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WATER-SMART SOCIETIES

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Introduction

The TETRAS Industry Sounding Board (ISB) and Community of Practice (CoP) were established to create a transnational platform for technology transfer, knowledge exchange, and continuous validation of project activities related to Recirculating Aquaculture Systems (RAS). Building on the concept of SUBMARINER's existing Working Groups, the ISB/CoP reaches a diverse network of industry representatives, SMEs, technology providers, business support organisations, regional clusters, public companies, research and development institutions, regional authorities, national policymakers, and NGOs. Their role is to co-create, review, and provide feedback on TETRAS outputs, support the development of new business models and value chain opportunities, and help demonstrate the techno-economic viability of RAS. This deliverable compiles the minutes from ISB/CoP meetings held throughout the project, documenting discussions, insights, and guidance that have shaped TETRAS pilots, tools, and policy recommendations.

ISB/COP Meetings

Mission Arena 1 – Gothenburg, Sweden (14-16 November 2023)

Industrial Symbiosis for efficient resource use and circularity

Industrial Symbiosis (IS) is more than a brilliant idea; it's a collaborative approach that brings together companies from different sectors. It's about creating synergies, forging connections, and building supply chains that are not just economically viable but also environmentally and socially responsible. This approach is no easy task; it requires deep knowledge of industrial processes and business/social relations. The objective of the workshop was to share knowledge, exchange ideas, and explore the potential of creating synergies between sectors. The session started with a brief presentation by the speakers where they shared their background and current activities, this was followed by a moderated discussion.

Speakers Stina Gottlieb, Sotenäs Municipality (SE) | Elise Dhale, Land Meets Ocean (NO) | Annette Løttrup-Moore, Business Lolland-Falster (DK) Moderator: Tom O. Kleppestø, Ocean Industry Forum Oslofjord (NO)

During the discussion, the need to transition from linear to circular processes was highlighted. Explaining the circular economy approach—narrow: use less, slow: use longer, close: use again, and regenerate: make clean—the regeneration part is challenging to communicate and implement. It's crucial to share good practice examples to help stakeholders understand the potential of industrial symbiosis.

To foster IS, creating accessible business models is essential for scaling up these setups. These models should internalize externalities. Moreover, promoting investment in IS requires a shift from a short-term to a long-term mindset and from an economy of scale to an economy of scope, where efficiencies come from variety, not necessarily volume. Additionally, reclassifying materials, side-streams, and residuals is imperative to extend the productive resource life, generate revenue, and promote sustainable resource management.

In industrial symbiosis networks, trust is pivotal for success. Regional business organisations and municipalities play a key role by providing a neutral ground for industries to connect and create synergies, fostering trust between parts. Trust is a significant challenge when replicating industrial symbiosis setups in other regions. Beyond industrial symbiosis, there is social symbiosis, which plays a crucial aspect for the success of projects. People, and especially the local community, are key to the growth and expansion of IS networks. While there are numerous challenges in implementing industrial symbiosis, one highlighted from this session is the commitment to fostering circular practices. Through collaboration among actors, industrial symbiosis can be advanced.

Land-based Aquaculture: innovation ecosystem

Recirculating aquaculture systems (RAS) are not a new concept, however, in recent years it has gained remarkable significance. The initial need to prove the concept of producing high-quality fish in closed-land aquaculture systems has transitioned into a phase focused on scalability, economic viability, and environmental performance. The objective of the session

was to discuss the drivers and barriers for RAS development. The session started with a brief presentation by the speakers where they shared their background and current activities, this was followed by a moderated discussion on the current maturity level of the industry and what is needed to bring it forward.

Speakers Rupert Baur, HanseGarnele and MyFishPlant (DE) | Ulf Nermark, WA3RM (SE) | Thue Holm, Aquafounders Capital (NL) | Franziska Fäarber, Frauenhofer IMTE (DE) | Thorsten Vammen, Frea Solutions (DK) | Brian Thomsen, Danish Aquaculture Producer Organisation (DK)

Here are the key points discussed:

- There is a need to clearly define recirculating aquaculture systems (RAS) and the diverse factors that need to be considered such as life stage, percentage of water recirculation, marine or freshwater, species, circularity indicators, etc.
- Promote RAS understanding among the public and authorities.
- Advocate for transparency in industry practices and sustainability.
- For new projects, initiate proof of concept with small-scale operations before scaling up.
- Create synergies by pairing RAS with other industries for efficient resource use, e.g. industrial symbiosis setups.
- R&D in RAS facilities is key for the continuous improvement of production systems.
- Acknowledge the importance of human capital, “better to have good staff and a bad system, than having a good system and bad staff.”
- RAS professionals require a different set of skills than other aquaculture production methods, for this is essential to align curricula with industry needs through collaboration with schools and universities.

Action items mentioned:

- Implement an EU-standardized aquaculture and RAS regulatory framework and a system approach.
- Reclassify RAS side-streams for extended productivity and encourage valorisation, e.g. sludge.
- Integrate RAS into land spatial planning, identifying, and fostering synergies with other industries. Raise public awareness about RAS and its advantages.
- Promote aquaculture as an appealing career path for the youth.

Other topics discussed:

- The RAS industry is still immature. Species like trout, shrimp, and salmon proved it is possible to grow high-quality seafood in closed-land-based systems, nevertheless, the focus now is on scalability, economic viability, and environmental performance. High amounts of capital are needed for this, and currently, RAS represents high-risk investments for commercial investors.

- In symbiosis setups, there needs to be a high level of trust between industries. Additionally, every system needs to have redundancy as a preventive measure.

Mission Arena 3 – Amsterdam, Netherlands (27-28 November 2024)

Feasibility & Beyond: Investing in and Developing RAS

Moderator Freya Robinson, Project Manager at SUBMARINER Network for Blue Growth, opened the session and handed over to Arne Baekgaard, for an introduction to RAS. Baekgaard gave an overview on RAS developments, which today opens many opportunities to produce fish sustainably. For example, new places and species can be utilized, and other industries can also become part of a circular system. Today, salmon smolt is the majority industry, but also more exotic species on the rise. Shrimp is an emerging market with big sustainability gains in Europe, both for reducing emissions and for biodiversity gains to avoid non-sustainable shrimp farming. Still today, a major obstacle is the permit process, which can take years. From the perspective of salmon, Baekgard gave examples from Skagen Salmon. An important development has been feed improvements, allowing faster growth and hence lower production costs per unit of output. Also, understanding factory affecting meat quality are better understood today, such as the importance of exercise for the fish. From a sustainability point of view they are also frontiers, producing 30% of the energy they use with wind- and solar power.

