DATA AVAILABILITY AND USES

Joint Algae and Mussels Working Group
6 November, 2024

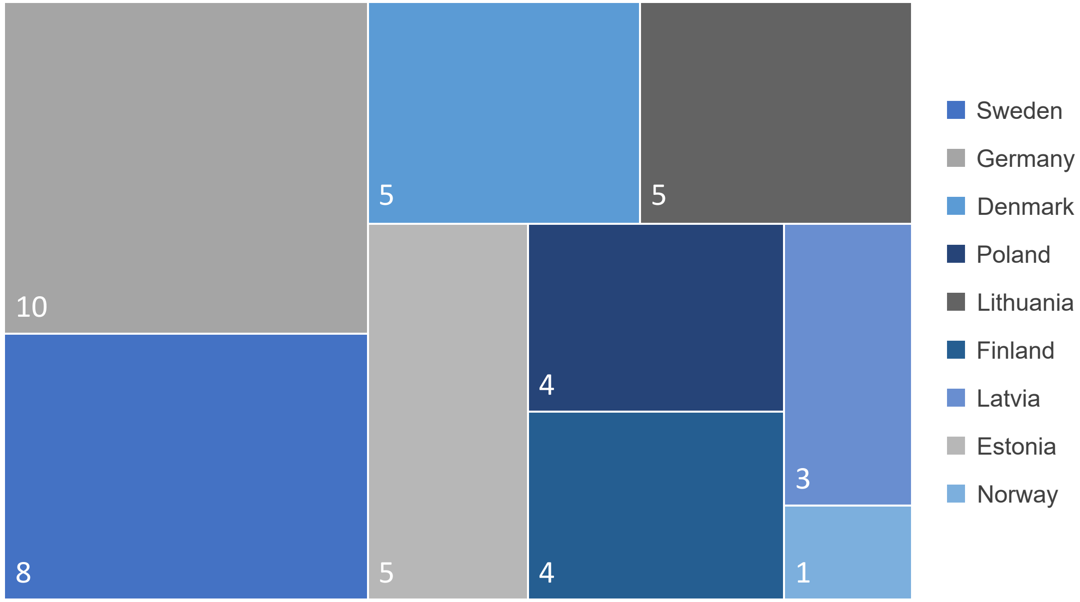
Baltic MUPPETS
AlgaePro BANOS
SEAMARK Seaweed-based Market Applications
SUBMARINER NETWORK

Together we improve the Baltic Sea's blue environment and economy

The cooperation platform for actors and initiatives across
the Baltic Sea Region and beyond who promote innovative approaches to the sustainable use of marine resources

06 November 2024 – Efthalia Arvaniti // Maya Miltell

SUBMARINER Network members & collaboration partners



80+ Start-ups/ SMEs

200+ Institutional Partners

1500+ Individual Experts

60+ Mentors/ Coaches

29+ Associate Members

13 Full Members

SEAWEED for EUROPE

BIOMARINE Community

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

SUSTAINABLE DEVELOPMENT GOALS

#EU4Algae

European Aquaculture Technology and Innovation Platform

EU MISSIONS RESTORE OUR OCEAN & WATERS BY 2030

eurocean

Bio-based Industries Consortium

Topics & Vision

Algae Cultivation and biorefining

Mussel Farming and biorefining

Sustainable Fishery & Aquaculture / Circular solutions

MSP/MPA

Ocean Multi-use

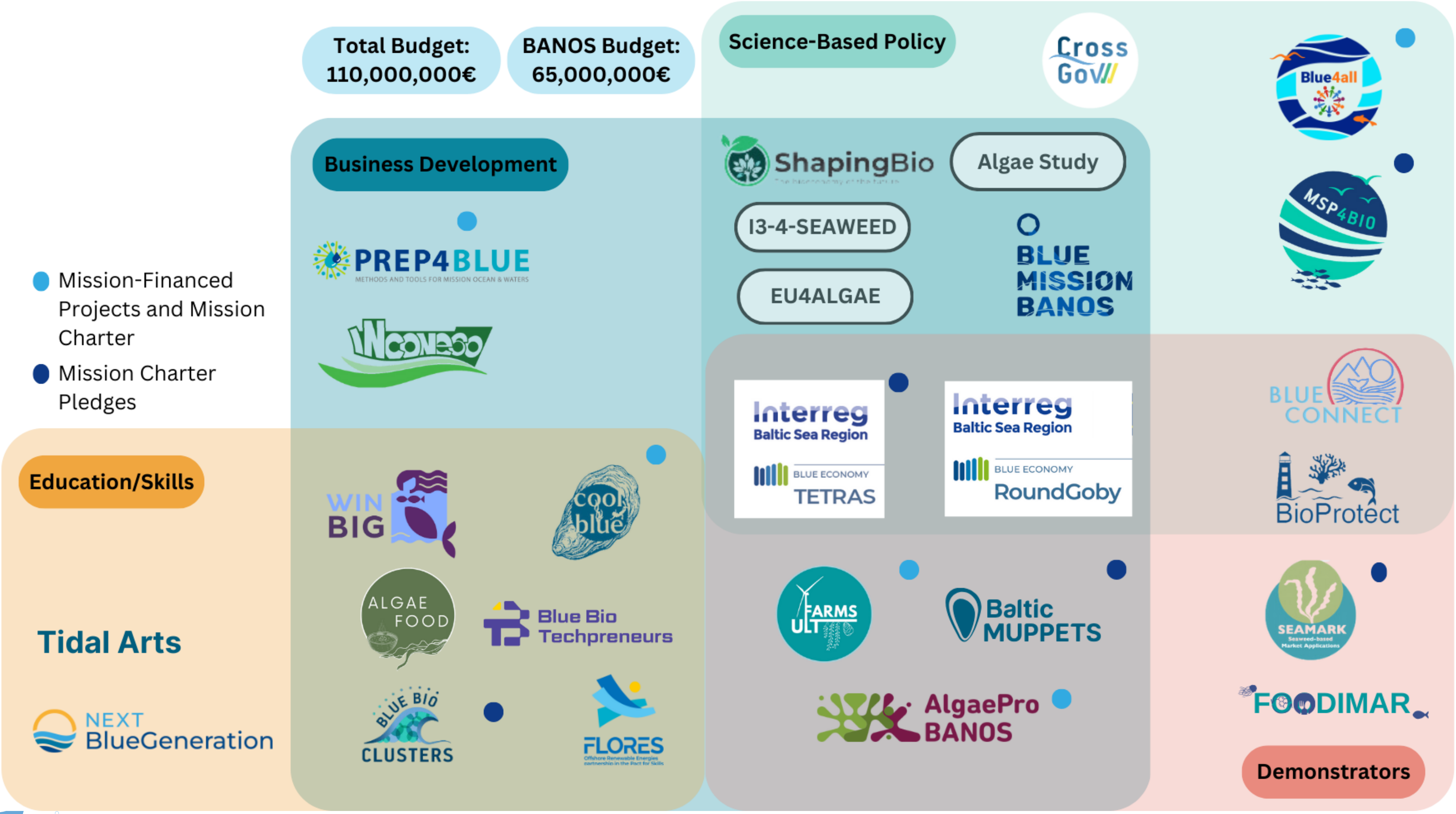
Marine Litter

Vision 2030

- Contribute to decrease of GHG emissions
- Ecosystem Restoration Increase Biodiversity
- A smart, resilient Baltic Sea Region- local, circular economy
- Improve human well-being
- Promote bio-based innovations

SUBMARINER NETWORK

Project Cloud 2024



Join all SUBMARINER Working Groups!

Sustainable Fisheries Working Group

16 members

Blue Bio Match

Aquaculture Working Group

72 members

Mussels Working Group

50 members

Algae Working Group

118 members

Women in the Blue Economy

Agenda

13:00 – 13.10	Opening of WG, Efthalia Arvaniti, SUBMARINER
13:10 – 13.40	Scaling-up EU cultivation of shellfish and algae *Philippe Bryère, ACRI-ST.*
13:40 – 13:55	Biodiversity data in seaweed farms *Sophie Koch, Sjokovin, Seamark*
13:55 – 14:10	Algae Knowledge Base and Algaeconomist Tool, Data Scarcity and Uncertainty in the Algae Domain *Tariq Yousef and Stefania Luzzi, SDU, AlgaeProBANOS*
14:10 – 14:25	The OMICS marine observatory of EMBRC: EMO BO" *Mery Pina, EMBRC*
14.25	AOB
14:50	Wrap-up and SUBMARINER updates

SUBMARINER NETWORK

BANTRY MARINE RESEARCH STATION

Experts
Jonne Kotta
Brecht Stechele

ACRI ST

ACTeon environment research & consultancy

Funded by the European Union

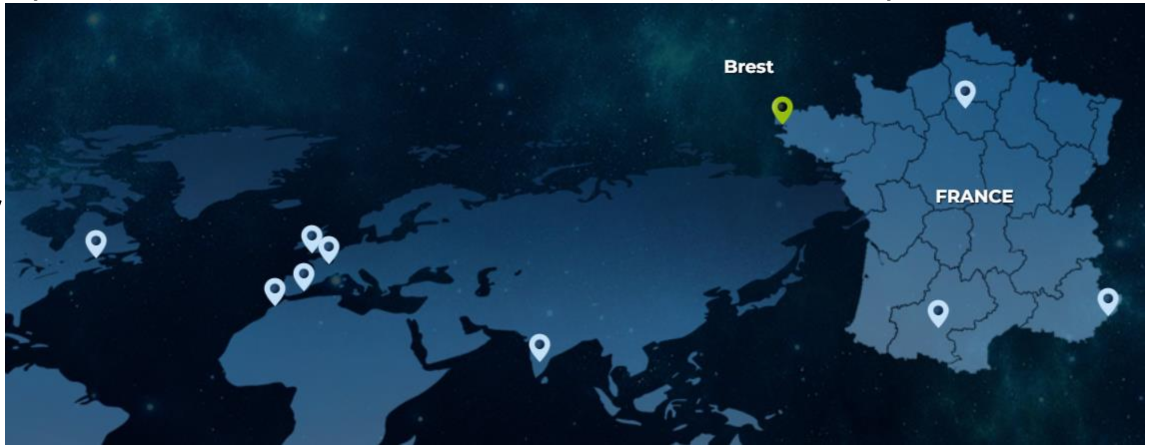
Blue Bio Match

Scaling-up EU cultivation of shellfish and algae

06 November 2024

Who are we

https://www.acri-st.fr/en/ Independent SME of 150 people (incl. branches and subsidiaries) of the Space sector.



- Strongly involved in oceanographical data analysis and production to support national and international directives (MFSD, WFD, OSPAR) as well as aquaculture and fishery support.

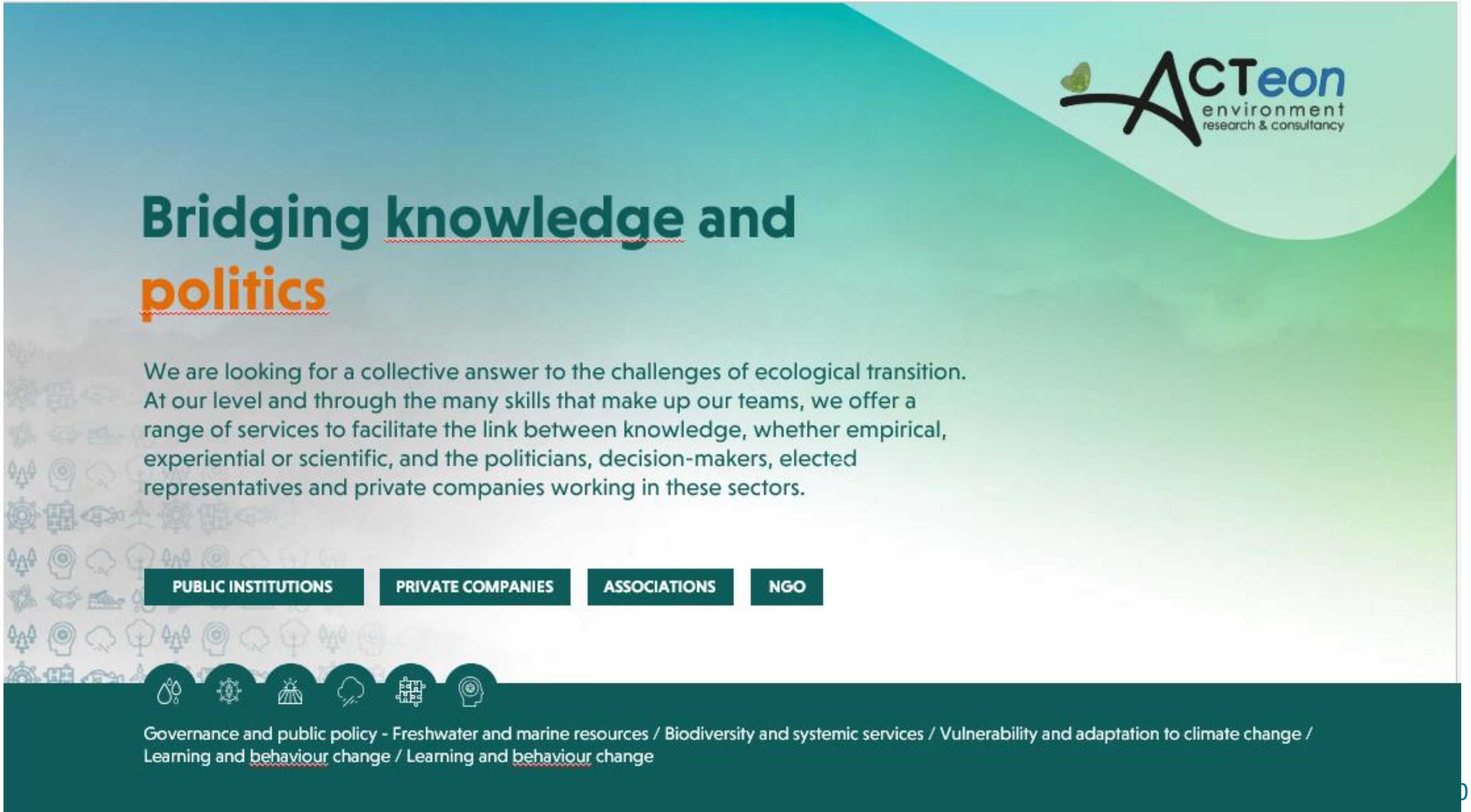
- Strong skill in operational software development.
- engineering and development of operational and prototypal data processors
- data quality check systems
- end-to-end and sensors' simulations, calibration & validation
- data processing, archiving and distribution.

