Interreg ADRION ADRIATIC-IONIAN
European Regional Development Fund - Instrument for Pre-Accession II Fund
EUSAIR FACILITY POINT

EU Strategy for the Adriatic and Ionian Region
EUSAIR

Workshop: EUSAIR Pillar I: Innovation for Sustainable Blue Economy
MED MRS Week 2022 Slovenia

The BLUE BIO MED Project: promoting sustainability, diversification and competitiveness in the fisheries and aquaculture sectors with a transnational approach

23. September 2022

Riccardo Priore

BLUE BIO MED - MEDITERRANEAN INNOVATION ALLIANCE FOR SUSTAINABLE BLUE ECONOMY

BLUEBIOMED (September 2020- September 2022) is a strategic project co-financed by the Interreg Mediterranean Programme that supports the better governance of blue bioeconomy innovation policies from three points of view:

- **Orienting** the objectives of the innovation policy in the direction pointed by UN **Agenda 2030 Sustainable Development Goals (SDGs)**;

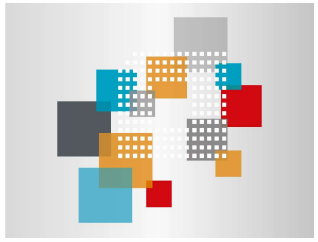
- **Ensuring coherent frameworks** for actions at different level of government and territorial scales, aligning different sectoral and thematic policies, ensuring that short term actions are supportive of long-term development goals;

- **Improving inclusiveness** and openness of the quadruple helix (QH) actors.

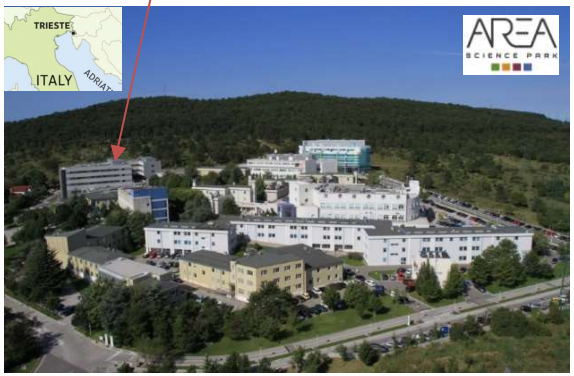
Coordinator

ART-ER
ATTRATTIVITÀ RICERCA TERRITORIO

THE CONTRIBUTION OF THE PATLIB NETWORK



Building C1, Campus Padriciano - TRIESTE



THE CONTRIBUTION OF THE NATIONAL INSTITUTE OF OCEANOGRAPHY AND APPLIED GEOPHYSICS OGS

THE CHALLENGE

According to the Food and Agriculture Organization of the United Nations (FAO), **global seafood consumption** has more than **doubled over the past 50 years**, driven by multiple factors including **population growth**, rising **incomes**, and major **transformations in fish production**.

Aquaculture, which already represents more than 50% of consumption globally, is **the fastest-growing food sector** and **may represent more than 63% of fish production by 2023.**

While the growth of the aquaculture industry will be vital to support future protein demand, intensification of **aquaculture poses challenges to the quality of its products and the environmental impact** of its production processes. Moreover, consumers demand **greater transparency of and visibility into the overall production** of products, which is an additional challenge given the historic reputation of aquaculture's potential environmental impacts.

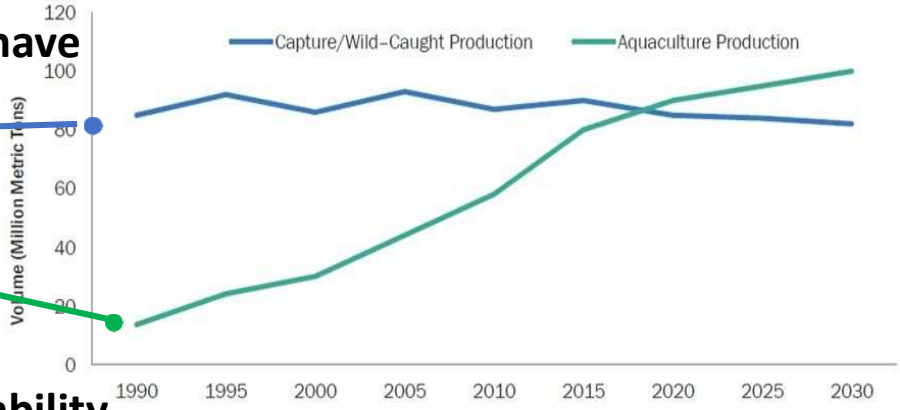
Increased attention to value chains from primary stakeholders, corporate bodies, and governments has important implications for improving the environmental and social outcomes from aquaculture practices associated with evolving standards.

TODAY AGENDA

- Overview of the main results from the Blue Bio Med analysis, focusing on the Fishery and Aquaculture sectors and technologies.
- Potential improvements, as suggested by an independent analysis regarding the Fishery and Aquaculture sectors.
- Examples of ICT patent applications driven implementations specific for the marine/submarine environment.

Fishery and aquaculture

Nevertheless fishery and aquaculture have very distinct patterns and issues: fisheries is worldwide declining in production, aquaculture is strongly increasing



For both there are issues related to **sustainability** but in quite different aspects:

-FISHERY: is suffering because of general **overcapacity and overfishing,** there is great need to control exploitations through strong management to avoid overexploitation. This implies to **not increase exploitation but increase sector EFFICIENCY** (e.g., reduction of costs), increase **SELECTIVITY** (e.g., less waste), improving technological activities after catch operations.

-AQUACULTURE: the trend is improving, but needs to **avoid ecological IMPACTS**, and this is pursued through **REPLACEMENT of FISH PROTEINS** in feed, **improved rearing technologies and rearing of low trophic level species**.

Technology and Market Forecast

Fishery and Aquaculture

- Pelagic and Demersal Large-Scale Fisheries (LSF) and Distant Water Fleet (DWF)
- Small Scale Fishery (SSF)
- Marine Finfish aquaculture (MFA)
- Shellfish aquaculture (SA)
- Seafood processing and trade

Blue biotechnologies

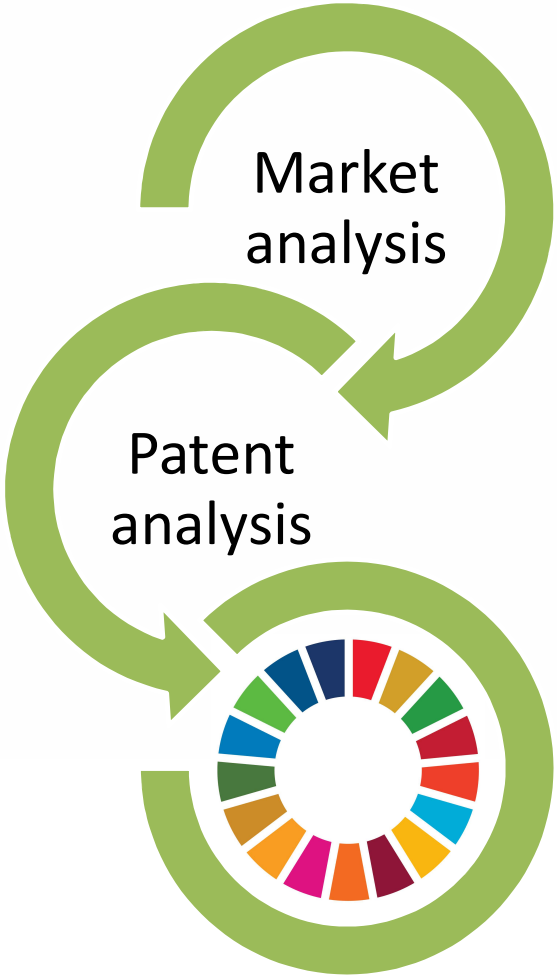
- Healthcare and Pharmaceutical applications
- Agriculture, Livestock, Food processing
- Industrial Processes and Manufacturing
- Biofuel
- Biomonitoring and Bioremediation