Rob van de Ven from Landing Aquaculture talked about good design and installation of RAS systems. The seven-step system includes:

- Assessment of Project Requirements and Objectives
- Production Planning
- System Engineering
- Equipment Selection
- System Design
- Final Design Approval by Client
- Construction and Implementation Support (extra step)

Some of the steps are done multiple times to make adjustments and improvements in the plan. One of the most foundational parts is the production plan – answering how much and how often you produce and harvest. This includes fish choice, how they grow, what and how much they eat, etc.

For feed loads you want to have as low fluctuations as possible, as the water treatment must be adapted for the max feed input, so if the fluctuations are high, you need high capacity equipment also for the “dips”, which isn´t efficient. As seen, a good and realistic production plan trickles down the line to technology choice and infrastructure set-up. Most important is to be realistic. For Landing Aquaculture 3 out of 80 projects have been realistic. Licensing is always more complicated, budgets stretched, and timeframes squeezed. When implementing, you have to plan for setbacks, regardless of kind, and have a buffer for handling them.

To give a perspective on good and bad examples of successful RAS implementation, Stefan Teerlick Chairman of the Flemish Aquaculture Platform gave two examples from Flanders. Aqua4c produced Australian Omega3 perch, or jade perch, integrated with a tomato farm. Heat, electricity and rainwater were reused in the system. However, they realized new species are hard to sell, and there weas no upscaling possibility. The production costs were high, and the planning was not greatly done from start. Low experience in the team could be a reason for the non-success, pointing also at the points from van de Ven on planning with buffer and importance of being realistic.

Aquabio produces royal Belgian sturgeon caviar. Their strength for them has been a very experienced founding team, strong financial background and a clear goal of focusing on quality. For example, they have selected a method to ensure the highest caviar quality over speed. Also, through the development there has been good client engagement and focus. The team knew the project would "eat money to give money" and had a good buffer to tackle setbacks and delays.

After the speaker session there was an open Q&A with the audience.

RAS is a frontrunner for food production in a changing climate. How is RAS interacting with sustainability labels? Certification, organic etc. Organic is not possible in the EU. A natural environment is needed, and hence grow-out in sea cages which is not part of a RAS system. ASC is developing a label for RAS production, but today are very general and not species specific. RAS is booming, but it won't replace all the other production methods.

What happened to the Jade Perch? It was bought up by a Scandinavian company. Since they are fatty fish, a problem was that too much feed was needed if not giving fish oil.

To summarize, Robinson asked for some main barriers from the sector. These were mainly high investment costs, complicated licensing processes, energy costs, and lack of skilled labor. The money is there, but you need the skilled labor and licenses. Young people don´t want to go into the industry, so we need to make RAS farming attractive. Also, effluent water treatment is also a barrier, as it needs to be treated to be used in agriculture.

Mission Arena 4 – Sopot, Poland (28-29 April 2025)

Blue Foods

The workshop featured four expert presentations exploring innovative approaches to sustainable aquaculture and consumer engagement across the Baltic region. The session focused on understanding consumer preferences for aquaculture products and how these influence market trends. Key topics included the role of sustainability, convenience, and cost in shaping purchasing decisions, as well as strategies for increasing acceptance of new species and innovative aquaculture products. The discussion also emphasized the importance of transparency in the food supply chain—particularly in communicating production methods and building consumer trust in seafood sourcing.

Tomasz Kulikowski shared key findings from the Aqualoop project's EU-wide survey on seafood purchasing habits. While convenience and price dominate consumer decisions, around 35% of respondents indicated a willingness to pay more for sustainable options.

Central and Eastern Europe showed greater acceptance of aquaculture products than Western Europe, although overall preference for aquaculture remains limited. Misinformation and concerns about antibiotics and artificial feed persist, highlighting a need for better education and communication.

Remigiusz Panicz presented developments in multitrophic freshwater aquaculture, focusing on integrated farming systems that combine fish, crayfish, and aquatic plants. These systems reduce nutrient emissions and open opportunities for cross-sectoral reuse, including growing mushrooms and worms from waste streams. He emphasized ecointensification and diversification as alternatives to geographic expansion.

Monika Normant-Saremba showcased the potential for farming whiteleg shrimp in Poland. Initial experiments and infrastructure development—such as EU-supported hatcheries and feeds—are laying the groundwork for a sustainable, land-based shrimp aquaculture sector. Consumer awareness remains a challenge, though demand and interest are growing, as evidenced by the success of Poland's first shrimp farm.

Anna Sowa and Marek Harenda introduced the Mr. Goodfish initiative, designed to promote sustainable seafood consumption through education and stakeholder engagement. Polish consumers still rely heavily on a few overfished species, with low awareness of sustainability labels and limited access to clear information. Their efforts include educational games, collaborations with chefs and influencers, school programs, and a multilingual website and mobile app.

Together, the presentations underscored the importance of connecting sustainable aquaculture practices with consumer education, policy alignment, and market innovation to drive meaningful change in the seafood sector.

The workshop discussion highlighted a strong interest in promoting circularity in aquaculture, particularly around the reuse and valorisation of by-products. One of the key topics was the use of saline discharge from RAS (Recirculating Aquaculture Systems) and its potential application in industrial symbiosis—for example, reusing treated water for cultivating crops like strawberries. Participants acknowledged that while the regulatory framework technically permits some reuse of water, clearer guidance is still needed. There was a call for better integration of such opportunities into legislation, with more explicit recognition of by-products as valuable resources beyond just fertiliser.

Representatives noted the practical solutions already being explored, such as drying sludge, and the importance of addressing technical challenges like sand removal. Although regulatory hurdles exist, they are being navigated, but more support is needed to scale up solutions.

In terms of stakeholder engagement, insights from Norway and Poland showed differing levels of awareness and adoption. In Poland, aquaculture is still relatively new to many farmers, and generating interest among the next generation remains a challenge. There was a clear need for academic involvement and educational initiatives to build capacity.

On the environmental side, it was noted that aquaculture contributes only a small share to eutrophication. Nevertheless, methods such as bioremediation with plants and sediment

capture were discussed as effective tools to mitigate any impacts and even enhance local ecosystem quality.