- Works in Ocean Colour since its origin in 1990:
- both on the instrumental and algorithmic aspects
- data processing and QC
- and on thematic exploitation (e.g. aquaculture and fisheries)

ACRI-ST is certified conform to the Quality Management System Standard ISO9001:2015.

Who are we

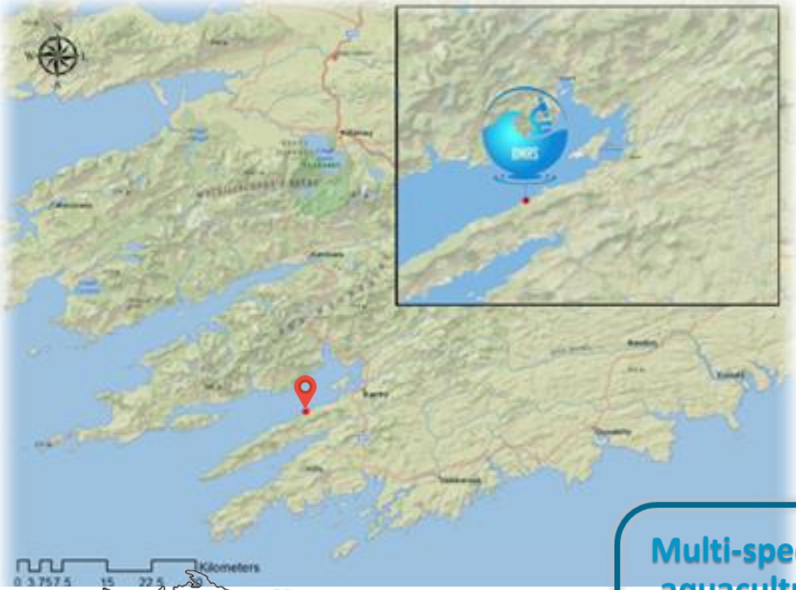
https://www.acteon-environment.eu/en/

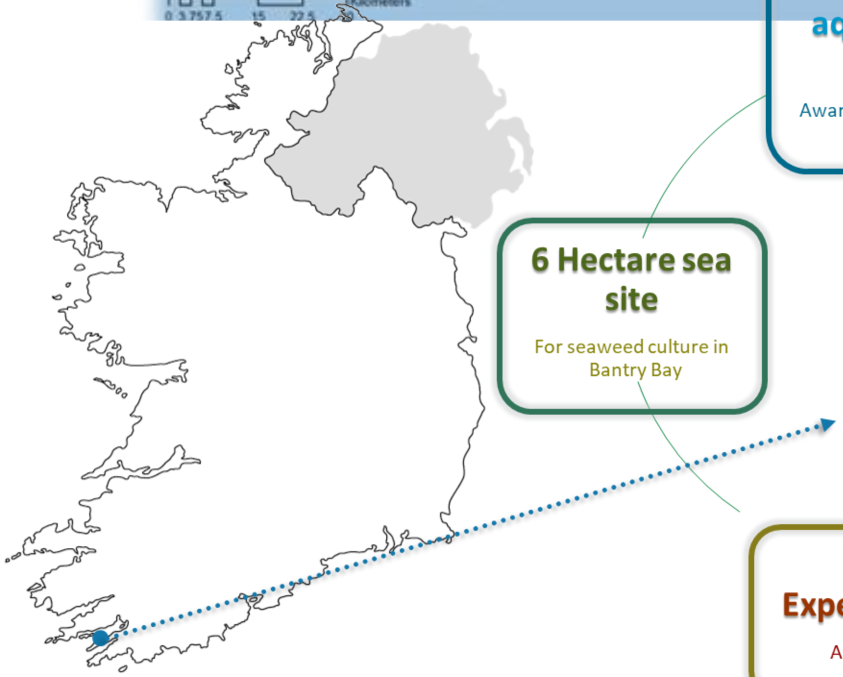


Who are we

BANTRY MARINE RESEARCH STATION

https://www.bmrs.ie/





Multi-species aquaculture licence
Awarded by the Dept of Agriculture

6 Hectare sea site
For seaweed culture in Bantry Bay

4.6 Hectare sea site
For sea urchin and oyster culture in Dunmanus Bay

Animal Experimentation
Awarded by HPRA

Algae, shellfish and nutrients – ACRI-ST/BMRS/Cofrepeche – 2022

This study conducted by ACRI-ST was commissioned by the European Commission (EC) to support the **European Green Deal**

The general objective was :

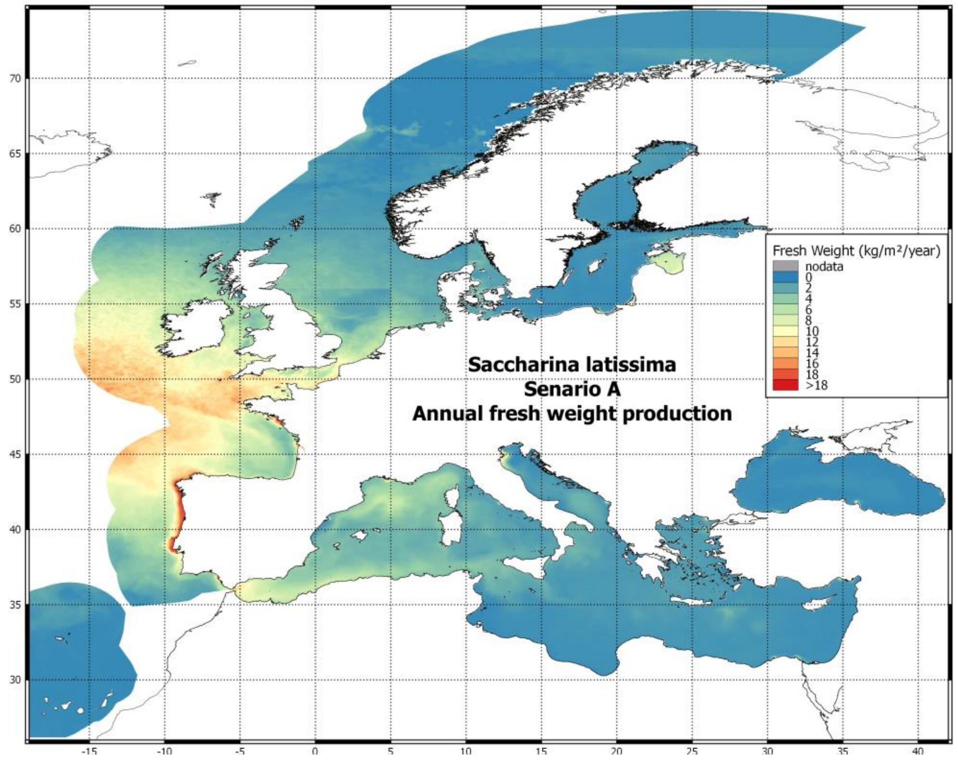
- to produce ***digital raster maps*** of the production potential of **shellfish and seaweed**.
- that ***help plan marine aspects*** of the **Green Deal**

3 seaweed species:

- Saccharina latissima
- Alaria
- Ulva

3 shellfish species:

- Blue mussel (M. Edulis)
- King scallop (Pecten Maximus)
- Pacific oyster (C. Gigas)



This production potential was estimated through numerical modelling on the basis of data from the Copernicus Marine Service (CMEMS).

Inputs

Outputs of reanalysis models

For seaweed:

- Nutrients (NO3 and NH4)
- Currents
- Temperature
- Phosphate (PO4)
- PAR -> OCEAN COLOR OB.DAAC | OBPG

For shellfish:

- Chlorophyll-a
- Currents
- Temperature

Seaweed growth numerical model →

Shellfish growth numerical model →

Outputs

Raster maps of production potential

Production results:

- Fresh weight
- Dry weight
- kcal equivalent
- protein equivalent

Different scales:

- per unit area
- per length of line
- per farm of a given size

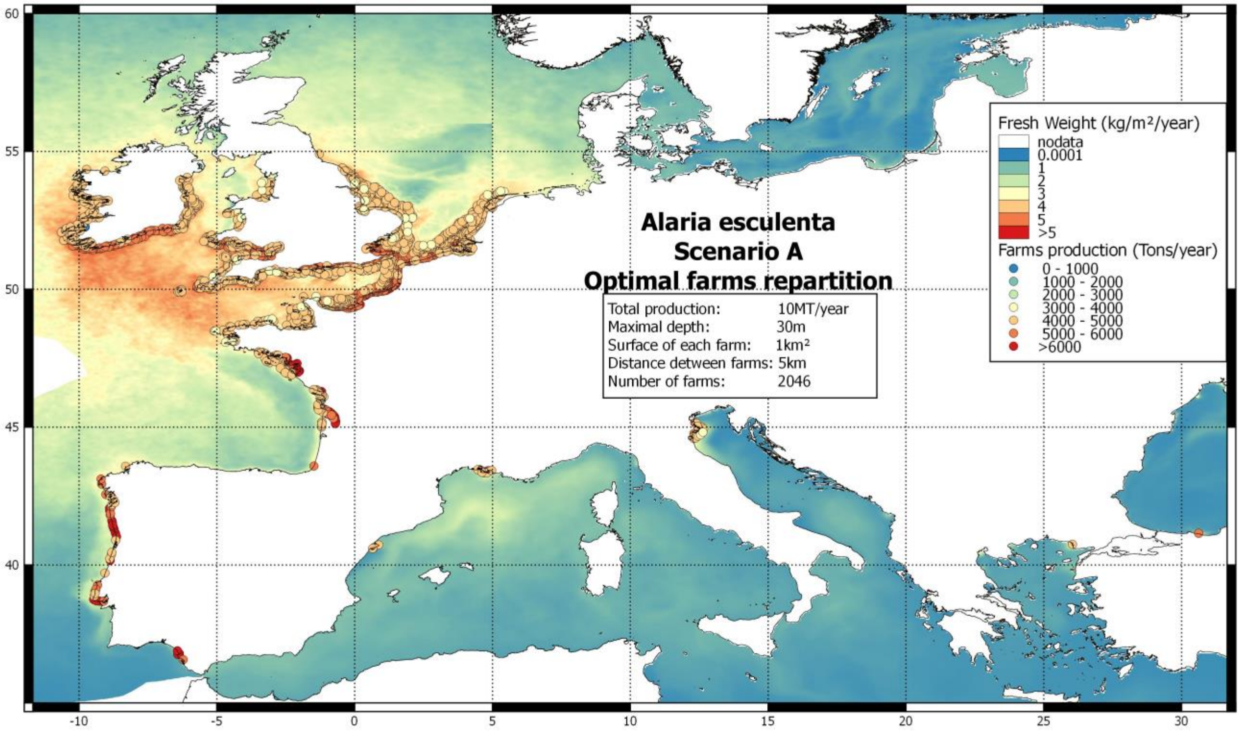
Environmental impacts:

- CO2 uptake
- Nutrient uptake

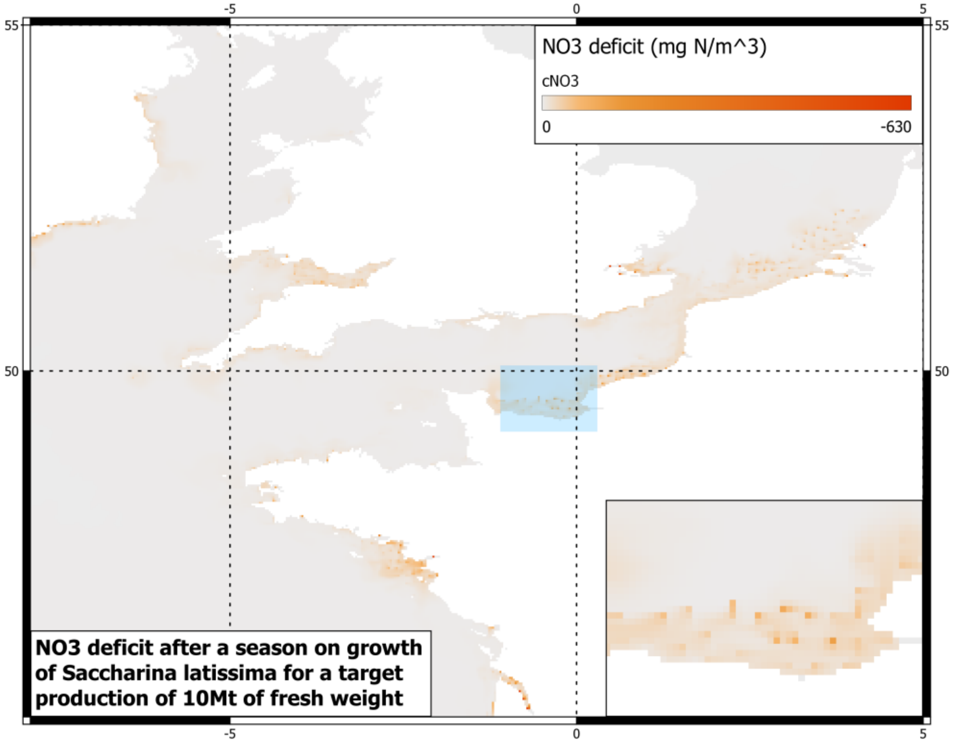
Algae, shellfish and nutrients – ACRI-ST/BMRS/Cofrepeche – 2022

Other results obtained with our models

Placement of farms for a target annual production



Spatial distribution of the impact of the farms on nutrients

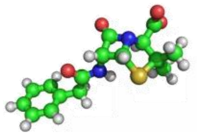


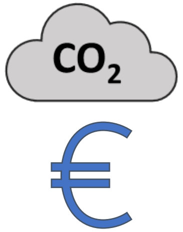
Algae and climate – – 2022

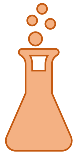
- **1. Context & Importance:**
- **Algae Farming for Climate Goals**:
  - Algae convert **CO_2 into biomass**, contributing to the reduction of **greenhouse gas emissions**.
  - **Underutilized production potential** at the European level.
  - Study aims to assess how expanding algae farming could help Europe achieve its **climate objectives**.
- **2. Study Details:**
- **Commissioned by**: Executive Agency for Small and Medium-sized Enterprises (**EASME**).
- **Conducted by**: ACTeon, in collaboration with **TNO**, **Aarhus University**, and the **University of Copenhagen**.
- **Methodology**: Analysis based on a comprehensive **literature review**.
  - Focus on **10 algae species** (5 microalgae, 5 macroalgae).
- **3. Key Outputs:**
- **Production Potential**: European **production projection maps**.

