Sustainable Blue
Economy Partnership

2026 SYMPOSIUM

POSTER EXHIBITION

SUSTAINABLE BLUE ECONOMY PARTNERSHIP
11 FEBRUARY 2026, BUCHAREST

Sustainable Blue Economy Partnership

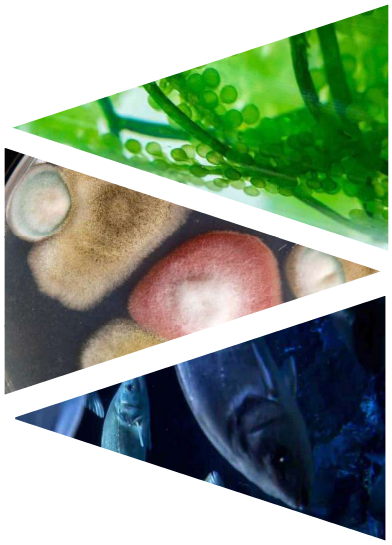
AlFunFeed

Fungal single-cell protein from macroalgal waste fermentation: improving sustainability and reducing the carbon footprint of fish aquafeeds

AlFunFeed develops sustainable aquafeed ingredients by transforming macroalgal by-products into fungal single-cell protein (SCP). Linking marine resource valorization with aquaculture nutrition, enabling a circular approach to protein production for European aquaculture.

Circular Innovation

Large volumes of macroalgal biomass generated by industrial activities remain underutilized, while aquafeeds rely on environmentally demanding fish and plant proteins. AlFunFeed converts macroalgal residues into high-quality fungal SCP using scalable fermentation, closing the loop between marine by-products and aquafeed production.



AlFunFeed applies a multidisciplinary framework to ensure performance & sustainability. Feeding trials evaluate feeding regulation, digestibility, nutritional performance, immune response, welfare, gut microbiota and growth in juvenile European seabass.

Holistic Approach

This biological assessment is complemented by Life Cycle Assessment (LCA) and cost analysis to compare SCP-based feeds with conventional formulations.

Expected Impacts

Environmental

- Valorization of marine by-products and waste reduction.
- Decreased pressure on marine resources.
- Lower carbon and nutrient footprints in aquafeed production

Economic

- Cost-effective & stable alternative proteins source.
- Strengthened competitiveness of European aquaculture.
- Support for local circular bioeconomy value chains.

Social & Policy

- Contribution to EU Green Deal, SBEP & One Health.
- Promotion of responsible resource use and stakeholder awareness.
- Engagement with policymakers, researchers, & industry to foster adoption.

AlFunFeed innovation lies in integrating biotechnology, nutrition, & environmental assessment to validate SCP as a functional, safe, and eco-efficient protein source for carnivorous fish species.

AlFunFeed

LEAD PARTNER

CIM Centro de Investigación Mariña Universidade de Vigo

FUNDED PARTNERS

ODS PROTEIN · University of Thessaly · Università Politecnica delle Marche · ciimar

SELF-FUNDED PARTNERS

Axencia Galega de Innovación · Xunta de Galicia Conselleria do Mar · Fedepesca

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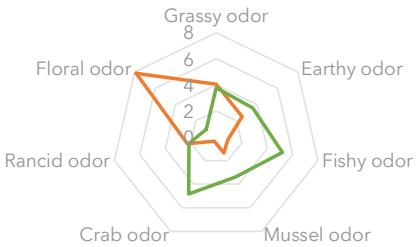
AlgFlavor

Enhancing algal consumer acceptance

Algae are a sustainable food source thanks to their nutritional value and low environmental impact. However, their wider use in food is limited by challenges related to flavor variability, off-flavors, and consistency during scale-up. AlgFlavor focuses on cultivating algae under controlled conditions to steer flavor development, studying how cultivation and processing affect sensory properties, and translating this knowledge into food prototypes.

Scientific Objective 1: Enhance the flavor characteristics of microalgae and seaweeds while ensuring flavor consistency during scaling

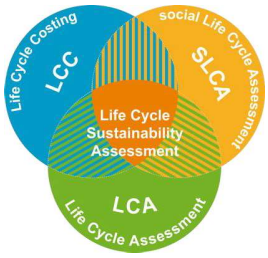
Algae are cultivated from lab to pilot scale with controlled growth conditions. Flavor profiles were assessed using chemical flavor analysis and trained expert sensory panels.



Scientific Objective 2: Formulate accepted algal-containing food prototypes by using both flavor science and consumer studies

Food prototypes are developed using flavor analysis across different food matrices and validated through sensory testing. Consumer research and co-creation ensure market-ready products with high acceptance.

Scientific Objective 3: Communicate market strategies to stakeholders for selling algal-containing food products and inform society about their sustainability, affordability, and nutritional benefits



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AQUABALANCE

AQUABALANCE elaborates on strategies and best practices for balancing economic, environmental, and social sustainability in the European aquaculture industry. It follows a pan-European perspective by focusing on several geographical locations and sea-basins (North Sea, Mediterranean Sea, Atlantic Ocean), and maps existing and promising solutions boosting the sustainability of the aquaculture industry.

MAIN GOAL

To provide the aquaculture industry and stakeholders with new knowledge and evidence-based recommendations to ensure its social legitimacy and sustainability

SCIENTIFIC OBJECTIVES

- Identify barriers and drivers for ongoing transition
- Investigate dilemmas associated with rebalancing the economic, environmental, and social dimensions;
- Explore the role of policy for the transition
- Provide recommendations to develop sustainable business models
- Develop an assessment method for economic viability and environmental effects of new technological solutions
- Provide knowledge on consumer preferences and deliver communication toolkits
- Co-create with stakeholders policy recommendations

Photo: Ingvild Constance Festervoll Melien

PRELIMINARY RESULTS

Report on baseline state of regional aquaculture hubs in Norway, Denmark, Ireland and Italy

12 qualitative case studies are selected, interviews with aquaculture firms and other local stakeholders are ongoing

Report on relevant technological options to the European aquaculture industry mapping technologies in the upstream and midstream parts of the aquaculture value chain

Database of European aquaculture producers and suppliers

Market survey is implemented in Norway, Denmark, Italy, and Ireland (ca. 1,000 people per country); ongoing analysis of consumer data

Framework for policy mix is developed based on an online review of policy documents from Norway, Ireland, Italy, and Denmark

Pilot **lab for policy experimentation** was organized; new policy lab is planned for April 2026

> ***The aquaculture industry needs to reduce its negative environmental impact and increase its positive societal impact***

IMPACTS

Aquaculture industry will get access to evidence-based approaches for deployment of innovative solutions and be given tools for communicating climate neutrality and sustainability for an increased social legitimacy

Policymakers will have a more comprehensive understanding of the complexity of the transition processes and how to better support and regulate them

aquabalance
Sustainable aquaculture

COORDINATOR: Western Norway University of Applied Sciences
PARTNERS: The Seafood Innovation Cluster, University of Limerick, University of Verona, University of Copenhagen
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Funders

The Research Council of Norway · Innovationsfonden · Foras na Mara Marine Institute · MUR

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AquaUP

Aquafeed Upgraded: Enhancing Immune Function of Fish with Seaweed-modified Functional Compounds

INTRODUCTION

Aquaculture must expand sustainably to meet future food demand, but its growth has been limited by diseases and reliance on antibiotics. Seaweed offers a promising, nutrient rich feed ingredient, yet its use is hindered by anti nutritional compounds. AquaUP investigates seaweed derived functional ingredients to improve fish growth, immunity, and disease resistance. We develop sustainable harvesting and green biorefinery methods for brown seaweeds, characterize their bioactive compounds, and assess their safety, immune effects, and digestibility for inclusion in aquafeeds. The entire value chain will be evaluated for social, economic and environmental sustainability.

Aim & Objective

AquaUP's aim is to refine and valorise seaweed to produce seaweed-modified functional ingredients for aquafeed.

AquaUP's **innovative approach** by;

- Identifying best harvest season for brown seaweeds in Norway and Ireland
- Optimizing quantity and quality by dewatering technology
- Developing cascading biorefinery

The benefits

- Boost immune system and fish health
- Socio-economic benefits Environmental sustainability.

Scientific & Technological results

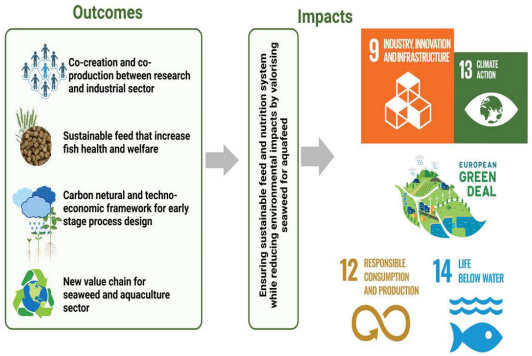
- **WP1 –** Project Management
  Led by NIBIO – ensuring coordination and delivery of project goals.
- **WP2 –** Seaweed Collection & Characterisation
  Sustainable harvesting guidelines for *Ascophyllum nodosum, Alaria esculenta,* and *Saccharina latissima* have been developed.
  Seasonal biomass variation and dewatering performance have been documented (Norway & Ireland).
- **WP3** – Cascading Biorefinery
  A zero-waste extraction platform (UAE-DES + enzymatic hydrolysis)is being developed to produce high-purity proteins and polysaccharides for aquafeed.
- **WP4 –** In Vitro Evaluation
  SOPs for testing seaweed extracts have been established; cytotoxicity testing is ongoing.
  Further evaluation includes immunomodulatory, anti-inflammatory & antiviral effects.
- **WP5 –** In Vivo Feeding Trials
  Assessing immune enhancement via gut microbiota modulation.
  Optimizing extract inclusion and pellet quality.

Transnational across borders knowledge generation and innovation benefit from diverse scientific, technical, and regional perspectives across sea basins

Interaction & Impact

WP6 – Sustainability Assessment

- Stakeholder workshop (D6.1) defined key sustainability pathways and bottlenecks at early stage.
- TEA and LCA will determine the economic viability, and bottlenecks, of a multiproduct biorefinery approach of producing seaweed-bioactive at a commercial scale.



More information

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AQUAUP

Scan me

Sustainable Blue Economy Partnership

Digital Twin of the Ocean for Arctic Fisheries

T. Hamre (NERSC), A. J. Hestnes (Kongsberg Discovery), A. Beszczynska-Möller (IOPAN), R. Higgins (EurOcean), M. Maar (AU), V. N. Gunnlaugsson (MATIS), Þ. Ágústsson (Trackwell hf.), S. Margeirsson (Brim hf.)

ARCFISH will develop a pilot Digital Twin of the Ocean (DTO) to support the Blue Economy by way of sustainable fisheries in the Arctic, focusing on two key regions: (1) Western Greenland, centred around Disko Bay, and (2) region around Iceland, northwards to the Svalbard archipelago and the Barents Sea.

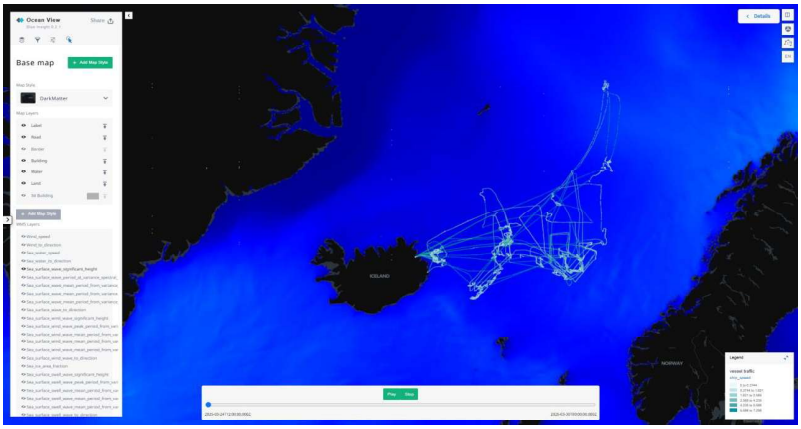
Close collaboration with fishers, processors, researchers, authorities, and policy-makers is essential. Stakeholders are involved throughout the development to ensure the product meets user needs. Partners focus engagement on the most relevant stakeholders to avoid fatigue and keep dialogue effective across regions and the wider Arctic community.

Greenland – Disko Bay

This case study engages institutions, authorities, NGOs, and industry to define needs for ecosystem indicators and Digital Twin tools supporting fisheries, productivity hotspots, and environmental drivers. The FlexSem model simulates 3D physical and ecological processes in Disko Bay. In ARCFISH, it was expanded with new ecosystem variables and integrated into Blue Insight to support Digital Twin applications.

Iceland regional case study

Structured meetings with key Icelandic stakeholders identified needs for fisheries data integration, pelagic species tracking, and Digital Twin services. Blue Insight now ingests vessel movement data, trawl records, and catch information from pelagic fisheries, enabling better environmental context, improved decision-making, more efficient operations, and sustainable management in Icelandic waters.



ARCFISH
Digital Twin of the Ocean for Arctic Fisheries

Coordinator: NERSC.
Partners: Kongsberg Discovery, EurOcean, IOPAN, AU, MATIS, Trackwell hf, Brim hf

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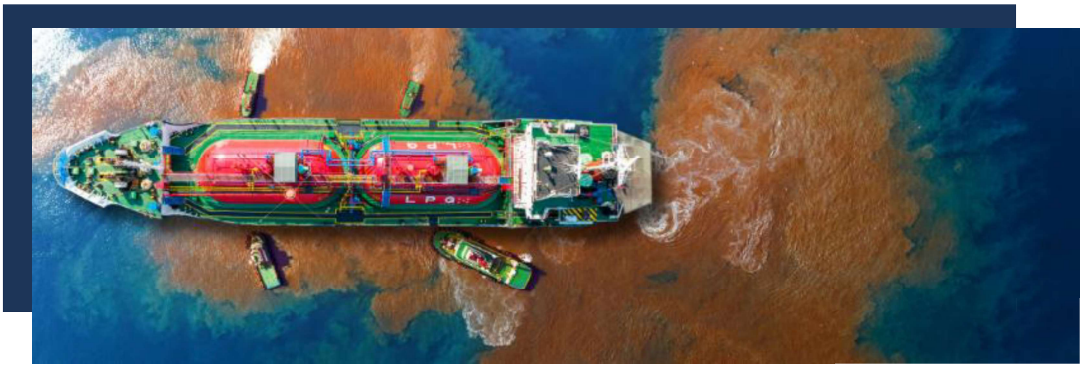
BilgeUp

Upcycling of BILGE Water into Biobased Solutions for Ghost-fishing & Oil-Spilling

BilgeUP is an innovative project aimed at transforming a problematic maritime waste—bilge water—into valuable bioproducts, addressing both environmental and industrial challenges in the marine sector.