Consumer-focused questions through Slido explored preferences for freshwater products in Central Europe, with most participants indicating continued consumer interest. Another key point was the importance of communicating the environmental and biodiversity impacts of aquaculture. Participants noted the lack of a widely accepted system to evaluate sustainability, with life cycle assessment (LCA) mentioned as a potential approach.

Misconceptions around sustainable seafood was also addressed. Concerns about parasites and antibiotics were frequently cited as barriers to consumer acceptance.

When asked about perceptions of seafood produced in RAS, some noted a gap between research projects and industry needs. While RAS technologies offer technical solutions, commercial viability is still a concern. There was a broader call to align research funding and legislative frameworks with industry realities, and to ensure that support for aquaculture development is comparable to what is offered to traditional agriculture and fisheries.

Overall, the session underscored the need for clearer regulation, improved communication with consumers, and stronger cross-sector collaboration to unlock the full potential of sustainable aquaculture.

Organic Summit – Copenhagen, Denmark (19 August 2025)

Organic Fish on Land? Is Recirculating Aquaculture Systems (RAS) Part of a Future of Sustainable Organic Animal Production?

Panel debate

Moderator: Lars Holdensen, Danish Agriculture & Food Council

Jacob Veiss, CEO of Skagen Salmon (DK)

Johan Ljungquist, CEO of Gårdsfisk (SE)

Emma Rung, representative from KRAV.SE

Christopher Atkinson, Head of Standards, Soil Association

Key Conclusions, Cases and Ideas

Consumers struggle to understand what “organic farmed fish” means. They expect naturalness, yet aquaculture is far from the fish’s natural habitat. Effective storytelling is critical, as willingness to pay depends on trust and clarity. While people say they care about welfare, biodiversity, and climate, buying patterns rarely match their stated values. Fish welfare is less visible than cows or pigs, and consumers often see fish as biomass rather than individuals.

- Sustainable Aquaculture Systems

Recirculating Aquaculture Systems (RAS) have many advantages as they filter and reuse water, reduce chemical use, and limit emissions. They provide a way to relieve pressure on

oceans and combat overfishing of species such as salmon. However, high energy use remains a drawback, though technology is driving improvements.

- Balancing Welfare and Business

Domestication brings compromises, and fish welfare depends on hygiene, hiding places, and species-specific density. Yet public understanding is limited. Consumers know far more about welfare towards cows and pigs, while fish are often viewed as biomas

SUBMARINER Network Aquaculture Working Groups (online)

RAS and symbiosis – 2nd May 2023

The first session of the year of the Aquaculture Working Group was held on May 2nd. About 25 participants gathered online for two hours to discuss different projects and topics related to recirculating aquaculture (RAS) and symbiosis.

Maria J. de la Peña, from SUBMARINER Network for Blue Growth EEIG, moderated the session. After a warm welcome, Efthalia Arvaniti, from SUBMARINER Network as well, gave a short introduction to the SUBMARINER Network, its members, and the topics the network works on. She also pointed out that there are many projects that the SUBMARINER Network is involved in that are interlinked with the TETRAS project, such as BlueMissionBANOS (Supporting the EU Mission Restore our Ocean & Waters in the Baltic and North Sea), EU4Algue (algaeponics, macroalgae), AlgaeProBanos (product development and market access of sustainable algae solutions, Baltic, and North Sea). Besides the Aquaculture Working Group, SUBMARINER Network also hosts working groups on mussels and algae that meet regularly every 2-3 months.

TETRAS – Recirculating aquaculture systems and industrial symbiosis for sustainable food Production

Maria J. de la Peña introduced the TETRAS project that will run until 2025 and is led by the Klaipeda Science and Technology Park Lithuania. TETRAS stands for Technology Transfer for Thriving Recirculating Aquaculture Systems in the Baltic Sea Region and is a three-year project co-financed by Interreg Baltic Sea Region. Ten partners from five countries in the Baltic Sea region work on recirculating aquaculture systems (RAS) in combination with other industrial processes. The partners build a strong consortium with different and complementary expertise in RAS systems, business support, commercialisation, finance, or administration. Additionally, associated partners provide feedback on results and the applicability of the results in different regions. The project will also benefit from feedback from the working group.

RAS stands out as a sustainable method of trophic aquaculture. These systems have many advantages, like their independency from natural water bodies, and geographical flexibility, and they allow the intensive production of healthy high-quality food products. Still, there are many challenges to overcome, such as the high investments and costs for their installation and operation, the carbon footprint, and the linearity of many systems. Symbiosis, the combination of RAS with other industrial processes to maximise the use of resources, might

be a solution to tackle these challenges and create a closed resource cycle with increased economic and environmental sustainability. TETRAS aims at demonstrating new symbiosis concepts to improve the economic and environmental sustainability of recirculating aquaculture systems and develop tools and standards to assess and monitor RAS and promote investment into these food production systems.

The TETRAS project includes 4 regional pilots:

1. Treatment of RAS water for use as technical water (i.e. Power-to-X)
2. Geothermal resources for heating and mineralisation of marine/brackish RAS
3. Feasibility study for a fully circular agro-industrial park with RAS
4. Small-scale RAS for data collection and awareness building

The project results will be summarised in a portfolio of solutions with investment-ready business cases, licensing, permits and regulation guidelines, communication material for end-users and consumers, and technical and non-technical recommendations for decision-makers.

TETRAS and the Estonian Industrial Symbiosis Agro-Park (EISAP)

Nele Rogenbaum, Business Development Manager at the Ida-Viru Investment Agency (IVIA) in Estonia continued the presentation by giving insights into one of the pilots, the Estonian Industrial Symbiosis Agro-Park (EISAP). IVIA is a regional investment promotion agency and developer of industrial parks. The pilot in TETRAS is a fully circular agro-industrial park, which currently is in early-stage development. The concept aims at using resources and outputs of different industries in the site by interlinking them.

The concept was developed in several co-creation sessions with more than 20 stakeholders. The park covers 1,500 ha of surface-mined land and has water resources and a power plant. In the centre of the park area is planned to have greenhouses connected to all other industries by material flows, one of these will be the RAS. The concept is to build the industries around the greenhouses in a modular style, like Lego blocks, and to build on nature and regenerate the local ecosystems and biodiversity, i.e. through agroforestry. For one year, a spatial planning process together with the local government has been undertaken. Environmental studies have just started. A feasibility study on the whole EISAP is planned, while as part of TETRAS, a feasibility study on the best use of land and resources for a fully circular agro-industrial park will be done, also to demonstrate how to connect RAS in a financially viable way to be attractive to investors. So far, the following risks have been identified: a strong increase in construction prices, fear to invest due to the project's proximity to the Russian border, and lack of financing as well as delays in planning and the permitting process.