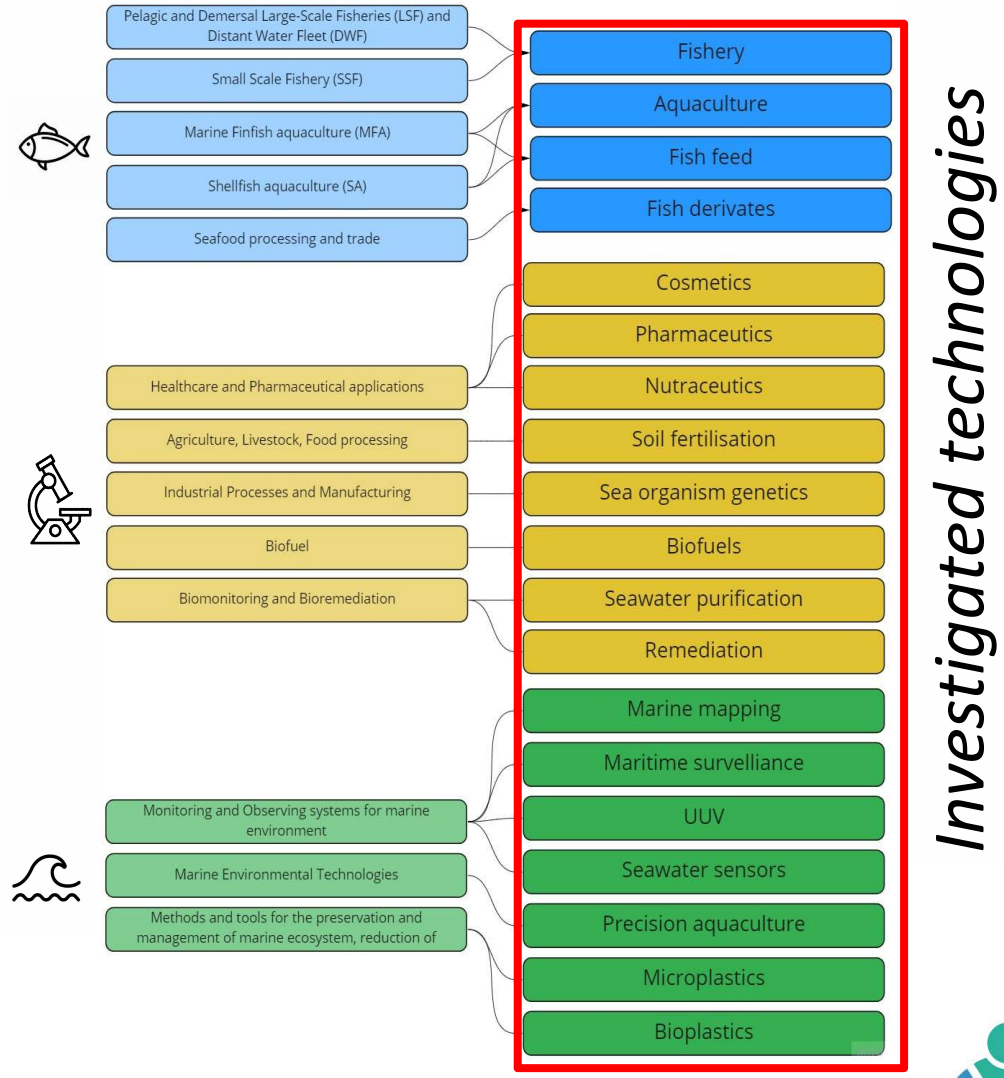
Blue sustainable development

- Monitoring and Observing systems for marine environment
- Marine Environmental Technologies
- Methods and tools for the preservation and management of marine ecosystem, reduction of anthropogenic pressure

miro

Investigated technologies





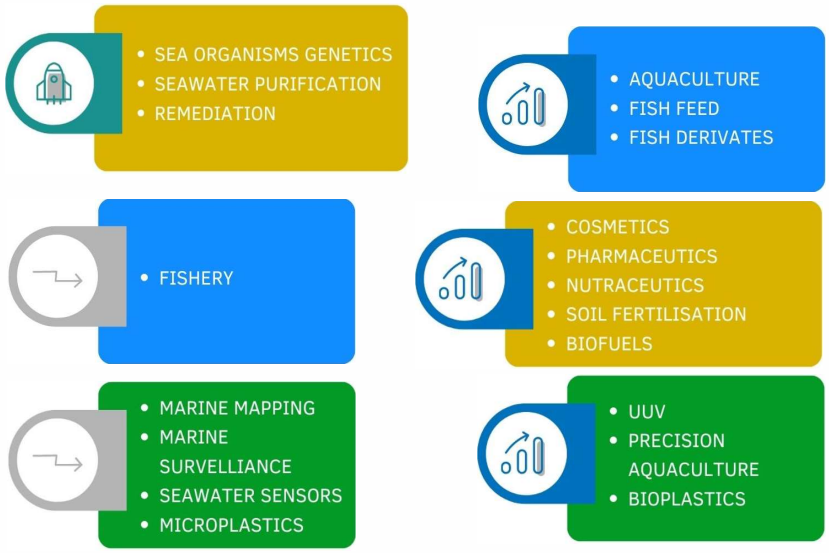
SUSTAINABLE DEVELOPMENT GOALS

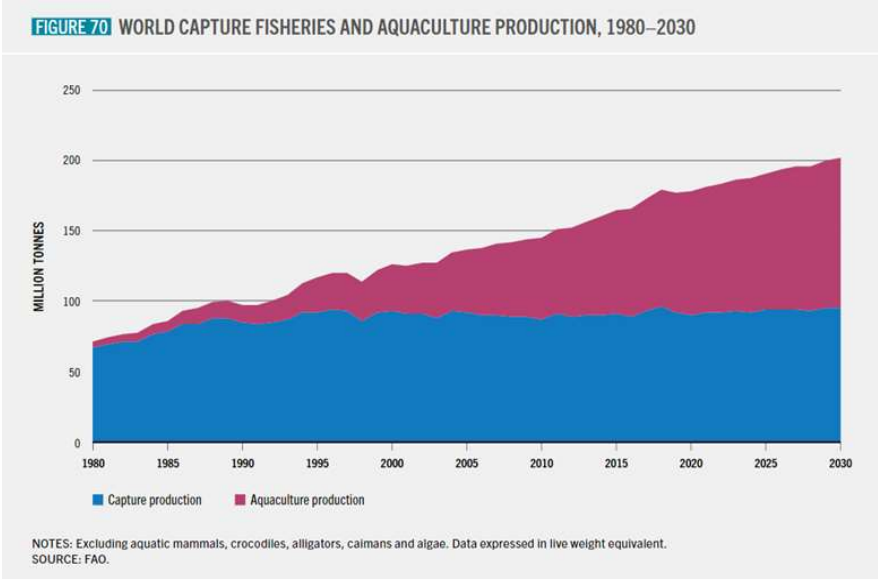
THE PATENT SEARCH CRITERIA

The selection of the patent documents has been performed using the database Orbit Intelligence (see also the report "*How to read this document* "and the chapter "References"). The queries are listed in the following table:

	Dataset	Orbit query (FamPat collection)	ND Patent families	Applications
Blue Biotechnology	Cosmetics	(+ALGA+ OR SEA_WEED+)/TI/AB/CLMS/ADB/ICLM/KEYW AND (A61K-036/02 OR A61K-036/03 OR A61K-036/04 OR A61K-036/05)/IPC/CPC (A61K-008 OR A61Q-019 OR A61P-017)/IPC/CPC ((SEA OR MARIN+ OR MARITIM+))/TI/AB/CLMS/ADB/ICLM/KEYW 2 AND 3 1 AND 4	833	2778
	Pharmaceutics	((DRUG+ OR ANTI_MICROB+ OR BIO_POLIM+ OR ENZYM+ OR MEDICAMENT+) 5D (SEA+ OR MARIN+ OR	191	433

Market analysis: overview



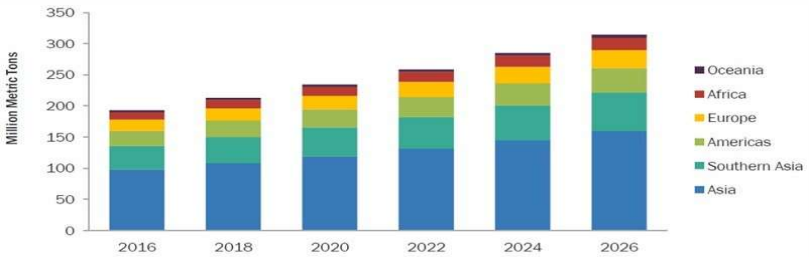


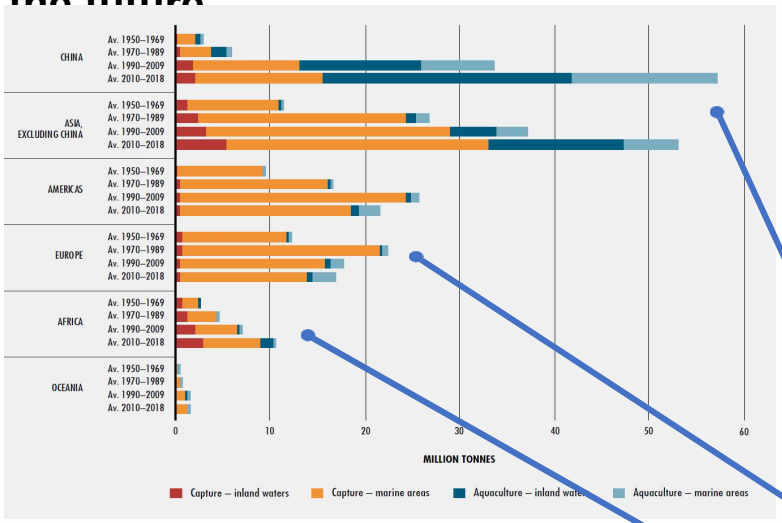
World capture fishery and aquaculture production, 1980-2030

FAO. 2022. The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome, FAO. https://doi.org/10.4060/cc0461en

Fishery and aquaculture

The consumption of marine products from fishery and aquaculture is growing in time and this positive trend is expected to grow in the future





Analysis of production by country vs consumption by country highlights:

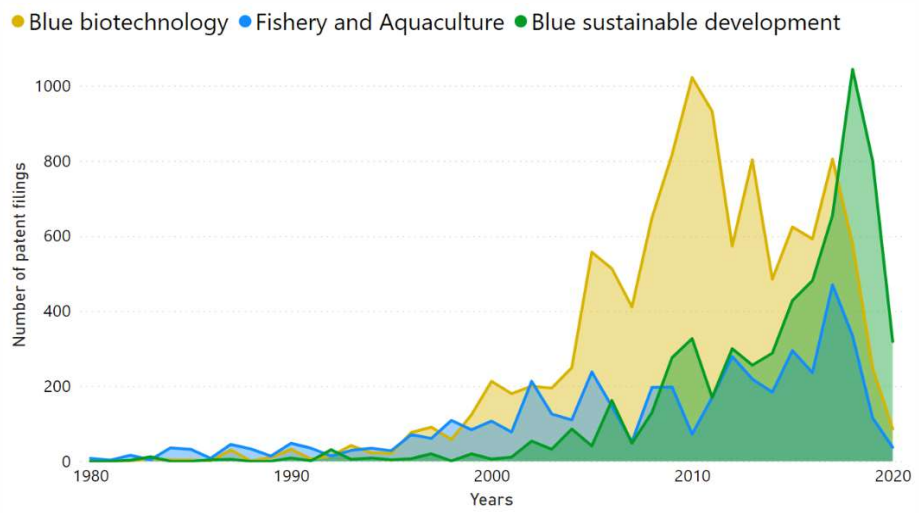
- Countries highly dependent on seafood;
- Countries increasing market demand;
- Main producers;