BilgeUp Seeks to

Valorise both bilge water and sludge by converting them into high-value, eco-friendly materials through two integrated bioprocesses:

- **Biosurfactant Production**

Bilge water will be used as a growth medium for selected marine bacteria and fungi known for producing biosurfactants (BS).
These biosurfactants will be tested as natural dispersants in marine oil spill remediation, offering a sustainable alternative to chemical dispersants.

- **Bioplastic Production**

The produced biosurfactants will be added to the sludge to enhance its bioavailability.
Specialised bacteria will then be cultivated to produce polyhydroxyalkanoates (PHA)—biodegradable plastics. These PHAs will be used to develop biodegradable fishing gear to address the persistent issue of ghost fishing and marine litter.

Expected Results

- Design & evaluation of biodegradable materials for **fishing gears**
- Testing of biosurfactants as dispersing agents in oil spills
- Assessment of **circularity, economic feasibility & market potential**

Impact & Circular Economy

By sampling and treating bilge water and sludge from the Mediterranean Sea, Atlantic Ocean, and Black Sea, BilgeUP applies circular economy principles by upcycling ship bilge waste into high-value bio-based materials, closing resource loops in the blue economy

Official Website
www.bilgeup.com

This project has been co-funded with support from the European Commission. This website reflects the views only of the author, and the Commission cannot be held responsible for any use that might be made of the information contained therein.
Project Number: SBEP2024-713 CALL ID: SBEP2024

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BIOVAL

MICROALGAL BIOMASS VALORIZATION FOR SUSTAINABLE PRODUCTION OF FUNCTIONAL FOOD AND FEED INGREDIENTS

"While marine microalgae offer a promising renewable source of high-value bioactive compounds, current production processing remain costly, resource-intensive, and insufficiently integrated, limiting large-scale adoption.

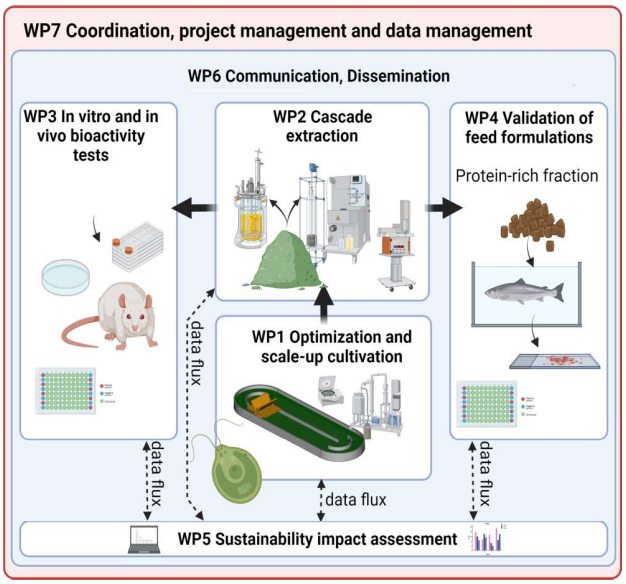
BIOVAL tackles this challenge by developing scalable, circular, and low-impact biorefinery solutions aiming to fully valorise microalgal biomass into safe, high-value ingredients for food and aquaculture, while minimising waste and environmental footprint.

PARTNERS

Stazione Zoologica Anton Dohrn (SZN)
Le Mans Université
Universidad de Almería
UCD Dublin
University of Tromsø
NB PharmaTox
ipvc estg
algamol

Sub-contractors

ANFACO CYTMA
Algreen – every day algae
Circularity

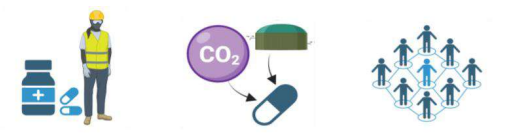


Expected results

- Scalable and sustainable biorefinery processes for marine microalgae enabling the production of food, feed ingredients, in a circular bioeconomy perspective.
- Optimised cultivation, photobioreactor-based production, and low-environmental-impact extraction technologies delivering safe, high-value PUFA-rich lipids and monoacylglycerides (MAGs).
- Validated microalgal fractions and aquafeed formulations derived from side streams, with demonstrated bioactivity and safety.
- Life Cycle Assessment results, sustainability indicators, and exploitation tools supporting scale-up, regulatory pathways, and market uptake.

Expected impacts

- Strengthened sustainability, resilience, and competitiveness of the European blue bioeconomy.
- Reduced environmental footprint and waste through a biorefinery approach valorisation of marine bioresources.
- Improved availability of sustainable food supplements and aquafeed ingredients, contributing to public health, food system diversification, and climate neutrality objectives.



sustainable bioindustries | climate resilience economy | economic and social benefits

COORDINATOR: Stazione Zoologica Anton Dohrn, Naples (Italy)
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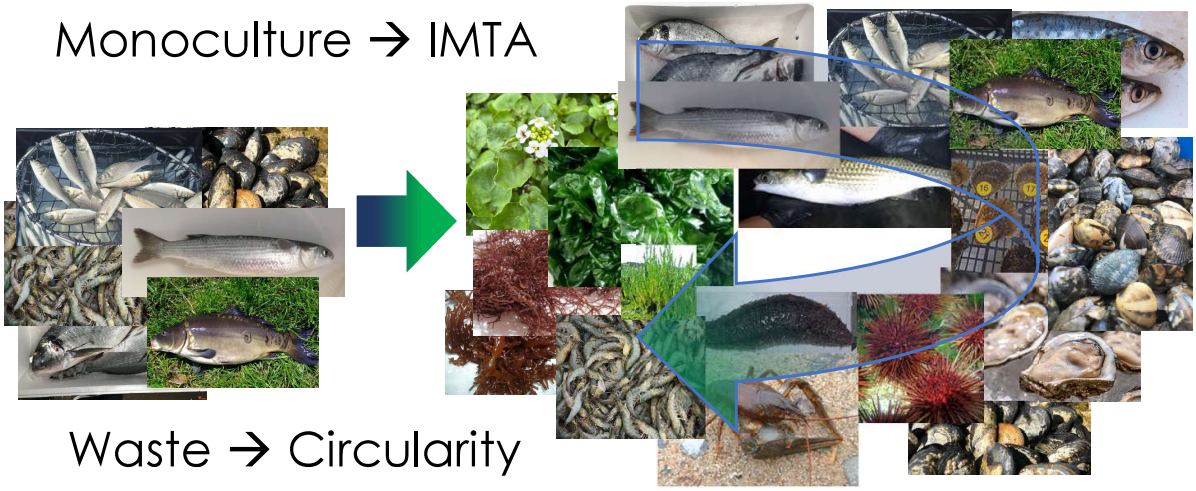
Culture of a wide range of low trophic species to boost sustainable production of Blue Food and reduce environmental footprint

GENERAL AIM: BLUEBOOST aims to demonstrate if the co-culture of a wide range of low-trophic species (fish, bivalves, invertebrates and seaweeds) with established species can boost current European aquaculture of foods and feeds while reducing the environmental footprint and moving towards a carbon-neutral aquaculture blue economy.

Scientific and technological results

Monoculture → IMTA



Waste → Circularity

- ✓ 6 case studies, monoculture → IMTA - Integrate Multitrophic Aquaculture
- ✓ Novel IMTA systems and culture technologies developed in Spain, Portugal, Poland, Italy and Brazil
- ✓ Environmental benefits of IMTAs have not yet been robustly demonstrated in LCAs
- ✓ Cost Benefit Analysis tend to find that IMTA outperforms monoculture
- ✓ The common perception that the reason for low uptake of IMTA is low profitability is thereby challenged

From an economic perspective, integrated multi-trophic aquaculture (IMTA) systems have the potential to outperform monoculture operations while maintaining comparable levels of environmental impact.

Spain · Portugal · Poland · Italy · Brazil · Brazil · Italy · Sweden · Finland

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WP2 IMTA: IMC-ITALY, s.carboni@fondazioneimc.it
WP3 LCA/Economics: RISE-Sweden, friederike.ziegler@ri.se

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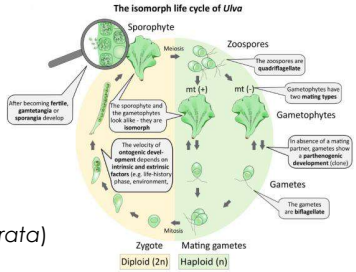
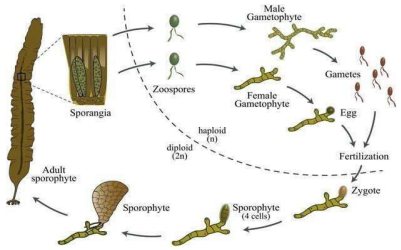
Blue Bio Boost

We aim for sustainable economic development of the macroalgae industry by:
- **exploiting genetic variation**
- **improving the efficiency of propagation and selection of suitable genotypes**
- **minimizing the impact of genetic exchange with natural populations**
- **involving stakeholders in creating a plan for future macroalgae breeding**

Study species

Sea lettuce (*Ulva fenestrata*)

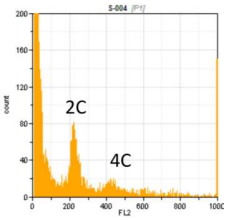




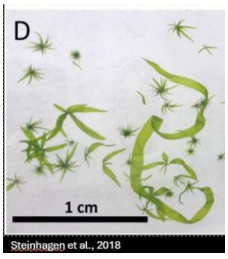
Sugar kelp(*Saccharina latissima*)

Determination of ploidy

A rapid method to determine ploidy level with flow cytometry is being developed for both species, and will be used to study life cycle stages and investigate how higher ploidy levels can be utilised in breeding.



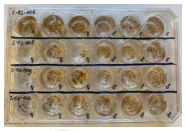
Giant Ulva

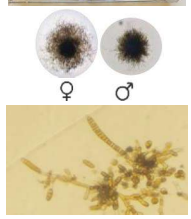


In sea lettuce, there is a certain proportion of giant individuals appearing spontaneously. We are investigating whether they are polyploids or not, if the phenotype is heritable, and assessing their overall performance and biochemical properties.

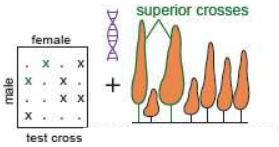
Crosses with hybrid vigour

We build sugar kelp gametophyte biobanks in Sweden, Ireland and Norway and test specific pair crosses in the sea.





Using phenotypic measurements and whole genome sequencing data, we perform genetic analyses and simulate optimal mating designs. The future application is to cultivate a mixture of selected pair crosses, each giving superior high-yielding offspring, and together having allele frequency profiles that largely resemble that of the natural population.



Gametophyte growth rate

Very slow gametophyte growth rate is an issue in sugar kelp breeding. We investigate how we can manipulate light conditions to increase growth rate.

European macroalgae breeding

We work with stakeholders to develop a future strategy for the macroalgae breeding sector.

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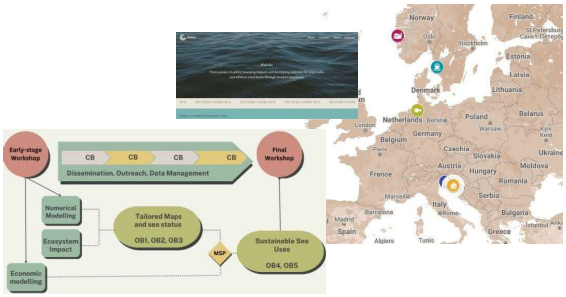
2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Sustainable Blue Economy Partnership

BluEcho

From science to policy: assessing impacts and developing solutions for ship traffic and offshore wind farms through detailed soundmaps.

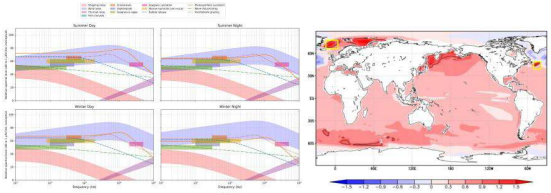
Objectives: Investigate sound generation and near-field propagation resulting from wind farms and marine traffic • Assess detailed regional noise maps for all sea basins • Assess impacts on selected marine taxa through maps tailored to the sea basins • Evaluate the efficiency of mitigation measures • Perform an economic analysis of costs and benefits coupled with a maritime spatial planning assessment.

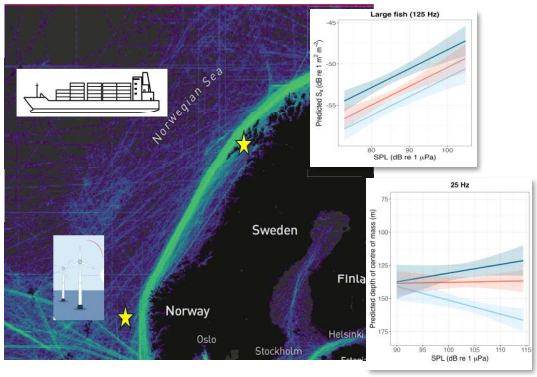


Partners: University of Trieste - National Institute of Oceanography and Applied Geophysics – OGS (Italy) - Institute of Marine Research (Norway) - Chalmers University of Technology (Sweden) - Alfred Wegener Institute (Germany).