- **Environmental Impact**: **Carbon footprint analysis**.
- **Economic Value**: Added value of algae in **animal feed** and broader **economic impacts** of algae farming.

Summary of Algae and climate







Macro-/Microalgae	Species	Cultivation methods
Coastal	Saccharina latissima	Rope system
	Alaria esculenta	Rope system
	Palmaria palmata	Rope system, pond/tank/raceway pond
	Asparagopsis sp.	Rope system
	Ulva sp.	Rope system, ponds
Land-based	Spirulina	Ponds
	Chlorella sp.	Photobioreactor
	Haematococcus pluvialis	Photobioreactor
	Nannochloropsis sp.	Photobioreactor
	Asparagopsis sp.	Photobioreactor

Biomass and Nutritional Yields

- **Microalgae** production systems provide higher **nutritional yield** (crude protein per area) compared to **macroalgae**.

Greenhouse Gas Emissions

- **(Semi) Closed systems** have higher **CO2 fixation efficiency** (60%) vs. **open systems** (30%).
- The carbon footprint of algae is not fully comparable to soybean due to incomplete input consideration (e.g., fertilizer, irrigation).

Production Costs

- **Algae production costs** (micro and macro) are **significantly higher** than conventional feeds.
- **Cost data** is scarce, but algae is not yet competitive in terms of pricing.

Competitiveness of Algae Production

- **High production costs** and limited benefits, even with carbon credit sales, mean algae farms are **not currently profitable**.

Potential for Algae Production in Europe

- Maximum algae production could sequester **5-21% of Europe's CO2 emissions**, based on ideal conditions (ignoring water or land limitations).

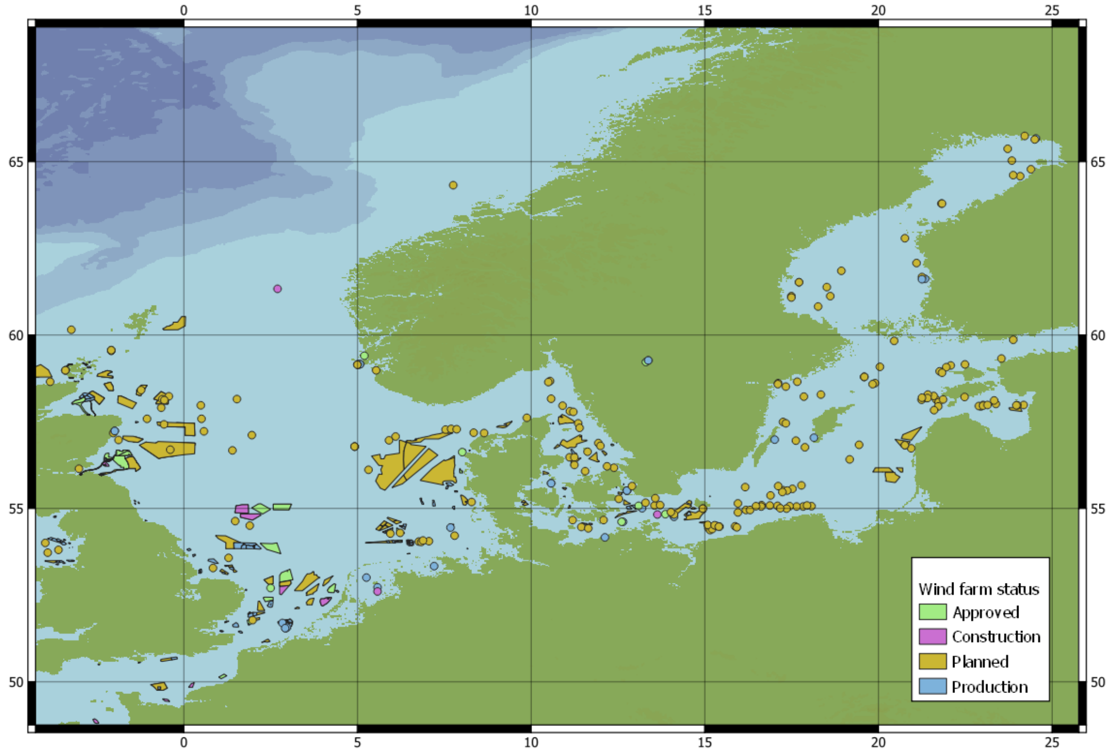
Algae for Animal Feed

- Algae is **non-competitive** as a feed source.
- High concentrations of minerals like **iodine, cadmium, and mercury** make it unsuitable for animal consumption.

Project continuation

Two new aspects:

- Focus on the **North Sea** and the **Baltic**, more specifically on current and future **offshore wind farm projects.**
- Introduction of **contaminants** in the growth models, to quantify the impact on **the viability for commercial use** of the production.



Wind farm data from EMODnet

Other improvements:

- New selection of species adapted to the area.
- Replacement or refinement of numerical models, particularly for the shellfish.

Scientific development of the models

Experts
Jonne Kotta
Brecht Stechele

Seaweed (macroalgae) model

- Mechanistic growth model based on nutrient uptake kinetics
- Found to be *fit for purpose* by expert review (WP1)
- Based on published model (Hadley et al., 2013)
- Published in the paper from forerunner study (Johnson et al., 2024)
- Parameter sets already implemented for *Ulva, Saccharina and Alaria*
- In this project we plan to extend model to *Fucus* and could implement a further additional species if required and if validation data are available
- Contaminant model to be added (simple uptake model given water column concentrations)

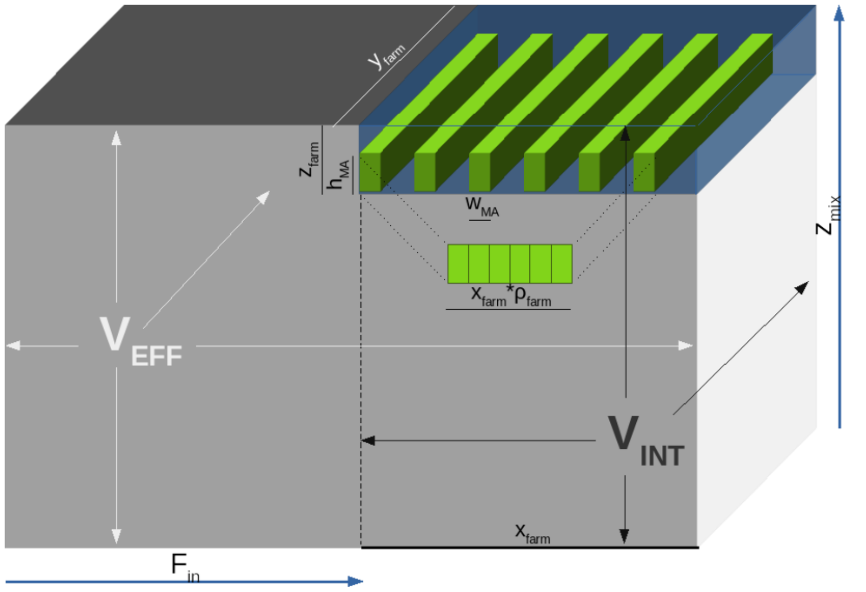


Figure 1: Schematic of macroalgal farm

Model schematic from Johnson et al., 2024

References:

Hadley S., Wild-Allen K., Johnson C., Macleod C. (2015). Modeling macroalgae growth and nutrient dynamics for integrated multi-trophic aquaculture. *J. Appl. Phycol.* 27, 901–916. https://doi.org/10.1007/s10811-014-0370-y

Johnson M, Jutard Q, Jaouen M, Maltsev N, Boyer M, Guillerme C, McElligott D, Paolacci S, Maguire J, Mangin A and Bryère P (2024) Potential nutrient, carbon and fisheries impacts of large-scale seaweed and shellfish aquaculture in Europe evaluated using operational oceanographic model outputs. *Front. Mar. Sci.* 11:1405303. https://doi.org/10.3389/fmars.2024.1405303

Scientific development of the models

Experts
Jonne Kotta
Brecht Stechele

Shellfish model

- ShellSIM model (Hawkins et al., 2013) implemented in forerunner study found to be *limited* by structural issues and stability
- Therefore, we will implement a new DEB (dynamic energy budget model)

- DEB = modelling framework applicable to all living structures
- Mass, energy, element balance
- 3k species, 1.2k publications (species level)
    - Niche research, growth, nutrient fluxes, carbon budget
    - Bioaccumulation
    - Effect of toxicants on species and populations

- Species selection:
    - 2 mussels: blue mussel, Mediterranean mussel
    - 2 oysters: pacific oyster, European flat oyster

References:

Hawkins A. J. S., Pascoe P. L., Parry H., Brinsley M., Black K. D., McGonigle C., et al. (2013). Shellsim: A generic model of growth and environmental effects validated across contrasting habitats in bivalve shellfish 32, 2, 237–253. https://doi.org10.2983/035.032.0201

Johnson M, Jutard Q, Jaouen M, Maltsev N, Boyer M, Guillerme C, McElligott D, Paolacci S, Maguire J, Mangin A and Bryère P (2024) Potential nutrient, carbon and fisheries impacts of large-scale seaweed and shellfish aquaculture in Europe evaluated using operational oceanographic model outputs. *Front. Mar. Sci.* 11:1405303. https://doi.org/10.3389/fmars.2024.1405303

References:

Kooijman, S. A. L. M. (2010). *Dynamic energy budget theory for metabolic organisation*. Cambridge university press.

Kotta, J., Stechele, B., Barboza, F. R., Kaasik, A., & Lavaud, R. (2023). Towards environmentally friendly finfish farming: A potential for mussel farms to compensate fish farm effluents. *Journal of Applied Ecology*, *60*(7), 1314-1326.

Vaher, A., Kotta, J., Stechele, B., Kaasik, A., Herkül, K., & Barboza, F. R. (2024). Modelling and mapping carbon capture potential of farmed blue mussels in the Baltic Sea region. *Science of the Total Environment*, *947*, 174613.

Scientific development of the models

Experts
Jonne Kotta
Brecht Stechele

Contaminants approach

- There is ***definitely not sufficient data*** to make interpolated gridded concentration fields to drive models.
- Assessment of available data is ongoing. ***It may be possible*** to derive predictive relationships with e.g. salinity, nitrate for some contaminants
- ***Fallback plan is*** to look at threshold environmental concentrations that would lead to non-compliant biomass concentrations for food/feed

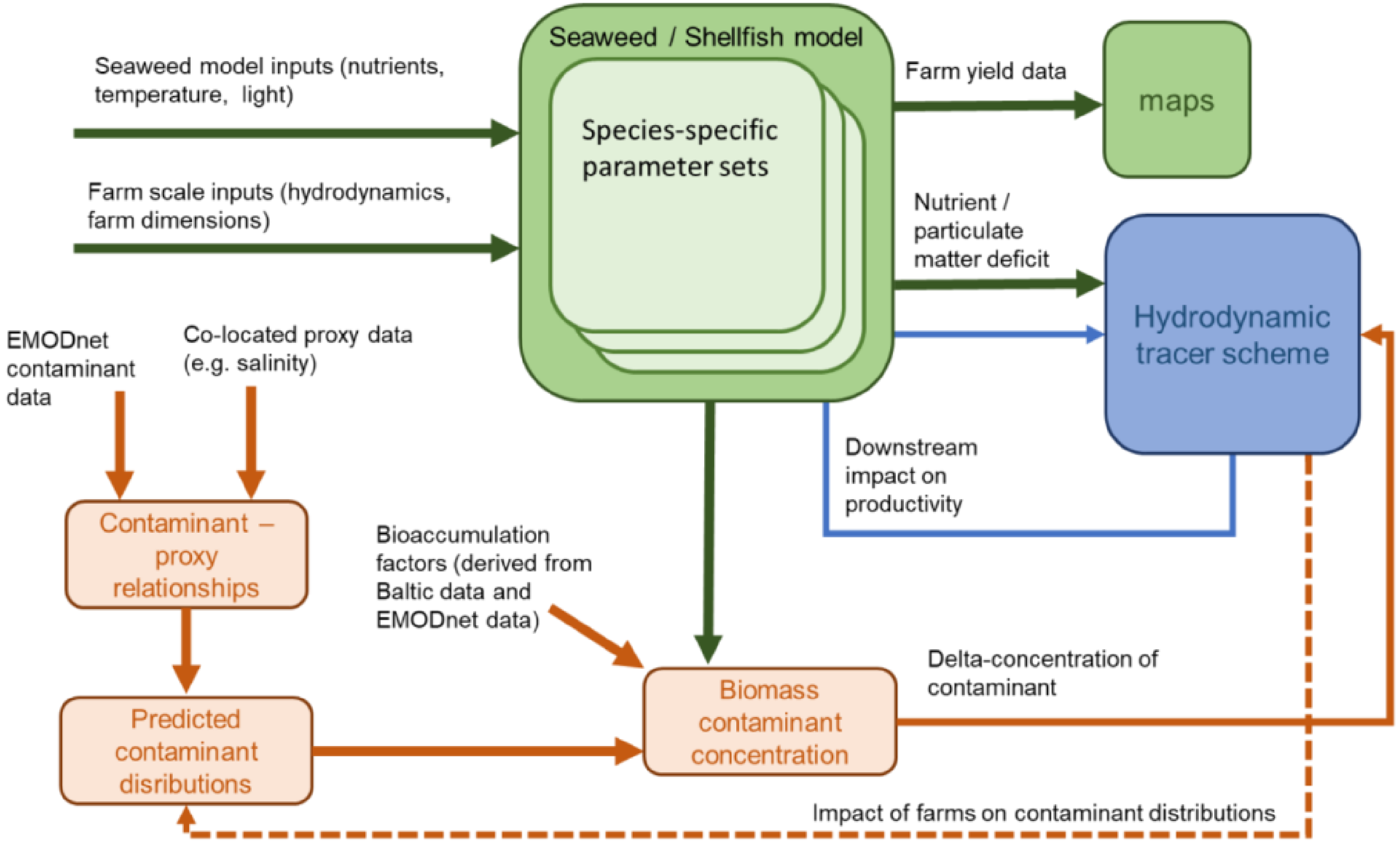


Figure 4 : OVERALL SCIENTIFIC MODELLING APPROACH

Selection of contaminants

Experts
Jonne Kotta
Brecht Stechele

Which contaminants could we consider?