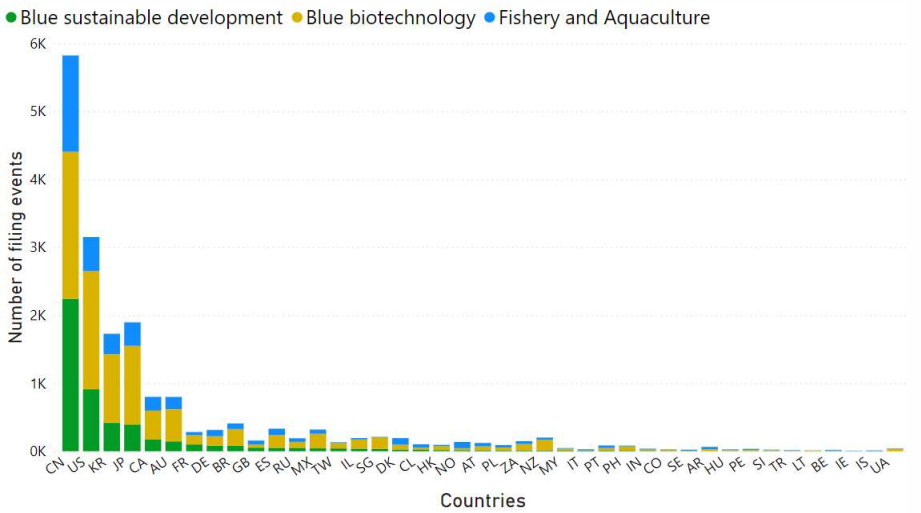
Insights:

- China and Asia are the main global producers esp. for aquaculture
- Europe is a net importer (especially of aquaculture products)
- Africa has large potential

Source: FAO, SOFIA, 2020

Patent analysis: overview



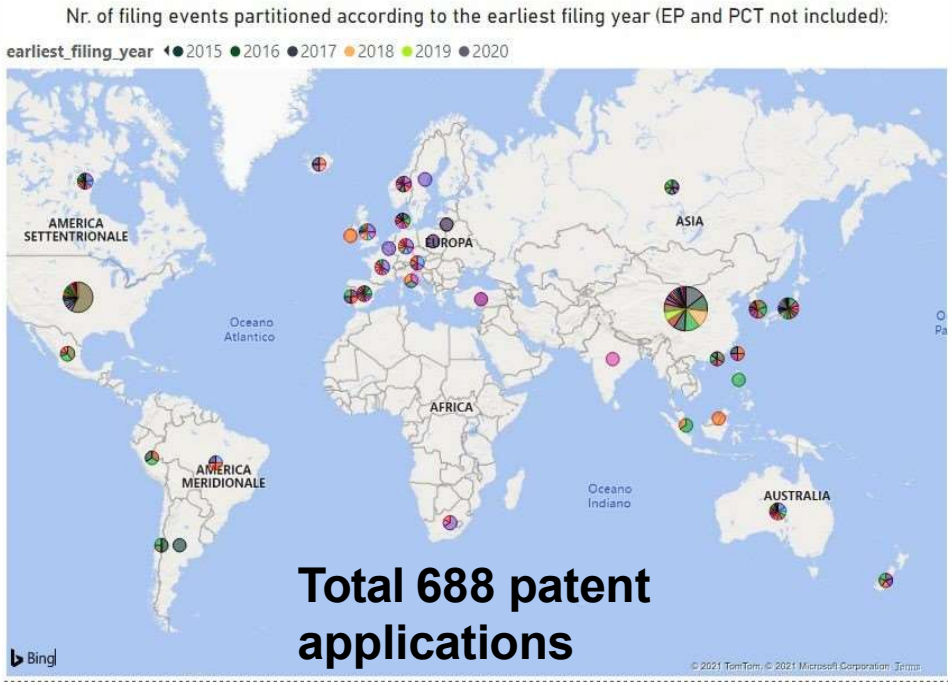


Patent filing events are mainly associated with innovation technologies related with the *Blue biotechnology* and *Blue sustainable development* sectors

The Chinese patent office (CNIPA/SIPO) scores the highest number of filings in the three sectors

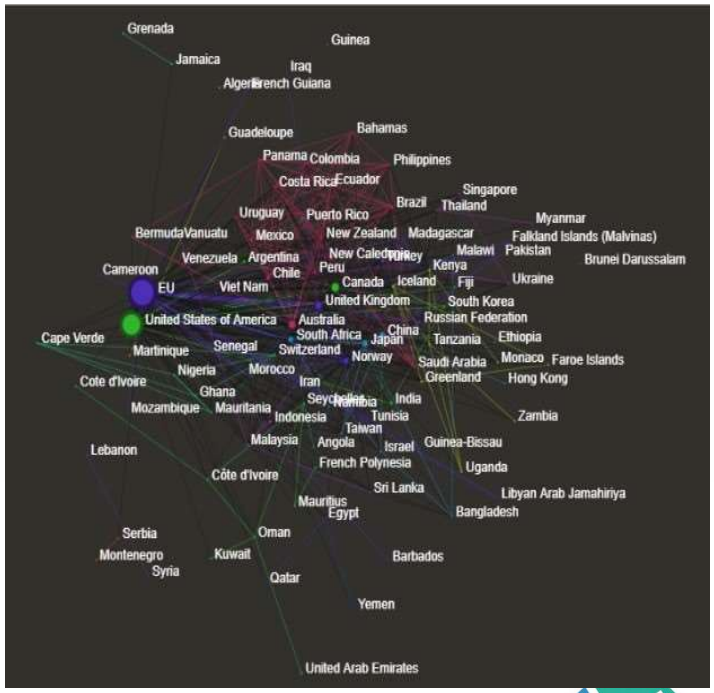
Fishery and aquaculture

PATENT ANALYSIS: Relevant impact on the commercialization of innovative technical solutions on fisheries sector regard especially territories such as the USA or China



Total 688 patent applications

NPL ANALYSIS: Other divulgation modalities (such as the scientific publications, the books, the reviews, funded projects etc) showed a relevant proportion of attention being concentrated in the EU countries.

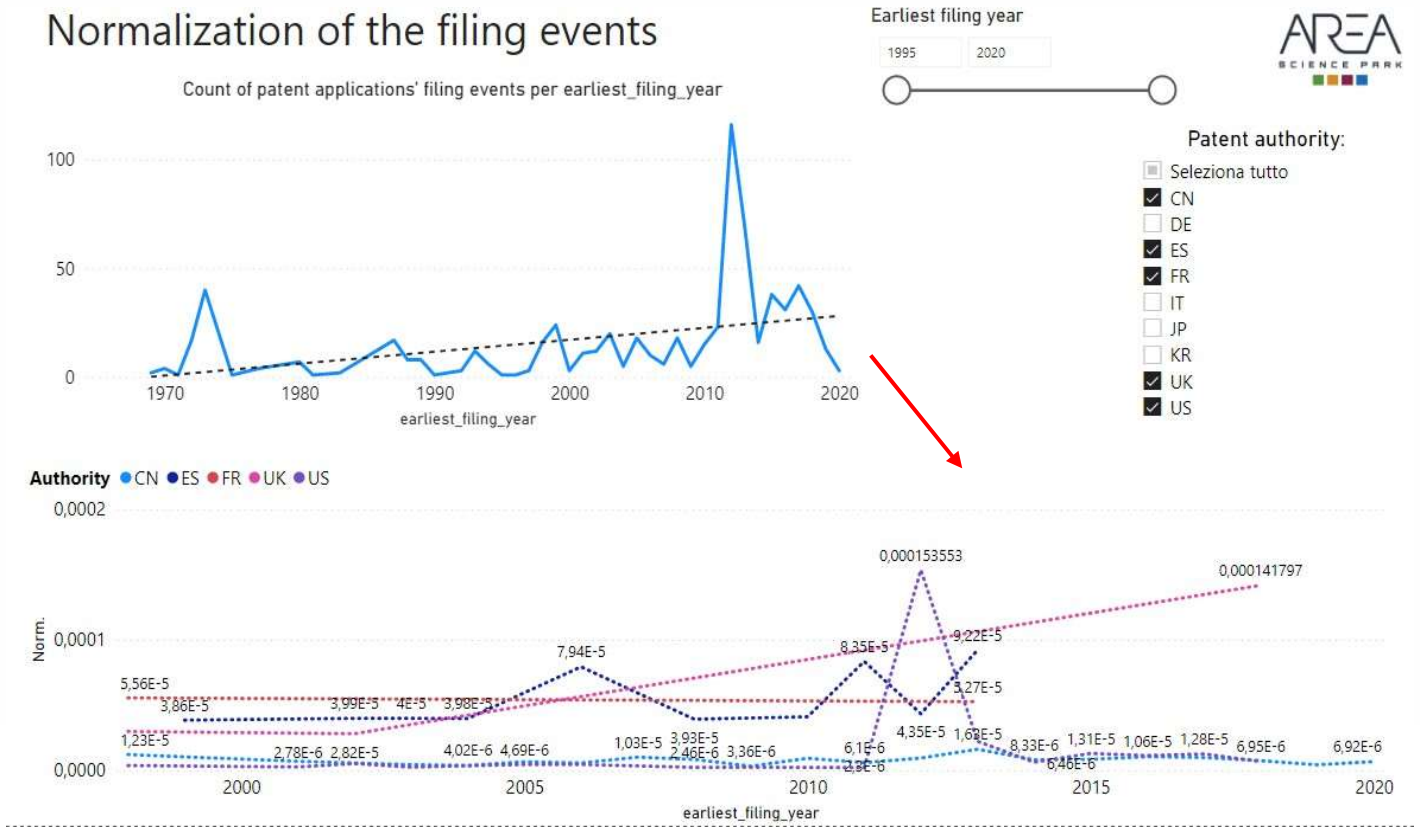


Fishery and aquaculture

I.a Fisheries: Pelagic and Demersal Large-Scale Fisheries (LSF) and Distant Water Fleet (DWF)

Players to be monitored: example
THE NEW ZEALAND INSTITUTE FOR PLANT AND FOOD RESEARCH (NZ)