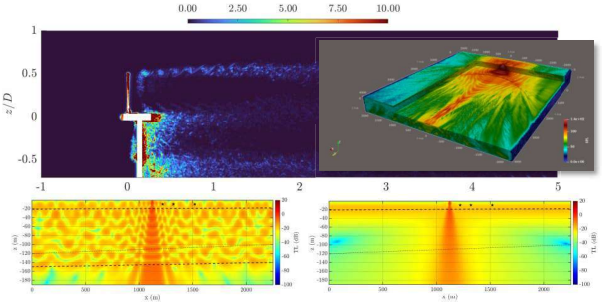
On 15–16 October 2024, an **Early-Stage Workshop** was organized to discuss: Maps modelling; Biological impacts - the concept of LOBE; Socio-economic consequences of mitigation measures. Main takeaway: 1) Update and mutual exchange among EU projects; 2) Identifying knowledge gaps that TG Noise aims to prioritize.

Key policy questions addressed by BluEcho: How can high-risk habitats and LOBE be defined? • Which parameters should inform coastal noise maps for EIAs? • How should impacts from small vessels be regulated and mitigated? • What is the economic value of quiet seas, and how acceptable are mitigation measures to stakeholders?





Key research lines: Integration of species distribution, habitat use and sound propagation into impact assessments • climate-driven changes in ocean sound speed and acoustic hotspots • effects of continuous low-frequency noise on fish behavior and abundance using acoustic and echosounder data • synthesis of shipping noise impacts on marine fauna • numerical noise mapping with sensitivity analyses • modelling of wind turbine and propeller noise, including trade-offs between underwater noise and efficiency.



Help us assess knowledge and economic values of marine ecosystem services

BluEcho

COORDINATOR: Marta Cianferra, University of Trieste – Italy marta.cianferra@dia.units.it
Project website: www.bluechoproject.eu

Co-funded by the European Union

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BLUESHORES

Estuaries and low-lying coasts are increasingly vulnerable to erosion and storms due to human impacts and habitat loss. While traditional Grey Infrastructure (GI) offers protection, it is costly, inflexible, and environmentally harmful. Nature-based solutions are more sustainable but often fall short of urban protection needs, particularly at high energy sites. BLUESHORES tests an innovative, modular Hybrid Blue-Green Infrastructure (HBGI) design concept that integrates natural and engineered elements to deliver resilient, multi-benefit shorelines, generating field-validated guidance and evidence to support HBGI implementation across diverse European contexts.

BLUESHORES develops and tests a **new modular hybrid combination of soft** (3D BESE structures for saltmarsh restoration) and **hard** (oyster reefs and wooden breakwalls) **eco-engineering elements** (Fig. 1). Building on pilot evidence that these elements may generate biogeomorphological synergies enhancing wave attenuation, the project will assess whether this flexible, locally adaptable infrastructure can **reduce wave and boat-wake** impacts, support the **recovery of oysters and foreshore vegetation**, and enhance aesthetic **integration with the cultural landscape**. HBGI performance will be tested against traditional grey infrastructure at three European sites (Table 1), including moderate- to high-energy settings with moderate to steep slopes where HBGI has so far been considered unsuitable.

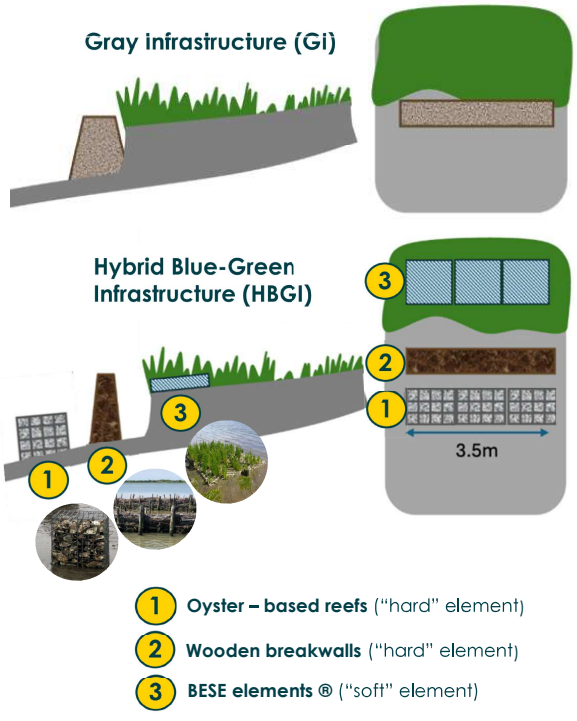

FIGURE 1 Characteristics of the three eco-engineering elements and their novel combination tested in BLUESHORES. The spacing of the HBGI elements is illustrative, as **the exact design configuration is flexible** and will be adapted to the specific characteristics of each site.

Table 1: Characteristics of the test sites and challenges addressed.

SITE 1 – Venice Lagoon (Mediterranean Sea)
Micro-tidal coastal lagoon under erosion threat over at least the past century, leading to changes in its morphology, tidal forms, hydrodynamics and wave field
SITE 2 - Eastern Scheldt Estuary (North Sea)
Macro-tidal sea arm, threatened by erosion which causes the loss of habitats and increase of wave-loading onto the dikes, thereby reducing flood safety 19,20. Current measures to counter erosion mostly rely on intertidal shoal nourishments and GI.
SITE 3 - Cork Harbour (Atlantic)
Meso-tidal natural harbour at the mouth of the River Lee, and one of the largest natural harbours in the world. Coastal erosion is a major concern, and Cork City is regularly flooded. There are discussions about building a large-scale GI tidal barrier to protect the city from flooding.

Using an iterative, participatory approach, BLUESHORES integrates local environmental conditions and socio-cultural considerations through a two-stage process. The project is currently combining stakeholder input, baseline field data (Figure 3), and numerical modelling to design and implement the first site-specific configurations at sheltered, moderately sloping shorelines, where technical, ecological, and societal performance will be assessed. Insights from this initial phase will inform refined simulations and subsequent deployments at more energetic, steeply sloping sites, alongside the development of indicators to evaluate performance, economic sustainability, and added value relative to traditional grey infrastructure, supported by continued stakeholder and public engagement.

FIGURE 3 Pre-deployment sampling assessment at Site 1, Venice Lagoon (January 2026).

Università degli Studi di Padova · UCC · NIOZ Royal Netherlands Institute for Sea Research · Regione del Veneto · Ministero delle Infrastrutture e dei Trasporti · IH cantabria · Cyprus University of Technology · ReSEES Research Laboratory on Socio-Economic and Environmental Sustainability · BLUESHORES https://blueshoresweb.github.io/Blueshores/ · DTU

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Sustainable Blue Economy Partnership

BLUE WAYSE

blue ways to a sustainable Europe

BLUEWAYSE is an innovative European initiative dedicated to transforming underused marine sidestreams, currently treated as waste or low-value byproducts, into nutritious foods, functional ingredients, and high-value products for human use. By creating new industrial synergies across aquaculture, biotechnology, and food systems, the project advances sustainability and circularity in the blue economy.

Through cutting-edge biorefinery processes, BLUEWAYSE valorises residues from shrimp, salmon, cod, and fish-processing wash waters into food and feed ingredients, nutraceuticals, biomaterials, and microalgae cultivation media. The research tackles key scientific and technological challenges such as improving solubility, taste, and bioactivity of fish, shellfish, and microalgal components used for human nutrition.

As the project progresses, efforts are focused on upscaling key sidestream extracts to generate sufficient biomass for a planned human clinical trial targeting chronic inflammation and male infertility. Environmental, societal, and economic assessments, along with regulatory and market analyses, will support the development of a roadmap for a sustainable blue bioeconomy.

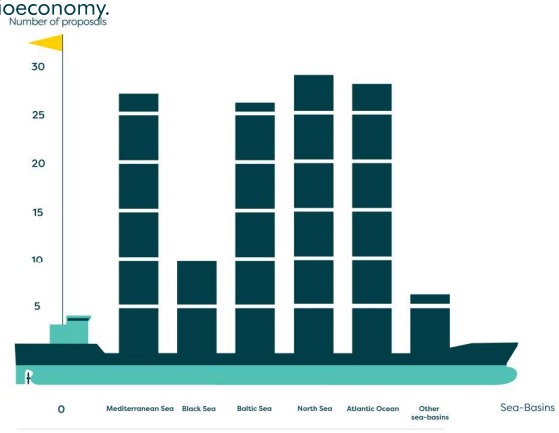

Fig. 2 Number of proposals addressing the different sea-basins

Dissemination activities are ongoing, and the multi-actor consortium continues to co-create circular, low-energy solutions that strengthen the blue bioeconomy.

To date, the project has screened advanced filtration technologies to obtain bioactive fish hydrolysates with immune-stimulating, antioxidant, and anti-inflammatory properties; produced collagen and calcium phosphate from bone-rich sidestreams; and demonstrated the use of CaP as an effective sunscreen SPF booster. Ongoing work includes characterising nutrient-rich wash waters for microalgae production and developing protocols for cultivating Spirulina and *Nannochloropsis* on fish-derived media to generate proteins, oils, and bioactive compounds for food, feed, and cosmetic applications.

> ***The project has identified specific fish- and algae-based extracts that significantly reduce inflammation and obesity markers in vivo, leading to their selection for the upcoming human clinical trial!***

By increasing the fraction of marine biomass used for human consumption and converting secondary residues into value-added products, BLUEWAYSE will contribute to climate-neutral food systems, reduce environmental footprints, strengthen coastal industries, and foster consumer acceptance of BLUE food and feed.

So far, the project has optimised lab- and pilot-scale production of salmon- and cod-based protein hydrolysates, achieving improved purity and reduced off-flavours through membrane filtration. Microalgae cultivation using nutrient-rich fish-processing permeates is underway, and green extraction technologies have yielded bioactive algal fractions with promising properties. Collagen and calcium phosphate have been successfully extracted from fishbones, while extensive in vitro and in vivo studies identified potent anti-inflammatory and anti-obesity extracts—now selected for an upcoming clinical trial on male subfertility and metabolic inflammation. Meanwhile, microalgae-enriched bakery prototypes (sourdough, focaccia, brioche) have been developed and sensory-validated, supported by market benchmarking and species-specific flavour profiling.

Coordinator: Nofima; Partners: SEAGARDEN, CNR, University of Valencia, LUND University, LISBON University, A4F, AlgiKey); Subcontractors: University of Crete, Ambrosia Lab

Co-funded by the European Union

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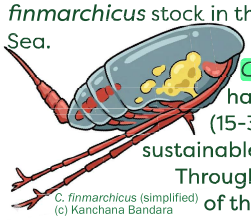
A low-CO_2 smart autonomous multiplatform system to monitor and forecast *Calanus finmarchicus* stock – a new sustainable climate-neutral blue fish feed

Lionel Camus (lca@akvaplan.niva.no)

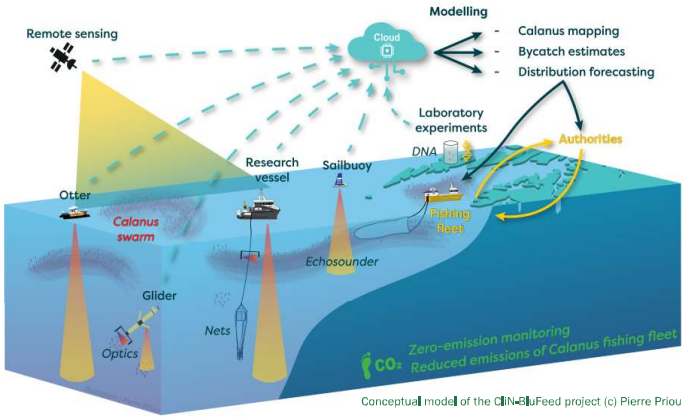
The CliN-BluFeed project

Launched in 2024, the the CliN-BluFeed project focuses on developing an integrated network of multiple smart autonomous sensors ranging from *in-situ* underwater monitoring instruments to spaceborne remote sensing and coupling them with cutting edge artificial intelligence (AI) and simulation modelling (SM) techniques to monitor and forecast the *Calanus finmarchicus* stock in the Lofoten-Vesterålen region of the Norwegian Sea.



C. finmarchicus (simplified) (c) Kanchana Bandara

C. finmarchicus is a lipid-rich copepod that is harvested by vessel-operated nets in shallow waters (15-30 m depth). *C. finmarchicus* has been used as a sustainable fish feed ingredient in the aquaculture industry. Through this project, we aim to improve the sustainability of the *Calanus* fishery through: (i) reduced by-catch, (ii) reduced scouting time, fuel consumption and thus carbon emissions and (iii) better stock assessment.

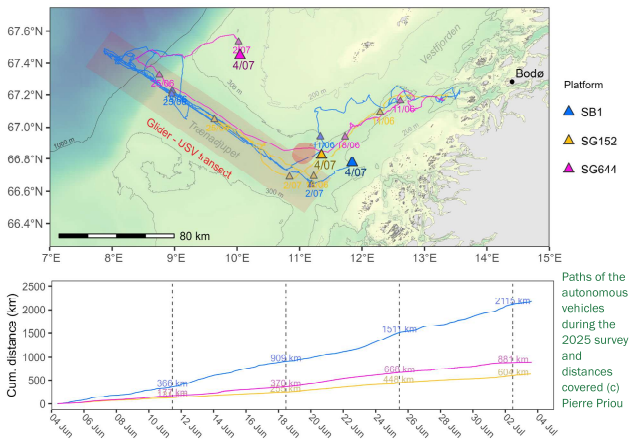


Conceptual model of the CliN-BluFeed project (c) Pierre Priou

Autonomous surveys

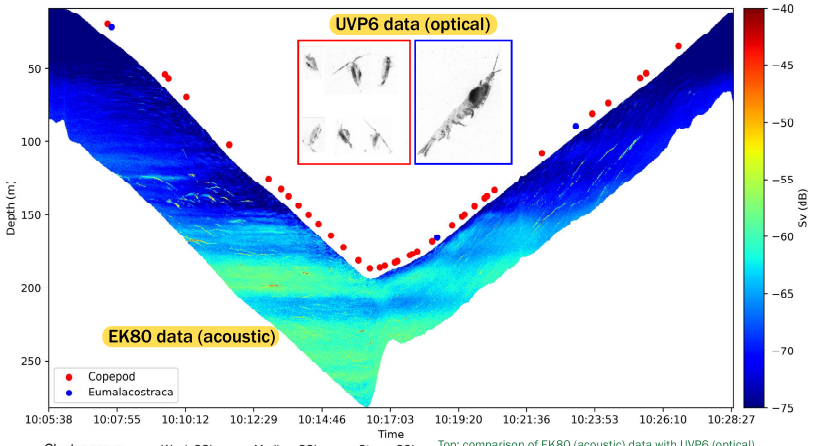
We deployed a fleet of autonomous surface and underwater vehicles during spring/summer of 2024 and 2025 for: (i) *in-situ* optical and acoustic observation of *C. finmarchicus* and other co-occurring taxa and (ii) to monitor their physical environment.