Looking forward to the progress of the EISAP throughout TETRAS. Exciting to see more and more industrial symbiosis centres being developed.

Sötenas Symbiosis & Testbed for Land-based Aquaculture

Peter Carlsson, representing the Sotenäs municipality, talked about the Sötenas Centre of Symbiosis & the project "Testbed for Land-based aquaculture in circular systems". Sotenäs municipality has a population of 9,200 people and is known for tourism with 1 million visitors per year, especially in summer.

Apart from tourism, food, and marine food (fishing, big fish processing companies) are the main business areas. The Sotenäs Centre of Symbiosis (Industrial & Social Symbiosis), founded in 2015, is a symbiosis network where companies exchange resources such as side-streams, energy, and other benefits to create added value and improve industrial productivity. Everything started when some large fish processing factories faced a common challenge, the management of their wastewater. To obtain permits to expand production, they required solutions for the treatments of their wastewater. Since 2018, processed water from the local industries and bio waste of the companies is used to produce biogas, which is then used by one of the processing plants. Additionally, eco-labeled fertilizer is sent to local farmers.

The same owners looked for new business opportunities in aquaculture and started Smögenlax –a land- based salmon farm with RAS technology currently at pilot scale– and the Swedish Algae Factory, the first inland-based greenhouse commercial farm for algae.

At the beginning of the symbiosis centre, the project had a testbed for aquaculture and symbiosis, where companies were able to run tests, verify technology and try out symbiosis synergies. Currently, they are working on the development of a large-scale Testbed for Land-based aquaculture in circular systems together with 15 partners from Sweden and Norway.

The technical concept of the project is to build and operate a large-scale reference centre for recirculating aquaculture with a flexible design –including a R&D small-medium-scale systems– that allows testing technologies, potential synergies between processes, management of waste streams, strategies to optimise energy, among other functions. The goal is to establish a reference centre for recirculating aquaculture in circular systems at the international level.

Currently, they are looking for partners to engage in this project for the next stages of this project. If interested, please contact peter.carlsson@sotenas.se.

The Blue-Green Bio Lab project

Cathy Brown Stumman, representing the Skive municipality, presented the Blue-green Bio Lab project.

It is an Interreg Baltic Sea Region project, that started in October 2022 and for the following eighteen months will help local authorities initiate bio-industrial symbioses among aquaculture, agriculture, and industry to reduce emissions while producing more consumer goods.

Six partners and associated partners grouped to follow their common interests to find win-win alternatives to cope with environmental challenges and climate issues regarding agricultural and marine ecosystems and to enable local development. To mention a few of the challenges faced are nutrient deposition from agricultural systems with negative impacts on water quality (inland and sea); over-fishing, and the need for higher degrees of self-

sufficiency for feed, food, and energy. Aquaculture, agriculture, and industry can provide solutions to these challenges through industrial symbiosis by using side streams or waste products to develop new products.

The project has a main output: the Blue Green Bio Lab Tool Kit. The Target group of the guide is primarily the local public authorities (that play an essential role as facilitators/initiators of discussions with key actors), but also businesses and business organizations. Biomass briefs, bio-industrial symbiosis briefs, policy briefs, and key learnings will contribute to the tool kit. 5 briefs on biomasses are finalized very soon and will be published on the website. National-level workshops and a final conference in Q1 2024 are planned.

Cathy Brown shared a few of the learnings gained so far, among them: the readiness for discussions is very different across the three partner countries (how to engage the local stakeholders and especially in which phase, at what point the policymakers need to be informed and when to involve the citizens; level of knowledge from different stakeholders is very different and communication is key. What are opinions, what are facts? Brown concluded that the framing of the discussions and adaptation of the language is crucial.

Open space & pitch

Jonas Eliasson, based in Copenhagen, entrepreneur, and architect, presented his project idea Blue Desert Plantations, a project developing methods for sea-based eco-farming (regenerative food production at scale and reconstructing local failing ecosystems) and a communication strategy (solution-based positive vision, state of the world, exhibitions in a museum in June this and next year).

- Key research areas: reef design /best practice, Bio design/selection/limitations; Biological impact/risks; Growth modeling, business modeling.
- Looking for partners with experience in multi-trophic aquaculture, sea-based farming, sustainable business modeling, regulation, food industry.

Contact: Jonas.o.p.eliasson@gmail.com

Aquaponics – 20th June 2023

The second session of the year of the Aquaculture Working Group was held on June 20. About 25 participants gathered online for two hours to discuss different projects and topics related to Aquaponics.

Maria José de la Peña, from **SUBMARINER Network for Blue Growth EEIG**, moderated the session. She shortly introduced the SUBMARINER Network, the working groups (algae, mussels and aquaculture), and the **TETRAS project**, which works on recirculating aquaculture systems (RAS) in combination with other industrial processes for the efficient use of resources (water) and improving the environmental and economic sustainability of RAS in the Baltic Sea Region. One of the four pilots from TETRAS will have a small-scale RAS and aquaponic system for data collection and social awareness. Learn more about Pilot 4 located in Guldborgsund, Denmark here.

AWARE – Aquaponics from Wastewater Reclamation

The session started with a presentation by Fabio Ugolini, from INNOVA, about the AWARE project – Aquaponics from Wastewater Reclamation. This HORIZON project has a budget of 5.1M euros and started recently in November 2022 and will run until October 2026. The project aims to create a new farm-to- fork value chain for European economic growth and urban KM 0 farming. By providing EU towns with an aquaculture system independent of natural water bodies, the project seeks to foster the circular use of resources and enhance food production systems' resilience to climate change, while making valuable use of urban space, empowering local communities, and enabling urban farming.

Fabio emphasized the increased need for seafood in Europe as a low-carbon footprint protein and the political will of the European Union to increase the aquaculture seafood production, which currently only amounts to 26% of the total seafood production, whereas the worldwide average is 60%. The growth is still limited for different reasons, f.ex. due to lack of access to space and water and complicated national regulations, among others, and innovative production systems are needed to overcome these barriers.