Apparatus and method for harvesting aquatic animals



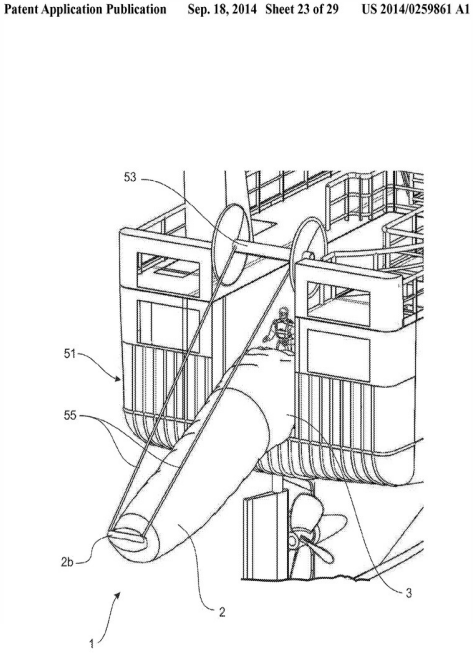
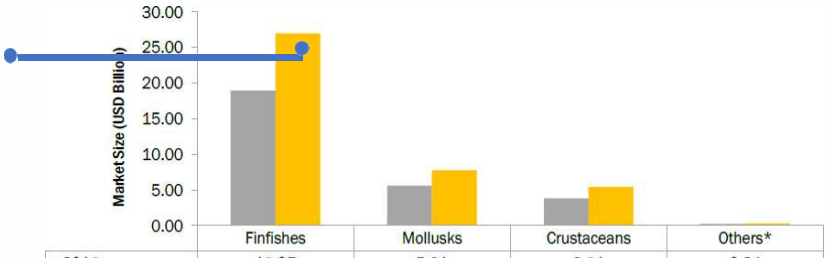


FIGURE 24

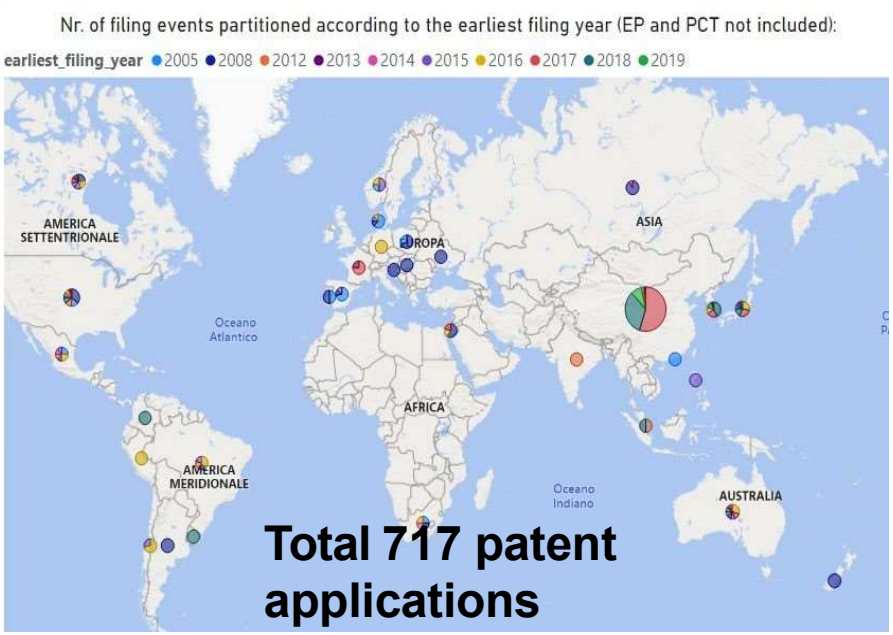
Fishery and aquaculture

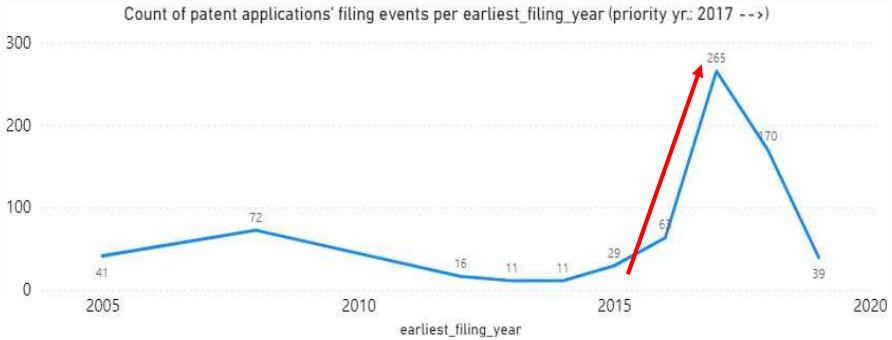
I.b Aquaculture: Marine Finfish aquaculture (MFA) and Shellfish aquaculture (SA)

Market demand for products is robustly forecasted as increasing in the next future. After a period of recession, after yr. 2015 there was a relevant positive trend in patent applications filed to European authorities.



	Finfishes	Mollusks	Crustaceans	Others*
2018-e	18.97	5.61	3.81	0.24
2023-p	27.00	7.78	5.44	0.30
CAGR (2018-2023)	7.3%	6.8%	7.4%	5.0%



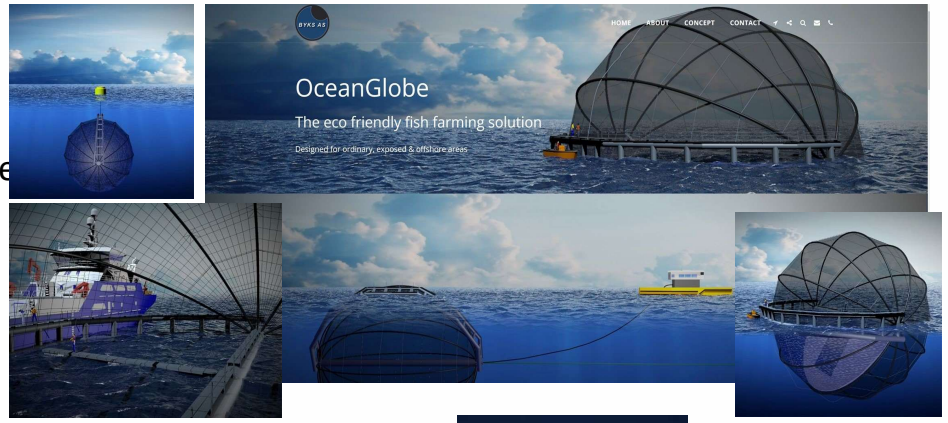


Fishery and aquaculture

I.b Aquaculture: Marine Finfish aquaculture (MFA) and Shellfish aquaculture (SA)

Players to be monitored. Example 1: BYKS AS (NO)

OceanGlobe is a globular fish farming construction designed to be used in both ordinary, exposed and offshore locations. Developed for farm fish in exposed and offshore areas. Flexible anchoring, working platform, continuous centre pole, can be emerged and submerged, elevate and submerge the complete fish farm, rotation (also for easy cleaning). Volume of about 40,000 m3, for fish farming but also for storage and transportation of wild fish.



Example 2: HAUGE AQUA (NO)

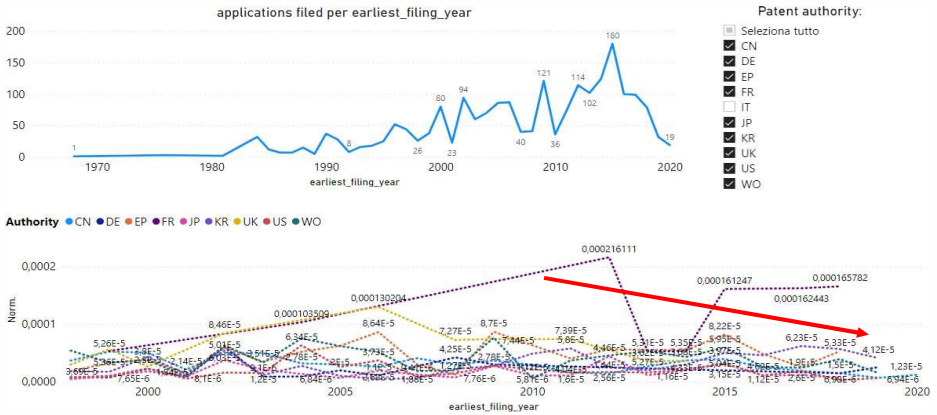
Egget is sheltered workplace addresses health and safety for the staff by eliminating many high-risk operations The water intake is located at the bottom of the unit.

Fishery and aquaculture

I.c Fish meal

PATENT ANALYSIS: large number of patents, great importance of European countries and in particular France (largest in EU) with several companies.
In the last decade slightly declining in EU.