The fleet of autonomous vehicles deployed during 2025 spring campaign (c) Pierre Priou

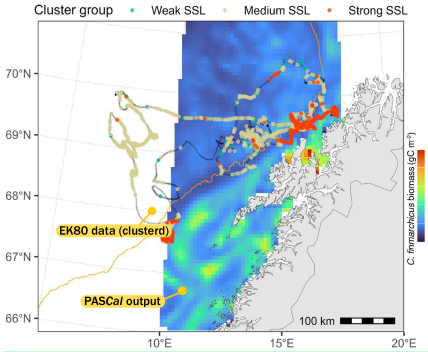


Paths of the autonomous vehicles during the 2025 survey and distances covered (c) Pierre Priou

From data to stakeholders

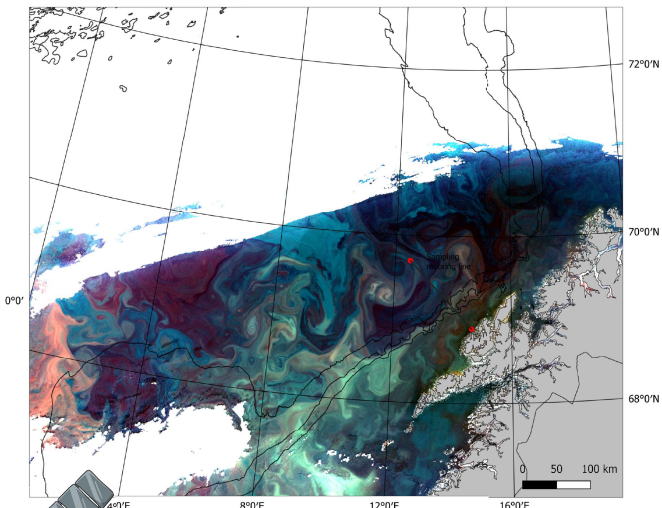


Top: comparison of EK80 (acoustic) data with UVP6 (optical) data collected during the survey, Left: comparison of acoustic backscatter clusters with simulated outputs of PAS*Cal* model. (c) Pierre Priou



We use UVP6 data for taxonomically resolving the acoustic backscatter from EK80 and estimating abundances. These will be used to improve the simulated *C. finmarchic -us* abundance and biomass estimates by the PAS*Cal* (v. 4.2) model. The visualized model outputs will be delivered to stakeholders.

Spaceborne Remote Sensing



OCLI-enhanced RGB image (Sentinel-III) of the north eastern Norwegian Sea during the 2024 spring field campaign (c) Andre Valante

We obtain contemporary satellite imagery from ESA Sentinel-2 and Sentinel-3 (RGB) and NASA ICESat-2 (LiDAR) missions in the attempt to detect *C.finmarchicus* near-surface swarms from space. The *in-situ* acoustic data are used to groundtruth the remote sensing data. This allows us to estimate *C. finmarchicus* spatial distributions across the whole harvesting area, that is comparable with the extent of the simulation model outputs.

Co-funded by the European Union
The Research Council of Norway
CliN-BluFeed (2024-2027) is funded under the Sustainable Blue Economy Partnership (SBEP) by the European Union and the Research Council of Norway (project no. 352139)

Sustainable Blue Economy Partnership

CodeBlue

Harmonized ocean data sets for blue sustainable eutrophication management of the North-East Atlantic Ocean and Baltic Sea.

"Code blue" is a hospital emergency term referring to a patient in critical condition i.e., a medical emergency!
Here, the patient is the ocean and the medical emergency is eutrophication.

Project structure

CodeBlue is a three year project, started september 2025.

WP1 – Compile in situ, remote and model data for model validation and create a unique harmonized biogeochemical forcing

WP2 – Hindcasts: current state, pre-eutrophication and no-climate

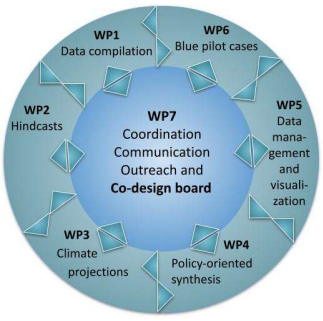
WP3 – Projections: one climate projection scenario and its twin with nutrient levels fixed at the Maximum Available Input

WP4 – Harmonized methodology, and policy oriented synthesis

WP5 – Data management and visualization

WP6 – 5 local test cases

Key stakeholders in a co-design board ensure support decision-making environment restoration and good environmental status.



Partners

15 partners from 13 EU countries.
Coordinator: The oceanographic research unit at SMHI (Swedish Meteorology and Hydrology Institute).
Co-design board: OSPAR, HELCOM and other national stakeholders.

Goal

Provide robust and harmonized data sets for long-term management, guidelines and policy briefs for both large- and regional scale.

Research questions

A) Eutrophication: Has climate change been significant compared to anthropogenic nutrient loads?
B) Will the "Maximum Allowable Input" (MAI) of nutrient loads to the ocean solve eutrophication in the North-East Atlantic and Baltic Sea?
C) How will the implemented measures affect blue economy activities in strategically targeted coastal areas?

Method

CodeBlue partners will run nine ocean-biogeochemical models. Models results will be harmonized using a weighting method in relation to observations. The results will be used to study the climate change effects on eutrophication back and forward in time. Will the MAI be sustainable in a future climate?

Results will be used in five local models to investigate the impact on aquaculture (mussel, oyster, fish), low trophic levels and generally on coastal management.

The data product will be developed in close dialogue with the co-design board to make sure it is useful and openly available according to the FAIR principles, i.e. making data Findable, Accessible, Interoperable and Reusable.

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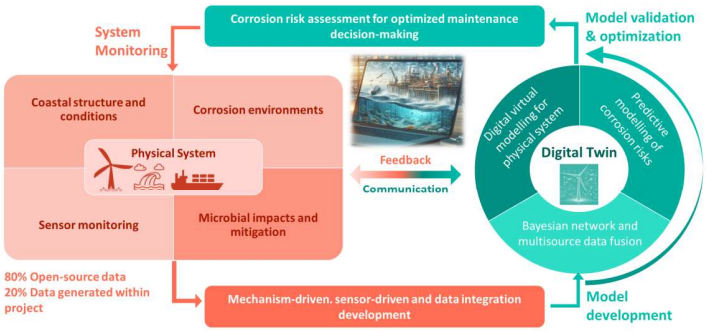
Sustainable Blue Economy Partnership

CORRASBlue: Coastal Corrosion Risk Management through Digital twin modelling for a Sustainable Blue Economy

The Blue Economy with its established and emerging sectors are challenged by aggressive and complex conditions towards materials. Corrosion in the coastal ecosystem poses a silent and high impact threat, jeopardizing both marine life and blue economy sustainability. Corrosion prevention is the measure with highest positive short-term impact on achieving structure stability. An effective corrosion management system is based on input data and subject matter expert contributions supported by efficient and accurate tools. Current expertise in corrosion management is divided between different scientific disciplines within each industrial sector and the matter of environmental impact has traditionally not been emphasized. Climate change and diverse biological life pose further complexity and risks to asset integrity. Digital twin offer key opportunities for enhanced structure integrity management including data contextualization, standardization, automated anomaly detection and learning through sharing.

> ***The Coastal Corrosion Risk Management (CCRM) digital twin aims to integrate holistic sensor measurements, corrosion state, and mitigator effectiveness to enhance corrosion management, enabling comprehensive monitoring and maintenance strategies to safeguard marine infrastructure and ecosystem health.***



- ✓ Develop a digital twin model system for selected marine corrosion control explicitly incorporating biological life
- ✓ Assessment materials performance in selected EU sea basins
- ✓ Evaluate available biotic and abiotic mitigation strategies on selected marine infrastructure
- ✓ Holistic system thinking for best practice of current corrosion monitoring sensor technologies
- ✓ Can we use the model to predict and design a better corrosion mitigation strategy that minimizes environmental impact?

Requirement analysis and stakeholder engagement

Gather and integrate stakeholder inputs on data priorities to ensure the development of CCRM DT will align with their needs and expectations.

System design and architecture

Define the type of marine infrastructure to be modelled based on results from stakeholder feedback. A data acquisition strategy will be developed for both sensor placement and conducting laboratory experiments.

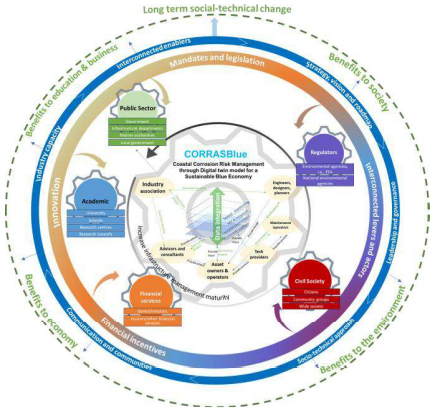
Baltic Sea
Atlantic Ocean
North Sea

Data collection and integration

Develop an organized/ interactive database covering annual data of corrosion, biofouling and marine environment from the EU basins. Prepare harmonized and usable input data for the DT and A.I models.

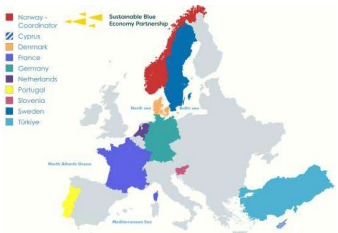
Digital Twin development

Development of a holistic DT combining prediction and prevention for marine corrosion management



Validation and optimization

Validate the accuracy of the DT model in predicting corrosion and MIC under real-world conditions and integrate real-time sensor data.



Final output and exploitation

Annie An Stepec, Project coordinator, bian@norceresearch.no

NORCE Research AS, Norway, NTNU, Norway, VIA University College, Denmark, BAM, Germany, U.Lisboa (FC.ID), Portugal, University of Ljubljana, Slovenia, RI.SE, Sweden, Uni Duzce, Türkiye, Uni Istanbul, Türkiye, TU Delft, Netherlands, WavEC, Portugal, Corrosion Advice, Denmark, Uni-LR, France, Institut de la Corrosion, France, CORRODYS, France, Endures, Netherlands, MetriCORR, Denmark, Fibrobeton, Türkiye, Microbial Analysis, Netherlands, University of Nicosia, Cyprus.

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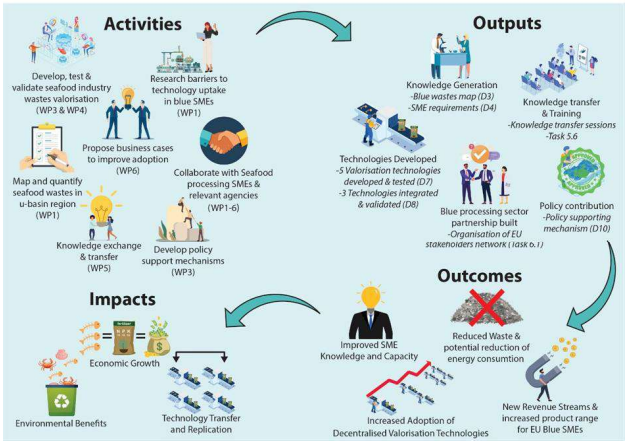
Sustainable Blue Economy Partnership

Development of Valorisation Systems for Seafood Industries (DORIS)

Introduction:

The DORIS project is an ambitious initiative dedicated to transforming the blue economy by addressing the critical challenge of waste management in the seafood sector. While the fishery/aquaculture industries have expanded significantly to meet global demand, vast amounts of low value by-products and waste are generated. DORIS focuses on providing practical, implementable solutions specifically for SMEs, which dominate the European landscape but often lack the resources to adopt traditional, large-scale biorefinery technologies.

Majority of EU fishery processing SMEs do not apply any valorisation approaches. This stems from lack of technical expertise, limited capital, and the absence of cost-effective technologies suited for small-scale, decentralised operations. Available research options also often rely on refined feedstocks that do not reflect actual industry waste streams, making it difficult for SMEs to implement. DORIS addresses this gap by developing modular systems that can be deployed near the waste generation source, reducing costs and environmental impact while unlocking new economic opportunities.



Targeted Stakeholders: Seafood processing SMEs, National Seafood Agencies, Technologies Developers.

DORIS Aims & Objectives:

Technology Development: Design & optimise five technologies for converting seafood waste into value-added products.

Resource Mapping: Create geo-spatial maps of available EU basin seafood waste resources

Viability Assessment: Evaluate socio-economic & environmental impacts and develop business cases for SME adoption.

Policy Support: Compile legislative needs & policy mechanisms to improve waste valorisation uptake.

Main Project Technologies:

- Improved biogas production from finfish waste using two stage anaerobic digestion process.
- Optimised supercritical CO_2 extraction & enzyme catalytic process for high-value fish protein hydrolysates (FPHs) production.
- Microwave-assisted "green" biorefinery semi-continuous process to extract value-added biochemicals from crustacean wastes
- Hydrothermal electrode fabrication from chitin-based wastes
- Mechanical milling & bio-based binding for countertop production using molluscs wastes

DORIS

www.dorisproject.com

Project Partners

National Funding Agencies

Project Coordinator: Dr Ehiaze Ehimen, ATU (Ehiaze.Ehimen@atu.ie)

Co-funded by the European Union

EUROPEAN PARTNERSHIP

Digital Twin Ocean for Offshore Wind Energy

DTO4OWE project is building fit-for-purpose sub-regional Digital Twins of the Ocean (DTO) for the Baltic and North Seas that can simulate, assess and visualize OWF-driven changes from short-term operations to multi-decadal futures. The project develops application models, ecosystem indicators and OWE-specific what-If scenarios supported by on-demand modelling, AI-based downscaling, forecasting and data-simulation fusion. These capabilities are co-designed with stakeholders to ensure relevance for decision-making and environmental assessment.

