Date: December 2019

Name: Francisco Ferreira
Thesis title: Development of bioremediation technologies based on deep sea organisms
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Ana Paula Mucha
Co-Supervisor: Maria Fátima Carvalho
Date: November 2019

Name: Guna Bavithra
Thesis title: Potential of Constructed wetlands for the removal of Cyanobacteria and Microcystins (MC-LR) from contaminated fresh water
Master degree: Integrated Biotechnology
Faculty/University: Vellore Institute of Technology, India
Supervisor: Vitor Vasconcelos
Co-Supervisor: Cristina Marisa Almeida and Alexandre Campos
Date: June 2019

Name: Inês de Carvalho Guerreiro Dias
Thesis title: Xenoestrogenic and androgenic impacts on carcinogenesis onset - A mechanistically look at a controversial issue recurring to diethylnitrosamine induced carcinogenesis in zebrafish larvae
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Eduardo Rocha
Co-Supervisor: Tânia Madureira
Date: December 2019

Name: Inês Lopes Pereira
Thesis title: Establishment of a Three-Dimensional (3D) In Vitro Model for Culture of Brown Trout (Salmo trutta f. fario) Primary Hepatocyte Spheroids - Insights into 5alpha-Dihydrostestosterone Regulation of Lipid-Related Genes
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Tânia Madureira
Co-Supervisor: Eduardo Rocha
Date: November 2019

Name: Ivo Filipe Magalhães Pinto
Thesis title: Evaluation of Aguieira Reservoir Water Quality: insights in addition to the Water Framework Directive
Master degree: Ecology and Environment
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Sara Antunes
Co-Supervisor: Olga Lage
Date: November 2019

Name: Joana Catarina Gomes da Costa
Thesis title: Design of marine inspired bioactive compounds: synthesis and lipophilicity assessment
Master degree: Pharmaceutical Chemistry
Faculty/University: FEUP, University of Porto
Supervisor: Carlos Afonso
Co-supervisor: Carlos Azevedo
Date: November 2019

Name: Joana Ferreira Borges Cordeiro Oliveira
Thesis title: Fish and sex steroids - Do juvenile fish have a distinct sex-specific steroid hormone profile? Observational study using the brown trout (Salmo trutta fario) as a model organism
Master degree: Marine Sciences - Marine Resources
Faculty/University: ICBAS, University of Porto
Supervisor: Eduardo Rocha
Co-supervisor: Tânia Madureira
Date: December 2019

Name: Joana Filipa Barbosa Teixeira
Thesis title: Development of new chiral selectors based on xanthone derivatives for liquid chromatography
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Carla Fernandes
Co-Supervisor: Maria Elizabeth Tiritan
Date: July 2919

Name: Joana Filipa Duarte Almeida
Thesis title: Chalcone derivatives: promising starting points for the discovery of new diarylpentanoids with p53-MDM2/X inhibitory activity
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Honorina Cidade
Co-supervisor: Lucília Saraiva
Date: July 2019

Name: Joana Margarida Soares Araújo
Thesis title: Synthesis of New Chiral Derivatives of Xanthone with Potential Biological Activity
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Maria Elizabeth Tiritan
Co-supervisor: Carla Fernandes
Date: October 2019

Name: João Miguel Ferreira de Brito Carecho
Thesis title: Floating wetland islands to promote water quality enhancement
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Cristina Calheiros
Co-supervisor: Ana Paula Mucha, Cristina Marisa Almeida
Date: November 2019

Name: João Pedro Alves Rodrigues dos Reis
Thesis title: A novel biocatalytic esterification involved in the biosynthesis of branched bartolosides
Master degree: Cellular and molecular biology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Pedro Leão
Co-Supervisor: Ralph Urbatzka
Date: November 2019

Name: João Ricardo de Sá Chambel
Thesis title: Analysis of Long-Term Damage of Offshore Wind Turbine Foundations
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Francisco Taveira Pinto
Co-supervisor: Tiago Fazeres Ferradosa
Date: December 2019

Name: João Vitor Oliveira Freitas
Thesis title: Influência da macrófita invasora *Egeria densa* na comunidade de macroinvertebrados
Master degree: Ecology
Faculty/University: School of Sciences, University of Minho
Supervisor: Martina Ilarri
Co-supervisor: Ronaldo Sousa
Date: December 2019