Total 2037 patent applications



Several patent applications referring to:
-substances helpful to reinforce the fish skeleton
-vitamins to be used in aquaculture applications
-use of microalgae or other products for animal feed production

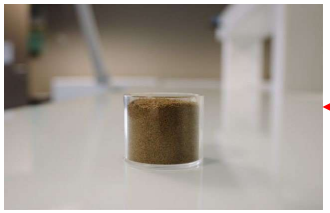
Fishery and aquaculture

I.c Fish meal

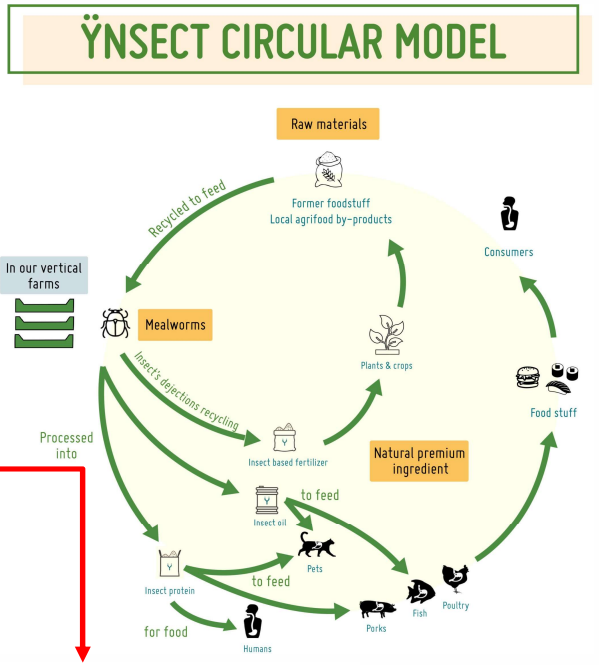
Players to be monitored: example YNSECT (FR)

Ÿnsect uses pioneering proprietary technology protected globally by c.300 patents to produce Molitor and Buffalo mealworms in vertical farms**.**

Ÿnmeal is an ingredient naturally rich in highly digestible proteins (more than 70%). Formulated with Molitor larvae, and produced in powder form, Ÿnmeal is perfectly suitable for the nutrition of farmed fish and shellfish. It is used at a level of 5 to 30% in the formulation of nutritional rations



Ÿnoil is a light oil, rich in polyunsaturated fatty acids, extracted by a mechanical process from Molitor larvae. Ÿnoil is perfectly adapted to the diet of farmed fish and shellfish



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(12) BREVET D'INVENTION B1

(54) POUDRE D'INSECTES POUR EVITER UNE DEFORMATION SQUELETTIQUE D'UN POISSON ET/OU RENFORCER LA SOLIDITE D'UNE ARETE DE POISSON PENDANT L'ELEVAGE.

(22) Date de dépôt : 12.10.18.

(30) Priorité :

(60) Références à d'autres documents nationaux apparentés :

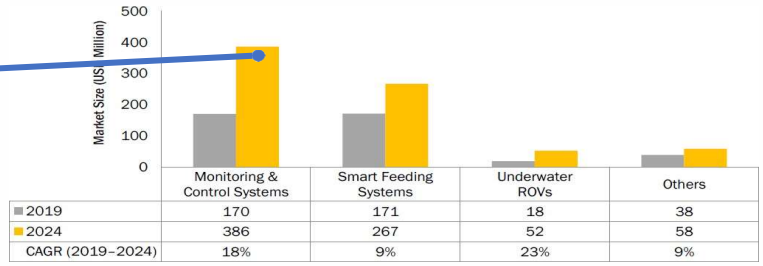
◯ Demande(s) d'extension :

(71) Demandeur(s) : YNSECT Société par actions simplifiée — FR.

Fishery and aquaculture

III.d Precision aquaculture

Precision aquaculture market is increasing.
PA market include adoption of advanced technologies such as Internet of Things (IoT), remotely operated vehicles (RoVs), and artificial intelligence (A.I.) in aquaculture farms.

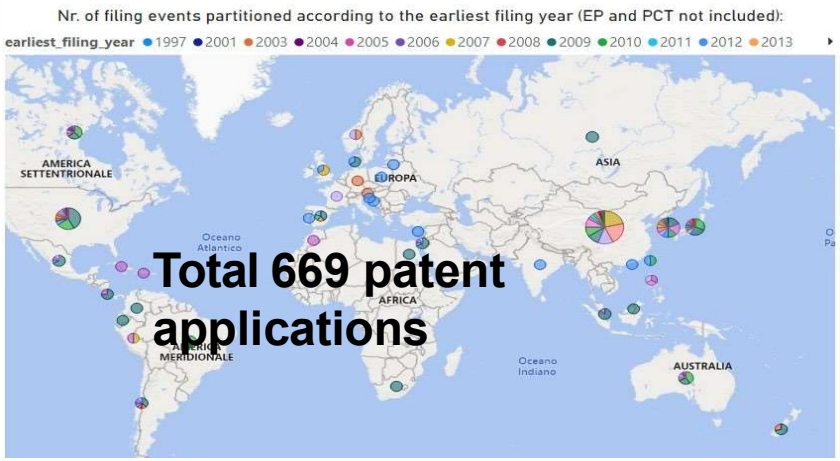


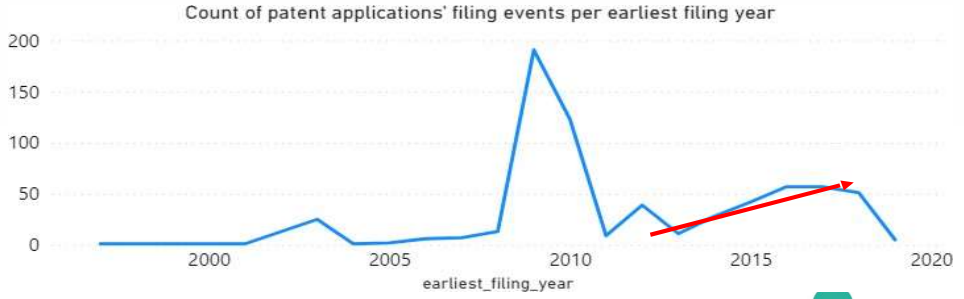
	Monitoring & Control Systems	Smart Feeding Systems	Underwater ROVs	Others
2019	170	171	18	38
2024	386	267	52	58
CAGR (2019–2024)	18%	9%	23%	9%

-Growing investments for adoption of innovative devices;

-Rising demand for protein-rich fish feed (smart feeding);

-Increasing worldwide the governments' support.





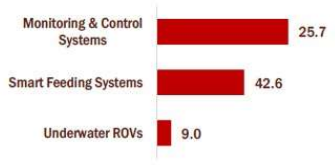
Fishery and aquaculture

III.d precision aquaculture

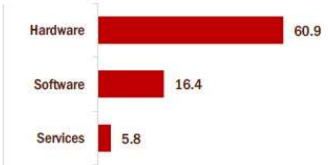
EUROPE

11% CAGR	USD 83 Million Size of European Market (2019)	Italy Fastest-growing Country in Europe	19% Share of Europe in Global Market (2018)

BY SYSTEM TYPE, 2019 (USD MILLION)



BY OFFERING, 2024 (USD MILLION)

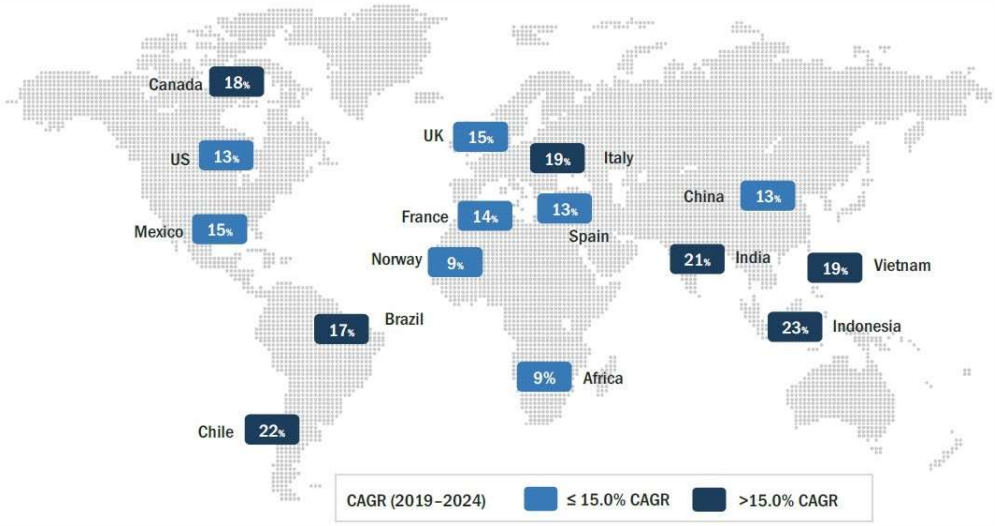


BY COUNTRY, 2019

COUNTRY	MARKET SIZE (USD MILLION)	CAGR (2019–2024)
Norway	32.4	9%
Spain	12.6	13%
UK	8.5	15%
France	6.9	14%

DRIVING FACTORS FOR GROWTH IN EUROPE

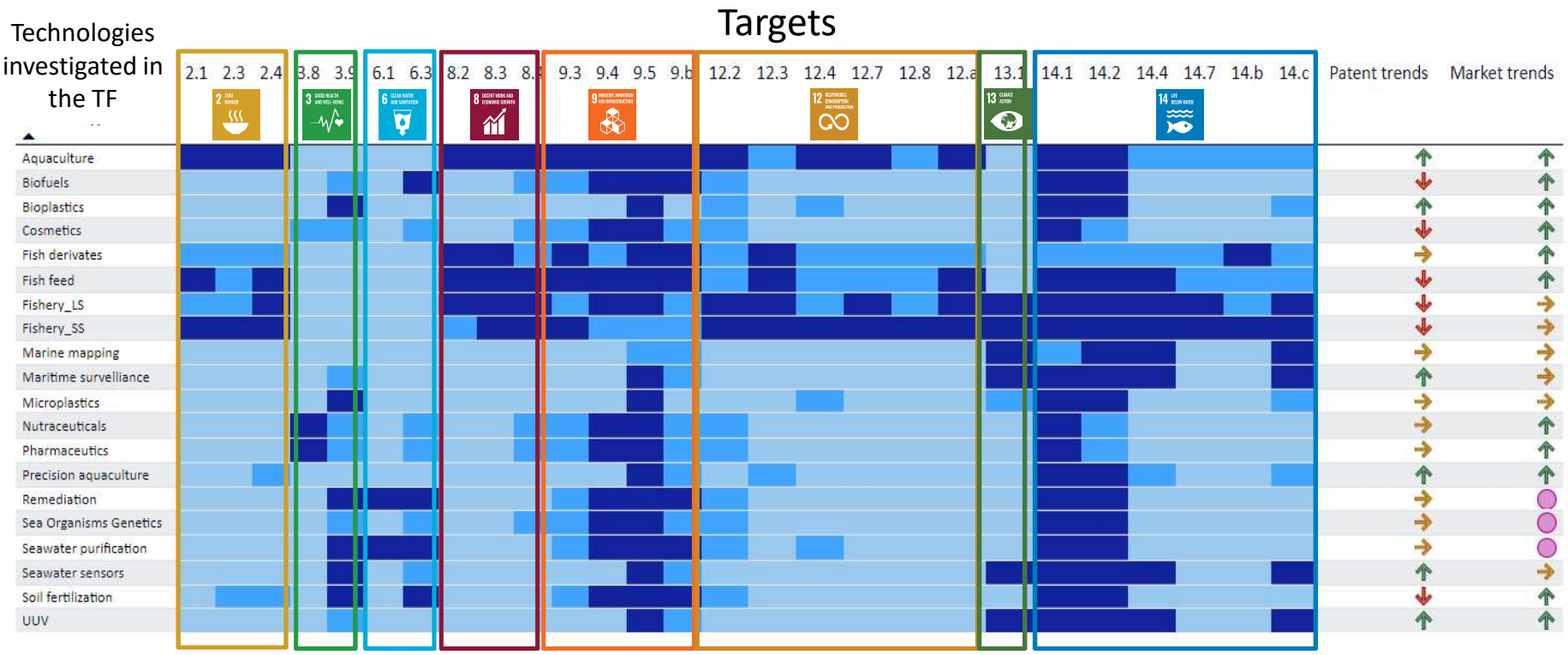
- Presence of various commercial aquaculture farms
- Favourable government policies