So far, according to data from 2021, the main freshwater aquaculture production systems in Europe are tanks and raceways (65%) and extensive pond systems (33%). Only a tiny number of RAS (2%) exist, which have several advantages compared to the traditional systems: nutrient recycling, water conservation, reduced environmental impact, and multitrophic.

AWARE seeks to integrate aquaponics with wastewater treatment to increase the resilience to water scarcity further, to make use of low-value space, to exploit residual heat and nutrients, and to foster urban farming and local production. Achieving these goals is quite complicated, but the project members can build on experiences from a former Horizon project regarding advanced tertiary wastewater treatment which ensures the removal of residual pollutants and contaminants, such as heavy metals, microplastics, and antibiotics. The project will build the first European Aquaponic farm running on reclaimed water and demonstrate a novel food value chain with technological, social, and political innovation. The pilot farm will be located in the town of Castellana Grotte (Italy). The pilot will include two systems, one control system running on natural water and the other using reclaimed water to facilitate comparisons. The Municipal Wastewater Treatment plant will carry out primary, secondary, and tertiary treatment, which results in reclaimed water fit for discharge and irrigation, which will then be treated in an advanced tertiary treatment step (advanced biofilter, UV-C LED, and microfiltration) before using it in the aquaponic RAS system.

In the first year, iceberg lettuce and tilapia shall be produced. After checking the toxicological and nutritional profiles of the produced seafood and vegetables, the products will be tested by volunteers. Socio-economic and legal analyses will be done, business cases will be developed, and consumer acceptance will be tested. So far, it is a pilot because there is no existing regulation for this. The project wants to demonstrate the feasibility and inform policy on a European level to facilitate replicability in other countries, especially countries facing water scarcity in the Mediterranean. Further studies are planned on microbial communities in nutrient bio-cycling, extraction of collagen from the fish, conversion of fish waste to insect

meal, and plant-enhanced filtration. The project wants to reach commercial scale (10 times the size of the pilot) between 2027 and 2030.

Fabio finished his presentation by giving an outlook on 2050, assuming that 100 cities take up the concept.

Q&A session

- Regarding the permits, is the main issue the use of wastewater?

There is not yet an aquaponic in Europe that uses reclaimed wastewater, and no policy allows it. There have been attempts in the 1970s in Germany, but they all failed. Zeitgeist hopefully has changed. For ornamental fishes, it already exists in Munich, but not for fish for human consumption. In Asia, southern China, and South America, the practice is already established, but not regulated, and it wouldn't comply with European standards.

- Rolf Morgenstern shared that there is a similar project from Fraunhofer Institute (https://suskult.de/).

In his experience, suitable facilities are rather outside of the cities and in rural sites, with agricultural areas around. So that aquaponics can be economically viable, they need a lot of space (approx. ratio 1:10), and there might be competition with traditional agriculture and backlash from farmers. He also suggests verifying the numbers shown to produce fish and vegetables. If more fish than vegetables were produced, the produced volume of nutrients would exceed the potential uptake capacities of the plants. He doubts that the fish sludge would be suitable to feed insects as they probably wouldn't like the consistency. From a technological point of view, it might be better to return the sludge to the waste water treatment plant system.

- How do you get rid of heavy metals and drugs that you often find in wastewater?

By applying the advanced tertiary water treatment that has been validated in a former project. More information on the method can be provided by email.

Fabio Ugolini - f.ugolini@innova-eu.net

ProGireg and INCITIS Food

Rolf Morgenstern, from the South Westfalia University of Applied Sciences in Germany, continued the session by presenting two projects, starting with **ProGireg,** which stands for "productive Green Infrastructure for post-industrial urban regeneration". The Horizon 2020 project is about to end, and after a long process, they had the opening ceremony of the aquaponic system last Friday (16.06.2023).

The project is not only about aquaculture but about nature-based solutions (NbS) for urban regeneration, city planning, more sustainable cities, and co-design. In four front-runner cities - Dortmund (Germany), Turin (Italy), Zagreb (Croatia), and Ningbo (China)-, eight different NbS have been implemented. In Dortmund, five NbS were selected for implementation; one of them is an aquaponics system. They encountered lots of difficulties finding an appropriate site. The hypothesis that in post-industrial industries, space is an available resource proved wrong; they found lots of competition around available space. Finally, two greenhouses have

been constructed at the site of the former Hansa Coking Plant, which stopped operations in the 1990s and is nowadays used as a museum. A considerable issue represented the contamination of the soil, and foils usually used to cover waste dumps had to be purchased and used under the greenhouses, which had a substantial impact on the financial resources of the project as this was not included when planning the budget. The set-up of two greenhouses will allow to compare data.

Rainwater is collected and stored in a wall of tanks inside one of the greenhouses. The greenhouses are set up in a Chinese style, in the direction from east to west. It's standard greenhouses that are retrofitted so that the low-standing winter sun hits the wall of stored tanks and warms up the water, and in summer, the wall works as a sun shield.

The intention is not to market food products through conventional channels like supermarkets because profit margins there are very low. You would need to have a much bigger system (more than 1ha) which is not possible within city limits; instead, the hydroponic rafts are available to interested citizens for rent, a system the project copied from the established urban business model "rent a field", where you can rent parcels without being responsible for the soil preparation, etc. A monthly fee will be paid, which decouples the income from the produced volume.

When asked, the participants from the working group meeting indicated being willing to pay between 20 and 50 Euro monthly, but the willingness might also depend on the volumes that can be harvested.

Due to the COVID-19 pandemic, the co-designing process was not possible as planned, but students developed lots of prototypes, and the system is now almost entirely set up. As the greenhouses are unheated, they need to think about how to use them during winter times; microgreens might be an option as they need less light.

The system will also be used within the curriculum and the course on urban agriculture for project works and master thesis. A digital twin of the aquaponic will f.ex. be developed, and a sensor system will be established to gain more data. Home automation sensors are sufficient, there is no need to purchase expensive sensors for industrial use.

Learn more about the aquaponic system here. And if you want to learn even more, you can meet the team at VERTI FARM in Dortmund next September 26-28, 2023.

The second project is called the **INCITIS food project** (INtegrated and Circular Technologies for Sustainable city region FOOD systems in Africa), which is implemented together with the Universität der Bundeswehr München.

In six African countries, eight Living Labs will be set up, where people are trained to use aquaponic systems so that they can produce for the local markets or sell aquaponic systems to others. The project focuses on the training of vulnerable groups and entrepreneurship.