> ***Project delivers data products, modelling tools and visualization platform that are compatible with pan-European initiatives such as EDITO, Destination Earth and EmodNet.***

The DTO includes the following components

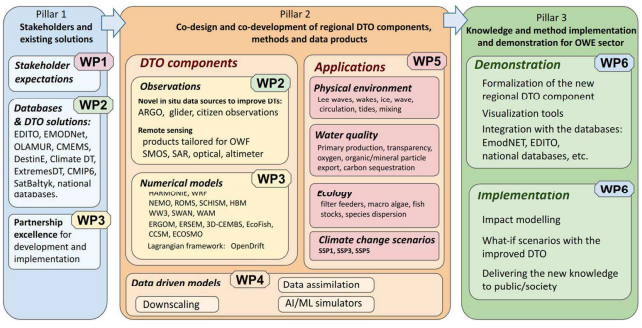
(1) Numerical modelling tools including high-resolution ocean, wave, ice, and ecosystem models spanning short-term operations to long-term (50-year) climate scenarios.

(2) Cost-effective, end-to-end AI/ML tools for downscaling, forecasting, and data fusion for improving the accuracy of digital representation of ocean variables near wind farms.

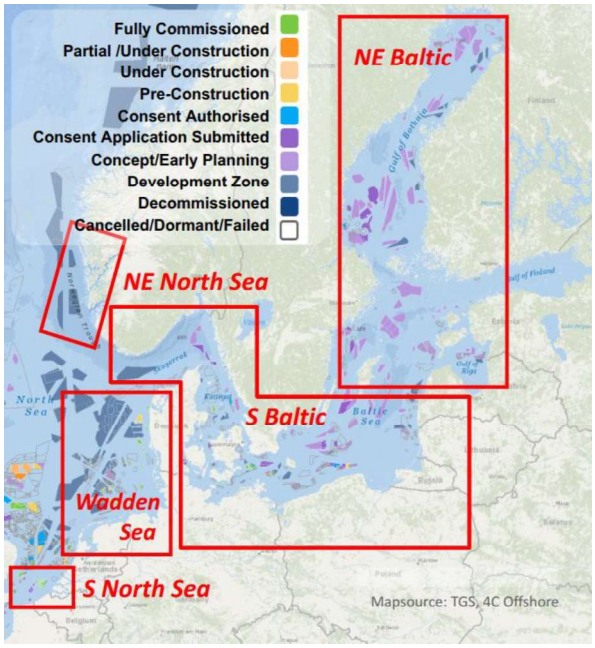
(3) DTO solutions (focus applications and what-if scenarios) for offshore wind "What-If" scenarios, including wake and lee effects, climate change impacts, cumulative ecosystem pressures, and multi-use interactions.

(4) Interactive data visualization platform with dynamic data viewer and stakeholder-oriented products.

Workflow of the DTO4OWE project



Study areas and existing/potential offshore wind energy sites



> ***The DTO components and data products are co-designed with project's Stakeholder Advisory Board (SAB) which includes representatives from industry, governmental agencies and academia.***

RWE Renewables (UK), Equinor (NO), Kerteminde Seafarm, (DK), Finnish MSP coordination (FI), Danish Hydraulic Institute (DK), Multiconsult (NO), Norwegian University of Science and Technology (NO), Wageningen University (NL), Ocean Rainforest (INT), Utilitas Wind(EE)

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DTO4OWE web: dto4owe.eu

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FOODIMAR

Sustainable Blue Economy Partnership

Dmitri Fabrikov[1], Amparo Jiménez-Quero*[1], Rasa Slizyte[2], Magnus Stoud Myhre[2], Freya Robinson[3], Federica Paolucci[3]

The FOODIMAR project aims to transform fisheries and aquaculture side-stream biomasses into high-value, sustainable food ingredients, improving resource efficiency and reducing waste.

1 From Waste to Value

FOODIMAR has characterised fish and jellyfish side streams to identify promising raw materials for high-value ingredient production. Building on this, partners developed a rapid, environmentally friendly cascade extraction process to recover collagen, gelatin and peptides while maximising resource efficiency.

Cod head prior to processing – example of rest raw material.

2 Materials Selection

Rest raw materials from cod, saithe, and haddock were assessed for collagen and gelatine extraction after mechanical deboning into protein-rich mince and bone fractions. Despite high mineral content, bone fractions had collagen-related amino acid profiles similar across species and to skin, supporting combined industrial processing, while separate backbone processing could yield a higher-value mince and clean bones for gelatine extraction.

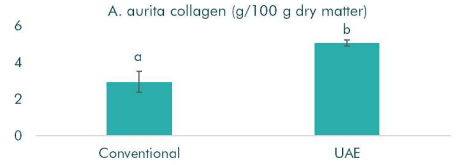
Cod backbones, bone fraction and soft tissue fraction after processing in the belt separator.

Seabream bone fractions retained high lipid levels after deboning, which may reduce collagen yield and require an added defatting step. Despite this, they showed high collagen-related amino acids, exceeding those in lipid-rich, low-protein seabream skin.

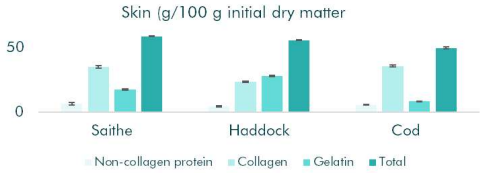
3 High-Yield Extraction

Cascade extraction from **backbones yielded 25-41**% of the initial dry mass. Total **amino acid** content **exceeded 80% in extracted fractions**, compared to 33–45% in raw material, demonstrating the effectiveness of cascade extraction in valorising bone side streams.

Ultrasound-assisted extraction significantly increased collagen yield from jellyfish, **raising total amino acid levels from 60% to 66%**.



Cascade extraction from **fish skin yielded about 50**% across three whitefish species. Ultrasound-assisted extraction **doubled collagen yield** without altering its structure or composition.



4 Scaling Forward

FOODIMAR continues with functionality testing and product development, supported by market analysis and sustainability assessments.

1 Division of Industrial Biotechnology, Department of Life Sciences, Chalmers University of Technology, Gothenburg 412 96, Sweden. 2. Division of Circular Bioeconomy, Department of Fisheries and New Biomarine Industry. SINTEF Ocean, Trondheim 4762, Norway. 3. SUBMARINER Network for Blue Growth, Berlin 13355, Germany

FOODIMAR · SUBMARINER NETWORK · SINTEF · SDU · CHALMERS · TETIS · GHENT UNIVERSITY

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Sustainable Blue Economy Partnership

FunSea

Functional processing of cultivated seaweeds for novel food products

The FunSea project aims to enhance nutritional quality, safety and functional properties of cultivated brown and green algae as food ingredients, through development of new sustainable processing technologies and utilization of side streams and residual biomass from biomarine industries. The project will further develop and characterize novel food prototypes toward a wide European market, and assess environmental, economic, and regulatory aspects along the value chain from biomass production to finished products.

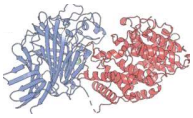
Biomass production and pre-processing

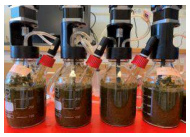
The project has contributed to the development of seaweed cultivation systems in the Baltic Sea, including identification of suitable green algae species (*U. intestinalis*, *U. prolifera*), for land- and sea-based cultivation. Brown algae (*A. esculenta*) from the Atlantic Ocean has been cultivated for use in processing experiments, and the project has worked on characterizing and utilizing production side streams for food applications.

Enhancement of safety and nutrition

The project has demonstrated treatments for reducing heavy metals in brown seaweed and increasing their protein content through use of other food side streams. Furthermore, stabilization of seaweed with organic acid has been explored under a variety of storage conditions, to understand effects on nutrition and safety parameters and prepare ingredients for novel prototypes

Enzymatic and microbial processing





Novel enzymes (ulvan lyase and laminarinase) are used to process seaweed biomass and produce bioactive oligosaccharides. Among other bioactivities, these oligosaccharides can act as prebiotics with benefits to human gut health, and/or enhance fermentation for food processing. The project is also exploring chemoenzymatic approaches for hydrolyzing seaweed waste fractions, for use as a feedstock supplement. in microbial fermention

Environmental assessment

The feasibility of the FunSea processes is not only evaluated based on the resulting properties of the biomass, but also on the environmental and economic impact. The project has already conducted a screening life cycling assessment (LCA) of the current value chain from cultivation to dried ingredients, and will compare energy, water and chemical use, and logistics of the different approaches (blanching, acid preservation, fermentation). The project has also conducted and published a market analysis to identify future seaweed suppliers to the currently largest market (China), to better understand Europe's potential future role as a producer and global exporter.

SINTEF · Seaweed Solutions · Marint Centrum · Aalborg Universitet · Lund University · Fraunhofer IVV · Bettafish

Development of novel food products

FunSea targets "everyday" food products where the seaweed has a high inclusion rate and improves the sensory, functional, and/or textural properties of the products. Differently processed seaweeds are compared in tuna and salmon analogues already on the market. In addition, the seaweed is evaluated in pasta and in fried veggie sticks, where the latter can use fresh seaweed preserved by fermentation and/or addition of organic acids, which can reduce the cost and environmental footprint of the ingredient. Ongoing work focuses on optimization formulations, sensory assessment, and assessing shelf-life of the finished prototypes.

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SINTEF Industry – Dept. of Biotechnology and Nanomedicine
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FunSea

Co-funded by the European Union

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Sustainable Blue Economy Partnership

INSPIRE: Innovative design and operation for rare earth material reduction and optimized lifetime for next generation offshore wind-based hydrogen production

NTNU · Fraunhofer IWES · VUB · Universität Bremen · SIEMENS

Offshore wind turbines - Green hydrogen - Rare earth materials – Drivetrain and Generator

INSPIRE integrates wind farm together with the hydrogen production to optimize the design, to reduce rare earth element (REE) usage, and to enhance the system lifetime

Objectives:

1. Optimized green hydrogen system design methodology with minimum REEs
2. AI-based wind-hydrogen production optimization for optimized lifetime
3. Reference design of an optimized, open access, green hydrogen system
4. Establish a pathway towards implementation in policy and industrial standards

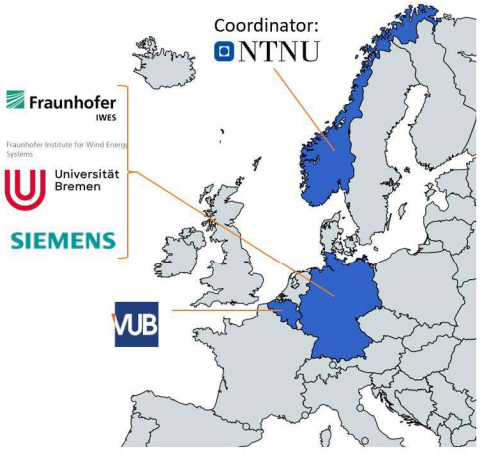
INSPIRE core ambition:
to deliver innovative optimized design for REE reduction and AI-based optimized operation for an integrated hydrogen-wind system, as well as road maps for implementation for EU policy makers

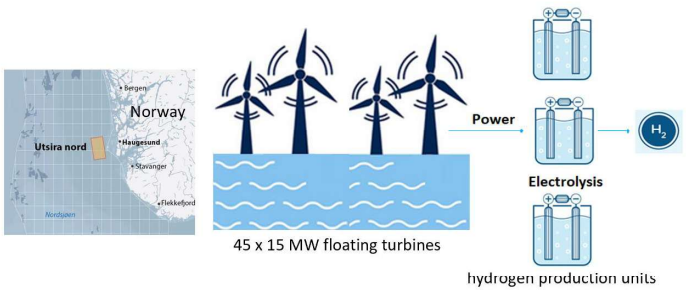
The INSPIRE novelties and position:

- ❑ new approach to REE reduction and optimized lifetime methodology and algorithm
- ❑ min 30% reduction of REEs
- ❑ open access integrated design as EU research infrastructure
- ❑ risk reduction of Europe's reliance on REEs and on the non-EU supply chain
- ❑ integrated transnational road maps for REE reduction and industrialization of innovations in wind-hydrogen for stakeholders and EU policy makers

Two Case studies with real world data aiming for TRL 4 -5:

1. INSPIRE 675 MW Green Hydrogen Farm
2. An on-grid hydrogen production system from a virtual wind farm calibrated on the Belgian offshore wind cluster





INSPIRE 675 MW Open Access Green Hydrogen farm

INSPIRE IMPACT

- ❖ Reduced REE and cost of renewable energy and renewable fuel and their value chains
- ❖ Enhanced sustainability of wind-hydrogen renewable energy and renewable fuels value chains (social, economic, environment)
- ❖ More effective market uptake of renewable energy and fuel technologies

Contact INSPIRE coordinator:

Co-funded by the European Union
EUROPEAN PARTNERSHIP

Sustainable Blue Economy Partnership

Multiple Acoustic obseRving systems to investigate soundscapes and acoustic behaViour of marine fauna in relation to underwater noise from vEssels in isLands ecosystems - MARVEL

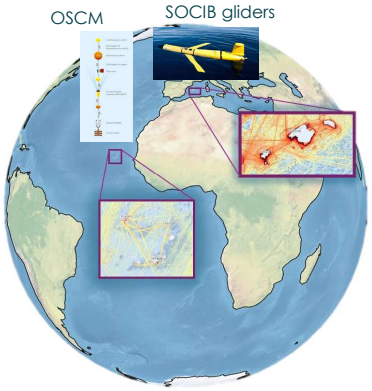
Aim

Evaluate soundscapes and marine fauna acoustic behaviour in relation to shipping noise to promote sustainable ship traffic, marine biodiversity conservation, and low-noise Marine Protected Areas and OECMs.