Technology and Market Forecast and alignment with SDGs

- 17 Goals
- 169 Targets
- 247 Indicators

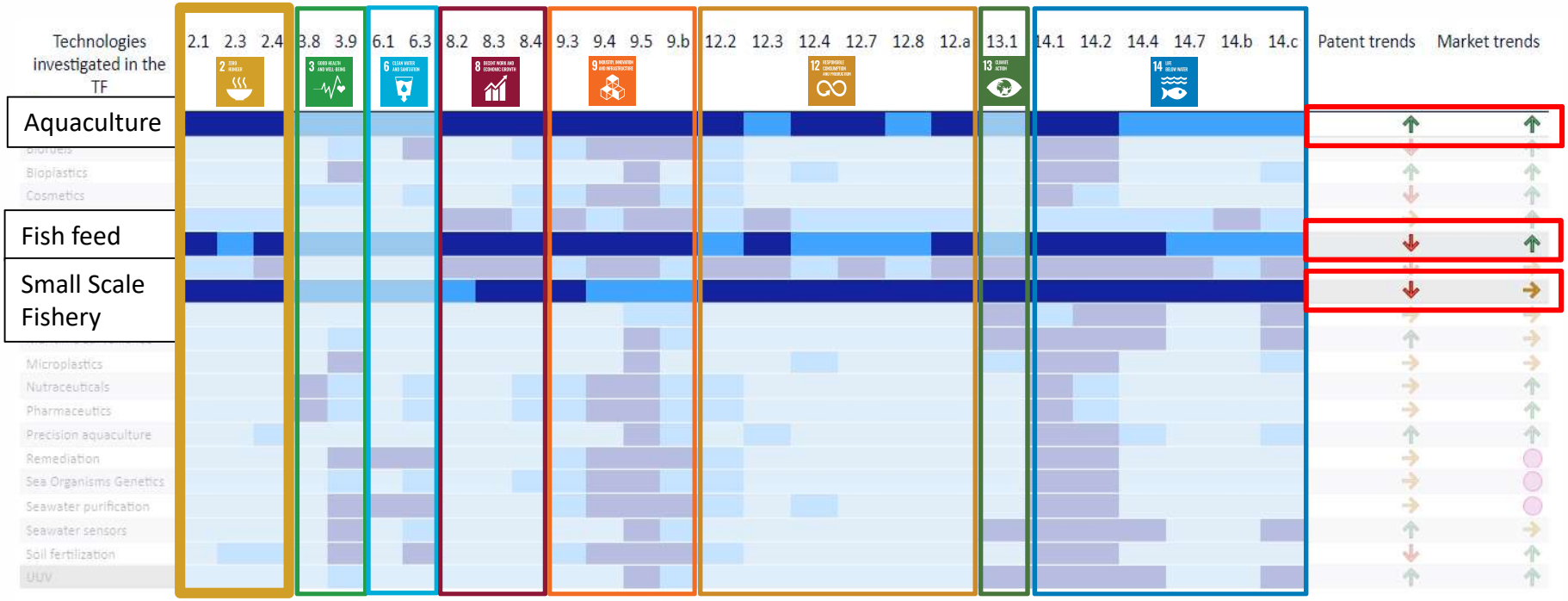
Technologies investigated and SDGs



Legend:

- strong impact
- weak impact
- not assessed

Fishery and Aquaculture



Legend:

- strong impact
- weak impact
- not assessed

Players to be monitored:

- **BYKS** (BYKS AS - OceanGlobe)
- **THE NEW ZEALAND INSTITUTE FOR PLANT AND FOOD RESEARCH** (Seafood Technologies: Plant & Food Research (plantandfood.co.nz))
- **XYLECO** (https://www.xyleco.com/impacts/)
- **DSM NUTRITIONAL PRODUCTS** (https://www.dsm.com/corporate/about/businesses/dsm-nutritional-products.html)
- **KIVERDI, Inc.** (https://www.kiverdi.com/)
- **HAUGE AQUA** (https://haugeaqua.com/)
- **GENOCEAN** (https://opencorporates.com/companies/fr/518466305)
- **KRAFT FOODS** (https://www.kraftheinzcompany.com/)
- **TRUE ORGANIC PRODUCTS Inc.** (https://true.ag/)
- **MARINE TECHNO** (https://marinetechno.tradekorea.com/main.do;JSESSIONID_TK=8Uhw6vu8rUdNcBeZ69A0fVM2saYIcu5o-nCmEkic_0057K206CRk!-798423004!1742867100)
- **NESTEC** (https://www.eitfood.eu/partners/partner/nestec)
- **YNSECT** (Ynsect, Premium Natural Feed)
- **ADISSEO** (Nutrition animale | Adisseo)
- **FERMENTALG** (Home - Fermentalg - Algae you can trust)
- **NIREUS AQUACULTURE** (Homepage | NIREUS AQUACULTURE)

D.3.2.3 Technology and Market Forecast

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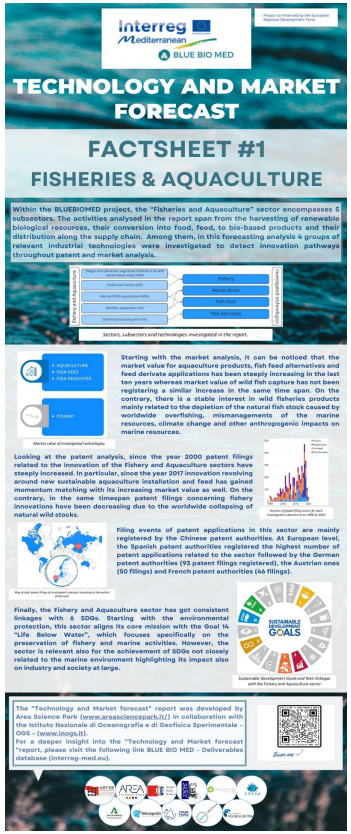
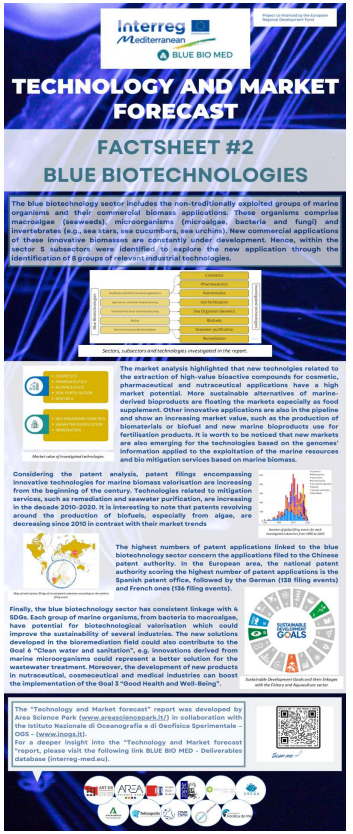
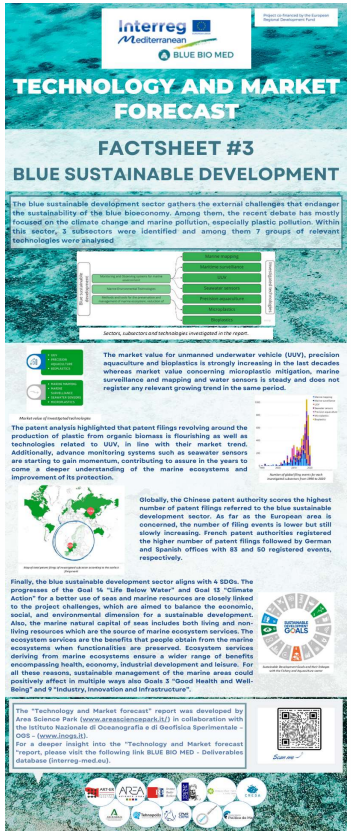
Home > What we achieve > Deliverables database