- Heavy metals (Cd, Cu, Pb, Hg)
- Pesticides / herbicides
- Persistent organic pollutants
- Polyaromatic hydrocarbons
- Polychlorinated biphenyls
- Other organics
- ~~HAB toxins~~
- ~~Microplastics~~

In water column / sediment / biota…

Contaminant selection will depend on

- Data availability
- Importance (i.e. contaminants that are commonly over thresholds)
- Representativeness (contaminants which are likely to be representative of a wider group)
- Input from expert stakeholders

Discussion

Join our stakeholder panel, contact: philippe.bryere@acri-st.fr

Open questions:

- What relevant seaweed and shellfish species should we focus on ?
- Which contaminants are important to track for these species in this area ?
- Do you have/know of data on these species and contaminants in this area ?

SEAMARK
Seaweed-based
Market Applications

Biodiversity assessment around the Faroe Islands

SOPHIE KOCH - RESEARCHER AND DOCTORAL CANDIDATE (SJOKOVIN)
COLLABORATION WITH: WAGENINGEN UNIVERSITY AND RESEARCH, OCEAN RAINFOREST, FIRUM

Co-funded by the European Union

31.010.2024 BERLIN

Agenda / Outlook

- Biodiveristy in seaweed: importance to study it
- Our data collection within Seamark
  - Where we sampled: study site
  - What we sampled: set-up
  - How we sampled: Manual and eDNA
  - Research questions
  - Some results
- Reflections
- Data needs

PICTURES: SOPHIE KOCH (SJÓKOVIN)

Biodiversity in seaweed

- Habitat creation
- Shelter
- Food

For small invertebrates (jellyfish, shellfish, worms, sponges, shrimp, lobster, crabs, snails, etc), different species of fish, even mammals and birds.

Many claims have been made, but we‘re still lacking data to prove it!




PICTURES: JÓHANNA ALBERG (OCEAN RAINFOREST)

Co-funded by the European Union

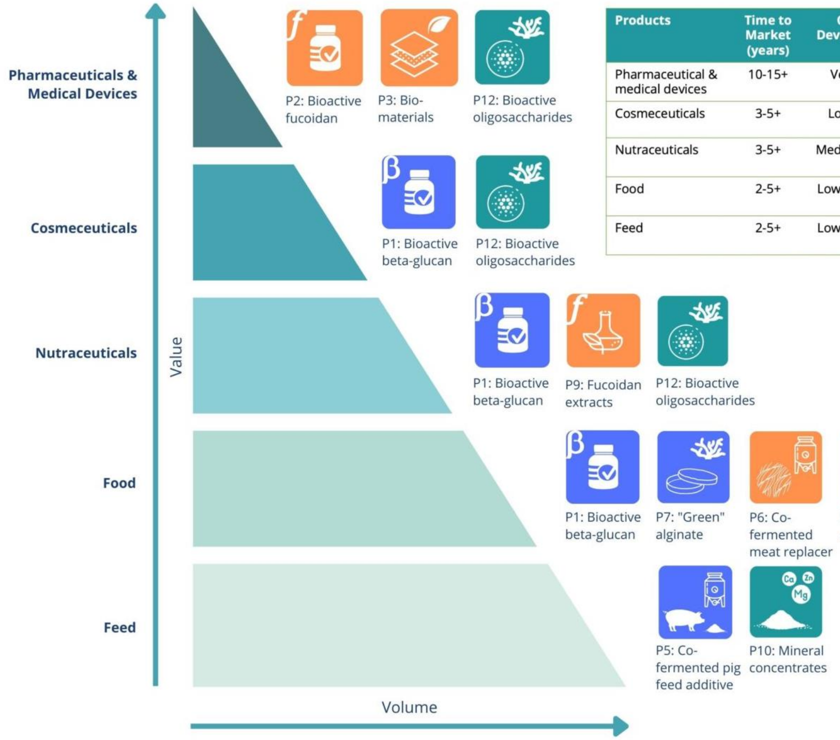
Data collection within SeaMark

Objective:

SeaMark will demonstrate how to scale up innovative seaweed cultivation and processing into **price-competitive product applications** making the entire supply chain attractive for commercial investments.

The SeaMark consortium comprises multi-disciplinary experts across **12 countries** including **12 industry partners** with expertise in multiple industry sectors. Together they will develop **12 innovative products** for market uptake.

www.seamark.eu



Products	Time to Market (years)	Cost of Development	Resource Availability	Need for Documentation	Potential Market Value	Skills & Competences
Pharmaceutical & medical devices	10-15+	Very High	Limited	Very High	Very High	Extensive medical & market
Cosmeceuticals	3-5+	Low - High	Fair	Medium	High	Toxicology effects
Nutraceuticals	3-5+	Medium - High	Fair	Medium - High	High	Nutrition & medicine
Food	2-5+	Low - Medium	Good	Medium - High	Medium - High	Nutrition & food science
Feed	2-5+	Low - Medium	Very Good	Medium - High	Medium - High	Nutrition & animal science

Flagship product
Innovation product
Research product

Co-funded by the European Union

Co-funded by the European Union

Data collection

- WP9 : Ecosystem services
  - Quantification of
    - Bioremediation (nutrient uptake)
    - Biodiveristy
    - Carbon sequestration
  - Valuation
    - Bioremediation (nutrient uptake)
    - Biodiveristy
    - Carbon sequestration

Data collection

- WP9 : Ecosystem services
  - Quantification of
    - Bioremediation (nutrient uptake)
    - Biodiveristy
    - Carbon sequestration
  - Valuation
    - Bioremediation (nutrient uptake)
    - Biodiveristy
    - Carbon sequestration

Where: the study site

Where: the study site

- North Atlantic
- Steady water temperatures (5-11 °C)
- Multiple harvests (up to 6 over 3 years)
- => Cultivation structure stays in the water
- Near-shore but exposed

Where: the study site

- North Atlantic
- Steady water temperatures (5-11 °C)
- Multiple harvests (up to 6 over 3 years)
- => Cultivation structure stays in the water
- Near-shore but exposed
- 3-dimensional cultivation site

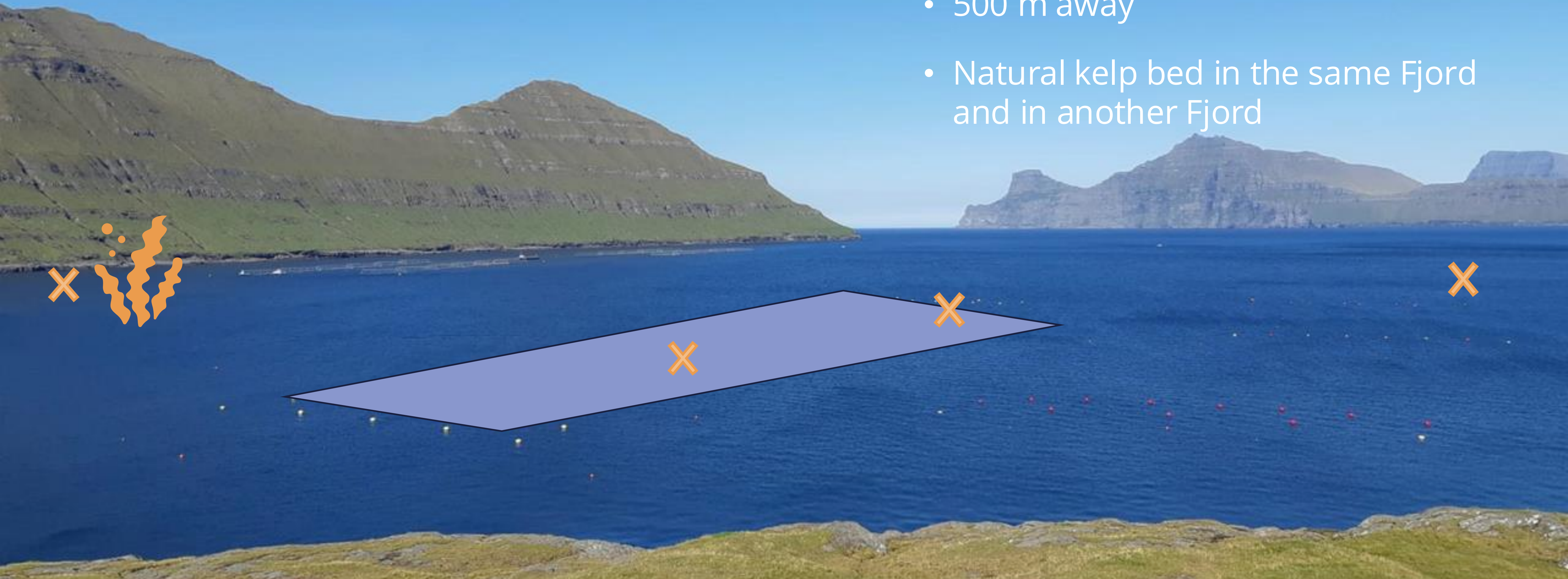
What:
Experimental set-up

- Two seasons (April – July)
- Exposed – semi-exposed
- Age of lines: first, second and third year lines
- Sampling depths: 4m and 7m
- Manual sampling for quantitative data
- eDNA for qualitative data inside and outside of the cultivation unit
    - Validate (biomass samples)
    - complement (water samples)

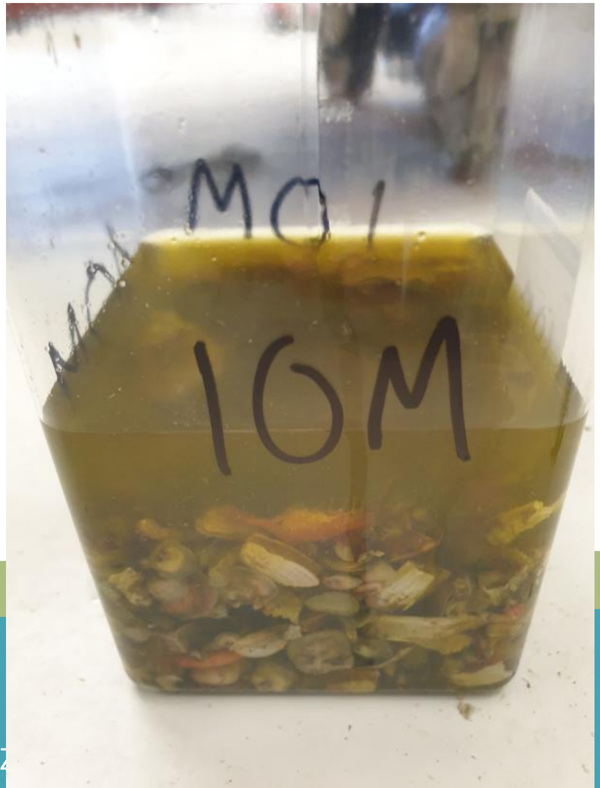
What:
Experimental set-up

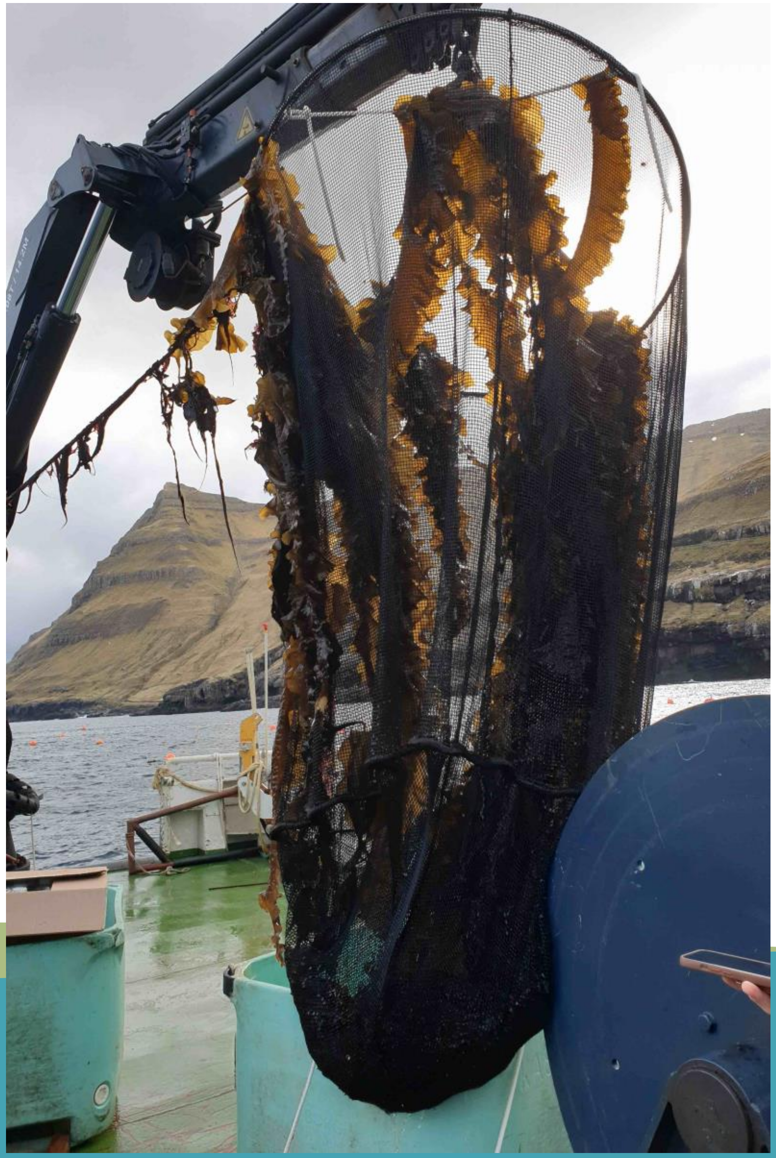
eDNA:

- in the middle of thecultivation unit,
- edge of the cultivation unit,
- 500 m away
- Natural kelp bed in the same Fjord and in another Fjord