Site visits in an informal settlement showed that vertical pipes didn't work well, but good examples for insect farming, (crickets for human consumption – really tasty! -, and black soldier flies – mainly for aquaculture feed).

Q&A session

- Which institutional actors did you need to get involved?
    - The company running the site (to rent the space)
    - The environmental department (because of the soil contamination)
    - Hazard analysis and critical control points (HACCP), the concept for food security had to be approved by the regulatory office “Ordnungsamt”
    - No fishes yet – but in the future, the veterinarian department will need to approve.
- To make an aquaponic profitable, how big does it need to be?

If you’re growing for the commercial market, probably 1ha is necessary (see feasibility study from Aquaponik manufaktur) with a ratio of 1:10 (aquaponic:hydroponic). The ratio also depends on the species and their nutrient output.

The company that produced herbs in supermarkets in Germany just went bankrupt. I probably also wouldn’t put greenhouses on roofs because it is a technological problem to build safe greenhouses in height with the wind. It is difficult to reach profitability, that’s why we chose the model of community supported aquaponics.

- Is the nutrient content always optimal or do you need to add nutrients?

Probably not, we know that we have to add iron.

The correlation between nutrient provision and yield is very different, f.ex the correlation between phosphorus and nitrogen.

Nutrient optimization might be overrated as a topic; almost no data is available about the tolerable levels of nutrients for fish.

Rolf Morgenstern - morgenstern.rolf@fh-swf.de

Open Space for pitches

The SAVRY

Tobias Lipsewers presented the **Finnish Aquaponics Society (SAVRY)**, a non-profit organization established in 2021, aiming to promote, develop & commercialize aquaponics in Finland by focusing on the four aspects of education, communication, organization, and research.

With currently seven people, they cover a broad range of knowledge (aquaponics, hydroponics, Recirculating Aquaculture Systems (RAS), urban gardening, etc.) and are working on a funding proposal for their work. SAVRY is currently looking for new board members for the executive committee. Besides, people interested in joining their mission are welcome to become members. No membership fees are charged.

Besides working for SAVRY, Tobias also offers consultancy services for aquatic ecosystems (f.ex. system development, feasibility studies, fish diseases, parasites etc.) for private and commercial use. More information and contact details will be shared with the participants of the meeting by email.

Tobias Lipsewers - tobias.lipsewers@gmail.com

Decoupled Aquaponics

Hendrick Monsees/Leibniz Institute of Vegetable and Ornamental Crops, IGZ) shared his knowledge on Decoupled Aquaponics. According to his research, in a decoupled system, decoupling aquaculture and hydroponics, productivity in terms of harvest yield can be increased by 30 %. Decoupled components allow to regulate the nutrient and pH-level better to ensure optimal growth conditions for both fish and plants. Additionally, by separating the fish from the plant unit, safety can be increased, f.ex. in case of any disease that needs treatment. The demonstrator produces catfish and tomatoes, and the products are sold on-site, which allows for higher prizes.

The topic of coupled vs. decoupled systems might be further discussed in another working group meeting as there was a lot of interest and debates around, but no more time left to go into the details.

School of Aquaponics

Pierre Garsi, from the Lycée Professional Olivier Guichard, talked about the vocational school in Guérande, France, close to Nantes, where more than 500 students between 14-20 years are signed up for technological and professional training courses in eight professional sectors. The school owns 25 ha of land, one agriculture farm and one learning restaurant. The agriculture section includes 4 facilities: Marine aquaculture, Freshwater fish farm, Horticulture and Aquaponics. The aquaponics facility exists for more than ten years. All facilities were built by themselves together with the students; therefore, it is relatively low-tech facilities but also easy to replicate and adapt with low investment needs.

They act like a small company within the school, selling fish and vegetables to the school cantina and shop. They produce more than 1t of fish yearly – very diversified species. They tried more than 25 sorts of vegetables, and 8 species of fish, currently rainbow trout and cress in the winter and basil, tomatoes, and pike perch in the summer. They teach different techniques, the welfare of the fish, and the reproduction of the fish, with a particular focus on RAS because there is not so much water available on the farm, trying to keep the water quality and using the least water possible. Further problems they encountered: adapting the pH level, theft of fish and vegetables, and electricity cuts during the night.

They welcome more than 2,500 visitors per year and have lots of cooperation with scientific and professional partners and projects.

Aquaponik Manufaktur

Ingo Bläser talked about **aquaponik manufaktur** and what they do. Aquaponik manufaktur was founded in 2014 with a focus on large-scale aquaponic systems, water treatment in aquaponics (anaerobic treatment), small-scale aquaponics training in African locations and European regions and multitrophic (IMTA).

Highlights: In 2016, they started building experimental bioreactors (anaerobic) for scientific projects; scientific aquaponic systems and developed trainings. They have experience with

Integrated farms; an example was shown, which integrates aquaculture, chickens, zooplanktons, mushrooms, algae, microgreens, and more. They are also involved in the project "Close the loop – new urban food" on nutrients and circularity.

Their experience in feasibility studies showed that a peri urban aquaponics farm needs to be at least 2.000m2 in space to be economically feasible in Germany.

During the meeting, we saw the work of aquaponik manufaktur in Rolf Morgenstern and Hendrick Monsees presentations. Looking forward to seeing more of what aquaponik manufaktur is doing!

www.aquaponik-manufaktur.de

Aquaculture Awareness with a focus on RAS – 6th March 2024

Side Stream Valorisation – 7th May 2025

The session was opened by **Freya Robinson,** SUBMARINER Network for Blue Growth, giving an introduction to the organisation and the Working Groups. This was followed by an introduction to the topic of side-streams using the BlueBioClusters´ Value Chain Facilitation tool. The tool aids in transforming the complexity of blue bioeconomy value chains into interactive, easy-to-understand visual formats, enabling value chain analysis, identification, and optimization. This tool can help stakeholders identify biomass valorisation potentials.

The introduction was followed with a presentation by **Sarah Tamulski**, SUBMARINER, introducing the new project RootLinks, a new working group for primary producers. The objective is to strengthen the role of primary producers in circular bio-based systems, and ensure the circular economy also includes blue primary producers. The project is now actively recruiting organisations to join the working group, and to do so you find instructions here.

Following, a number of speakers lined up, presenting R&I initiatives and knowledge. First, **Rasa Slizyte** from SINTEF Ocean presented results from the FOODIMAR project. The project focuses on creating food applications from marine side-streams from processing and fishing. Pilots include gelatine, collagen and GAG (Glycosaminoglycans) extraction from fish and valorisation of jellyfish bycatch. This includes characterisation and extraction, functionality testing, sustainability analyses and regulatory assessments.