Case Studies:

Mediterranean Sea: Ibiza Channel, Balearic Islands

Atlantic Ocean: Ocean Science Center Mindelo (OSCM), Cape Verde



Objectives (Obs)

OB1 – Investigate Soundscapes
-Study biophony, geophony, and anthropophony.
-Compare Ibiza Channel and Mindelo soundscapes.
-Focus on shipping noise impact using BluEcho acoustic maps.
-Measure environmental parameters to study sound propagation.

Stakeholder Engagement

OB2 – Assess Acoustic Behaviour of Key Marine Taxa
-Monitor species acoustic behaviour in both sites.
-Identify critical habitats for feeding, mating, and migration.
-Overlay vessel presence with species distributions to identify vulnerable areas.
-Feed results into economic models for MPA implementation.

OB3 – Leverage Research Infrastructures
Promote open science, networking, and stakeholder cooperation.
Use HPC resources to process large datasets.

Support national and regional marine noise monitoring policies.

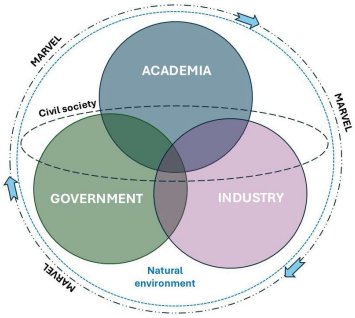
Expected Impacts

I1: Increase public and stakeholder awareness of underwater noise impacts.
I2: Inform long-term planning of MPAs and OECMs.
I3: Support common standards for underwater noise monitoring.
I4: Promote data sharing, outreach, and open science.
I5: Synergize with other EU-funded projects (BluEcho, NECCTON, BEYOND).
I6: Co-create solutions with local communities, fisheries, and tourism stakeholders.
I7: Strengthen regional cooperation and transnational knowledge exchange, supporting SDG 14

MARVEL combines acoustic monitoring, species behaviour analysis, and stakeholder engagement to tackle shipping noise impacts.

Promotes sustainable marine management, low-noise MPAs, and biodiversity protection.

Results will support policy-making, regional cooperation, and public awareness.



PI: Alice Affatati (OGS, Italy)
Partners: OGS (Italy), Counting Whales (Martinique)
JASCO Applied Sciences GmbH (Germany), MediaLab (Italy), Morigenos (Slovenia)
RIs: OSCM (Cape Verde, GEOMAR), SOCIB glider fleet (Spain)

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Sustainable Blue Economy Partnership

MEDSEAPLAN

Data and Scenarios for a Sustainable Mediterranean Blue Economy

MEDSEAPLAN is a three-year project (2024 - 2027) supporting the development of future-proof Maritime Spatial Planning (MSP) in the Mediterranean. Bringing together 15 partners from across the region, the project strengthens data availability, ecosystem-based approaches and stakeholder participation to support a more sustainable and coordinated Blue Economy.

MEDSEAPLAN addresses key challenges in Mediterranean Maritime Spatial Planning, where limited data availability, fragmented data systems and uneven stakeholder participation continue to constrain effective planning.

The project responds by developing a science-based, ecosystem-driven framework for MSP that combines new data generation, participatory engagement and foresight scenarios.

Through comparative analysis of MSP processes, pilot data collection and stakeholder-informed scenario development, MEDSEAPLAN supports more coherent, transparent and cross-border planning.

The project links planners, scientists and maritime stakeholders to improve decision-making and help align MSP processes with Sustainable Blue Economy objectives

What MEDSEAPLAN is doing:

Strengthening MSP foundations

- Comparative analysis in 8 Mediterranean countries
- Governance, data and participation gaps
- EBMS roadmap development

Engaging Stakeholders

- Mediterranean-wide stakeholder surveys on MSP
- Targeted stakeholder interviews informing scenarios
- Ocean literacy activities for sustainable MSP

Generating New Data

- Floating data buoy in the Marmara Sea (Türkiye)
- Nature-based solutions pilot in Cyprus
- Smart Oceans – Smart Industries initiative

Supporting Future-Ready Planning

- Multi-sector, cross-border foresight scenarios
- Decision-support & Digital Twin tools
- Focus on transparent and long-term MSP

Our partners:

WORLD OCEAN COUNCIL · CTN · BURSA TECHNICAL UNIVERSITY · Cohabys · MCAST · UNIVERSITY OF TWENTE. · Cerema · CYPRUS MARINE & MARITIME INSTITUTE · KARADENİZ TEKNİK ÜNİVERSİTESİ · Helmholtz-Zentrum hereon · elkon electric system integrator · ISSNOVA · Ocean Ecostructures · CSIC

WORLD OCEAN COUNCIL

Coordinator: World Ocean Council

www.worldoceancouncil.org/medseaplan/

jenny@worldoceancouncil.org

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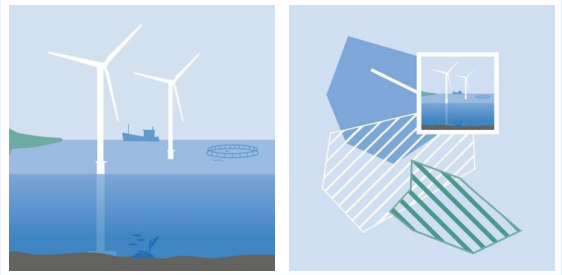
Sustainable Blue Economy Partnership

MSP4MORE

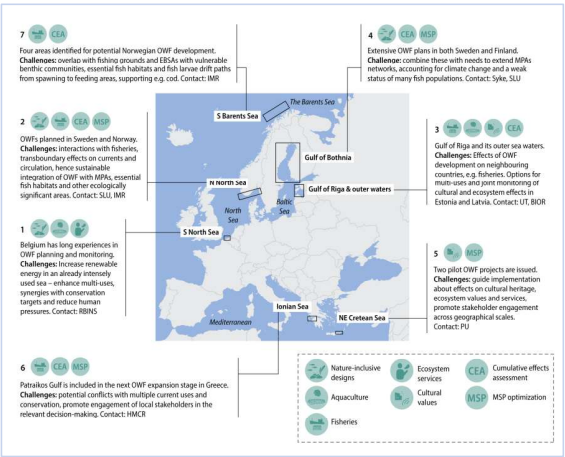
Sustainable integration of renewable energy in MSP

MSP4MORE aims to identify solutions for OWF development that align with sustainable livelihoods, nature conservation, restoration and the protection of cultural assets.

Rapid expansion of renewable energy is a global priority. Offshore wind farms (OWF) can increase renewable energy within a relatively short time frame. However, it is crucial that this development does not compromise equally important objectives for conservation and food production.



Our research focuses on OWF challenges and opportunities related to biodiversity and multi-uses at the local and planning scales. We link these two scales by refining existing cumulative impact assessment and spatial optimization tools.



Our study areas with their a priori key challenges. Icons show the areas' key topics for development and knowledge sharing.

Challenges at local scale relate to the OWF design and include:

- minimize negative ecological impacts and conflicts with other sea uses
- reliably estimate the OWF's contribution to overall cumulative effects

Opportunities include:

- enable synergies, e.g. through multi-uses and nature-inclusive designs
- understand conditions for societal acceptance and innovation

> ***We address the project's key challenges guided by the concept of "mitigating the bad, promoting the good".***

Key challenges at the planning scale include:

- avoid negative trade-offs,
- potential for co-location with other activities
- align plans across jurisdictional borders.

Opportunities include:

- identify synergies and optimised planning solutions across sectors
- clarify conditions for multi-uses
- resolve trade-offs and minimizing cumulative impacts

MSP4MORE (MSP tools for integrating multiple sustainability objectives under expansion of offshore renewable energy) runs 2025-2028.

Contact: lena.bergstrom@slu.se

MSP4MORE
Renewable energy, biodiversity, and livelihoods

SLU

Co-funded by the European Union
EUROPEAN PARTNERSHIP

Sustainable Blue Economy Partnership

OCEAN-H2

Offshore Clean Hydrogen Production for Multi-use Purposes

Offshore Hydrogen: secure Europe's clean energy future

The OCEAN-H2 project aims to assess the long-term feasibility of sustainable large-scale green hydrogen production using offshore renewable energy (ORE), with the aim of contributing to the decarbonization of various sectors and the achievement of a clean energy future

Main objectives

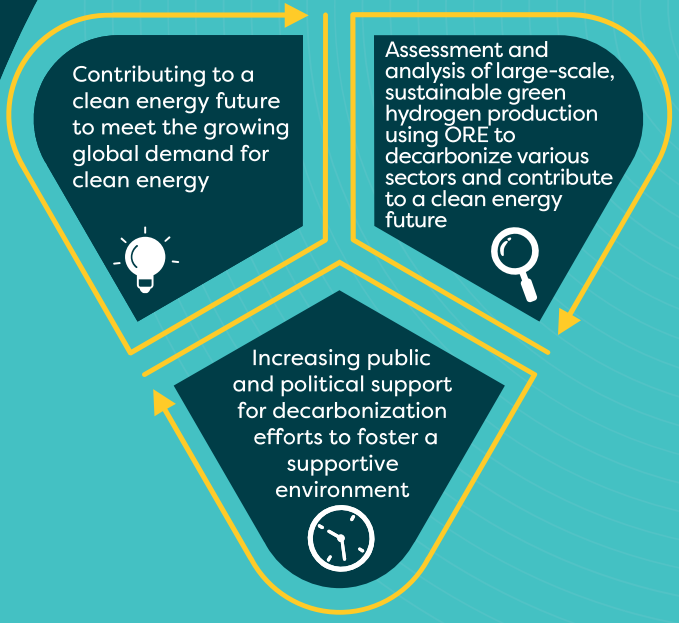
01. Identifying the most effective technical solution for the large-scale production of green hydrogen in the European Union seas

02. Developing connection models that take into account the specific infrastructures and renewable resources available in each basin, promoting synergy between decentralized production and continental distribution

03. Analyzing the economic factors that influence the feasibility and competitiveness of offshore green hydrogen production compared to conventional methods

04. Studying the social dimensions and potential conflicts of interest related to the acceptability of the system through stakeholders involvement and building consensus around the proposed solutions

Expected Results



Contact and follow us

alexander.micallef@um.edu.mt

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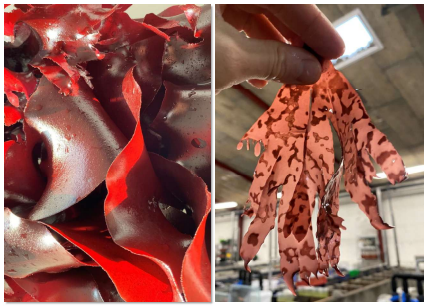
Sustainable Blue Economy Partnership

PalmariaPlus

The red macroalgae dulse (*Palmaria palmata*) and Irish moss (*Chondrus crispus*) are nutrient-dense, antioxidant-rich seaweeds with high market potential but limited commercial production. Aquaculture of these species is constrained by complex reproductive biology and unresolved cultivation practices. PalmariaPlus will develop the tools and techniques needed to enable commercial-scale production of red seaweeds, working closely with industry partners to bring these valuable and sustainable products to market.

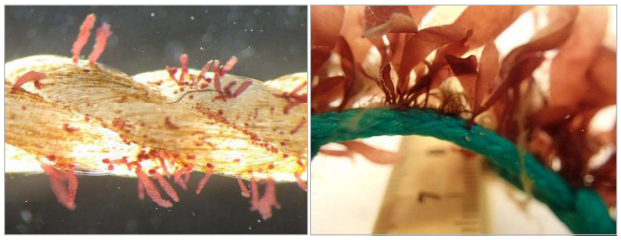
European seaweed aquaculture is dominated by kelp species due to their relative ease of cultivation and rapid growth. Red seaweeds, however, contain **higher protein** (equivalent to soybeans), are low in unfavourable compounds such as iodine and heavy metals, and are a rich source of **antioxidants** and **pigments**. Consumer perception of red seaweeds is good, but the market presence of these products is limited due to a reliance on wild stocks with variable yields.



Mature Palmaria palmata

Increasing market supply requires **sustainable aquaculture** to increase production. Currently, the major hurdles to farming red macroalgae are seed supply and uncertain cultivation protocols. Additionally, very little is known with regards to how product quality changes across seasons, environments, and geographic regions. **PalmariaPlus** seeks to improve the red seaweed industry holistically, and includes activities to:

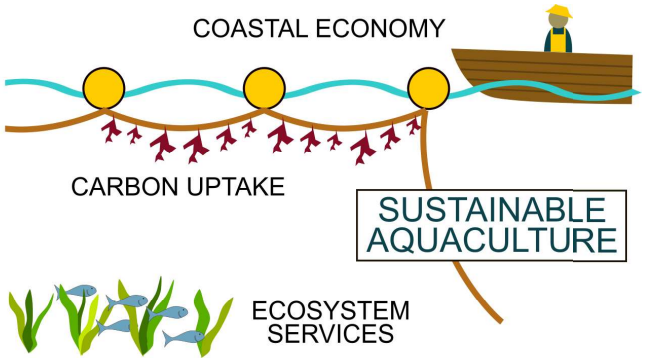
- Improve techniques to reliably produce seed material
- Develop cultivation protocols for farms across the North Atlantic
- Establish baseline parameters for tank cultivation and maturation
- Create new tools to rapidly quantify seaweed quality
- Evaluate population resilience to future ocean conditions
- Engage directly with farms and consumers to boost the entire value chain



Juvenile Palmaria *sporophytes*

The nascent European seaweed industry is overdue for **diversification**, which would strengthen its ecological resilience and create new market opportunities. Red macroalgae offer a distinct sustainability profile that complements existing production systems:

- Resource efficiency: Species like Dulse often have higher nitrogen uptake rates, making them superior candidates for **bioremediation** and Integrated Multi-Trophic Aquaculture (IMTA).
- Low input nutrition: Red seaweeds provide a **"soy-equivalent" protein profile** with a significantly lower carbon footprint than terrestrial crops and a more favorable iodine-to-nutrient ratio than many kelp species.
- Climate resilience: Developing cultivation protocols for diverse species across the North Atlantic builds a more **robust seaweed sector** capable of withstanding shifting ocean temperatures and conditions.
- Year-round potential: Unlike many kelp species with strictly seasonal growth windows, many red seaweeds allow for more flexible harvest cycles, providing a more stable, sustainable supply chain for the European bio-based industry.