How: Manual sampling

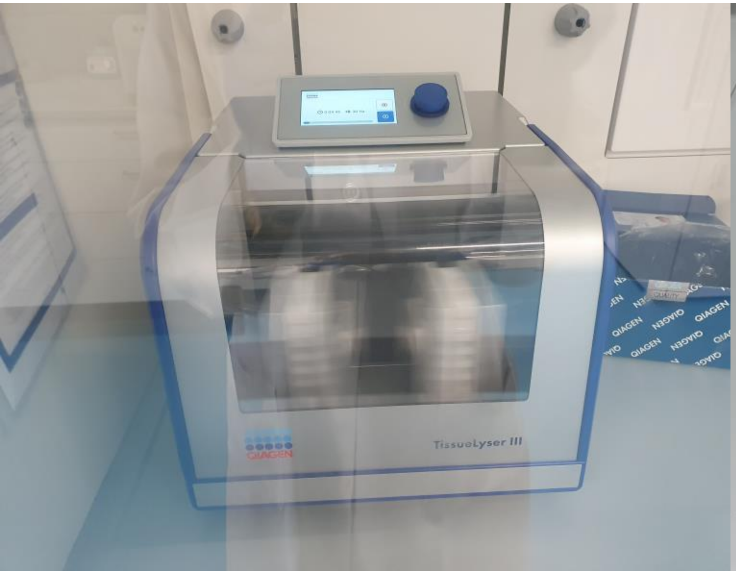


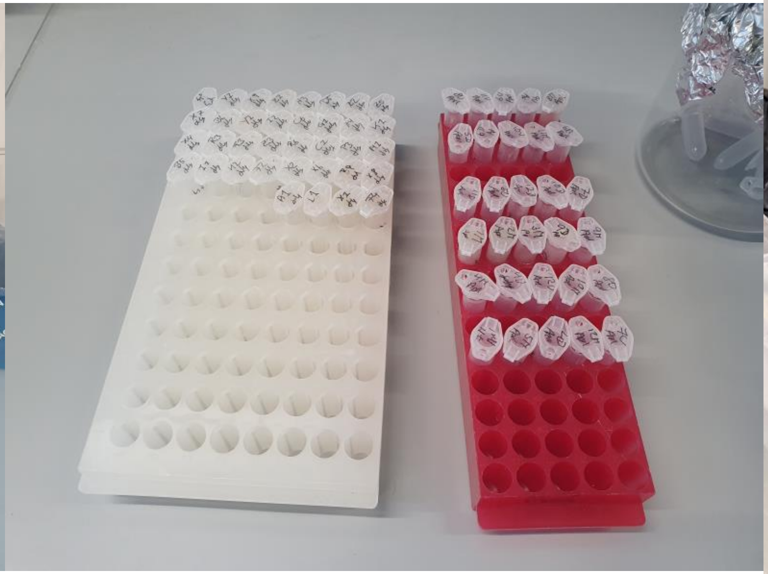


SEAMARK
Seaweed-based
Market Applications

How: eDNA

How: eDNA



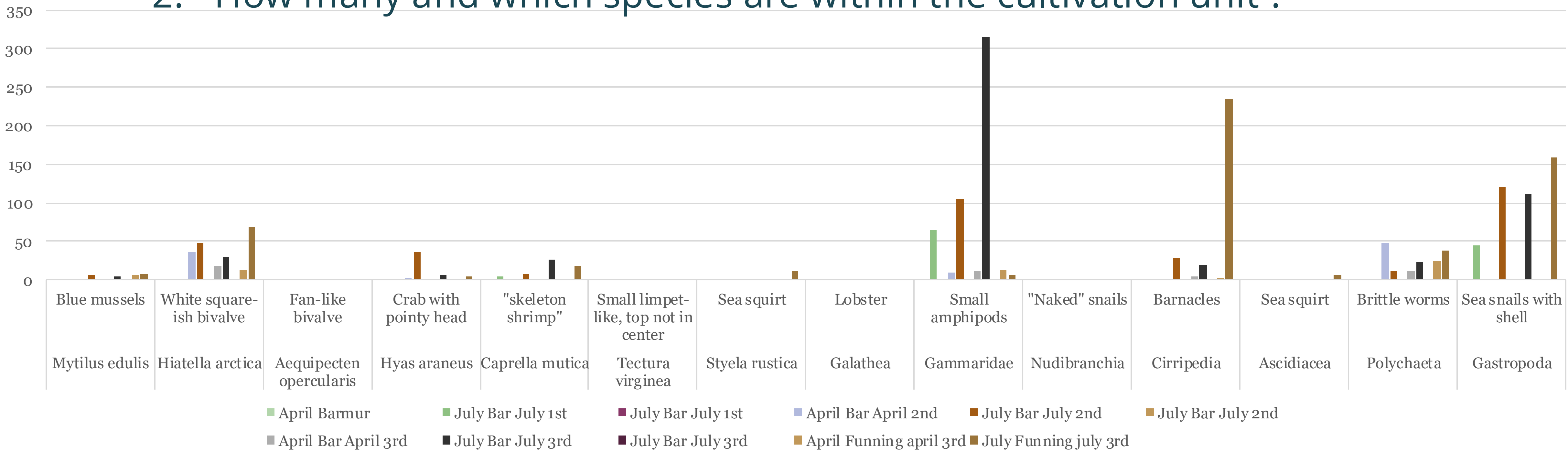



Research questions

1. What does the biodiversity in the cultivation unit look like?
2. How many and which species are within the cultivation unit (per kg of seaweed) ?

Research questions => Data

1. What does the biodiversity in the cultivation unit look like?
2. How many and which species are within the cultivation unit ?



Research questions

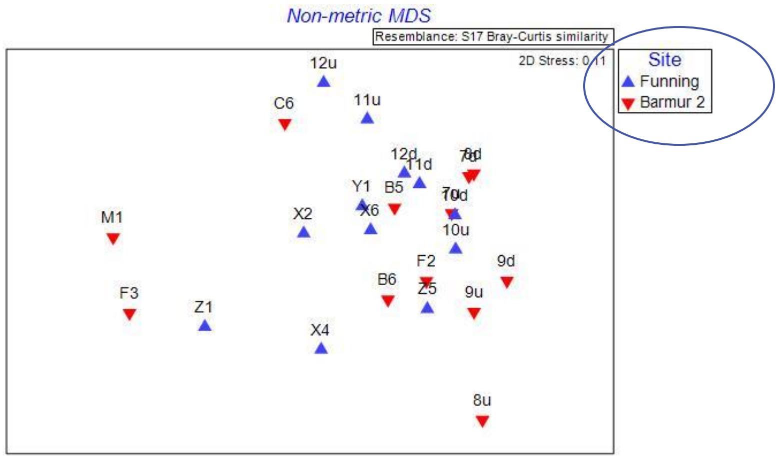
1. What does the biodiversity in the cultivation unit look like?
2. How many and which species are within the cultivation unit (per kg of seaweed) ?
3. How does it change considering => exposure, years or seasons

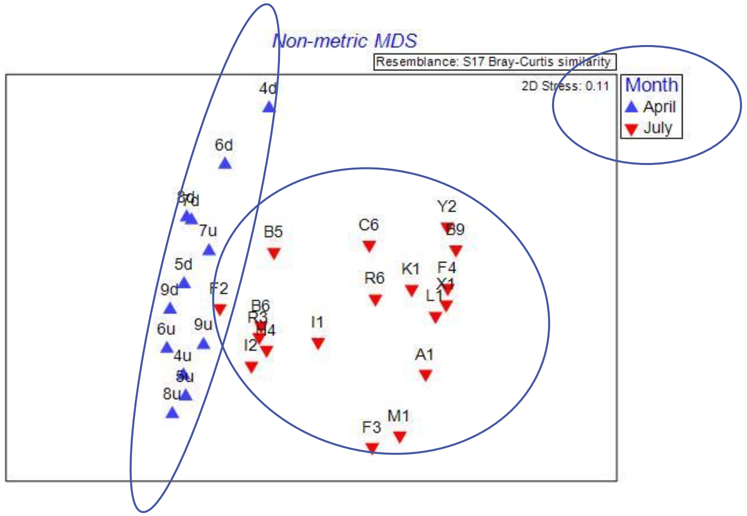
Research questions => Data

3. How does it change considering => exposure, years or seasons

Using the software Primer 7 : multivariant data analysis

Compared results from only 3rd year lines





https://www.primer-e.com/software

Research questions

1. What does the biodiversity in the cultivation unit look like?
2. How many and which species are within the cultivation unit (per kg of seaweed) ?
3. How does it change considering => exposure, years or seasons
4. How does it differ to outside the cultivation unit / natural kelp?

Research questions

1. What does the biodiversity in the cultivation unit look like?
2. How many and which species are within the cultivation unit (per kg of seaweed) ?
3. How does it change considering => exposure, years or seasons
4. **How does it differ to outside the cultivation unit / natural kelp?**

- Few samples of eDNA outside the farm
- eDNA data base is far from complete
- No quantitative data of animals not caught in the net (fish and mammals)

$\Rightarrow$ **Data needs!**

Reflections

- How to best quantify fish?
  - Other projects have tested different methods
- Is a seaweed cultivation additional habitat ?
  - Compare to same data from natural kelp
  - Immensly vast data to make a statement on additional habitat or attraction
- When does a cultivation practice might harm biodiversity?
  - Long term studies
- Biodiversity credits
  - Huge data collection necessary

Data needs

1. Research for standardized Biodiversity monitoring / assessments that are
   a. Feasible (time and money)
   b. Useful
2. Open data to be able to compare and test hypothesis

Thank you !

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Algaeconomist Tool and Data Scarcity and Uncertainty in the Algae Domain

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Joint Algae and Mussels Working Group - Data Availability and Uses – 6 November 2024 –online

TNO innovation for life

SDU University of Southern Denmark

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AlgaePro BANOS

New products – Tools – Guidelines – Acceleration & seed for startups

Aqua feed

Food

Cosmetics

Nutraceuticals

Biostimulants

Textile agents

To demonstrate market accessibility and presence for sustainable and innovative algae products and solutions in the Baltic and North Seas.

Co-funded by the European Union

Algae Economist - Goal

ECONOMIC SCREENING TOOL FOR VARIOUS ALGAE VALORIZATION AND PRODUCTS

- Screening tool for fast evaluation of algae evaluations options
- Available for industry, startups, researchers, investors
- Make your own combination of algae type, processing technologies and targeted products
- Give insights on:
  - Cost and revenues of the selected valorization route
  - Breakdown of CAPEX and OPEX of the process

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Algae Economist - Concept

ECONOMIC SCREENING TOOL FOR VARIOUS ALGAE VALORIZATION AND PRODUCTS

ALGAE SUPPLY AND CHARACTERISTICS

PROCESSING TECHNOLOGIES

APPLICATIONS

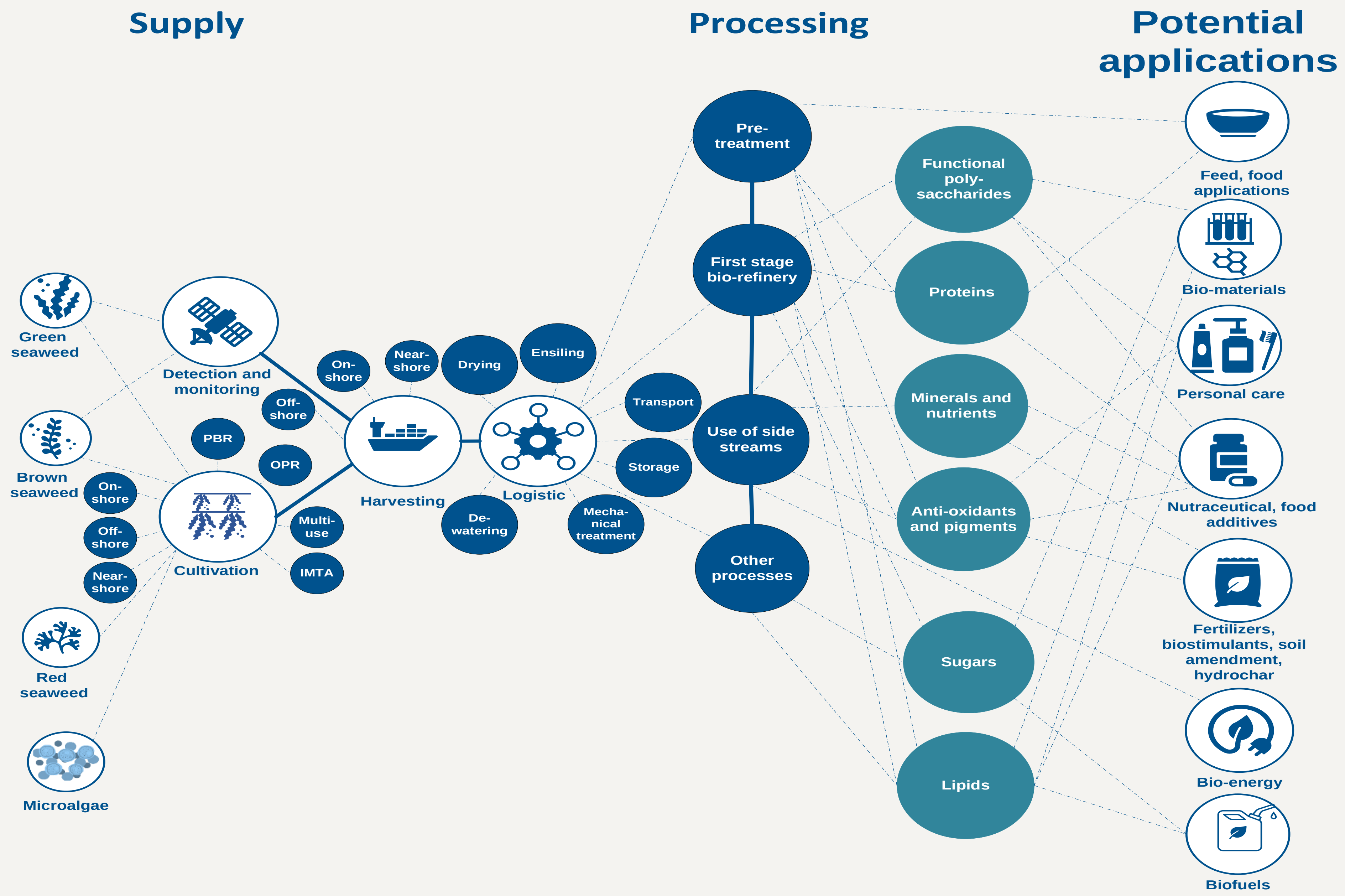
ALGAE ECONOMIST

EXAMPLES OF DATA SOURCES:

Co-funded by the European Union

AlgaePro BANOS

Algae Valorization overview



MANY OPTIONS, MANY COMBINATIONS OF OPTIONS AND LIMITED INFO ON ECONOMIC PARAMETERS

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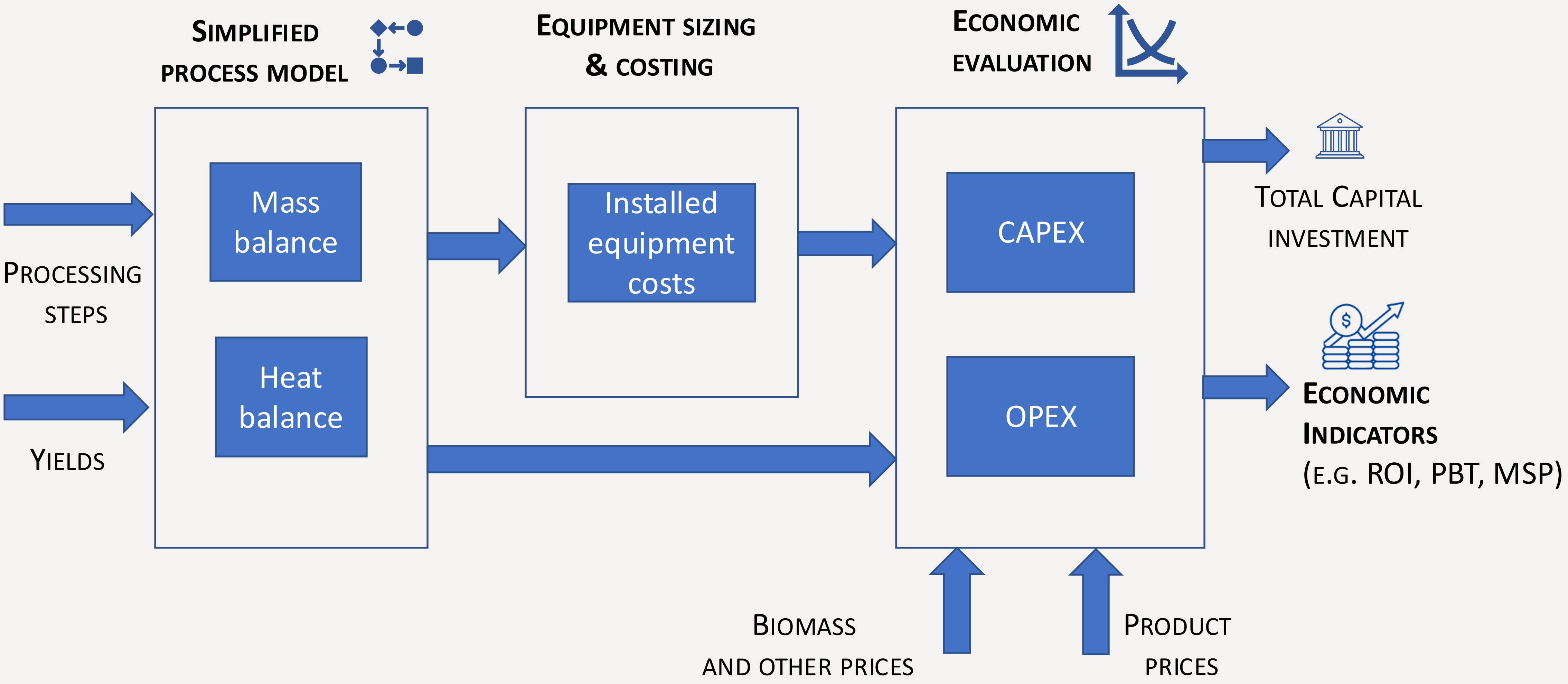
Algae Economist Engine



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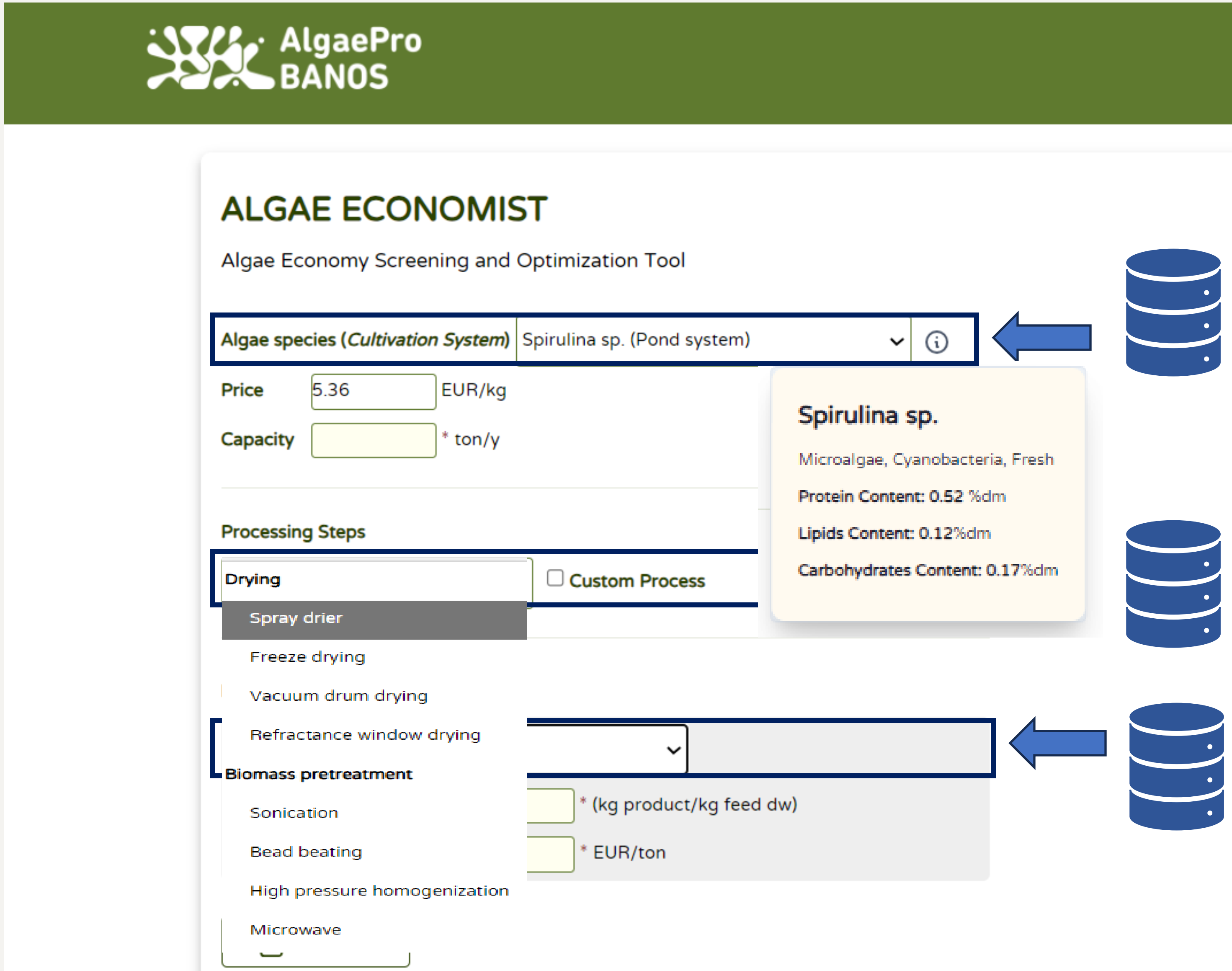
Algae Economist



ALGAE INFORMATION

PROCESSING STEP SPECIFICS: INSTALLED EQUIPMENT COSTS, OPEX

PRODUCT PRICES BASED ON THE TARGETED SECTOR

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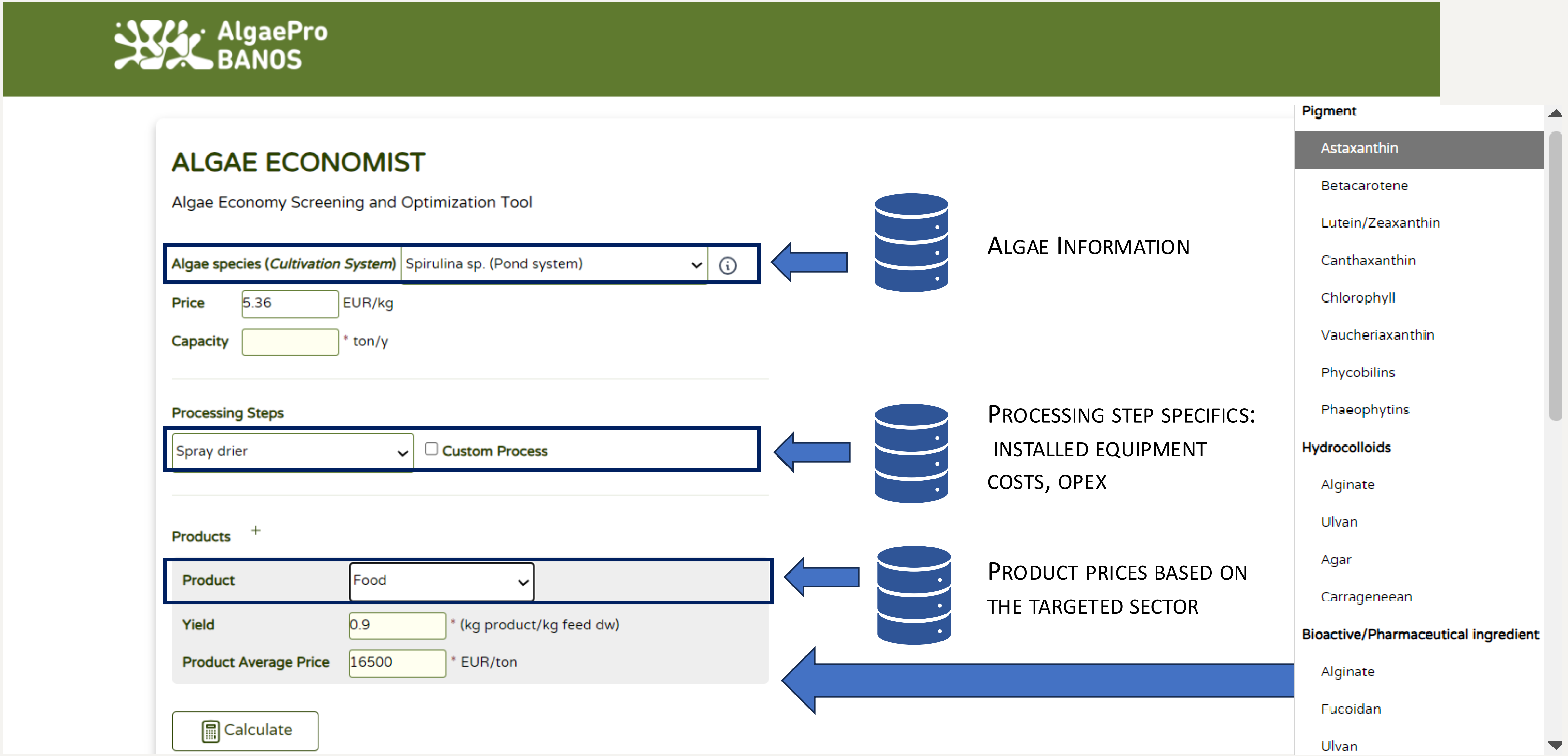
Algae Economist



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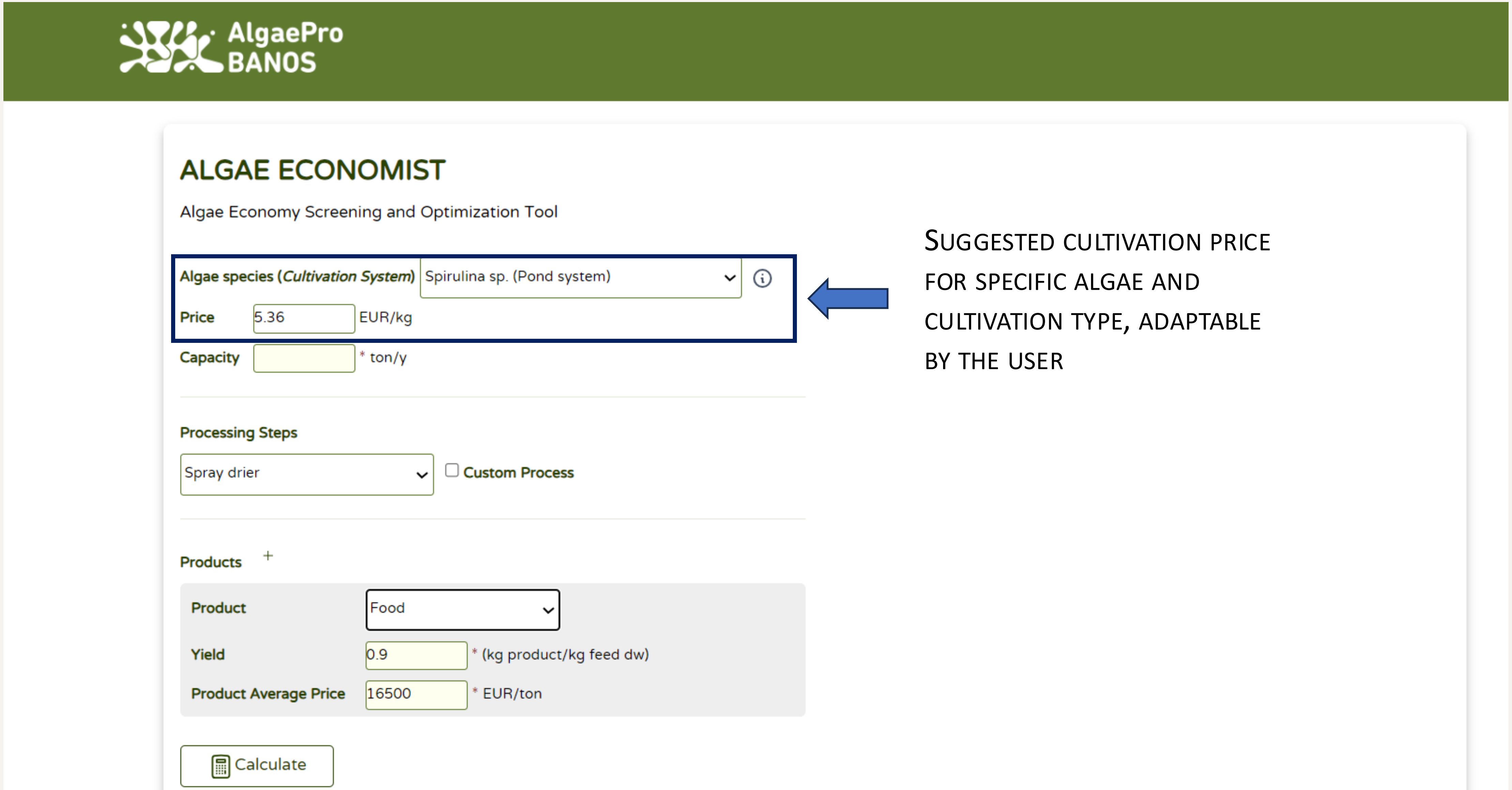
Algae Economist