Name: Jonas de Azevedo
Thesis title: What has changed in the macroalgal communities of the Portuguese coast
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Francisco Arenas
Co-supervisor: João N. Franco
Date: December 2019

Name: José Alberto Morais Machado
Thesis title: Vertical sub-surface flow constructed wetland for olive oil mill wastewater treatment
Master degree: Biology and Water Quality Management

Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Ruth Pereira
Co-supervisor: Cristina Marisa Almeida
Date: December 2019

Name: José Eduardo Sousa Andrade Gomes
Thesis title: Pré-avaliação experimental (2D) do impacto da subida do nível do mar na alteração da morfologia de um sector costeiro arenoso artificializado
Master degree: Civil Engineering
Faculty/University: FEUP, University of Porto
Supervisor: Fernando Veloso Gomes
Date: September 2019

Name: Lisa Petit
Thesis title: Incorporation of Insect meal in European sea bass (*Dicentrarchus labrax*) diets
Master degree: Veterinary Medicine
Faculty/University: University of Trás-os-Montes and Alto Douro (UTAD)
Supervisor: José Manuel Almeida
Co-supervisor: Justina Oliveira
Date: September 2019

Name: Lucas José da Cunha Rocha Ferreira
Thesis title: Contribuição das comunidades piscícolas na avaliação da qualidade da água de albufeiras europeias
Master degree: Ecology and Environment
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Sara Antunes
Date: November 2019

Name: Luís Quádrio Alves
Thesis title: An integrated online platform for automatised gene loss inference in mammals
Master degree: Bioinformatics and Computational Biology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Filipe Castro
Co-Supervisor: Pedro Ribeiro
Date: November 2019

Name: María de los Reyes Luque Urbano
Thesis title: Determinación del efecto anticancerígeno y antioxidante de la feniletilamida maslínica (FEM) en la línea celular KM-H2 de linfoma de Hodgkin
Master degree: Research, Development, Control and Innovation of Medicines
Faculty/University: University of Granada
Supervisor: Amalia Pérez Jiménez
Co-Supervisor: Eva Rufino Palomares
Date: June 2019

Name: Mariana Ferreira Fernandes
Thesis title: Quantification of macro and microplastics on a desert Island, North East Atlantic Ocean
Master degree: Veterinary Medicine
Faculty/University: ICBAS, University of Porto
Supervisor: Augusto Faustino
Co-supervisor: Lúcia Guilhermino
Date: June 2019

Name: Mariana Marques Carmona
Thesis title: hysiological Responses to Ocean Warming and Acidification of *Diplodus cervinus*
Master degree: Biochemistry
Faculty/University: School of Science and Technology, University Nova of Lisbon
Supervisor: Patrícia Anacleto
Co-supervisor: Mário Diniz
Date: October 2019

Name: Marta Catalá Bellver
Thesis title: Bioactivity screening of cyanobacteria for obesity and obesity-related comorbidities within the framework of the Cyanobesity project
Master degree: University La Rochelle, France
Faculty/University: Ralph Urbatzka
Supervisor: Stéphanie Bordenave-Juchereau
Date: June 2019

Name: Marta Correia
Thesis title: Integrated multi-trophic aquaculture: a laboratory and hands-on experimental activity to teach environmental sustainability and value of aquaculture productsuacultura Multitrófica Integrada
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Laura Guimarães
Co-supervisor: Helena Peres
Date: December 2019

Name: Miguel Ferreira de Sousa
Thesis title: Análise e Dimensionamento de Sistemas Para Aquacultura Offshore
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Paulo Rosa Santos
Co-supervisor: Francisco Taveira Pinto
Date: September 2019

Name: Nelson Alves
Thesis title: Potencial de um extrato rico em enzimas obtido por fermentação sólida da dreche em rações para robalo (*Dicentrarchus labrax*)
Master degree: Environmental Contamination and Toxicology
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Miguel Santos
Co-Supervisor: Teresa Neuparth
Date: November 2019

Name: Nelson Fernandes
Thesis title: Potencial de um extrato rico em enzimas obtido por fermentação sólida da dreche em rações para robalo (*Dicentrarchus labrax*)
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Carolina Castro
Co-supervisor: Helena Peres
Date: December 2019