Next up **Maya Miltell**, SUBMARINER, presented the project Baltic MUPPETS, valorising small blue mussels and shells. The project works with creating a new market for Baltic Sea blue mussels, which are smaller in size. This also offers opportunities for using side-stream mussels from conventional cultivation, and additional revenue possibilities for farmers. Further, the shells have been developed into added-value products as garden fertilizers and soil enhancement.

Following this, **Birthe Vang** from NOFIMA presented an array of projects and research on shellfish valorisation such as SHELLTER offers uses of oyster shells for construction material

and CELS for different applications of limpets shells. Other projects have also focused on king crab and snow crab side-stream uses, producing oils and protein fractions, and lump fish from salmon farming for feed. NOFIMA also has the ATC for testing and producing new feed ingredients, and also Biotep which companies can rent for testing new products.

Annette Løttrup-Moore, Business Lolland-Falster, gave an overview of the Pilot 1 of the TETRAS project, treating saline RAS-water for use in other industrial applications. Looking at technologies like ceramic ultrafiltration, reverse osmosis and membrane distillation and potential applications in agriculture, biogas production or discharge to sea or wastewater treatment plants, the pilot wants to demonstrate and evaluate water reclamation from RAS and its economic feasibility.

Focusing on uses of alternative sources of nutrients for microalgae cultivation for applications in organic agriculture, **Efthalia Arvaniti**, S.pro, presented results from the Algae Industry Study, finishing in June. Aiming to assess the state-of-play and regulatory requirements the study has developed recommendations for viable sources, including fermentation by-products and plant-based digestate from wine, beer and bread production or bioethanol plants, crop residues from agricultural production, and struvite.

To conclude the morning session, **Amparo Jiménez Quero** from Chalmers presented CIRCALGAE. The project concept is to valorise industry relevant macro- and micro algae side streams into products such as food, feed and cosmetic ingredients. They will validate the ingredients in 12 demonstrator products and have already shown side-streams from red and brown macroalgae as well as microalgae present interesting functional properties with potential health benefits and proposes alternative extraction in cascading as a proposed feasible biorefinery approach.

After lunch, a second session was introduced by **Maya Miltell**, SUBMARINER. Now the focus went more to the industry and businesses working with side-stream valorisation. Due to some last minute fall-outs the agenda was a bit shorter and restructured, but some rewarding discussions got to take more space in the meeting.

First out was **Clara Jégousse** from the Icelandic Ocean Cluster, presenting their 100% Fish Strategy. The strategy is outlined as four main points; site & species identification, current utilization & biotechnological analysis, prototype development & economic feasibility and market strategy & and relationship building. This was exemplified with results from like 100% Great Lakes Fish and 100% Cape Hake. Future prospects are to expand to other value chains, such as seaweed cultivation, land-based RAS system as well as shellfish shells.

Lastly, **Ida Näslund** presented the Mounid company, developing textile dyes based on micro- and macroalgae. Mentioning the projects Allgea and Kelptex, it was highlighted how seaweed sidestreams can provide alternatives for circular and sustainable textile products that are 100% bio-based. Having reached a key milestone of dying over 50 m of textile and creating prototype products, the company is now working on scaling up and go to market.

The Q&A and discussions raised many interesting points. Some key takeaways from the day are:

- The regulatory landscape is complex and offers many obstacles for utilization of side-streams. This can hinder innovation and creating circular systems if market uptake is limited.
- A big complication is the classification of side-streams, and the various regulations connected to the different classifications. This is true for multiple value chains including microalgae and mussels. Also, sometimes permits are connected to "waste management", and it can be complicated for companies to change their ways and processes.
- To enable the industry to use side streams it is also important to increase the capacity to properly handle the biomass and sort fractions in the beginning. This makes it possible to reduce the need for refining and the costs. It also creates an idea of "value" from the beginning, seeing each fraction as a product.
- Potential valuable project could focus on technologies and methods for sorting, stabilisation and handling in the early parts of the value chains.
- Life-cycle assessments of side-stream products are developing and will become fairer, but still need to be developed and standardised.
- To enable industry up-take, infrastructure and procedures need to improve for correct handling of different fractions of biomass, early on in the processing. Projects should also focus on closer collaboration between research and industry to transfer the knowledge and really achieve higher TRL. It is clear that research is needed to provide quantifiable information on the potential value, but in the end the industry needs to adopt the methods.
- Consumer acceptance is also key for valorising the side-streams as well, as there is no value without demand. We have to adapt products to the markets we are targeting, also geographically. Looking to other countries, biomass is used and accepted more holistically, but in other countries consumers are not used to this approach. Either we adapt the products, or we try to change the mindset of the consumers.
- There must be clear and secure business models for valorising the side streams for it to be interesting for the industry. There must be profit, or the incentive is lost and there will be no industry uptake. This can also be achieved from different stakeholders, e.g. from policy by tax reliefs.
- We can learn from other existing industries, e.g. land-based agriculture, for solutions and innovations as they are often times more fore front. Many of the aquaculture applications are not as developed, so there is much innovation potential. Although as landings or scale is smaller, it might also be more difficult to make it profitable to valorise multiple streams from one biomass.
- The economical question can potentially be solved with sharing of infrastructure or making infrastructure more available lower the threshold for scaling up and making innovation economically viable. This can be obtained by clusters providing solutions and closer collaborations across industries.

- It was also clear there is a close discussion between side-stream valorisation and closing the blue-green circular economy. This connection should play a stronger role in “circular economy” projects in general, as the blue and the green are not separate systems.
- To obtain saleable impact fast we need to learn from each other, and from the existing solutions world-wide. Knowledge and skills can be transferred and replicated, and this is also something to emphasise.

The Business Case of a Blue Bioeconomy – 20th November 2025

Maya Miltell (SUBMARINER Network for Blue Growth) introduced the session by outlining the critical role of the blue economy in Europe’s sustainability and innovation transition. She also placed the session within the wider EU context and funding mechanisms, highlighting the mission to move from why to how in blue economy business.