PalmariaPlus will catalyze the red seaweed sector by resolving technical bottlenecks in seed supply and cultivation, directly enabling commercial-scale farm expansion. Through coordination with partners in Norway, Sweden, Denmark and Ireland, the outcomes will be relevant to a wide geographical range rather than isolated regions and seaweed populations. Furthermore, by synchronizing production protocols with market requirements, the project bridges the gap between raw biomass and **consumer-ready products**. This integrated approach connects the entire value chain to transform dulse and Irish moss from niche regional harvests into stable, high-value staples of the European bio-economy.

Coordinator:
Evan Durland, PhD
Nofima, Norway
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Co-funded by the European Union

Sustainable Blue Economy Partnership

ReSEAlience:

Unlocking the Potential of Seaweeds and Halophytes through Biorefinery for Enhanced Resilience in the Aquaculture Agri-Food and Chemical Industries

The ReSEAlience project pioneers a transformative approach in the sustainable valorization of marine bioresources, focusing on seaweed and halophytes. By integrating advanced biomass production and biorefinery technologies, ReSEAlience goes beyond traditional practices, enhancing efficiency and sustainability, significantly advancing the Blue Economy.

Scientific objectives:

Feedstock

Optimizing Storage for Stable, High-Quality Biomass: Establish storage and preservation conditions to ensure high-quality raw materials for fractionation, with **less than 1% protein** and lipid loss and stability for at least two months.

Conversion

Validate Black Soldier Fly Larvae (BSFL) and Microalgae as Bioconversion Systems: High-value biomass conversion with **≥40% protein content** and functional lipid-rich biomass with **≥50% lipid content**, using seaweed and halophytes, replacing traditional feed ingredients.

Biomass pretreatment

Validate the HALOREFINE Extraction Technique: Extraction of bioactive compounds from **seaweed** and **halophytes**, comparing it with conventional methods.

Optimize the Organosolv pretreatment process: Efficient fractionation into cellulose, hemicellulose, and lignin, aiming at **<5% lignin in the cellulose fraction** and an overall cellulose and **hemicellulose recovery of >70%** after the pretreatment.

Develop Enzymatic Treatments for Seaweeds: At least **70% sugar** availability and protein digestibility for enhanced bioconversion into quality feed.

Novel Products

Evaluate Economic and Environmental Sustainability: Validation of **feed, textile and yarn & cosmetics products**, including two cosmetic extract fractions and developing a marine ingredient-based cosmetic formula.

System analysis & impact

Develop a Scalable Biorefinery Model: Design a flexible biorefinery model adaptable to diverse regions, and synergistic with **Integrated Multi-Trophic Aquaculture (IMTA)** and eutrophication processes

Support Algae Aquaculture in all evaluated regions: Provide guidance to foster the sustainable growth of aquaculture in all project regions, ensuring **positive social impacts** while **minimizing environmental harm.**

Added value:

- ✓ Promote sustainable agriculture
- ✓ Strengthen Europe's sustainable feed production
- ✓ Enhance the resilience of communities dependent on marine resources by diversifying income sources and promoting sustainable practices

"We target the rich and biodiverse ecosystems of the Mediterranean Sea (including the Aegean Sea), and the Atlantic Ocean (Northeastern, South, North).

Work Packages:

WP1: Biomass Management and Conditioning
WP2: Biorefinery Technologies For Seaweed
WP3: Biorefinery Technologies For Halophytes
WP4: Bioproducts Production & Sidestreams Valorization
WP5: Bioproducts Analysis and Validation
WP6: Conceptual Engineering Design and Pilot-Scale Biorefinery Processes Validation
WP7: Process Assessment and Feasibility
WP9: Dissemination, Communication & Exploitation
WP10: Project Management

Project partners:

Resealience

Coordinator:
Paul Christakopoulos, Luleå University of Technology; contact: paul.christakopoulos@ltu.se

Co-funded by the European Union

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Sustainable Blue Economy Partnership

ROMEO

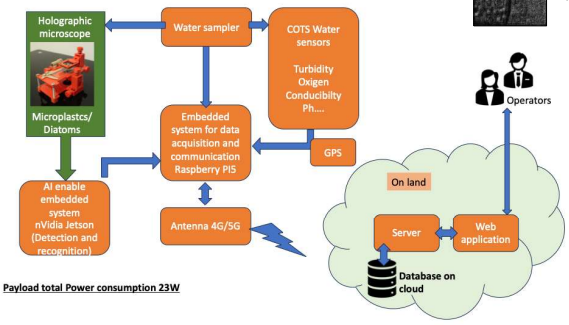
smaRt Online Multisensory systEm for microplastic quantificatiOn and water quality assessment

Microplastics and water pollution severely impact marine ecosystems, biodiversity, and human health. Current monitoring methods are slow, manual, and dependent on laboratory testing-delaying timely action.

ROMEO delivers an integrated, real-time system for water quality assessment.

It combines digital holographic microscopy, environmental sensors, and AI analytics to automatically detect and classify microplastics and diatoms.

Installed on autonomous, solar-powered sailboats, it enables continuous, georeferenced monitoring of aquatic environments.

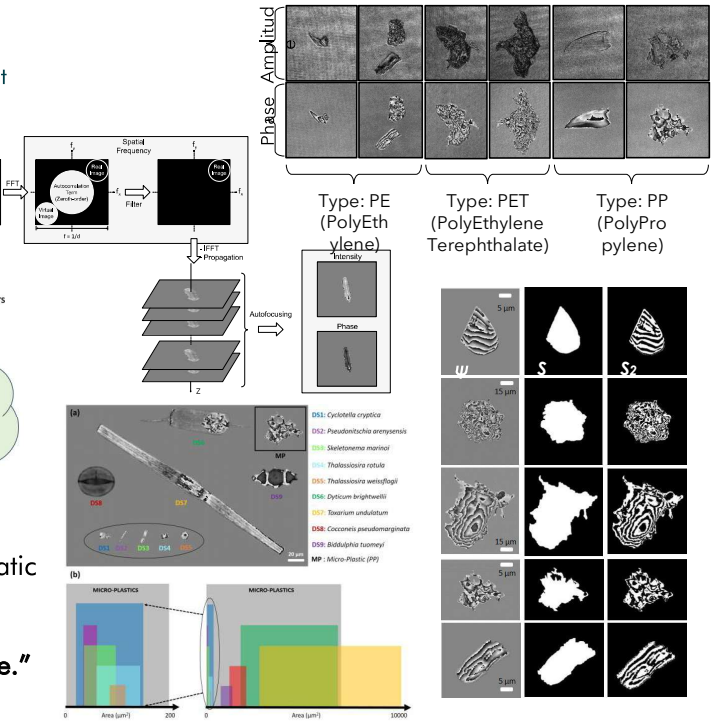


To fundamentally change the paradigm of aquatic monitoring

The Core Idea: "Any sensor, anytime, anywhere."

A dedicated digital twin platform simulates and predicts ecosystem conditions, enhancing decision-making for researchers, policymakers, and industry.

- ✓ Real-time multisensory water quality monitoring
- ✓ AI-based identification of microplastics & diatoms
- ✓ Digitai twin for simulation and prediction
- ✓ Deployment on autonomous solar-powered sailboats
- ✓ Open data supporting EU marine and sustainability policies



ROMEO

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SEAlgaePower

Sustainable Blue Economy Partnership

Sustainable development of microalgae-based ingredients using side streams from aquaculture and seafood processing industries as feedstock

The Dual Challenge

The aquaculture and seafood processing industries generate large volumes of nutrient-rich side stream waters that are costly to manage and can impact the environment. At the same time, demand is increasing for sustainable, carbon-neutral sources of food, materials, and energy.

Environmental | Biomass Innovation

Microalgae offer a promising solution: they use photosynthesis to capture carbon and convert dissolved nutrients into valuable biomass.

The SEAlgaePower Solution

SEAlgaePower is developing innovative biotechnologies to recover and valorize nutrients from aquaculture and seafood process waters, transforming them into high-value microalgal biomass. This biomass provides renewable inputs for food, feed, health, and MedTech applications, contributing to a circular and sustainable blue bioeconomy.

Approach

Seven interlinked work packages form an integrated workflow connecting advanced research with real-world demonstration and long-term blue economy benefits (Fig. 1).

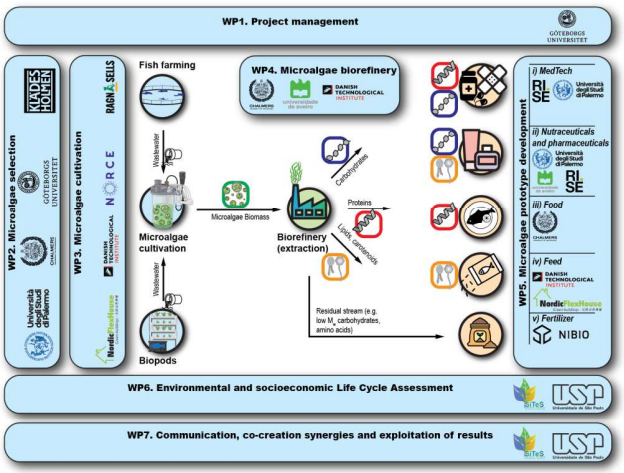
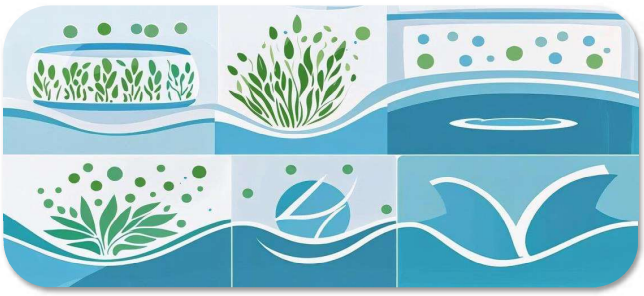


Fig.1 **SEAlgaePower** work package framework, value chain, and project partner organisations

Objectives

Six specific objectives guide the research, pilot activities and impact creation across the project:

1. Microalgae selection
2. Pilot-scale cultivation
3. Biorefinery development
4. Microalgae-based prototypes
5. Sustainability assessment
6. Impact and legacy

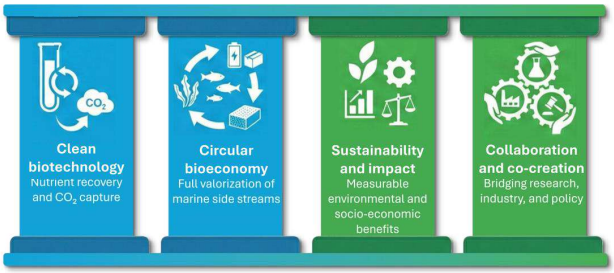


Research Focus

Eleven microalgae strains from the North and Mediterranean Seas (genera *Nannochloropsis*, *Chlorella*, *Dunaliella*, *Phaeodactylum*, *Skeletonema*, *Cryptophytes*, *Cyanothece*) are screened for nutrient uptake, valuable compound content (proteins, Ω-3 fatty acids, carotenoids) and salt tolerance. Promising strains advance to pilot-scale cultivation in two case studies, feeding cascade biorefinery processes that generate products for MedTech, nutraceutical, pharmaceutical, food, feed, and fertiliser sectors.

Outcomes & Impact

SEAlgaePower transforms nutrient-rich side streams into a resource for sustainable growth. The project is built on four pillars:



"Our goal is to turn a cost into an opportunity. By linking aquaculture and processing industry with microalgae cultivation, we reduce environmental impact, recycle valuable nutrients and open new market pathways for sustainable blue growth."

Co-funded by the European Union

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SEAlgaePower

Coordinator:
Prof. Cornelia Spetea Wiklund
University of Gothenburg, Sweden

www.sealgaepower.eu

Sustainable Blue Economy Partnership

Integral valorisation of seaweed biomass for the development of sustainable, high nutritional quality food products SEAFOODTURE

SEAFOODTURE explores the potential of seaweeds as a sustainable source of high-quality proteins and dietary fibres. The project aims to valorise the whole seaweed biomass to develop protein-rich food products and innovative packaging materials through sustainable and resilient cultivation methods and green processing approaches.

SEAFOODTURE is structured into 9 interconnected Work Packages (WPs) ensuring a multidisciplinary and collaborative approach.

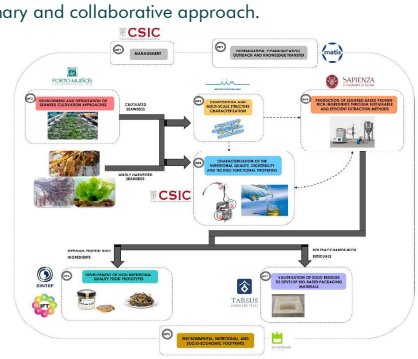

Fig. 1 SEAFOODTURE work plan structure.

WP1 **Project and consortium management** CSIC

Objective: Ensure effective coordination of project activities, timelines and budget.

WP2 **Development and optimisation of seaweed cultivation approaches**

Objective: Explore and optimise farming methodologies for the cultivation of different seaweed species.

Achievement: Successful optimisation of cultivation strategies for Ulva, Porphyra, Gracilaria and Saccharina species

WP3 **Composition and multi-scale structure characterization of different seaweed species**

Objective: Gain insight into the composition of each seaweed species to determine their potential applications.

Achievement: Seaweed species with the greatest potential for food ingredients and material applications were identified

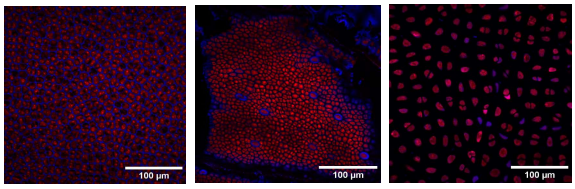

Fig. 2 Confocal microscopy images of *Ulva, Gracilaria and Porphyra.*

WP4 **Production of seaweed-based protein-rich ingredients through sustainable and efficient extraction methods**

Objective: Optimise and scale up the extraction of protein-rich fractions from seaweed biomass.