Name: Noémia Cristina Loio Marques
Thesis title: Determinação de ácido pirúvico e ácido lático em mulheres profissionais de saúde: grupo exposto e grupo não exposto a citostáticos
Master degree: Occupational Health
Faculty/University: Faculty of Medicine, University of Coimbra
Supervisor: António Jorge Correia Gouveia Ferreira
Co-supervisor: Lúcia Guilhermino
Date: September 2019

Name: Nuno de Santa Ribeiro
Thesis title: Evaluation of Overtopping on Rubble Mound Breakwaters using Numerical Modelling
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering of University of Porto
Supervisor: Francisco Taveira Pinto
Co-Supervisor: Jesper Sandvig Mariegaard

Date: March 2019

Name: Patrícia da Silva Lopes Cardoso
Thesis title: Cultivo e utilização de macroalgas em alimentos funcionais para aquacultura
Master degree: Biological Aquatic Resources
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Ana Couto
Co-supervisor: Mires Oliva-Teles and Rui Pereira
Date: December 2019

Name: Patrick Romário Dias Gomes
Thesis title: Infraestruturas verdes para a gestão sustentável de águas pluviais em ambiente urbano
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Rodrigo Maia
Co-Supervisor: Rita Cunha
Date: September 2019

Name: Paulo Ricardo Ribeiro Cristelo
Thesis title: Synthesis and anticoagulant activity of new small molecules containing sulfated saccharides
Master degree: Pharmaceutical Chemistry
Faculty/University: Faculty of Pharmacy, University of Porto
Supervisor: Marta Correia da Silva
Co-supervisor: Emília Sousa
Date: September 2019

Name: Pedro Antonio Soriano Fernández
Thesis title: Estudio de los efectos del hidroxitirosol como compuesto bioactivo en células HL60 de leucemia promielocítica aguda
Master degree: Research, Development, Control and Innovation of Medicines
Faculty/University: University of Granada
Supervisor: Amalia Pérez Jiménez
Co-supervisor: Eva Rufino Palomares
Date: June 2019

Name: Pedro Ribeiro
Thesis title: Locomotory reaction spectrum of Triops longicaudatus in response to aquatic contamination
Master degree: Environmental Contamination and Toxicology
Faculty/University: Faculty of Sciences / ICBAS, University of Porto
Supervisor: Luís Oliva-Teles
Co-supervisor: Laura Guimarães
Date: November 2019

Name: Pedro Vinagre
Thesis title: Avaliação de Soluções para Proteção Costeira Baseadas na Natureza para Adaptação às Alterações Climáticas
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Francisco Taveira Pinto
Co-supervisor: Paulo Rosa Santos
Date: July 2019

Name: Raúl Sánchez Gallego
Thesis title: Estudio del potencial anticancerígeno del ácido maslínico procedente de *Olea europaea* L. en la línea cancerígena de linfocitos T derivados de leucemia linfoide aguda
Master degree: Research, Development, Control and Innovation of Medicines
Faculty/University: University of Granada
Supervisor: Amalia Pérez Jiménez
Co-supervisor: Eva Rufino Palomares
Date: June 2019

Name: Ricardo Luís da Silva Ferreira
Thesis title: Avaliação do efeito da recolha de *Osmundea pinnatifida* e *Codium* spp. nas comunidades de macroalgas da costa Norte de Portugal
Master degree: Ecology and Environment
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Débora Borges
Co-supervisor: Isabel Azevedo and Isabel Sousa Pinto
Date: November 2019

Name: Rodrigo Minnemann Baptista
Thesis title: Caracterização de derivados de petróleo por métodos espetroscópicos associados a técnicas quimiometricas de reconhecimento de padrões supervisionados e não supervisionados
Master degree: Chemistry
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Carlos Rocha Gomes
Co-supervisor: Cristina Marisa Almeida
Date: November 2019

Name: Rui Carlos Soares Rocha
Thesis title: Impactos ambientais mais críticos associáveis a projetos portuários portugueses muito recentes
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Co-supervisor: Fernando Veloso Gomes
Date: July 2019

Name: Saul Simão Monteiro Fernandes
Thesis title: Induction of bystander effect by different contaminants on soil oligochaetes
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Ruth Pereira
Co-supervisor: Verónica Nogueira
Date: December 2019