Business Interaction Models for Mission Ocean Scale-Up - Silvia Tosatto (SUBMARINER Network for Blue Growth, PREP4BLUE)

Presented three business interaction models:

- Easy Harvest (Portugal): A circular seaweed valorisation model addressing algal blooms. Collaborated with CCMAR, DGRM, coastal municipalities, and BlueBioAlliance.
- German Aquaculture Initiative: Pioneering Bluefin Tuna aquaculture via collaboration with universities, BlueInvest (2023 award), and EIT Sustainable Aquaculture.
- Elia Energy Island (Belgium): World-first artificial energy island with nature-inclusive design developed through intensive stakeholder collaboration.

Sustainability Goals of Business Models - Ana López Vázquez (CTA, ULTFARMS)

- Introduced a methodology integrating environmental, social, and economic indicators into business models.
- Applied 17 sustainable development goals, the EU Taxonomy, and a circularity economy survey to evaluate impact alignment across 6 pilot sites.
- Enhanced the traditional business model canvas with two “eco-social benefit” blocks.

The European Seaweed Market and Opportunities - Martins Lastovskis (SUBMARINER Network for Blue Growth, I3-4-Seaweed)

- The global seaweed market is worth $70 billion, while the EU accounts for less than 1% of production.
- Barriers: fragmented regulation, high production costs, and low market demand.

- Four main drivers of the business case: technological, food and nutrition sector, agritech applications, and high-value applications.
- Called for harmonisation of licensing and MSP regulations.
- Introduced several business cases (hatcheries, digital twins, biofertilizers, seaweed-based food/cosmetics).

Community-Supported Aquaculture, Regenerative Ocean Farming – Frederick Bruce (sPro, Cool Blue Project)

- Proposed "Community Supported Aquaculture," inspired by community gardening models.
- Low-cost, high-impact regenerative ocean farms (ROFs).
- Focus: education, food security and social cohesion over monetary profit.
- Mixed financial business model: public grants, local business sales, and tourism integration.

Blue Business Models in RAS - Matas Zubas (Akola Group, TETRAS)

- Explored shrimp RAS basics and why stability in physics, biology and economics is essential.
- Major costs: feed, heat, energy.
- Provided comparative economic modelling (100t–1000t scale), including using thermal heat sources.
- Emphasised risk mitigation and long-term viability.

The Business Case for Bioremediation – Frederick Bruce (sPro, EU4Algae)

- Introduced phycoremediation (using algae for nutrient uptake, pollution reduction and phosphorus recovery) and carbon capture as business cases for algae cultivation.
- Highlighted downstream algae cultivation as a tool to reduce eutrophication and harmful algal blooms.
- Positioned regenerative ocean farming as a dual-impact model: ecosystem restoration plus biomass for soil health, compost, biochar and biobased materials.
- Noted that carbon markets are early-stage, but land-based uses (biochar, soil improvement) already offer realistic value.

MPA Business Models – Franziska Drews-von Ruckteschell (SUBMARINER Network for Blue Growth, Blue4All)

- Framed MPAs through a business-minded lens to map funding gaps and sustainable financing options.
- Covered 10 mechanisms from public budgets and grants to market-based tools like blue bonds and carbon credits.
- Introduced Blue4All tools that help MPAs identify their financial needs and match suitable revenue models.

The Business Case of Invasive Species – Aksel Ydrén (Low Impact Fishers of Europe - LIFE, Round Goby)

- Positioned the round goby as an underused biomass with real valorisation potential.
- Showed that production costs vary across the Baltic and can be reduced through machinery upgrades and value-added products.
- Highlighted invasive-species utilisation as both an ecological intervention and a niche market opportunity.

Q&A Session

Who is currently buying the very small amount of seaweed produced in Europe (≈1%), and is it mainly sold inside the EU or exported? Can Europe realistically be a market for its own cultivated biomass?

- There are some brave product developers buying seaweed as ingredients for their products, but often it's imported, and harvested seaweed is still significantly cheaper than cultivated seaweed. Given the gap between producers and buyers, what key actions could accelerate demand for EU-grown seaweed?
- A similar competitiveness gap exists in agriculture and is bridged through CAP subsidies. Recognising algae under the Common Market Organisation would open access to subsidies and market protection, making EU-cultivated biomass more competitive. Until then, small-volume, high-value applications like nutraceuticals remain the most viable route.
- For round goby, the price differs throughout the Baltic Sea region because of different salaries. The way to tackle this is by adapting machinery and by adding value, which in the end reduces the cost.
- The EU is a leader in technology, suggesting an opportunity to develop biorefinery solutions that could be exported to other markets. However, this would require a holistic approach to ensure the entire value chain is considered. Is the introduction of new seaweed species in the Irish hatchery regulated, and how tightly?
- In the Irish business case, no new species were introduced, so no complex regulatory process was required. Regulations vary by region but are strict when new species are

involved. What is the long-term plan for the seaweed hatchery, given that existing hatcheries already struggle to sell seed due to limited market demand? Is the aim to develop it for industry application, or is it primarily intended for research and knowledge building at this stage?

- The need for hatcheries varies by region, as each has specific environmental conditions and market contexts. Hatchery development should therefore follow regional needs, since some areas still require hatcheries to begin commercialisation, while cultivation potential must be matched with actual demand. How can the seaweed sector avoid repeating current challenges and ensure new products fit consumer tastes?

- Follow major market trends such as plant-based seafood (e.g. vegan tuna), declining meat markets and health-driven consumption. Linking seaweed to these established trends is essential for uptake. Environmental benefits are strong, but does the public care enough to drive demand?

- Interest in sustainable food, ecotourism and nature-positive experiences is increasing. However, these are not mass markets, and sensitive ecosystems (like MPAs) cannot scale tourism indefinitely. Community-led and small-scale models remain valuable.

BlueActionBANOS Open Call - Alberto Terenzi (SUBMARINER Network for Blue Growth, BlueActionBANOS)

- BAB will support community-led Baltic and North Sea initiatives through:
    - Funded Transition Agendas (strategic roadmaps)– Community-Led Actions (€200 000–€2 000 000)
    - Technical assistance and expert support
- Eligible countries: all Baltic and North Sea countries except France and the UK.
- Funded actions start in 2026. Two upcoming sessions: Technical webinar on 10 December 2025 and Inspirational webinar on 16 December 2025.

Actions and useful resources:

- ULTFARMS: Participants are invited to complete the Social Acceptance Survey.
- PREP4BLUE: Case Study Report D5.5: Business Interaction Models for Mission Scale-Up
- COOL BLUE: Guide to Regenerative Aquaculture.
- EU4Algae: EU4ALGAE Business Case Report.