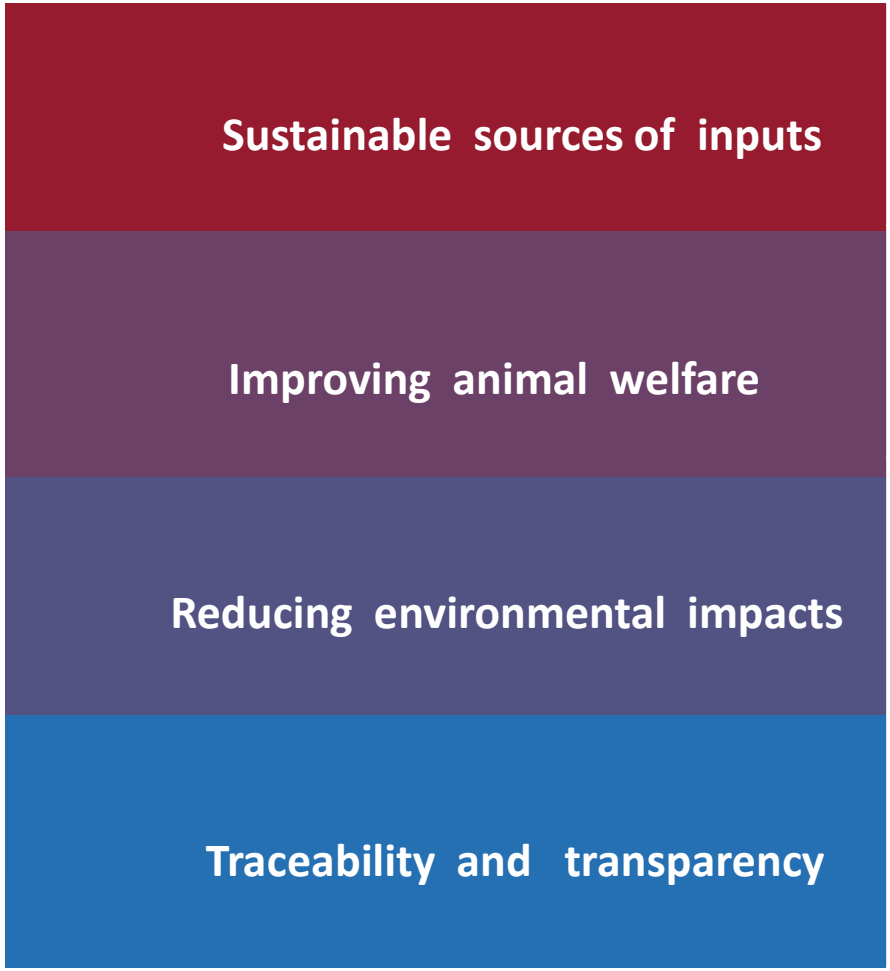
DELIVERABLES DATABASE







Fishery and Aquaculture: possible improvements



Replacing current production-limiting components with viable alternatives

Promotes livestock immunocompetence and well-being, resulting in decreased animal stress and mortality

Mitigating damage to water, land, and other ecosystem elements; includes reducing use of finite resources

Achieves increased insight into and control over production processes as well as accountability

Source: Lux Research (Lux Research (luxresearchinc.com))

Fishery and Aquaculture: opportunities for sustainable innovation

FEED ALTERNATIVES

Refers to novel ingredients or production methods that **replace key macronutrients, with nonanimal-sourced alternatives**. These ingredients seek to promote **sustainable feed formulations** while delivering on cost, palatability, and performance compared with conventional sources, specifically fish meal and oil.

CULTIVATION SYSTEMS

Refers to the infrastructure used for aquaculture production. **Systems improve water quality, reduce energy consumption and resource use, and provide unique approaches to rearing multiple aquatic species simultaneously**. This area extends beyond on-land production to include offshore farming.

ANIMAL HEALTH

Intensification challenges the health of aquatic species. Farmers require **sustainable additives that enhance the immunocompetence of their stock**. While some solutions aim **to replace antibiotics**, most technologies are intended to **prevent disease** as well as promote feed conversion and growth in livestock.

MANAGEMENT & ANALYTICS

Technology that provides **real-time data acquisition and/or supports analytics to enable producers to make better farming and market decisions**. These systems fine-tune performance by **monitoring feeding, fish health, and environments as well as leverage data within transactions between sellers and buyers**.

Source: Lux Research (Lux Research (luxresearchinc.com))

Fishery and Aquaculture: opportunities for sustainable innovation

Feed alternatives

EMERGING TECHNOLOGY OPTIONS

Technology	Description
Plant-derived sources	Plant sources, such as barley and cottonseed meal, as well as **recovered nutrients from food waste**
Insect protein	Larvae feed on organic waste; black soldier fly larvae and **mealworm larvae are the most relevant types of insects for aquaculture feed**
Single-cell protein	Microorganisms, including bacteria, yeast, and other fungi, grown through fermentation; the **microbes involved metabolize simple organic compounds that can be sourced from industrial emissions to promote commercial value**
Algae	**Photosynthetic organisms** that, in the process of cultivation, use CO_2, water, and light to grow and produce biomass and algal oil

Source: Lux Research (Lux Research (luxresearchinc.com))

Fishery and Aquaculture: opportunities for sustainable innovation Animal health

EMERGING TECHNOLOGY OPTIONS

Technology	Description
Functional ingredients	Any nutrient input fed to livestock **to support health and performance; this includes probiotics, prebiotics, phytogenics, or other immune-boosting** feed additives
Bacteriophages	**Bacteriophages are viruses that target and kill specific bacteria or other microorganisms, such as fungi**; phages may be naturally occurring or designed
Novel vaccines	Treatments designed to **train the immune system to recognize and protect against specific pathogens or pathogen groups**
Genetic stock improvement	**Selective breeding and genomic selection improves disease resistance** and other performance traits

Source: Lux Research (Lux Research (luxresearchinc.com))

Fishery and Aquaculture: opportunities for sustainable innovation

Cultivation systems

EMERGING TECHNOLOGY OPTIONS

Technology	Description
RAS (recirculating aquaculture systems)	**Closed-loop system that requires extensive water treatment through biofiltration to reduce wastewater effluent volume and water-quality-related toxicity**
Aquaponics	A hybrid **approach that marries hydroponic plant production with fish production**; nitrogen-rich fish waste is removed from the circulating system by plant roots
Emerging culture targets	**The cultivation of** aquatic plants and mollusks, particularly **filter-feeding bivalves**, provides a range of ecosystem services when conducted in open water
Offshore farming	**Cultivation is carried out in an open ocean** environment where **cages can be floating, submersible, or moored in deep waters**; otherwise, vessels can be used as a mobile production platform

Source: Lux Research (Lux Research (luxresearchinc.com))

Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics

As management & analytics solutions can leverage a wide range of sensing tools and devices for communication and connectivity, we break down the technology options by use-case: environmental, disease, feed, and supply chain.

EMERGING TECHNOLOGY OPTIONS

Technology	Description
Environmental management	Management solutions take many form factors, including **sensors (e.g., radio-frequency identification tagging, computer vision, acoustic wave), AI, drones, robotics, and remote sensing, that typically connect with farms through satellites, Internet of Things, and mobile phones**
Feed management	
Disease management	
Supply chain management	Includes **e-commerce, in which transactions are carried out through an online marketplace**, and ledger-based platforms, or distributed database technology that stores transactions by logging them in cryptographically linked blocks (e.g., blockchain)

Source: Lux Research (Lux Research (luxresearchinc.com))

Fishery and Aquaculture: opportunities for sustainable innovation driven by ICT patent applications

Management & analytics (ICT patent applications in general)

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--IPC of ICT:
('F21H','F21K','F21L','F21S','F21V','F21W','F21Y','H01B','H01C','H01F',
'H01G','H01H','H01J','H01K','H01M','H01R','H01T','H02B','H02G','H02H',
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'H04H','H04J','H04K','H04M','H04Q','H04L','H04W','H03B','H03C','H03D',
'H03F','H03G','H03H','H03J','H03K','H03L','H03M','G06C','G06D','G06E',
'G06F','G06G','G06J','G06K','G06M','G06N','G06T','G06V','G10L','G11C',
'G16B','G16C','G16Y','G16Z','G06Q','H01L')
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('H04N   3','H04N   5','H04N   7','H04N   9','H04N  11','H04N  13','H04N
 15','H04N  17','H04N  19','H04N 101',
'H04N   1','H04N  21')
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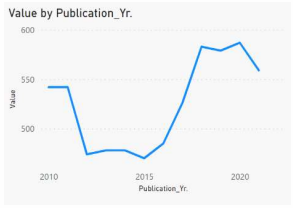
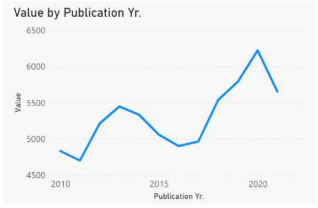
See: [Espacenet – patent classification](#) for meaning of IPC codes

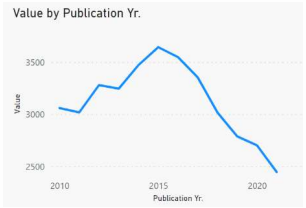
Fishery and Aquaculture: opportunities for sustainable innovation driven by ICT patent applications

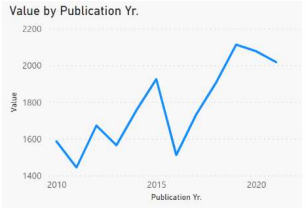
Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

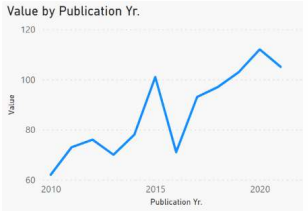
ICT (in general) patent application counts











ITALY	GERMANY	FRANCE	SWEDEN	NORWAY
6303	63640	37563	21307	1041

ICT in the sea context: Patent family count

ITALY	GERMANY	FRANCE	SWEDEN	NORWAY
13	41	32	13	23

Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

GERMANY

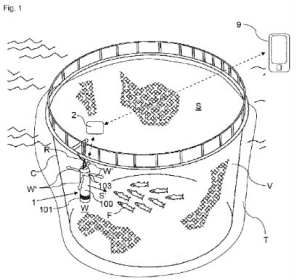
63640

41

- https://worldwide.espacenet.com/patent/search?q=EP20170758049

INTELLIGENT OXYGEN CONTROL IN SEA CAGES

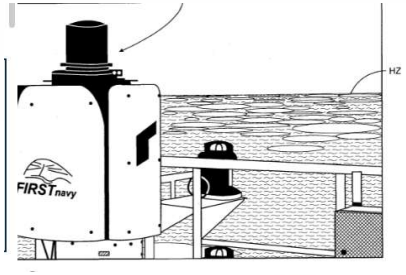
The invention relates to a **method for controlling a concentration of dissolved oxygen in a volume (V) of water (W), wherein a device (1) for dissolving oxygen in water** (W) is submerged in said volume (V) of water, wherein oxygen is injected by the device (1) with an adjustable flow rate into a main water stream (W') sucked into a housing (100) of the device (1), ….