Name: Sílvia Micaela Amaral Correia
Thesis title: Monitoring the Effectiveness of Water Resources Protection Interventions after Forest Fires. The case of the fires of June and October 2017
Master degree: Environmental Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Rodrigo Maia
Co-supervisor: Pedro Teiga
Date: October 2019

Name: Susana Lemos da Costa
Thesis title: Discovery of novel compounds from cyanobacteria for the treatment of obesitya
Master degree: Environmental Contamination and Toxicology
Faculty/University: ICBAS, University of Porto
Supervisor: Ralph Urbatzka
Co-Supervisor: Vitor Vasconcelos
Date: November 2019

Name: Suzana Mendes da Rosa
Thesis title: Estudo da influência do ângulo de saída do trampolim em salto de esqui na erosão a jusante de um descarregador em degraus convergente
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Elsa Carvalho
Date: March 2019

Name: Tomás Ferreira Costa Rodrigues
Thesis title: Jellyfish impact on aquatic ecosystems: warning for the development of mass occurrences early detection tools

Master degree: Biology and Water Quality Management
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Agostinho Antunes
Co-Supervisor: Daniela Almeida
Date: December 2019

Name: Vânia Encarnação Amorim
Thesis title: The effects of distinct heatwaves on the immunological and oxidative stress responses of the bivalve Scrobicularia plana
Master degree: Biology and Water Quality Management
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Patrícia Teixeira
Date: November 2019

Name: Vânia Arantes Silva
Thesis title: Green roofs implementation and assessment in coastal areas
Master degree: Functional Biology and Biotechnology of Plants
Faculty/University: Faculty of Sciences, University of Porto
Supervisor: Cristina Calheiros
Co-Supervisor: Ana Paula Mucha and Francisco Arenas
Date: November 2019

Name: Vera Filipe Magalhães de Sousa Figueiredo
Thesis title: Valorização de subprodutos de origem vegetal na alimentação da tilápia: efeitos na cor e textura do filete
Master degree: Consumer Sciences and Nutrition
Faculty/University: Faculty of Sciences, University of Porto
Co-supervisor: Luísa Valente
Date: March 2019

Name: Verónica Simões
Thesis title: Efeito do aquecimento e acidificação da água do mar na qualidade nutricional do linguado (*Solea senegalensis*)
Master degree: Food Technology and Safety
Faculty/University: School of Science and Technology, University Nova of Lisbon
Supervisor: Patrícia Anacleto
Co-supervisor: Maria Paula Duarte
Date: November 2019

Name: Vicente Machado
Thesis title: Estudo Experimental de um Nanogerador Triboeléctrico para Aplicações Offshore
Master degree: Civil Engineering
Faculty/University: Faculty of Engineering, University of Porto
Supervisor: Paulo Rosa Santos
Co-supervisor: Francisco Taveira Pinto
Date: September 2019

Name: Zofia Konarzewska
Thesis title: Allelopathic influence of three picoplanktonic cyanobacteria Synechococcus sp. strains on studied Baltic cyanobacteria, green algae and diatoms
Master degree: Oceanography
Faculty/University: University of Gdánsk
Supervisor: Sylwia Slìwinska-Wilczewska
Co-supervisor: Aldo Barreiro
Date: June 2019

OTHER SCIENTIFIC OUTPUTS

PROVISIONAL PATENT APPLICATIONS

Inventors: Urbatzka, R., Freitas, S., Leão, P.N., Sousa, M.L., Reis, M.A., Silva, N.G., Vasconcelos, V., Ribeiro, T., Rosa, F. 2019. Provisional Patent Application PT 115348 – Hydroxypheophorbide compounds, methods and uses thereof. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto.

Inventors: Arenas, F., Franco, J.N. 2019. Provisional Patent Application PT 115418 – Multisystem in situ metabolic chamber for marine communities. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental.

Inventors: Sousa, E., Long, S., Pinto, M., Kijjoa, A., Martins da Costa, P., Freitas da Silva, J., Nogueira, F. 2019. Provisional Patent Application PT 115744 – Pyrazino [1,2-B]Quinazoline-3,6-Diones Derivatives, their Production and Uses Thereof. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, Universidade Nova de Lisboa.