Achievement: High protein extraction yields were achieved using enzymatic methods

WP5 **Characterization of the nutritional quality, digestibility and techno-functional properties of seaweeds and their protein-rich ingredients** CSIC

Objective: Characterise the nutritional quality of the protein-rich ingredients to evaluate their potential as food ingredients while ensuring their safety for human consumption.

Achievement: Developed methods to improve protein digestibility of seaweeds.

WP6 **Development of high nutritional quality food prototypes containing seaweed-based ingredients** SINTEF

Objective: Develop and evaluate food prototypes incorporating selected seaweed-based protein-rich ingredients, considering consumer preferences, food matrix effects and processing conditions.

Achievement: Consumers' study helped identify products with market potential.

Achievement: First prototypes successfully developed at lab scale.

Fig. 3 Pasta prototypes combining legumes and seaweeds

WP7 **Valorisation of solid residues to develop bio-based packaging materials** TARSUS

Objective: Characterise the chemical composition and structure of residues from seaweed processing and transform them into bio-based packaging materials.

Achievement: Bio-based packaging materials suitable for food industry applications are being successfully developed.

Fig. 4 Aerogels and films prepared from seaweed residues after ficocolloid or protein extraction.

WP8 **Environmental, nutritional, and socio-economic footprints of the developed processes and products**

Objective: Assess the environmental, nutritional, and socio-economic impacts of seaweed-based extraction processes, food prototypes, and bio-based packaging materials.

Achievement: Critical steps in seaweed cultivation have been identified to reduce environmental impact and energy consumption.

WP9 **Dissemination, communication, outreach and knowledge transfer** matis

Objective: Disseminate and communicate project outputs to diverse stakeholders, fostering impact, knowledge transfer, and responsible research practices.

Achievement: Project results are being disseminated via multiple platforms, including LinkedIn and the project website.

Web page

Scan me!

Fig. 5 Example posts published on the SEAFOODTURE LinkedIn page and project website.

SEAFOODTURE
COORDINATOR
Marta Martínez Sanz
marta.martinez@csic.es
CSIC
PARTNERSHIP

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SeaWeave

Sustainable Blue Economy Partnership

Novel functional textiles from red and brown seaweed

The SeaWeave project aims to pioneer new knowledge and technologies for a blue biorefinery model, focusing on converting red and brown seaweed into innovative and sustainable fibers and dyes, contributing to increased valorization of underutilized renewable resources from the Atlantic Ocean and Mediterranean Sea. The project will develop innovative biorefinery processes, new fiber production processes, product concepts and manufacturing methods, and provide a holistic environmental assessment of the entire value chain.

Biomass characterization and pre-processing

Identification of suitable seaweed species for fibers and dyes and development of stabilization methods to preserve composition, processability, and product quality.

Biorefinery, downstream processing, and modification

Development of scalable, cost-efficient processes for co-extracting fiber- and pigment-rich fractions and functionalizing biopolymers for high-value fiber materials.

Material formulation, production, and characterization

Use of polysaccharide-rich crude seaweed biorefinery fractions in textile fibers and production of functionalized alginate, carrageenan, and cellulose nanofibers for reinforcement.

Prototyping, manufacturing, and functional testing

Production of seaweed-based yarns using conventional spinning equipment, demonstration of performance comparable to commercial natural yarns, validation of the applicability and stability of seaweed-based dyes for seaweed-based and conventional textiles, and fabrication of selected fabric prototypes for stakeholder engagement.

Environmental, economic, and social assessment

Early-stage assessment of the environmental, economic, and social impacts of the technologies to enable comparison with incumbent textile products and identify hotspots and areas for improvement.

SeaWeave partners with main contacts

KTH VETENSKAP OCH KONST · SINTEF · RI.SE · VIIS NOVIS UNIVERSITAS ALBURGENSIS · Università di Foggia · ZEEFIER · PYRATEX®

From left to right: Matteo Francavilla (UNIFG), Oleksandr Nechyporchuk (RISE), Anne Boermans (Zeefier), Ewa Katarzyna Lagodzka (AAU), Qi Zhou (KTH), Øystein Arlov (SINTEF), Katharina Nøkling-Eide (SINTEF), Ietje Klaver (PYRATES)
Not in the photo: Massimo Pizzol (AAU)

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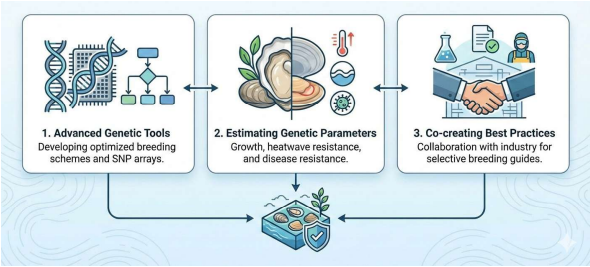
Sustainable Blue Economy Partnership

ShellFishBoost

Boosting the resilience of European shellfish production against climate change-related challenges through genetic selection

Bivalve aquaculture is a critical pillar of the global blue bioeconomy but is increasingly threatened by climate change. ShellFishBoost aims to protect this sector by developing advanced genetic selection tools and breeding schemes to improve the resilience of key European bivalve species against extreme weather and pathogens.

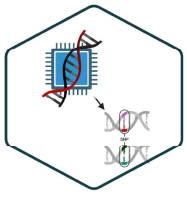
Core Objectives



- Developing advanced genetic tools, such as optimized breeding schemes and SNP arrays (WP1)
- Estimating genetic parameters for climate-change resilience and disease-related traits (WP2-4)
- Co-creating best practices for selective breeding schemes with industry stakeholders (WP5)

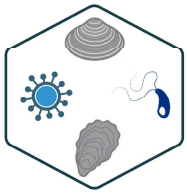
Latest Achievements

WP1: Inventory of genotyping tools



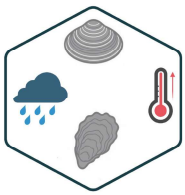
We successfully built two novel SNP-chip arrays: a mid-density (60k) multi-species clam array for the Manila clam and the Grooved carpet shell and a high-density oyster array for the Pacific oyster.

WP2: Disease Resistance



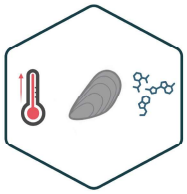
Research is advancing on discovery and validation of Quantitative Trait Loci (QTLs) for resistance against *OsHV-1* and *Vibrio aesturianus* in Pacific oysters, as well as *Perkinsus spp.* in Manila clams.

WP3:Climate Change Resilience



Studies are quantifying heritability and genetic correlations for resistance to climate extremes, specifically heatwaves and sudden salinity drops, in European oyster and clams. Genotyping from a series of lab and field experiment is in progress.

WP4: Toxin Accumulation in mussel



Significant advancements have been made in mussel genetics, including the assembly of short-read and long-read data and the identification of toxin-related QTLs on one of the chromosomes.

WP5: Stakeholder Engagement

Interactive engagement with hatcheries to define best practices has begun. Efforts are particularly concentrated in France (counting the biggest producers), with expanding plans to engage producers and associations.

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Partners:

ITALY: Università degli Studi di Padova; IMC International Marine Centre

SPAIN: USC

PORTUGAL: ciimar; AQUAGOMA Lda

FRANCE: SYSAAF; INRAE; marinove; france naissain; Ifremer

NORWAY: Nofima

VASEACAD

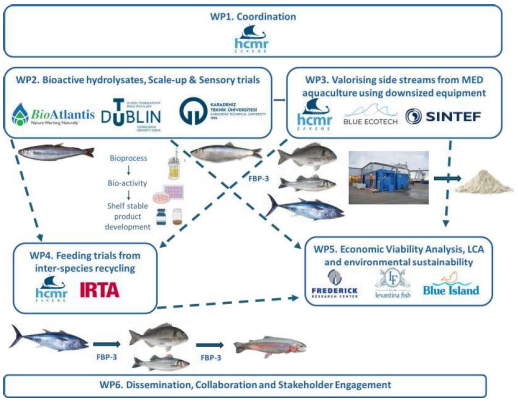
Sustainable Blue Economy Partnership

"Valorising seafood side streams, residues, unwanted catches and discards for production of bioactive protein hydrolysates and high added value biomolecules"

> *The aquaculture and fisheries sectors generate substantial quantities of side streams, residual biomass, and discards that are frequently underutilised or disposed of as waste. This practice results in the inefficient use of valuable marine bioresources and contributes to avoidable environmental impacts and economic losses.*

VASEACAD aims to address this challenge by developing innovative inter-species recycling approaches that convert these residues into bioactive protein hydrolysates, novel fish feed ingredients, and other high-value biomolecules.

The project involves key sea basins such as the Mediterranean, Black Sea, and Atlantic, with activities led by partners from Greece, Ireland, Malta, Norway, Cyprus, Spain, and Türkiye.



Over the next 3 years, we will:

- Develop antioxidation, anti-inflammation, and skin and muscle health products from species such as bluefin tuna, seabass, seabream, sprat, and blue whiting
- Pilot SINTEF's Mobile Sealab in the Mediterranean for localized side-stream valorisation
- Create novel fish feed ingredients from solid biorefinery residues by employing interspecies recycling strategies to support zero-waste aquaculture
- Evaluate the economic, environmental, and social impacts to support industry-scale adoption

Who's behind it? Ten partners from seven countries bring expertise across the entire value chain:

- Hellenic Centre for Marine Research **Coordinator** (Greece)
- Technological University Dublin (Ireland)
- Frederick Research Center (Cyprus)
- Blue EcoTech LTD (Malta)
- Institute of Agrifood Research and Technology (Spain)
- SINTEF Ocean (Norway)
- Karadeniz Technical University (Türkiye)
- Blue Island (Cyprus)
- Kimagro fish farming ltd (Cyprus)
- BioAtlantis Limited (Ireland)

By integrating the seafood industry with side-stream biomass production, VASEACAD aims to contribute to sustainable waste management, enable the development of new bioproducts, and convert costly side streams into valuable resources, transforming a linear challenge into a circular opportunity.

NATIONAL FUNDING AGENCIES

GSRI General Secretariat for Research and Innovation · Foras na Mara Marine Institute · The Research Council of Norway · Research & Innovation Foundation · TÜBİTAK · Ministerio de Ciencia, Innovación y Universidades · Cofinanciado por la Unión Europea · Agencia Estatal de Investigación · XJENZA MALTA

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http://vaseacad.eu/

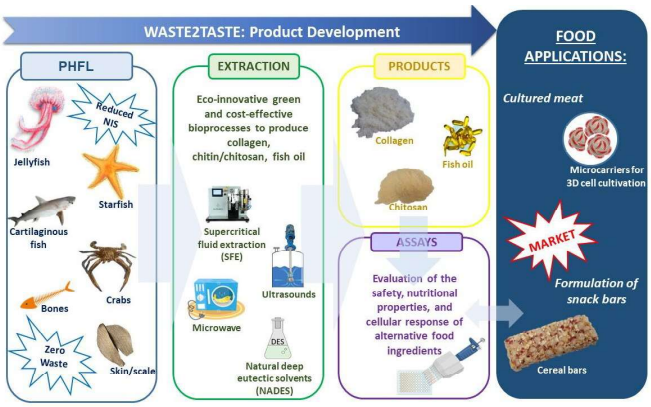
Project Coordinator: Dr Yannis Kotzamanis (jokotz@hcmr.gr)

WASTE2TASTE

Sustainable Blue Economy Partnership

From waste to taste: exploring innovative food applications of postharvest fish losses

WASTE2TASTE is a network composed of a multidisciplinary group of 8 Partners including academia, research centers, and Large industries/SME from 5 countries (Italy, Malta, Spain, Norway, Türkiye), covering several Atlantic and Mediterranean sea basins.



"WASTE2TASTE aims to develop eco-innovative green and cost-effective bioprocesses to produce collagen, chitin/chitosan, and fish oil, to be applied by the food industry"

Several by-catch species (including NIS) were collected from the Marmara, Aegean, and Black Sea regions.

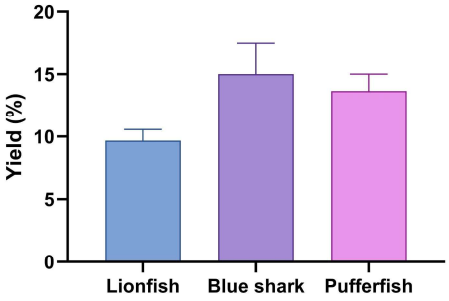
Fish by-products were widely available in fishmongers and processing industries.



INGREDIENTS TO PROTOTYPES: Positioning & audience

- **Market signal:** European marine collagen was valued at USD 4.56 billion in 2024 and is projected to reach USD 7.49 billion by 2032
- **Target:** health-conscious adults (30–55)
- **Key value props:** upcycled feedstock; sustainability
- **Most relevant applications:** functional snacks, nutraceutical supplements, and beauty-from-within products such as collagen beverages

Green Collagen Extractions



SFE trials achieved 8–12% yields across tested biomass.

NADES vs. supercritical CO_2

NADES systems increased collagen solubility by ~35% and outperformed supercritical methods by up to ~30% (yield/solubility performance).

Fish Oil Extraction

Species	% Yield (w/w)
Siganus luridus	1.0 %
Thunnus thynnus	8.9%
Sarda sarda	6.5%
Salmo salar	10.5%
Portunus segnis	< 0.1%
Callinectes sapidus	< 0.1%
Fistularia comensonii	0.5%

https://wastetotaste.eu/

Coordinator: Stazione Zoologica Anton Dohrn
4 Academic Partners: University of Malta, Arctic University of Norway, Higher Council for Scientific Research, Koc University
3 Industries/SME: SINTEF, TETIS BIOTECH, ULKER CHOCOLATE

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