- https://worldwide.espacenet.com/patent/search?q=EP20120783084

METHOD FOR AUTOMATIC REAL-TIME MONITORING OF MARINE MAMMALS

Monitoring the presence of marine mammals on the basis of detecting the thermal signature (TSMM) has so far been carried out manually by observers or in simple, **only partially automated prototypes**. With such methods, fast and **reliable image processing combined with a high degree of user-friendliness** is problematic…



Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

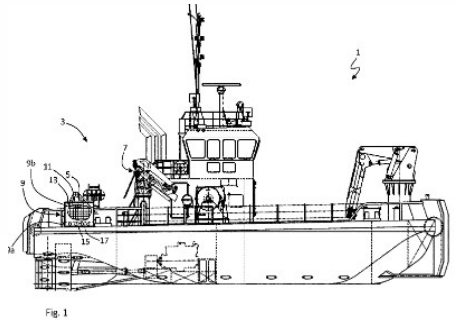
GERMANY

63640

41

- https://worldwide.espacenet.com/patent/search?q=EP20180164114

BOAT WITH AN APPARATUS FOR KILLING SEPARATED AND COLLECTED FISH PARASITES
The present disclosure relates to a ship (1) with a device (3) for **killing separated and collected fish parasites, the device (3) being a container** (9) which has an upwardly open or openable opening (11) and is designed for this purpose is to contain an immersion bath (13), - a filter bag (5) that can be filled with separated fish parasites and is permeable to water, and - a crane (7) for pivoting and immersing the filter bag (5) filled with separated fish parasites through the upper opening (11) of the container (9…



- https://worldwide.espacenet.com/patent/search?q=EP20120805423

METHOD FOR PROTECTING FISH
The invention relates to a **method for herding fish out of a specific region**. In said region, at least one grid is provided in the water, and **current and/or voltage pulses are applied to the at least one grid**.

Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

FRANCE

37563

32

- https://worldwide.espacenet.com/patent/search?q=EP20130812056

CABLE ELECTRODE SYSTEM FOR A DEVICE FOR REDUCTION OF UNWANTED ORGANISMS IN A FISH AND/OR SHELLFISH CORRAL/FARM

A cable electrode comprising at least three sections a connection section, an active section and an end section is disclosed. The cable electrode comprises a central conductor which in the connection section is surrounded by a electrically insulating polymer layer, in the active section the central conductor is surrounded by a polymer layer comprising a conductive filler and in the end section the conductor is surrounded by a electrically insulating polymer layer. **The use of the cable electrode in an electrical fence for a fish corral is also disclosed.**

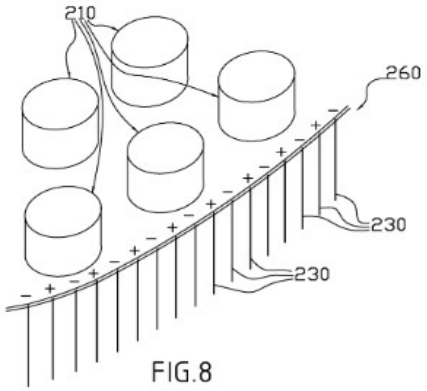


FIG.8

Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

SWEDEN

21307

13

- https://worldwide.espacenet.com/patent/search?q=EP20040021699

Method that Improves Human Interpretation of Color Images with Limited Spectral Content

Abstract

The present invention relates to **image processing in general and more specifically to methods and means facilitating the human detection of physical object representations in colour images with a wide range of applications such as** aviation and air transport, land transportation, shipping, **submarine work, underwater inspections**, medical investigations, **marine archaeology**, land archaeology, agriculture, surveillance and security, food safety, energy systems and forestry. The invention achieves this by providing an image processing method for a colour image representation, IC, formed by at least two distinct colour pixel matrixes, Mi, by carrying out a histogram equalization processing step (250), which is carried out separately for each colour pixel matrix. Different pre-washing steps may be applied prior to the histogram equalization processing step (250). The invention also provides a number of apparatuses adapted for different applications using the method according to the invention.

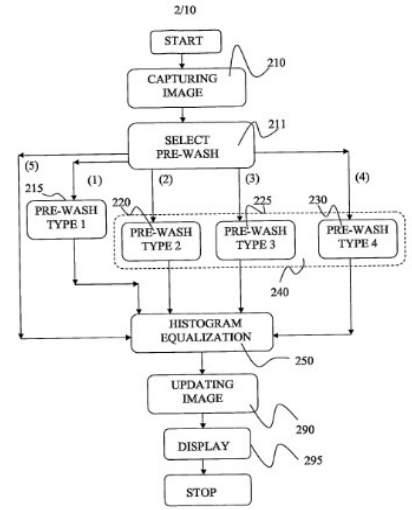


FIGURE 2

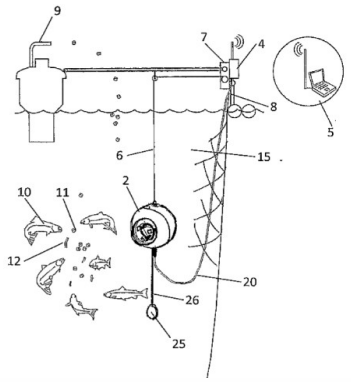
Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

NORWAY

1041

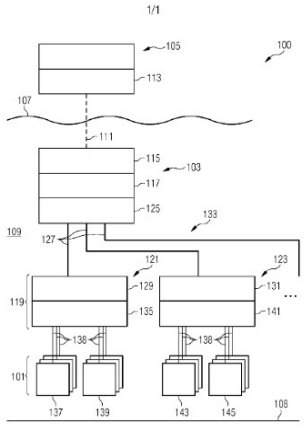
23



- https://worldwide.espacenet.com/patent/search?q=EP20080779101

MEANS AND METHOD FOR AVERAGE WEIGHT DETERMINATION AND APPETITE FEEDING

A method and system for registration of predominately freely moving objects in a fish farm netpen are described […] **the computer processing unit (5) analyses the images taken at different angles to determine the main pattern of the objects, by grouping each pattern element based on relations between shape, size, contrast and/or colour, and to determine mutual distance between given pattern elements for identification of the main pattern and determine, based on the main pattern, whether the objects are fish (10), pellets (11), faeces (12) or other unknown elements.**



- https://worldwide.espacenet.com/patent/search?q=EP20110711850

ARRANGEMENT AND METHOD FOR CONTROLLING AND/OR MONITORING A SUBSEA DEVICE

WO2012041535A1

It is described an arrangement for controlling and/or monitoring at least one subsea device, the arrangement comprising: a first level node (103) communicatively, in particular electrically and/or fiberoptically connectable to an equipment (105) above a sea surface (107) of a sea (109); **at least one second level node (119, 121, 123) communicatively, in particular electrically and/or fiberoptically connected to the first level node (103) and electrically connectable to the at least one subsea device** (101,137,139,143,145), ….

Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

NORWAY

1041

23

- https://worldwide.espacenet.com/patent/search?q=EP20140784104

WEARABLE DEVICE FOR FISHING

Various implementations described herein are directed to a wearable device (100) used to record fishing data. The wearable device may include a housing (120). The housing may include a sensor (140) or sensors to detect motion. **The housing may include a computer system (130) with a processor and memory**. The memory may have a plurality of executable instructions. When the executable instructions are executed by the processor, the processor may receive motion data from the sensor or sensors and determine whether a cast has been made.

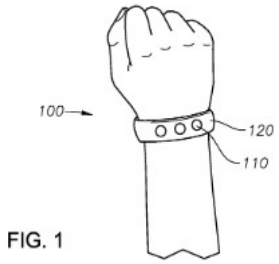
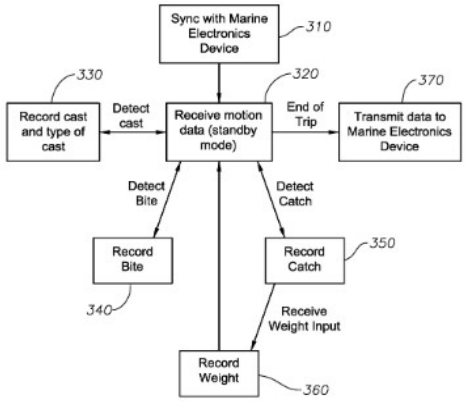


FIG. 1

FIG. 3



Fishery and Aquaculture: opportunities for sustainable innovation

Management & analytics (ICT patent applications in general vs. the patent families (~ inventions) in the sea context)

According to the patent data regarding the **"ICT" sector in general**, there are several initiatives aimed at legally protecting the know-how by means of patent applications, especially in Germany, UK, France, Sweden and Switzerland. However, **a net increase of the patent publications' number in recent years can be detected only in the case of Germany, Sweden and Switzerland**.

Despite the consistent number of patent publications concerning the "ICT" sector in general, when the analysis is further restricted to **applications dedicated to the marine/maritime fields** (not excluding applications specifically dedicated to fish/algae sectors), **in every European country analyzed a dramatic limitation of the patent publications can be noticed**. Which is **not so surprising, considering that also the worldwide patent analysis dedicated to the 'Precision Aquaculture'**, which may be close in terms of kind of technology, has revealed only **269 patent families in a quite large timeframe**.

Quite **often the small number of patent publications referring to ICT technologies deals with marine propulsion control, energy production** (exploiting resources such as tides/wave energy, wind or sunlight) and **submarine cables enabling/optimising communication**.

Interreg ADRION ADRIATIC-IONIAN
EUROPEAN UNION
European Regional Development Fund - Instrument for Pre-Accession II Fund
EUSAIR FACILITY POINT

EU Strategy for the Adriatic and Ionian Region
EUSAIR

Thank you!

For any further information on the report please contact Area Science Park

Riccardo Priore riccardo.priore@areasciencepark.it
Noemi Tomasi noemi.tomasi@areasciencepark.it

Project manager: Elena Banci elena.banci@areasciencepark.it