Inventors: Vasconcelos, V., Leão, P., Ramos, V., Morais, J., Castelo Branco, R., Oliveira, F., Reis, M., Soto, S., López, Y., Cepas, V., Lombo, F., Villar, C.J., Gutiérrez-del-Río, I., Redondo-Blanco, S., López Ortiz, F., Iglesias, M.J., Soengas, R.G., Rodolfi, L., Sampietro, G. 2019. Provisional Patent Application PT 115761 – Halogenated Compounds and Uses Thereof. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidad de Oviedo, Universidad de Almería, ISGLOBAL - Fundacíon Privada Instituto de Salud Global de Barcelona, F&M - Fotosintetica & Microbiologica SRL, Universidade do Porto.

INTERNATIONAL PATENT APPLICATIONS

Inventors: Valente, L. M. P., Pintado, M., Batista, S., Futuro, A., Faria, J. 2019. International Patent Application PCT/IB2019/051811 – Method for obtaining proteins or a rich-protein extract from algae, extracts and uses therefore. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, Universidade Católica Portuguesa - UCP, New Enzymes, Lda.

Inventors: Serra, C., Enes, P., Oliva-Teles, A., Tavares, F. 2019. International Patent Application PCT/IB2019/059131 – Sporeforming probiotic strains, methods and uses thereof. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto.

Inventors: Magalhães, C., Ribeiro, H., Dias, A., Almeida, M., Tomasino, M.P., Guedes, M., Ramos, S., Dias, N., Mucha, A. P., Carvalho, F., Martins, A., Gonçalves, M., Silva, E., Almeida, J. 2019. International Patent Application PCT/IB2019/060370 – Device for capturing in situ aquatic microbiomes. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Instituto Superior de Engenharia do Porto.

Inventors: Correia-da-Silva, M., Pinto, M., Sousa, E., Vasconcelos, V., Almeida, J.R., Geraldes, E. 2019. International Patent Application PCT/IB2019/059886 – Xanthonic Compounds and their use as antifouling agents. Applicants: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto.

GRANTED PATENTS

Inventors: Leão, P., Rosário, M.M., Costa, M., Vasconcelos, V., Nogueira, F., Domingues, V. 2019. US Patent US 10,287,228 – Antimalarial agent, methods and uses thereof. Institutions: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, IHMT-NOVA – Universidade Nova de Lisboa – Instituto de Higiene e Medicina Tropical, IPP – Instituto Politécnico do Porto.

Inventors: Leão, P., Rosário, M.M., Costa, M., Vasconcelos, V., Nogueira, F., Domingues, V. 2019. European Patent EP3313807 – Antimalarial agent, methods and uses thereof. Institutions: CIIMAR - Centro Interdisciplinar de Investigação Marinha e Ambiental, Universidade do Porto, IHMT-NOVA – Universidade Nova de Lisboa – Instituto de Higiene e Medicina Tropical, IPP – Instituto Politécnico do Porto.

NEW MATERIALS, DEVICES, PRODUCTS AND PROCESSES, SOFTWARE, COMPUTER CODES AND ALGORITHMS

Ecosystem model of the Minho estuary (NW coast of Iberian Peninsula) implemented in AQUATOX 3.1 (US-EPA). Published: Martins I., Dias E., Ilarri M.I., Campuzano F.J., Pinto L., Santos M.M., Antunes C. 2019. Antagonistic effects of multiple stressors on macroinvertebrate biomass from a temperate estuary (Minho estuary, NW Iberian Peninsula). Ecological Indicators 101, 792-803. http://dx.doi.org/10.1016/j.ecolind.2019.01.065

Physical modelling tools for risk management associated to deep-sea mining. Published: Lopes C.L., Bastos L., Caetano M., Martins I., Santos M.M., Iglesias I. 2019. Development of physical modelling tools in support of risk scenarios: A new framework focused on deep-sea mining. Science of the Total Environment 650, 2294-2306. http://dx.doi.org/10.1016/j.scitotenv.2018.09.351

CETUS Database: Cetacean monitoring surveys in the Eastern North Atlantic, EurOBIS. Published: Correia A.M., Gandra M., Liberal M., Valente R., Gil Á., Rosso M., Pierce G.J., Sousa-Pinto I., CIIMAR - UP (2019). CETUS: Cetacean monitoring surveys in the Eastern North Atlantic. Marine Data Archive. https://doi.org/10.14284/350

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