SUGGESTED CULTIVATION PRICE FOR SPECIFIC ALGAE AND CULTIVATION TYPE, ADAPTABLE BY THE USER

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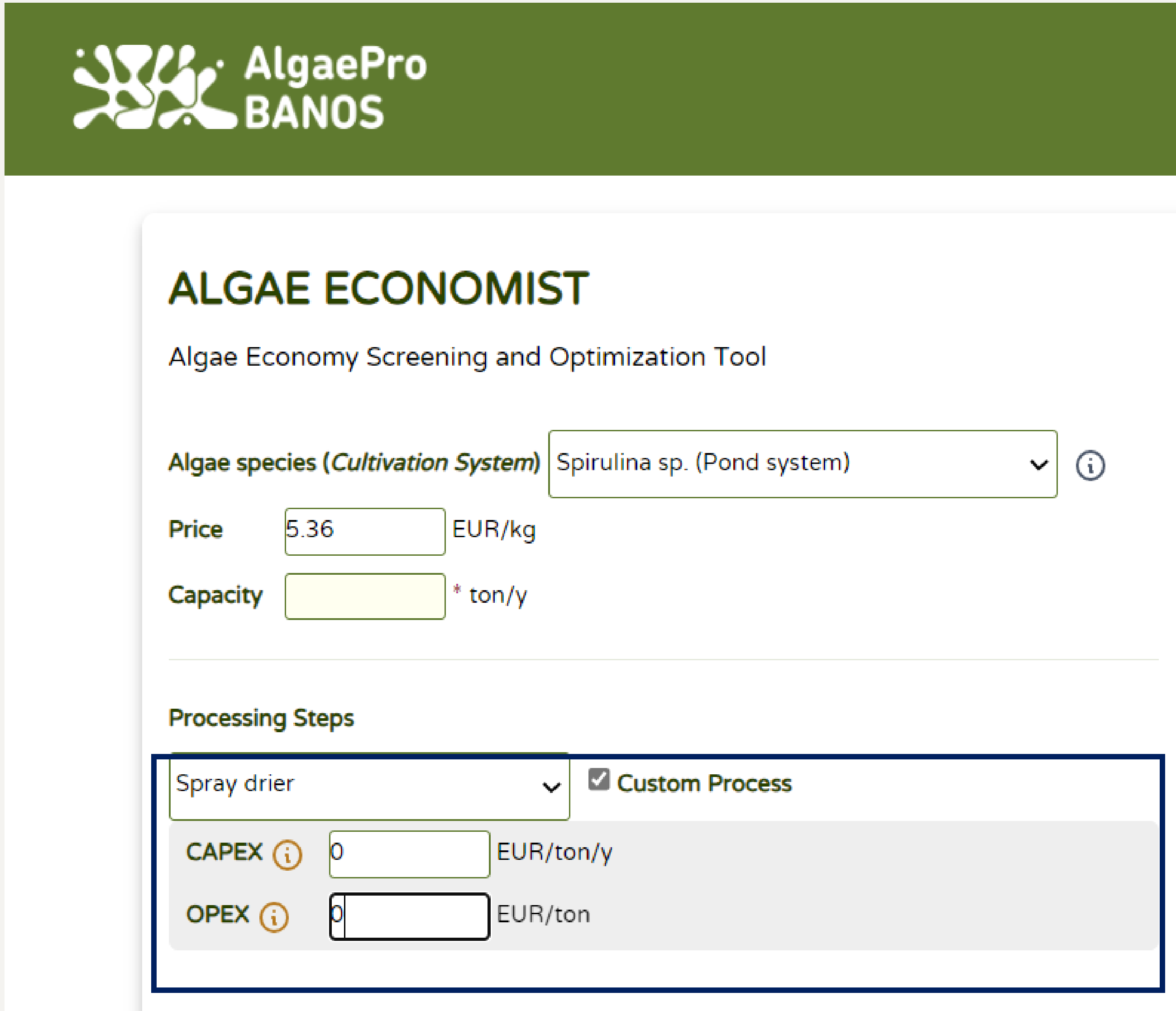
Algae Economist



Possibility of adding a customer process specifying CAPEX and OPEX rather than the suggested one

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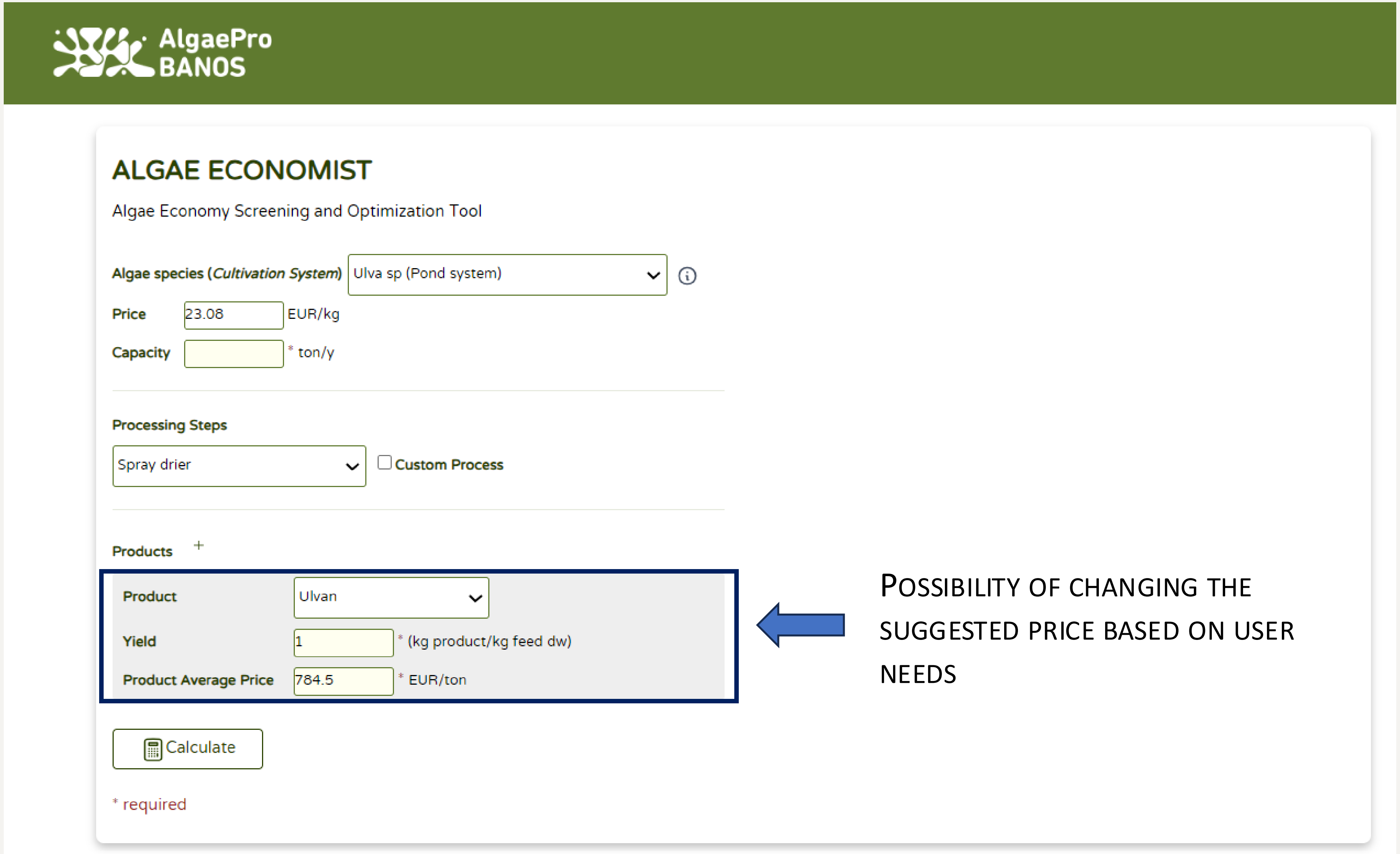
Algae Economist



POSSIBILITY OF CHANGING THE SUGGESTED PRICE BASED ON USER NEEDS

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Results

ALGAE ECONOMIST

Algae Economy Screening and Optimization Tool

Algae species (*Cultivation System*) Sargassum sp. (wild harvesting)

Price 50 EUR/kg

Capacity 800 * ton/y

Processing Steps +

- Mechanical pressing — Custom Process
- Precipitation — Custom Process
- Lyofilization — Custom Process
- Hydrolysis — Custom Process
- Anaerobic digestion — Custom Process

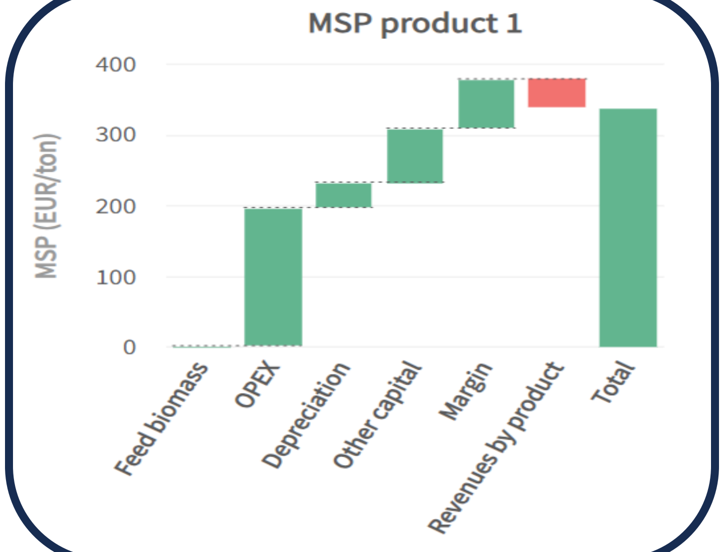
Products +

Product	Yield	Product Average Price
Fucoidan	31.5 * (kg product/kg feed dw)	500 * EUR/ton
Antioxidant extractive	0.02 * (kg product/kg feed dw)	30000 * EUR/ton
Alginate	0.035 * (kg product/kg feed dw)	5000 * EUR/ton
Solid/liquid residue	0.4 * (kg product/kg feed dw)	550 * EUR/ton

Calculate

* required

Total revenues-total costs	15.03 MEUR/y
Hrs/yr	8000 hours/year
Depreciation	20 years
Return on Investment (ROI)	37%
Payout Time (PT)	3 years
Minimum Selling Price (MSP)	338 EUR/ton



Economic Indicators

Waterfall diagram with main contributions

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Concluding remarks

- An economic screening tool to rapidly evaluate various valorization routes for microalgae and macroalgae is currently in development.
- This tool aims to play a crucial role in accelerating the growth of the blue bioeconomy collating many inputs in a single tool.
- As the project progresses, additional processing steps and updates will be incorporated to enhance the tool's functionality and ease of use.
- Feedback? Ideas? Feel free to contact me!

  stefania.luzzi@tno.nl
- More sources or ideas can be provided at: https://forms.office.com/e/mEJwRgU13V

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Thank you for your attention

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ACCELERATING INNOVATION IN MARINE BIOTECHNOLOGY

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Industrial Liaison Officer, EMBRC

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EMBRC
EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

What is EMBRC?

→ Research Infrastructure

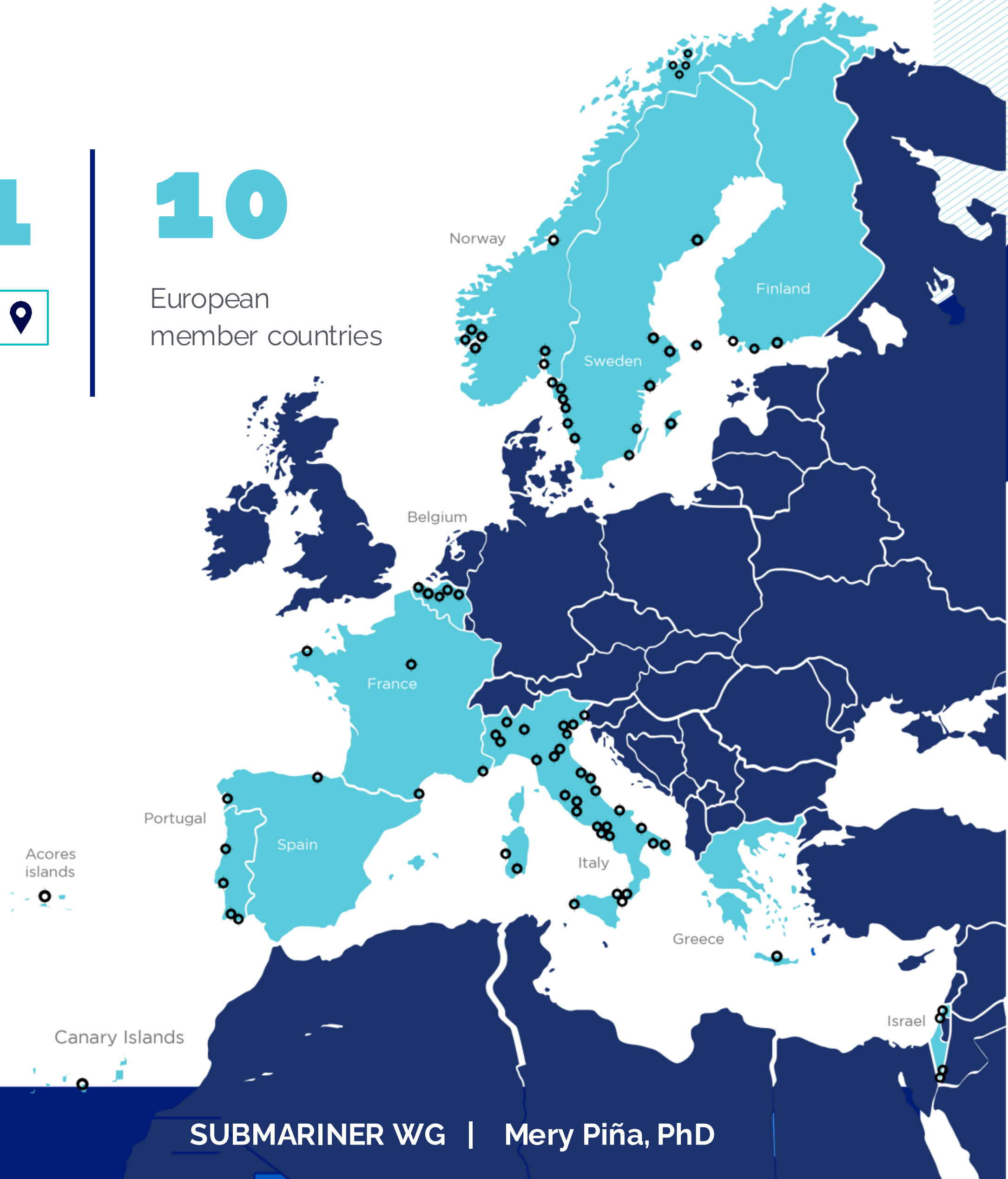
→ ERIC (legal status), LT organisation

→ Our GA is composed by the ministries of member countries

We advance the understanding of life in the oceans and sustainably harness its potential for the benefit of humankind

81
EMBRC marine sites

10
European member countries



EMO BON

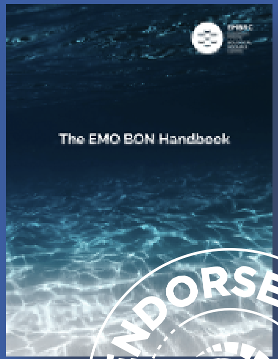
European Marine Omics Biodiversity Observation Network

Monitors biodiversity using eDNA techniques

Collects information on biodiversity health

Enhances global ocean observation and monitoring

- Water column metagenomics
- Soft and hard substrate metabarcoding
- >50 Physicochemical variables including chlorophyl, nitrate, phosphate, turbidity, etc.

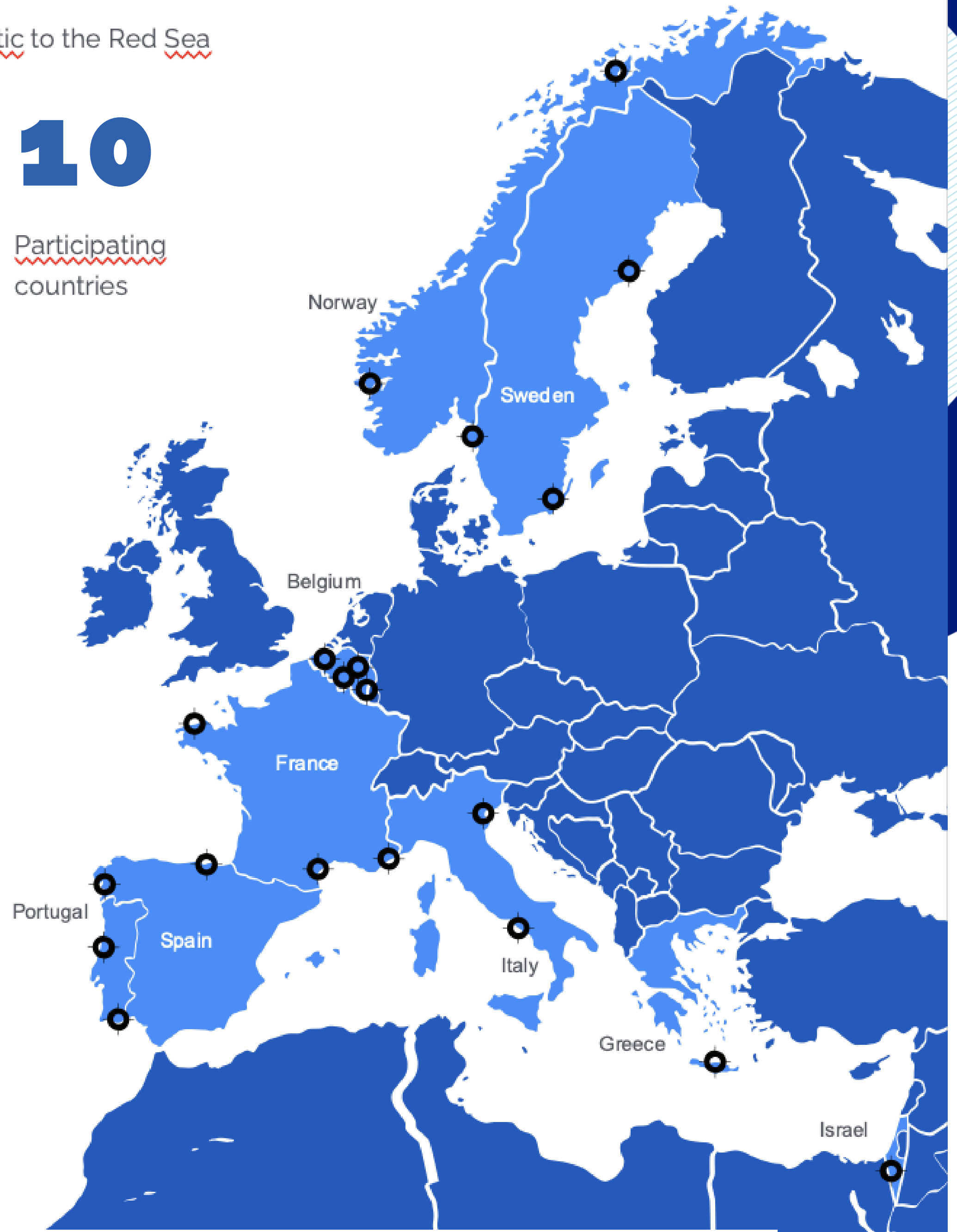


ENDORSED BY • THE UN DECADE •

Covering from the Arctic to the Red Sea

20 partner institutes

10 Participating countries



Why Create Multi-national biodiversity observation programme?

- Marine observation is very mature and well structured, except for biology
- Most biological observation programmes are project-based and short term
- Lack of rigour in implementing Standard Operating Procedures
- Still many questions around marine biodiversity: where, when, why?
- Need long-term time series to predict biodiversity response to climate change and anthropogenic pressures.

The Challenge

- Biodiversity has no borders!
- Resources are common and shared
- Harmonizing monitoring programmes between countries
- Improving comparability and interoperability
- FAIR (Findable, Accessible, Interoperable, Reproducible) data

EMO BON Objectives

- Create “best practice” observatory model
- Shared protocols linking established observatories
- Provide baseline genomic biodiversity data
- High data and metadata standards
- Follow all national and international regulations
- Coordinated management of data, ABS & national permits
- Protocols, DMP, and data openly available on EMBRC website, OBPS, Zenodo
- Framework for global collaboration in observing marine biodiversity

EMO BON – A Genomics Observatory Demonstrator

- Cover 3 different habitats: Water column, soft and hard substrates (ARMS)
- Mock communities for sequencing
- Centralised DNA Extraction & Sequencing
- High standard, quality controlled open data
- Standardised metadata: MiXS and Darwin Core
- Facilitate permits and ABS reporting
- Data will be released regularly as citable data papers

Centre National de Séquençage
GENOSCOPE

Protocols

Water Column

- Bimonthly sampling
- Microbial community
- 3-200 & 0.2-3 μm size fractions
- Metagenomics

Soft Substrates

- **Microbial community**
- Bimonthly sampling
- Metagenomics
- **Meio- & macro-benthos**
- 2-3 samplings a year
- COI & 18S metabarcoding

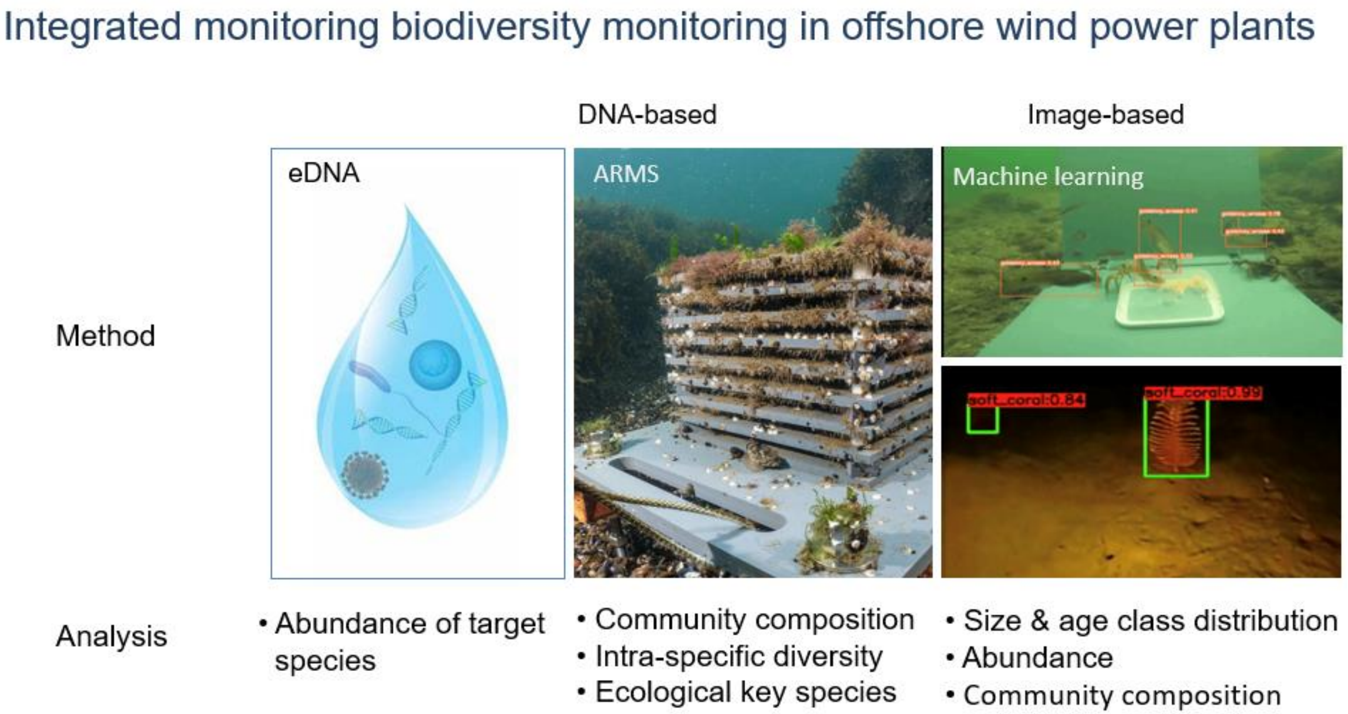
Hard Substrates

- Passive sampling using Autonomous Reef Monitoring Structures (ARMS) units
- Long term (12-month deployment)
- Sessile and motile organisms
- *COI* & *18S* metabarcoding

Available @ embrc.eu/services/emobon

EMO BON – Artificial Reef Monitoring System

- Data since 2018
- Data used for research AND environmental monitoring
- Open access data from 81 ARMS in 16 observatories in 12 countries



EMBRC projects related to EMOBON

MARCO-BOLO
STRENGTHENING BIODIVERSITY OBSERVATION IN SUPPORT OF DECISION MAKING

Building a framework for European coastal, marine, and freshwater biodiversity data streams and access, to align with global standards

- Enhance collection, coordination and delivery of marine, coastal and freshwater biodiversity observations for users.
- Develop cost-effective and accurate observation technologies.
- Test and advance new tools, technologies and models.
- Empower European biodiversity data producers and users with best practice guidelines for data-driven restoration.
- Engaged in biodiversity monitoring discussions (e.g. EuropaBON, Biodiversa+)
- Implementing GOOS and EV concept

EMBRC projects related to EMOBON

eDNAqua-Plan
NEXT GENERATION OF AQUATIC BIODIVERSITY MONITORING

- Standardization and Harmonization of data formats, metadata standards, and ontologies across different eDNA repositories, improving data integration and interoperability.
- Creation of a Digital Ecosystem of eDNA repositories and an integrated reference library for marine and freshwater species.
- Establishing a unified and standardized approach to eDNA research, ensuring a broad use of genomics data for conservation, policy, social, and cultural agenda
- International collaboration: International eDNA Standardization Task Force, National Biodiversity DNA Library – Australia, The eDNA Society of Japan

Access opportunities for aquaculture research

AQUAEXCEL3.0 and EMBRC: Joint call
Research supported: sustainable aquaculture and fisheries

Open call for Transnational Access
Apply here:
aquaexcel.eu/transnational-access

agroSERV: Integrated SERVices supporting a **sustainable AGROecological transition**

Research supported:
- marine compounds as pest control products, disease control or as feed / food
- environmental impact of aquaculture: new species and techniques (aquaponics)
- impact of climate change and land-water pollution on aquaculture

2nd call for Transnational Access
Apply here:
agroserv.eu/calls-and-applications/application-procedure

aquaSERV: Research Infrastructure Services For **Sustainable Aquaculture, Fisheries and The Blue Economy**
Research supported: sustainable aquaculture and fisheries

1st call for Transnational Access
Open on **Fall 2024**
aquaserv-ri.eu
COMING SOON

Thank you!

Mery Piña, PhD
Paris Headquarters

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Sorbonne University
Paris, 75005

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Find all our access opportunities at www.embrc.eu

AlgaePro BANOS

EU MISSIONS
RESTORE OUR OCEAN & WATERS

Applications are open

Accelerate Growth - Join the Algae Accelerator

The Algae Accelerator is a six-month mentorship program aimed at helping startups and SMEs in the algae sector refine and scale their business strategies. **Read more on our website and apply!**

algaeprobanos.eu @AlgaeProBANOS

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Baltic MUPPETS

Open call launched!

Open for submission 5th of November 2024 – 14th of January 2025, 17:00 CET.

Information webinar

28th of November 2024, 11:00-12:00 CET

Up to €50.000 for SMEs solving our challenges in the regions of

- Stockholm, Småland and islands and South Sweden
- Berlin and Schleswig-Holstein
- Denmark - Metropolitical area, Zealand, Southern Denmark, Mid Jutland, North Jutland
- Estonia
- Ireland

Questions?

opencalls@balticmuppets.eu

@Baltic MUPPETS

Balticmuppets.eu

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Save the Date

3rd MISSION ARENA
26-27 November 2024
Amsterdam

EVENTS

BLUE MISSION BANOS

Supporting the Mission Ocean Lighthouse in the Baltic and North Sea Basins

REGIONAL FOCUS ARENA 3

THE NETHERLANDS
BELGIUM
DENMARK I West
GERMANY I West
FRANCE I North

SUBMARINER NETWORK

Next SUBMARINER WG meeting

- 30th of January, 2025
- **Topic: Monitoring!**

Keep updated on BlueBioMatch!

SUBMARINER NETWORK

Thank you!

ea@submariner-network.eu

mmi@submariner-network.eu

Please register: https://bluebiomatch.hivebrite.com